REPORT OF

THE FIFTY-SECOND MEETING OF

THE EUROPEAN AIR NAVIGATION PLANNING GROUP

(Paris, 23 to 25 November 2010)

PREPARED BY THE EUROPEAN AND NORTH ATLANTIC OFFICE OF ICAO NOVEMBER 2010

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0. INTRODUCTION

Place and duration

0.1 The 52nd Meeting of the European Air Navigation Planning Group (EANPG) took place in the premises of the European and North Atlantic (EUR/NAT) Office of ICAO from 23 to 25 November 2010.

Attendance

0.2 The Meeting was attended by 66 representatives of 29 member and non-member States and by observers from 5 international organisations. A list of participants is at **Appendix A**.

Officers and Secretariat

0.3 Mr Phil Roberts, the Chairman of the EANPG, presided over the meeting throughout its duration. Mr Karsten Theil, ICAO Regional Director, Europe and North Atlantic, was Secretary of the meeting and was assisted by Mr George Firican, Deputy Director, Mrs Carole Stewart-Green, Mr Gregory Brock, Mr Sven Halle, Mr Victor Kourenkov, Mr Elkhan Nahmadov, Mr Léon Vonlanthen, from the ICAO EUR/NAT Office, Mr Mohamed Smaoui from the MID Office and Mr Gustavo de Leon from Air Navigation Bureau, Montreal. Additional assistance was provided by Mrs Patricia Cuff, Ms Rosa Maria Di Martino, Ms Delia Dimitriu, Mrs Nikki Goldschmid, Ms Leyla Suleymanova, Mr J. Benoist, Mr Andrei Filipoiu, Mr Aurel Moater from the European and North Atlantic Office.

Conclusion, Decisions and Statements

0.4 The EANPG records its action in the form of Conclusions, Decisions and Statements with the following significance:

- **Conclusions** deal with matters which, in accordance with the Group's terms of reference, merit directly the attention of States or on which further action will be initiated by ICAO in accordance with established procedures.
- **Decisions** deal with matters of concern only to the EANPG and its contributory bodies.

  <u>Note</u>*: in order to qualify as such, a Decision or a Conclusion shall be able to respond clearly to the "4W" criterion (What, Why, Who and When)*

- **Statements** deal with a position reached by consensus regarding a subject without a requirement for specific follow-up activities.

Agenda

0.5 The Group agreed to the following agenda for organising the work of the Meeting and the structure of the report:

Agenda Item 1: Review of significant international aviation developments

Agenda Item 2: Previous EANPG follow up

Agenda Item 3: Aviation safety

Agenda Item 4: Planning and implementation issues

a) Amendment to ICAO documents, ICAO provisions;

b) Air Traffic Management;

c) Aeronautical Information Management;

d) Communication, Navigation and Surveillance;

e) Human resources - Language Proficiency Requirements;

f) PBN;

g) Meteorology;

h) The implementation of the new content of the FPL in 2012.

Agenda Item 5: Monitoring

Agenda Item 6: Deficiencies

Agenda Item 7: Any Other Business

1. REVIEW OF SIGNIFICANT INTERNATIONAL AVIATION DEVELOPMENTS

Assembly

1.1 The EANPG noted a brief presentation by the Secretariat on the main outcome of the 37th ICAO Assembly (complete information to be found at: http://www2.icao.int/en/Assembly37newsroom-public/default.aspx#).

European Commission

1.2 The European Commission advised the EANPG that its recent efforts had focussed on the implementation of the second package of the Single European Sky (SES) regulations; the deadline for the implementation of these regulations was the end of 2012. A new regulation (EU) No. 691/2010 laying down a performance scheme for air navigation services and network functions had been approved in July 2010, which introduced a performance framework with quantified performance targets and which was also linked to the revised version of the EC charging regulation.

1.3 The EANPG was advised that, with regard to Functional Airspace Blocks (FABs), which, in accordance with the SES Regulation must be established by the end of 2012, an IR was being developed which would define the criteria for States to follow when establishing FABs. The European Commission was working in close cooperation with EUROCONTROL to develop supporting guidance material. The draft IR on Network Management was nearly finalized and it was expected that the Single Sky Committee would approve it by the end of January 2011. Among other subjects, the Network Management IR affected route design and development, frequency management and the management of Secondary Surveillance Radar (SSR) codes, issues which were also coordinated at the regional level through the working structure of the EANPG. The European Commission had recently signed a Memorandum of Understanding with the United States' Federal Aviation Administration (FAA) concerning the Single European Sky ATM Research Programme (SESAR) and NextGen in order to support the alignment of these programmes and ensure interoperability. Close cooperation with ICAO was also being maintained concerning these programmes to support global interoperability; in this regard, the European Commission was working closely with ICAO on the development of material to be presented at the 12th Air Navigation Conference, which was planned to take place in November 2012. During the recent 37th ICAO Assembly, the European Commission had been pleased to see the level of cooperation between itself, other international organizations, States and ICAO and hoped this would continue into the future. Cooperation with EUROCONTROL had intensified, particularly with the assignment of the EUROCONTROL Performance Review Commission as the Performance Review Body and with regard to EUROCONTROL being requested to support regulatory development under its new SES pillar. Finally, the EANPG was informed that the EASA competence had been extended to include Air Traffic Management (ATM) and aerodromes.

International Federation of Airline Pilots Associations (IFALPA)

1.4 IFALPA advised the EANPG that the organisation was feeling economic challenges in line with the financial impacts being experienced by the aviation industry in general. IFALPA was finding it harder to find experts that were able to volunteer their services and was focusing their staff resources to their offices in Montréal, Canada as a means of supporting ICAO processes at the Headquarters level. IFALPA was doing its best to adapt to the changing circumstances and was grateful for the support of European pilot associations, which enabled it to participate in activities of the ICAO EUR Region.

Interstate Aviation Committee (IAC)

1.5 The Representative from IAC drew the attention of the EANPG to the necessity for States to amend their national rules with regard to the investigation of incidents in line with the new provisions in Annex 13 - *Aircraft Accident and Incident Investigation*. IAC was involved in supporting this work and in particular had prepared a draft document for amending the regulations of the Russian Federation. It was highlighted that these changes would need to be implemented as soon as possible, in view of the November 2010 applicability date for the new provisions.

Establishment of the Regional Aviation Safety Groups (RASGs)

1.6 The EANPG was informed that, subsequent to the decision of the Council in March 2008, which called on the ANC to present a report regarding the development of new structures for the implementation Business Plan related to safety, the Commission initiated a study aimed at identifying a regional mechanism to address safety issues.

1.7 As the current regional mechanisms (such as PIRGs, COSCAPs, RSOOs, DGCA meetings) were not sufficient in addressing and harmonizing regional flight operations safety issues, it was proposed that a new follow-up body was needed that would monitor progress, coordinate actions among States and make recommendations to ICAO to facilitate the implementation of the Global Aviation Safety Plan (GASP) and the associated Global Aviation Safety Roadmap (GASR).

1.8 Further to consultations with States and international organizations, the Commission agreed with the concept of establishing a new regional mechanism, the Regional Aviation Safety Groups (RASGs) and noted that in some areas (e.g. Pan-America) States had already established their own regional mechanism for addressing flight safety issues. The EANPG noted that the establishment of RASGs would not fundamentally change the efforts that are presently underway in several ICAO regions.

1.9 In May 2010, on the recommendation of the Commission, the Council approved the establishment of RASGs in all ICAO regions. The RASGs would develop and implement a work programme that supports a regional performance framework for the management of safety on the basis of the GASP and the GASR. The reports of RASG meetings would be reviewed by the Commission on a regular basis providing interregional harmonization and by the Council as deemed necessary.

1.10 The EANPG noted the concern related to the parallels drawn between the PIRG framework and the RASG. It was noted that while the PIRGs did touch on some safety issues related to ATM, their main tasks remained to deal with air navigation plans at a regional and global level, with ICAO playing a key leadership role. In contrast, safety continued to lie within the sovereignty of individual States.

1.11 The EANPG was informed by the ICAO Regional Director, Europe and North Atlantic, of consultations under way with ECAC, European Commission/EASA and the EURASIA Council regarding the establishment of the RASG EUR. The EANPG noted that an ICAO EUR High-Level Meeting of States that was originally scheduled to take place on 16-17 February 2011 in Paris and was planned to address, *inter-alia*, the establishment of the RASG EUR, had been postponed due to its conflicting dates with other events. The EANPG was informed that the meeting would be re-scheduled for the first half of 2011. The EANPG noted this information and expressed support for the establishment of the RASG EUR. Furthermore, the EANPG reviewed and commented on the proposed amendment to the terms of reference for EANPG to reflect the need for a coordination mechanism between EANPG and future RASG EUR Accordingly, the EANPG agreed the its revised terms of reference as presented at **Appendix B** to this report.

A global CNS technology roadmap

1.12 The EANPG recognized that the existence of numerous, closely related, CNS technologies with different capabilities caused confusion and made it difficult to assess potential benefits. This also made it difficult for States and aircraft operators to make long-term investment decisions.

1.13 The EANPG agreed that it would be beneficial for a global CNS technology roadmap to be created that would inform States of the forecasted capabilities of aircraft and the implementation programmes of ATS providers. The benefits of such a roadmap would include predictable implementation with early achievement of operational benefits and returns on investment and widespread deployment, which would ease transition issues. The EANPG therefore welcomed the information that the 37th ICAO Assembly had agreed that ICAO should develop a global CNS technology roadmap (a web-based, interactive, graphics-based, information tool) to assist States and other stakeholders with their implementation decisions. It was expected that the roadmap would be endorsed by the 12th Air Navigation Conference in 2012. A draft version of the Global CNS Technology Roadmap would be reviewed at the Air Navigation Technology Forum that was scheduled to take place in 2011.

1.14 In this regard it was recalled that the CNS Part of the ICAO EUR Air Navigation Plan (ANP) was recently reviewed and approved by the ICAO Council. The revised EUR ANP included the regional CNS roadmaps with the aeronautical radio frequency spectrum strategy elements incorporated. It was recalled that the aeronautical radio frequency spectrum sections of the EUR ANP were maintained by the EANPG Frequency Management Group (FMG).

1.15 In this regard, the EANPG agreed that future CNS technology developments should include the need for introduction of more radio frequency spectrum-efficient aeronautical systems and establish timelines for the gradual phase out of older technologies. Furthermore, the EANPG noted that the global aeronautical radio frequency strategy should be an integral part of the Global CNS Technology Roadmap. In this respect, the EANPG recalled that the ICAO global aeronautical radio frequency spectrum strategy and policies were described in the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including statement of approved ICAO policies* (Doc 9718) which was maintained by the ICAO Working Group-Frequency (WG-F) of the Aeronautical Communication Panel. It was noted that any proposals for amendments to this global radio frequency spectrum strategy should be channelled through the WG-F.

Civil/military cooperation – in support of optimum airspace use

1.16 The EANPG was informed about the outcome and follow-up to the Global Air Traffic Management Forum on Civil/Military Cooperation, held in Montréal from 19 to 21 October 2009. The Forum emphasized that a flexible and efficient use of the airspace for both civil and military operations would provide benefits in terms of more efficient aircraft operations and improvement of the environment. One of the key conditions for increasing the effective use of available airspace, while maintaining safety and security, was a commitment from both civil and military authorities to improve cooperation and coordination.

1.17 The follow-up to the Forum included the use of ICAO as an open forum for civil/military cooperation, collaboration and the sharing of best practices; developing an ICAO guidance material on civil/military cooperation; working together toward ensuring the safe and efficient integration of unmanned aircraft systems into non-segregated airspace; strengthening States' commitment to enhancing cooperation between civil and military authorities; PIRGs and all partners to collaborate in supporting regional civil/military events; and ICAO to convene a second global forum at an appropriate time to measure progress in civil/military cooperation.

1.18 The EANPG underlined that the participation of military representatives in its meetings was a fact for quite a long time and noted with satisfaction the global developments in the enhancement of civil/military cooperation. In concluding the discussions on this subject, the EANPG noted the need to urge States to work with air navigation service providers and their military counterparts, to take action to establish political will, develop institutional arrangements, set performance objectives and formulate practical and operational measures so to enhance civil/military cooperation in optimizing safe and efficient use of airspace for all users.

Keeping standards relevant

1.19 The EANPG was informed that an extensive analysis of the NextGen and SESAR programmes was conducted to determine their impact on ICAO Standards, manuals and circulars. Although both programmes were based on the *Global Air Navigation Plan* (GANP, Doc 9750), it was found that the programmes had significant differences; and the programmes would require a significant number of changes to the Standards. It was noted that each programme contained deliverables termed “operational improvements”, supported by various “enablers”. The enablers, which were technical, operational, procedural or even policy or legal prerequisites, would be required to achieve the operational improvements (generally defined at the same level of technical detail that Air Navigation Commission panels deal with). Both operational improvements and enablers were evaluated to determine if additions to international Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services (PANS) and other documentation would be required.

1.20 The work identified was divided into two categories: clearly defined document changes; and new concepts that require further development. In total, over 300 changes to ICAO documentation were identified. Further work on these would be needed in order to determine their impact on the standards development activities. For each category, ICAO had initiated a “standards roundtable” process in which ICAO would meet regularly with management personnel of NextGen and SESAR and various industry standards-making bodies. In the standards roundtable process, work schedules would be driven by implementation dates. Standards development would be treated like a project and would adopt a multi-disciplinary approach to SARPs development.

1.21 The EANPG also noted that many other States had developed next generation plans for air navigation modernization including within the ICAO European region. As the number of modernization plans would increase, so too would the challenge of ensuring harmonization. ICAO, starting the task of ensuring harmonization between NextGen and SESAR identified the benefit in extending this exercise to all new air navigation modernization plans. The benefits of this approach would include: the availability of best practices to all and a reduction in transition problems. Therefore ICAO would amend the GANP to include a framework for other States’ air navigation modernization plans requiring them to define the objectives of each air navigation modernization programme (in terms of desired operational improvements) and the necessary enablers to support these improvements. States should then submit this information to ICAO for review so that the impact on ICAO’s work programme and standards development activities could be determined. The information would then be forwarded by ICAO to the air navigation service providers concerned with appropriate recommendations as: clearly defined needs, engagement in appropriate standards development work and, if necessary, a standards roundtable process like the one applied to NextGen and SESAR.

1.22 The EANPG acknowledged the need for ICAO to amend the GANP to include a framework which would allow ICAO to easily analyze the impact of other States’ air navigation modernization plans on the global ATM system and then take appropriate action needed to ensure global harmonization. Consequently, the EANPG adopted the following:

EANPG Conclusion 52/1 - States’ air navigation modernization plans

> That, the ICAO Regional Director, Europe and North Atlantic invite States, when developing their national air navigation modernization plans having an impact on ICAO SARPs, to share those plans in a timely manner with ICAO for review and assessment in order to ensure global compatibility and harmonization.

Work programme of ANC Panels and sub-groups

1.23 The EANPG noted the information related to the work programme of the ICAO voluntary work force: Air Navigation Panels, Study Groups and Task Forces.

Developments in the economic aspects of airports and air navigation services – economic analysis

1.24 The EANPG noted the ICAO work programme relating to statistics, forecasting, economic analysis and the accomplishments of ICAO in assisting States to operate airports and air navigation services in an efficient and cost effective manner.

Cooperation between MATMC of Russian Federation and CFMU

1.25 The EANPG was informed on the progress regarding ATFM operational cooperation between the Main ATM Centre (MATMC) of the Russian Federation and the Central Flow Management Unit (CFMU) of EUROCONTROL on operational aspects. The cooperation would take place under the ICAO umbrella, in support of the EUR Air Navigation Plan (ANP – ICAO Doc 7754) Volume 2 - EUR Facilities and Services Implementation Document (FASID) provisions implementation. It was recognised that the scope of cooperation should be enlarged to cover the whole ICAO EUR Region (involving the EURASIA Council, an organisation of the air navigation service (ANS) providers from Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan and Uzbekistan) and beyond (involving the Asia-Pacific CFMU system BOBCAT).

1.26 The EANPG noted that the ICAO Secretariat would develop an amendment to the EUR FASID in order to include the above scope of cooperation and that progress would be reported regularly to EANPG.

Outcome of TRASAS/3

1.27 The EANPG was informed on the main outcomes of the third meeting of the Trans-Regional Airspace and Supporting ATM Systems Steering Group (TRASAS/3) that was held in the EUR/NAT Office of ICAO in Paris, France, from 19 to 20 October 2010.

1.28 The EANPG noted the progress regarding TRASAS Conclusion 2/4 – Airspace of Unassigned Responsibility over the Arctic Ocean, and that discussions were held under the Arctic Council, which had resulted in agreements on the Search and Rescue (SAR) activities for aviation and maritime operations, involving Canada, Denmark, Finland, Iceland, Norway, Russian Federation, Sweden and the United States. It was noted that proposals for amendment to the *Regional Air Navigation Plan – Europe* (Doc 7754) (EUR ANP) of the new agreed Flight Information Regions (FIR) and Search and Rescue Regions (SRR) were being prepared by the States concerned for submission to ICAO for further processing.

1.29 Additionally, the EANPG noted the TRASAS position on the approach to the implementation of Amendment 1 to the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) (Doc 4444) on the new format of the ICAO flight plan, as well as the work that would be carried out on the IATA "Pacific Project".

Tel Aviv Flight Information Region

1.30 The EANPG noted information that the EUR/NAT Office of ICAO had recently been accredited to Israel and that Israel had addressed a request to the Secretary General that Tel Aviv FIR be included in the European Air Navigation Region/Plan.

2. PREVIOUS EANPG FOLLOW UP

Review of the actions of the ANC on the Report of EANPG/51

2.1 The EANPG was informed on the actions taken by the Air Navigation Commission (ANC) on the report of the fifty-first meeting of EANPG after its review. It was informed that the ANC took actions on those EANPG conclusions that would require approval by the ANC.

2.2 As no specific items in the EANPG/51 report required Council action, the said report was not submitted to the Council.

2.3 The ANC supported the development of ATM Safety Key Performance Indicators (KPIs) emphasizing to States the need to participate in the self-assessments surveys. The ANC also noted that it will be useful to have harmonized KPIs among ICAO regions to facilitate comparisons and coordinated actions for improvements, but acknowledged that different level of development may lead to different safety as well as efficiency indicators.

2.4 The ANC noted the involvement of EUR/NAT Office of ICAO in safety related activities supporting implementation of safety management systems (SMS), state safety programs (SSP), universal safety oversight audit preparations and follow-up assistance, language proficiency, expansion of Single European Sky to non-European Union member States among others.

2.5 The ANC supported the principle of Flexible Use of Airspace (FUA) and encourage States to proceed with implementation, as well as request the Regional Director to clarify issues with States that objected the proposal.

2.6 The ANC noted that current Basic Operational Requirements and Planning Criteria (BORPC) do not reflect properly new developments such as Performance Based Navigation (PBN) and others. The ANC requested the Secretariat to update BORPC.

2.7 The ANC noted progress made in the preparations of the Twelfth World Telecommunications Conference, Low Visibility Procedures (LVP), and PBN implementation, Language Proficiency Requirements (LPR).

2.8 The ANC noted with satisfaction the progress achieved by the Russian Federation and Ukraine in the implementation of WGS-84 but also noted concern with the incomplete implementation of WGS-84 in other States.

2.9 The ANC supported the training on the intended use of new gridded WAFS forecast of icing, turbulence and CB clouds and also QMS for MET services requesting ICAO Secretary General to coordinate with the World Meteorological Organization (WMO). The ANC also supported the clarification of terms “vicinity” and “approach area” with the Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG) and the harmonization of AFTN addresses used for ASHTAM and volcanic ash NOTAM in Annex 10 and Annex 15.

2.10 The ANC also noted the activities underway in ICAO EUR Region for the implementation of the new content of the flight plan and requested the Secretariat to ensure adequate global coordination.

2.11 The EANPG noted that the ANC when analyzing the proposal for amendment to the PANS-ATM concerning the limit of a vector, recalled that this issue was addressed within the Commission some years ago and was found that a limit of a vector shall be specified when diverting the aircraft from an original route and it does not present an air traffic management concern. Consequently the ANC did not support this conclusion (51/5) and concluded that no further action was required except a clarification that the limit of a vector was to be given only when an aircraft was given its initial vector diverting it from a previous assigned route; the Secretariat was requested to undertake further analysis of this issue.

2.12 In this respect, the EANPG expressed its concern and disappointment that the ANC had not supported its proposal to amend PANS-ATM paragraph 8.6.5.1 with regard to clarifying the requirement to specify the limit of a vector (*EANPG Conclusion 51/5 – Limit of a Vector clarification* refers). The EANPG recalled that this was a subject of significant concern, due to the workload issues that had been identified with regard to implementing the changed provisions. It was also noted that, until a clarification had been received (as requested in sub-part a) of EANPG Conclusion 51/5), it would not be possible to develop an alternative course of action to address its concerns; neither was it clear whether States should be notifying differences to the PANS ATM in their national AIPs. The EANPG was advised that the requested clarification would be sought as a matter of urgency. Therefore, the EANPG agreed to the following:

EANPG Conclusion 52/2 - Clarification of Limit of a Vector

> That the ICAO Regional Director, Europe and North Atlantic take the necessary steps to clarify the intent of *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) (Doc 4444) paragraph 8.6.5.1 b), as requested in EANPG Conclusion 51/5 sub-part a), as a matter of urgency.

Status of EANPG Decisions and Conclusions

2.13 The EANPG reviewed the status of EANPG/51 Conclusions and Decisions and noted the good progress of implementation. The EANPG noted that only ten (10) of the thirty seven (37) Conclusions and one (1) of the seven (7) Decisions had not been finalised at the time of the meeting, but were in various stages of being addressed. With respect to the *EANPG Conclusion 51/03 – Amendment to ICAO Doc 7754* (regarding FUA over the high seas), the EANPG noted that the ANC supported the proposal for amendment and requested the EUR/NAT Office of ICAO to solve the existing objections. The EANPG was informed that at the moment of the meeting, the Secretariat exhausted all means to reach a compromise with the objecting stakeholders and therefore the proposal for amendment affecting the *Facilities and Services Implementation Document* (EUR FASID, Doc 7754 Vol II) would be submitted to the ANC for their advice and/or decision.

Performance-based global air navigation system – developments in implementation

2.14 The EANPG noted in follow-up to the performance-based Global air navigation system presented in EANPG/51, that while adopting a regional performance framework States were invited to implement a national performance framework for air navigation systems on the basis of ICAO guidance material and aligned with the regional performance objectives, the regional air navigation plan and the Global ATM Operational Concept.

2.15 The EANPG was informed that when reviewing the EANPG/51report the Air Navigation Commission noted that it would be useful to have harmonized performance indicators and metrics among the ICAO regions so as to facilitate comparison and coordinated actions for improvements, but acknowledged that different levels of development in the regions could lead to different indicators and metrics.

2.16 In the current practice, all PIRGs would always review the status of implementation of various conclusions of earlier meetings so as to assess the regional performance in enhancing the air navigation infrastructure. In addition to this, and as a part of air navigation systems performance monitoring and measurement process, the EANPG noted that it was proposed to introduce at every PIRG meeting a "regional performance review report (RPRR) for air navigation systems". In order to facilitate a uniform approach, ICAO HQ, in consultation with Regional Offices and PIRGs, would develop by 2011 a standardized format for this RPRR.

2.17 On the subject of new concepts, the EANPG received information pertaining to the FF-ICE (flight and flow information- Information for a collaborative environment), which was being developed to achieve the vision as outlined in the Global Air Traffic Management Operational Concept (Doc 9854).

Outcome of the COG Performance Task Force

2.18 The EANPG was presented with the main outcome of the work performed by the COG Performance Task Force (COG PERF TF), which was established by COG/47 in order to develop a Regional Performance Framework by using the relevant ICAO guidance material and, as far as appropriate, also already existing material and arrangements in the ICAO EUR Region (e.g. SES Performance Regulation (EC) No. 691/2010). The EANPG took note of the proposed Task Force approach to produce a comprehensive document describing the main elements of the Regional Performance Framework. The scope of this document would be to define the ICAO EUR Region approach to the development of suitable Key Performance Areas (KPAs), Performance Indicators and Key Performance Indicators (KPIs) preferably with one KPI per KPA, performance objectives and metrics (realistically measurable) to be used for the regional implementation of the performance based approach. In addition the definition of consistent terminology, the definition of roles and responsibilities of all actors involved as well as the description of the processes to be used for the functioning of the framework were also identified as key elements of the COG PERF TF document.

2.19 It was also highlighted by the *Rapporteur* of the COG PERF TF that this activity could also represent the regional contribution to ICAO Headquarters on-going activities aimed at defining a set of key performance indicators and metrics to be used in the global implementation of the performance based approach. Moreover the results of the Task Force could represent a valuable input for the future developments (i.e. second reference period) of the performance scheme implemented in the European Union area.

2.20 The EANPG was informed that the transition to the Performance-Based Approach would not be a “one-off” exercise. The final aim would be to establish a process that would need to continuously evolve to address changes to the performance framework associated with changing performance objectives and data gathering/analysis capabilities. In addition, the main goal for the COG PERF TF would be to identify a list of useful, realistic and measurable indicators that would be applicable in the whole ICAO EUR Region (and possibly also in the ICAO NAT Region), that could be reported by all States without huge efforts (in terms of resources, data collection/extraction/distribution, etc) and that can be implemented through a layered approach. This would include pan-regional indicators and indicators appropriate for homogeneous areas that would be identified based on the complexity and traffic characteristics. Those indicators must correctly reflect the ICAO EUR Region’s performance and be capable of identifying areas where improvements were required.

2.21 The EANPG noted the proposed structure of the document describing the ICAO EUR Region performance framework and agreed to the proposed work programme/timeline, which reflected the urgent need to work on the definition of the performance framework for the ICAO EUR Region, so that initial results could be presented to the EANPG COG/50 (21-23 June 2011) and be endorsed at EANPG/53 meeting.

3. AVIATION SAFETY

ICAO-ECAC States ATM Safety Framework Monitoring

3.1 The EANPG noted the information provided on the ICAO-ECAC Safety Framework Maturity Studies carried out since 2002, with the last study conducted in 2009. A new methodology was defined and applied for the 2010 ATM Safety Framework Maturity Survey, which was launched in August 2010. It was noted that there could be significant resource issues related to increasing States’ maturity levels, particularly with regard to elements of the survey which measured the extent to which States had plans in place to ensure certain requirements were being met; this would likely require additional regulatory staff. The EANPG was advised that EUROCONTROL had developed a model for estimating the costs associated with increasing the maturity level in various subject areas, as part of a parallel activity related to estimating the cost of SMS implementation. The EANPG noted the concerns expressed by France with respect to the possible resource implications. The first draft of the 2010 survey report applying the new methodology should be published in December 2010. As part of the Single European Sky (SES) performance assessment, the ATM safety framework maturity surveys methodology was featured in the Commission Regulation 691/2010 laying down a performance scheme for ANS as KPI. Considering the importance of the ATM Safety Framework Monitoring and the difficulties encountered with the lack of participation of some States in the ICAO EUR Region, the EANPG agreed to the following:

EANPG Conclusion 52/3 - ICAO-ECAC States ATM Safety Framework Monitoring

That the ICAO Regional Director, Europe and North Atlantic, on behalf of the EANPG:

a) re-emphasize to all ICAO EUR Region States the importance of the ATM Safety framework maturity surveys;
b) urge States and Air Navigation Service Providers (ANSP) to consistently participate in the survey and the associated report process, as requested; and
c) encourage those States and ANSPs who have not done so to ensure their involvement and continuous participation.

Tackling the global issue of runway safety

3.2 The EANPG noted that runway-related accidents and serious incidents continue to be a serious safety concern. While runway incursions (RI) remained a significant problem, runway excursions (RE) greatly exceeded all other occurrence categories in the ICAO Accident/Incident Data Reporting (ADREP) system. The EANPG was provided with an update on the ICAO Runway Safety Programme, initiated in 2002 with an education and awareness campaign consisting of a series of seminars in ICAO regions. This was followed in 2005 with the ICAO Runway Safety Toolkit CD-ROM and, in 2007, the Manual on the Prevention of Runway Incursions (Doc 9870). As the frequency and severity of RE became more apparent through the analysis of ADREP data, it was considered appropriate to address all runway-related safety issues in a comprehensive manner. Therefore, the ICAO Runway Safety Programme has been expanded to cover both RI and RE, as well as other runway-related safety occurrences and activities.

3.3 In terms of runway excursion, the EANPG noted that ICAO was reviewing Annex 14, Volume I specifications for runway end safety areas (RESA), and it was expected that new and amended SARPs and guidance material would be developed to help States and operators conduct risk assessments in relation to the provision of RESA and other mitigating measures to manage RE. The prevention of RE would be also enhanced by provisions for standardized visual aids that provide consistent situational awareness of flight crews and by the advent of performance based navigation (PBN) that provides for better stabilized approaches.

3.4 ICAO was currently working with IATA, with assistance from other industry partners, toward the development of a joint Runway Excursion Risk Reduction Toolkit which would comprehensively address the fields of aerodrome operations, air traffic management and flight operations. Current solutions to help prevent RI included the use of aerodrome ground radar systems and standardized controller-pilot-driver communications. Standardized operations and communication phraseology were provided for in the *PANS-ATM* (Doc 4444) and in the *Manual of Radiotelephony* (Doc 9432).

3.5 The EANPG noted that in 2004, a definition of RI was introduced into the PANS-ATM to standardize the terminology and collection of data. Also, related to other runway-related safety occurrences and activities, ICAO had introduced new and amended provisions concerning, among others, revised quantities of extinguishing agents and rescue and fire fighting (RFF) during low visibility operations to increase the safety and survivability of passengers and crew in the event of a catastrophic accident (the *Airport Services Manual* (Doc 9137) Part 1, Rescue and Fire Fighting provided guidance material in this regard).

3.6 As a part of its future work programme, the EANPG noted that ICAO was planning to organize a global runway safety conference from 20 to 24 May 2011, which, in addition to strengthening the implementation of ICAO provisions for the prevention and mitigation of RE, RI and other runway-related occurrences, would assist in the initiation of the regional runway safety summits.

3.7 The EANPG, noting the global developments on the issue of runway safety, urged States, which has not yet done so, to establish runway safety programmes to prevent and mitigate runway related accidents and serious incidents.

Review of other safety-related activities

3.8 The EANPG noted the continuous involvement of the EUR/NAT Office of ICAO supporting the implementation of Safety Management Systems (SMS) and State Safety Programme (SSP) by providing courses to many States, as well as providing assistance on audit follow-up, language proficiency, expansion of Single European Sky and contributions on several safety related initiatives. The Chairman noted the amount of work provided by a small group of specialists to assist States in the Region. Georgia confirmed with thanks the assistance received from the EUR/NAT Office of ICAO and mentioned in particular the SMS Course recently hosted in Tbilisi.

4. PLANNING AND IMPLEMENTATION ISSUES

4.1 AMENDMENTS TO ICAO DOCUMENTS / PROVISIONS

Progress on Review of European Regional Air Navigation Plan

4.1.1 The EANPG was presented with an update on the work that was progressing on the review of the European Regional Air Navigation Plan (EUR ANP, Doc 7754). It was recalled that EANPG/48 had tasked the COG to revise the current provisions of the EUR ANP to reflect the relevant elements of the GANP and the evolving ATM operational concept that would be necessary for the entire ICAO EUR Region (*EANPG Decision 48/12 - Review the European Regional Air Navigation Plan* refers).

4.1.2 The EANPG recalled that the EUR/NAT Office of ICAO had obtained resources to fund a technical officer since September 2009 to provide assistance in revising the EUR ANP and also noted with appreciation the extra-budgetary funding which had been provided by Czech Republic, Denmark, Finland, Kazakhstan, Norway, Romania, Russian Federation, Sweden and United Kingdom to enable this project to be continued in 2010, which resulted in good progress in the drafting of the new EUR Basic ANP.

4.1.3 Following the outcome of EANPG/51, the EANPG noted with appreciation that ICAO Headquarters had taken prompt action on updating the Basic Operational Requirements and Planning Criteria (BORPC) (*EANPG Conclusion 51/4 – Update to Basic Operational Requirements and Planning Criteria (BORPC)* refers). It was reported that the Air Navigation Commission (ANC) would review the drafted text (AN-WP8500 refers) and agree to its circulation to States and international organisations at its meeting which would take place from 13 to 17 December 2010. It was noted that the final draft, following update based on comments received from States and international organisations, would be presented to the ANC for approval in 2011.

4.1.4 The EANPG was informed that feedback and support were received from several ICAO Regional Offices and Headquarters when the initial drafts of the Parts on Introduction, General Planning Aspects and Air Traffic Management were sent to them for informal coordination and comment. It was noted that based on the comments received, revision of these Parts was made as appropriate.

4.1.5 The EANPG received a comprehensive presentation on Part 0 - Introduction, Part I - General Planning Aspects (GEN), Part IV – Air Traffic Management (ATM), Part VIII – Safety (SAF), Part VI – Search and Rescue (SAR) and Part VII – Aeronautical Information Management (AIM).

4.1.6 With regard to Part I – GEN, the EANPG noted that changes had been made to better reflect the ATM Operational Concept 'performance based approach'. The new text reflected the requirement to have common Performance Objectives throughout the ICAO EUR Region, based on the ICAO global Key Performance Areas (KPA); associated local Performance Targets and related Performance Indicators (KPI) which can be measured. It was also noted that a suitable methodology to manage performance requirements was required to ensure consistency of approach whilst providing flexibility to cater for the different traffic volumes and associated requirements throughout the ICAO EUR Region. The EANPG noted that the incorporation of the principle elements of the performance approach in the Basic ANP would underpin the subsequent inclusion of Performance Objectives, which would be developed by the COG Performance Task Force.

4.1.7 The EANPG also noted that following the analysis of the responses received from States to the questionnaire on the status of States' implementation of Global Planning Initiatives (GPI), the information on this issue was deemed to be unstable and inadequate. The table which reflects the EUR Region's overall GPI implementation status was thus removed from Part I-GEN of the Basic ANP and considered more suitable for incorporation in the Facilities and Services Implementation Document (FASID).

4.1.8 The EANPG noted that minor changes to update references had been made to the draft Part IV – ATM.

4.1.9 The EANPG noted that, following informal discussion with ICAO Headquarters, the draft Part VIII - SAF that had been presented at the COG/47 meeting had been revised to emphasise that this Part related to safety matters associated with air navigation services, ATM/CNS and the work of the EANPG. References to regional safety initiatives had been changed to regional safety objectives (RSO) to reduce any potential confusion with global safety initiatives. It was recognised that the COG Performance Task Force would develop the initial safety objectives and associated targets and KPI.

4.1.10 The EANPG noted the draft Part VI – SAR. It was agreed that, in respect of the specification of the minimum SAR facilities required, the outcome of the ICAO global Search and Rescue conference (SAR2010, Dubai, June 2010) would be requested and an update to the current SAR facilities table be undertaken before determining whether any further action was necessary in respect of 'minimum SAR facilities' as set out in ICAO Annex 12.

4.1.11 With regard to Part VII – AIM, the EANPG noted that the draft AIM Part had been reviewed by the members of the EUROCONTROL Aeronautical Information Team (AIT). It was noted that the title had been changed from AIS to AIM to reflect the future direction on the provision of aeronautical information in the context of the Global ATM Operational Concept and associated System Wide Information Management (SWIM). The EANPG was informed that this Part detailed the key elements that States should provide in the provision of aeronautical information, provided an overview of the Transition to AIM and referred to the requirement for States to develop national plans for transition to AIM.

4.1.12 It was noted that details of the component elements and timings of the ICAO AIM Transition Plan would be reflected in the FASID. It was reported that States were developing this material guided by the EUROCONTROL AIT for Western Europe and the COG AIM Task Force for Eastern Europe. The EANPG noted the intention of the ICAO Secretariat and the EUROCONTROL AIT to deliver the AIM FASID material by September 2011.

4.1.13 The EANPG was presented with an overview of environmental challenges, considerations and direction provided by ICAO 37th Assembly that would form the basis of the Environment content of the revised Basic ANP and FASID.

4.1.14 The EANPG noted that ICAO Environmental Policy, Regional Office responsibilities and guidance to States would be detailed in the Environment content of the Basic ANP. Information on Performance Objectives and associated requirements as well as models of environmentally efficient best practices would be detailed in the FASID. In these respects the EANPG noted that:

a) Regional planning groups had been asked to take environmental factors into consideration when developing CNS/ATM systems implementation plans;

b) ICAO Council would provide the necessary guidance and direction to ICAO's Regional Offices to assist States with studies, evaluations and development of procedures, to limit or reduce green house gases (GHG) emissions on a global basis;

c) The European and North Atlantic Office would develop the necessary tools to assess the benefits associated with ATM improvements, and intensify its efforts on the development of new guidance on operational measures to reduce international aviation emissions; and

d) The European and North Atlantic Office would assist EUR Region States to develop their Program of Actions related to emissions reduction and climate change.

4.1.15 The EANPG endorsed and commended the work that had been completed thus far. The EANPG noted the on-going work to develop the Parts on Environment, Contingency Planning, and Human Resources and Training.

4.1.16 In light of the remaining work to be done, it was noted that the full package of the Proposal for Amendment to the Basic ANP could not be completed in time for endorsement at the EANPG/52 meeting. The EANPG thus agreed that the COG should be mandated to endorse the final version as soon as the material was completed. Additionally, it was agreed that the final drafts for the Proposal for Amendment to the FASID would also be presented to the COG for their endorsement once they would be available, which should be during the second half of 2011. In the ensuing discussion on the future work, the EANPG noted with appreciation that inter-regional coordination on the adoption of the new format of the Air Navigation Plans by all ICAO Regions would be initiated at the forthcoming ALLPIRG meeting in 2011. Therefore the EANPG agreed to the following:

EANPG Decision 52/1 - Progress on Review of European Regional Air Navigation Plan

That the EANPG Programme Coordinating Group (EANPG COG) be mandated to review and approve, as appropriate:

a) the proposal for amendment to the ICAO Basic Air Navigation Plan (EUR ANP – ICAO Doc 7754 Volume I) resulting from the review of the EUR Region ANP; and

b) the proposal for amendment to the ICAO Facilities and Services Implementation Document (EUR FASID – ICAO Doc 7754 Volume II) resulting from the review of the EUR Region ANP.

Mode S Transponder procedures

4.1.17 The EANPG recalled that at its 48th meeting, it had reviewed a proposal to amend the *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS, Doc 8168), Volume I with regard to the operation of Mode S transponders. The proposal did not gain the endorsement of France and IATA and it was agreed that the proposal should be further developed (*Report of the Forty-Eighth Meeting of the EANPG*, paragraph 4.42 refers). When the revised proposal was presented to the thirty-eighth meeting of the EANPG COG, it was agreed to invite the ICAO Regional Director to further process the proposed amendment on behalf of the EANPG (*Summary of Discussions of the EANPG COG, Thirty-Eighth Meeting*, paragraphs 4.57 through 4.60 refer). The EANPG was advised that, for reasons unknown, the proposal had not been further processed.

4.1.18 The submission to COG/38 identified the reasons for the proposal and the coordination undertaken following EANPG/48 to address the concerns which had initially prevented endorsement of the proposal by the EANPG. In order to ensure that this proposal was still valid and to support correct processing, the Secretariat submitted the proposal to COG/48 where it was agreed that the proposal was still valid and indeed represented current practice in the ICAO EUR Region. The EANPG accordingly agreed that the proposal and supporting material should be formally submitted for further processing by ICAO. This would support the development of global provisions for operation of Mode S transponders on movement areas, ensure effective use of A-SMGCS for aerodrome surveillance applications by ATS, proper functioning of ACAS and support mitigation of 1030/1090 MHz frequency congestion resulting from non-appropriate setting of transponders of aircraft operating on movement areas. Therefore the EANPG agreed to the following:

EANPG Conclusion52/4 - Proposed amendment to PANS-OPS, Volume I, regarding the operation of Mode S transponders

That the ICAO Regional Director, Europe and North Atlantic, undertake the necessary action to process the proposed amendments to *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS, Doc 8168), Volume I, with regard to the operation of Mode S transponders, as detailed in **Appendix C** to this Report.

Global Operational Data Link Document (GOLD)

4.1.19 The EANPG was presented with the work and status of the Global Operational Data Link Document (GOLD), which was developed in coordination between the ICAO NAT and ASIAPAC Regions. The GOLD merged the Guidance Material for ATS Data Link Services in North Atlantic Airspace (NAT Data Link GM) and FANS 1/A Operations Manual (FOM) used in Asia-Pacific, and parts of South Atlantic and South American Regions). This work was initiated in order to develop, through the involvement of the Regions, an inter-regionally harmonized operational data link guidance material with the aim of eventual acceptance of the resulting document by ICAO as a global document. This work was fully supported and coordinated by ICAO. An ICAO interregional Ad Hoc Working Group was established to develop the GOLD. The group was comprised of subject matter experts from all participating regions to represent air navigation service providers, operators, communication service providers, equipment suppliers and aircraft manufacturers.

4.1.20 The First Edition of the GOLD was completed in June 2010 and had been formally adopted by the NAT (NAT Systems Planning Group (SPG) Conclusion 46/8 refers) and Asia and Pacific (APAC) (APANPIRG Conclusion 20/74 refers) Regions, and the South Atlantic (SAT) Sub-Region of the African-Indian Ocean (AFI) Region (SAT FIT Conclusion 5/7 refers). Coordination was initiated to adopt the GOLD in other ICAO Regions. The FAA recognized the GOLD in its recently issued Advisory Circular (AC) 20-140A, *Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic*

Services (ATS), and AC 120-70B, *Operational Authorization Process for Use of Data Link Communication System*.

4.1.21 The EANPG noted that the GOLD was available on the following web sites:

a) http://www.paris.icao.int/documents_open/subcategory.php?id=106;

b) http://www.ispacg-cra.com; and

c) http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/data_link/.

4.1.22 The EANPG noted that the GOLD provided guidance material for airspace planners to relate the provision of air traffic data link services and for operators to ensure appropriate aircraft equipage and preparation for operational use, e.g., flight crew training. It included guidelines for controller and flight crew procedures and technical criteria contained in required communication performance (RCP) and surveillance performance specifications. These specifications allocated criteria to the air traffic service providers, communication service providers, aircraft systems and the operators. Finally, the GOLD included guidance material for post-implementation monitoring, analysis, and corrective actions to ensure continued operational safety.

4.1.23 It was noted that the GOLD was not specific to FANS 1/A or to oceanic areas. In addition to the merging of NAT data link Guidance Material (GM) and FANS Operations Manual (FOM), the GOLD included a definition of existing implementations, including ATN Baseline 1 (ATN B1)—or Link 2000+ in the following sections of the GOLD:

a) Chapter 2.1 defined ATN B1, referred to RTCA/EUROCAE Standards, O-280B/ED-110B, DO-290/ED-120, Changes 1 and 2, and EUROCONTROL specification 0116 (per the EC data link Implementing Rule (IR)), and the relevant ICAO EUR SUPPs (Doc 7030) provisions;

b) Chapter 2.4 included a provision to describe ATN B1 further;

c) Appendix A precisely defined the ATN B1 message set; and

d) Appendix E provided specific information for three control areas (CTAs) —Amsterdam, Bruxelles, and Hannover—in Europe, where Maastricht Upper Area Control Centre was providing data link services to FANS 1/A and pioneer Link 2000+ aircraft.

4.1.24 The EANPG was informed that the FANS 1/A parts of the GOLD could be useful in support of the existing and planned FANS 1/A implementations in the ICAO EUR Region (e.g. FANS 1/A implementations in the Russian Federation). The ATN B1 related sections of the GOLD would need to be reviewed to ensure consistency with the LINK2000+ Operational Guidance document developed by EUROCONTROL.

4.1.25 In view of the above, EANPG supported the need for a review of the GOLD and LINK2000+ Operational Guidance documents with the aim to develop an operational data link guidance that could be used in the entire ICAO EUR Region for all data link implementations and would be globally harmonized. This would ensure global harmonization of the current data link implementations and provide a path to the convergence of the future data link communications systems and would be in line with the EUR Data Link Harmonization Strategy as developed by the EUR/NAT Data Link Study Group (DLSG) and endorsed by the EANPG (EANPG Conclusion 49/19 refers). It was recognised that States and international organizations should review the GOLD as provided in **Appendix D**, in order to provide informed input to COG/50 (June 2011). The COG would be mandated to address the practical aspects of harmonization of the two documents, establish a mechanism to advance this work and report to EANPG/53. Therefore the following Decision was agreed:

EANPG Decision 52/2 - Global Operational Data Link Document (GOLD)

> That the EANPG Programme Coordinating Group (EANPG COG) be mandated to address the practical aspects of harmonization of the LINK2000+ Operational Guidance and GOLD documents, establish a mechanism to advance this work and report to EANPG/53.

4.1.26 In connection with this, the EANPG was informed that the ICAO OPLINK Panel was re-established and held a meeting in October 2010. It was noted that the OPLINK Panel had included the following tasks on its work programme:

a) monitor progress of inter-regional activity including the EANPG and GOLD Ad Hoc Working Group;

b) review LINK2000+ Operational Guidance material against GOLD and consider potential amendments to GOLD; and

c) merge LINK2000+ Operational Guidance and GOLD as basis for a Global Operational Guidance material.

4.1.27 The EANPG was informed that coordination was taking place between the ICAO OPLINK Panel Secretariat and the EUR/NAT Office of ICAO and that the above mentioned work of the OPLINK Panel was not inconsistent with the proposed work in the ICAO EUR Region but rather supporting it.

Proposed amendment to PANS-ATM – transfer of identification

4.1.28 The EANPG reviewed a proposed amendment to the PANS-ATM to ensure that the provisions concerning transfer of identification would be consistent and unambiguous. It was noted that, when providing ATS surveillance services, transfer of control should be effected, whenever practicable, so as to enable the uninterrupted provision of the ATS surveillance service. A prerequisite for the provision of ATS surveillance services to an aircraft was that the aircraft be identified. Considering the current ATM environment, where automation and integration of surveillance data with flight plan processing data was a common feature in the large majority of European ATM systems, concerns had been expressed with regards to a potential misuse of the provisions of PANS-ATM paragraph 8.6.3.2 b), c) and d), in that it was permitted to use the notification of the aircraft address as a method for the transfer of identification.

4.1.29 In considering this application, it had been noted that the source of the aircraft address should be the aircraft's transponder or transmitter and not the flight plan. There were instances where aircraft address would be available from other sources, such as datalink requests or information in Item 18 of the filed flight plan, but there were no provisions or requirements for verification by the controller of the aircraft address. In addition, there was no phraseology supporting a verbal notification of the aircraft address, no requirements to display the aircraft address on the surveillance display and the flight crew would not have any indication of the aircraft address.

4.1.30 The concern was that the fact that there was no initial method of identification directly based on aircraft address, but only the transfer of identification, could lead to the understanding that once an aircraft was identified, the aircraft address received from the transponder / transmitter could be forwarded to the next unit/sector for the transfer of identification. ANSPs currently using or intending to use Mode S surveillance technologies did not envisage using aircraft address for the transfer of identification. Consequently, it was considered appropriate to clarify the existing PANS-ATM provisions to limit the use of "notification of the aircraft address" as method for the transfer of identification to those situations where such notification was performed directly between the ATS systems concerned.

4.1.31 The EANPG was advised that, according to PANS-ATM 8.6.3.2 c) and d), the notification that an aircraft was equipped with an Aircraft Identification Feature would suffice to perform the transfer of identification but that certain issues had been identified in this regard.

4.1.32 Information pertaining to the equipment carried on board the aircraft was normally available from Item 10 of the filed flight plan, and most systems could extract this information and reflect it in what was commonly known as "system flight plans". Subsequent coordination processes between the transferring and accepting units were relying on flight data derived from the system flight plans. Notification that the aircraft was suitably equipped with an Aircraft Identification Feature might be sufficient to support the transfer of identification if both units were using the same surveillance technology, provided that the transferring controller had verified that the aircraft identification was correct.

4.1.33 Although PANS-ATM 8.5.3.4 and 8.5.3.5 (or 8.5.4.2 and 8.5.4.3 for ADS-B) stated that, whenever it was observed on the situation display that the aircraft identification transmitted was different from that expected from the aircraft, an air traffic controller (ATCO) shall notify the erroneous aircraft identification transmitted by the aircraft to the next control position and any other interested unit using Mode S (or ADS-B) for identification purposes, there could be situations where such inconsistencies remained undetected. If the aircraft identification displayed to the ATCO was the result of a correlation between surveillance information and flight plan information, and if the correlation was not done on the basis that the information in Item 7 of the flight plan was consistent with the aircraft identification feature transmitted by the aircraft the ATCO would be unaware of differences between what was transmitted by the aircraft avionics and what was available in the flight plan.

4.1.34 Considering that aircraft identification information derived from the flight plan was a main parameter for the notification and coordination processes between transferring and accepting units, and that the equipment information was derived from the filed flight plan information and its associated messages, the transfer of identification based on information available from the Aircraft Identification Feature of a Mode S transponder (or ADS-B transmitter) required that the information from the transponder/transmitter be consistent with the information from the flight plan and, if applicable, the information from the call sign used in air-ground voice communication.

4.1.35 The EANPG agreed that all of these concerns would be addressed in the proposed amendment and agreed that processing of the proposal should be initiated no later than 31 January 2011. Therefore the EANPG agreed to the following:

EANPG Conclusion52/5 - Proposed amendment to PANS-ATM, regarding the transfer of identification

That the ICAO Regional Director, Europe and North Atlantic undertake the necessary action to process the proposed amendment to the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444) on the subject of transfer of identification, as detailed **in Appendix E** to this report.

Emergency Descent Procedure

4.1.36 The EANPG recalled that COG/48 had agreed that EUROCONTROL should be invited to develop proposals for amendment to the EUR SUPPs and PANS-ATM in order to remove ambiguities and reduce the likelihood that aircraft would react to a broadcast informing of an emergency descent in a manner that could increase the likelihood of conflicts with other aircraft (Summary of Discussions of EANPG COG/48 paragraph 8.1 refers). Although it had been foreseen that this request would be initiated by EANPG/52, EUROCONTROL had already prepared draft proposals for consideration.

4.1.37 The EANPG reviewed the draft proposals and supporting material, which are provided in **Appendix F**, and agreed that they formed a good basis for further development. The representative from IFALPA advised that, because there would still be differences between ICAO Regional procedures, and indeed even within the ICAO EUR Region, regarding the direction that flights should initiate a turn away from the assigned route or track before commencing the emergency descent, this aspect of the procedure was still considered an open issue. It was acknowledged, however, that the circumstances that would prompt an emergency descent were so varied as to render complete harmonization impossible.

4.1.38 Considering the foregoing and agreeing that this issue should be clarified without any undue delay, the EANPG agreed that the COG should be empowered to request that ICAO initiate processing of the proposals to amend the provisions in the EUR SUPPs and the PANS-ATM. It was anticipated that finalized proposals would be presented to COG/50, which was planned to take place from 21 to 23 June 2011. Therefore the EANPG agreed to the following:

EANPG Decision 52/3 - Emergency descent procedures – Proposals for Amendment to the EUR SUPPs and to the PANS-ATM

> That, considering the urgency and the importance of providing clarity on emergency descent procedures, the EANPG Programme Coordinating Group (EANPG COG) is authorized to review, approve and process further as appropriate proposals for amendment to the European Regional Supplementary Procedures (EUR SUPPs, Doc 7030) and the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444) addressing the provisions related to emergency descent procedures.

Radio communications failure

4.1.39 The EANPG was presented with a proposal to address concerns that had been identified with regard to the provisions applicable when an aircraft experienced radio communications failure (RCF), as defined in Annex 2, paragraph 3.6.5.2. Extensive discussions within the working arrangements of the EUROCONTROL Airspace and Navigation Team had concluded, *inter alia*, that the present provisions in Annex 2 and the PANS-ATM were not optimal and that air traffic control (ATC) could not predict in all cases the actions that a pilot experiencing air-ground voice communications failure would take.

4.1.40 Furthermore, in the development of Part A of the European Commission Mandate to EUROCONTROL as regards the transposition of ICAO provisions into Standardised European Rules of the Air (SERA) it was observed that the ICAO provisions, as written, could not be agreed; for example, some States had filed differences limiting the use of provisions related to the continuation of flights experiencing radio communication failure in Visual Meteorological Conditions (VMC).

4.1.41 It had been noted that ICAO provisions related to pilots' actions when experiencing RCF could be found in different documents such as Annex 2 and Annex 10. Regarding the issue of COMLOSS/Prolonged Loss of Communications (PLOC) as compared to situations classified as RCF, it was recommended that a better delineation between the two events and circumstances was required. Furthermore, in order to provide an effective ATC service to aircraft experiencing air-ground voice communication failure, it was agreed that the pilot actions in various circumstances needed to be more predictable.

4.1.42 In this context the EANPG noted that the present ICAO provisions only referred to meteorological conditions and not to the flight rules applied by aircraft (IFR or VFR). In order to address these and other issues, the ATM Procedures Development Sub-Group of the EUROCONTROL Airspace and Navigation Team developed proposals for amendments to Annex 2, PANS-ATM, Annex 10 (Volume II, Volume IV) and Annex 4.

4.1.43 The EANPG was advised by IFALPA that the proposals were viewed as an improvement on the current provisions, although certain issues, such as provisions for long haul flights to return to their departure aerodrome, had not been addressed. The EANPG noted that the proposals were, in parallel, being considered by other bodies and a number of inconsistencies in the proposed text were pointed out.

4.1.44 Accordingly, it was viewed as likely that there would be changes to the material as presented and it was therefore premature to authorize the COG to take action on behalf of the EANPG to initiate further processing of the proposal by ICAO, based on the outcome of the parallel coordination taking place within the EUROCONTROL decision making structure. The EANPG concurred that, if necessary, the COG could request the EANPG to endorse a more mature proposal via correspondence, if it was believed there would be undue delay incurred by waiting to present it to EANPG/53.

4.2 AIR TRAFFIC MANAGEMENT

Implementation of RVSM in the eastern part of the ICAO EUR Region

4.2.1 The EANPG was informed of the activities in the Eastern part of the ICAO European Region related to the implementation of the Reduced Vertical Separation Minimum (RVSM) on 17 November 2011. The EANPG recalled that the following ICAO European Region States were participants in this EURASIA RVSM implementation project: Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan and Uzbekistan and that all these States agreed and adopted the RVSM implementation Master-plan.

4.2.2 It was also noted by the EANPG that Afghanistan and Mongolia expressed their interest to join the project, however, Mongolia had been unable to participate in the EURASIA RVSM implementation meetings conducted during the year 2010 and information on the status of the Mongolia preparations was not updated.

4.2.3 The preparatory actions by States since the EANPG/51 covered the following main areas related to the ATM and monitoring issues:

- preparation/revision of draft Aeronautical Information Circulars (AIC) for the EURASIA RVSM project States;
- amendments to the formal Letters of Agreement (LoAs) to provide the RVSM working procedures;
- ATM procedures for contingency situations (COM failure, turbulence etc.);
- coordination procedures between adjacent ATM centres in RVSM environment;
- establishment of reporting points compulsory for transfer of ATC and application of procedures in case of COM failure in RVSM airspace;
- development of a draft agreement on establishment and statute of the Regional Monitoring Agency;
- methods and organisation of data collection/reporting;
- Minimum Monitoring Requirements (MMR) for EURASIA RVSM airspace;

4.2.4 The EANPG was informed about the formal decision of the Russian Federation to establish the Regional Monitoring Agency - EURASIA RMA in Moscow, the Russian Federation, and that the EURASIA RMA project team had been already operational.

4.2.5 The EANPG noted the progress on the actions by the States concerned with regard to the preparations for the RVSM implementation and considered overall advancement satisfactory.

SSR Code Allocation at the interface between two ICAO Regions

4.2.6 The EANPG was advised of the operational difficulties being encountered due to SSR code conflicts arising with respect to flights operating in the buffer area between the ICAO EUR and Middle East (MID) Regions. It was recalled that ICAO provisions prescribed that SSR codes be allocated to States or areas in accordance with regional air navigation agreements, taking into account overlapping radar coverage over adjacent airspaces (PANS-ATM paragraph 8.5.2.2.1 refers). However, the current practice by all ICAO Regions was to use all SSR codes within their area of applicability without establishing a buffer area and without any coordination with other ICAO regions. This practice was causing code conflicts at the interface between neighbouring regions, as depicted in **Appendix G** to this report.

4.2.7 The EANPG recalled that the SSR Code Secretariat managed the implementation of the *European Secondary Surveillance Radar (SSR) Code Management Plan* (EUR SSR CMP. EUR Doc 023) on behalf of the EANPG through the SSR Code Planning Group (SCPG) (paragraphs 4.2.13 and 4.2.16 also refer). The EANPG reviewed the method for avoiding code conflicts with other ICAO regions which was employed in the ICAO EUR Region, namely dividing the Region into ten Participating Areas (PA's). However, where other regions did not apply the same system, PA's adjacent to those regions experienced code conflicts.

4.2.8 The EANPG was advised that this issue had been discussed at the Second Inter-Regional Coordination Meeting (IRCM/2) between the Asia and Pacific (APAC), European and North Atlantic Office (EUR/NAT), and Middle East (MID) Regional Offices of ICAO, which took place in September 2006. Based on subsequent agreement with the MID Office of ICAO, the SSR Code Secretariat had developed a PA structure and retention rules, but the States of the ICAO MID Region had not accepted the proposal due mainly to military requirements and workload concerns.

4.2.9 Within the ORCAM area of applicability a PA structure had been implemented and PANS-ATM procedures related to the assignment of A2000 were being applied, exhausting the possibilities to solve the problem solely within the ICAO EUR Region. Further coordination with the ICAO MID Region had failed to reach a solution and as a result, code conflicts were occurring at the boundary between the two Regions. The SSR Code Secretariat had confirmed that the assignment of unambiguous individual discrete codes within the overlapping radar coverage over adjacent airspaces between the ICAO EUR Region PA's and other ICAO Regions could not be ensured. The EANPG agreed that, to ensure the unambiguous identification of aircraft operating in the buffer area and transiting between the ICAO EUR and MID Regions, an inter-regional meeting should be convened specifically to resolve SSR code management issues. Therefore the EANPG agreed to the following:

EANPG Conclusion 52/6 - Inter-regional Coordination Concerning SSR Code Management

That the ICAO Regional Director, Europe and North Atlantic, undertake the necessary action to convene an inter-regional coordination meeting to resolve, as a matter of urgency, Secondary Surveillance Radar (SSR) code management issues concerning flights operating in the buffer area between the ICAO EUR and Middle East (MID) Regions.

Report on ACID programme

4.2.10 The EANPG recalled that the Provisional Council of EUROCONTROL had launched the Aircraft Identification Programme (ACID) in December 2009 to resolve the problems with Mode 3/A code assignment (*Report of the Fifty-First Meeting of the EANPG*, paragraphs 4.2.23 through 4.2.31 refer). The ACID Programme would also support the gradual implementation of downlinked aircraft identification enabled by Mode S Elementary Surveillance (ELS). The Provisional Council would formally review the programme at its 34th meeting (PC34) in December 2010.

4.2.11 The EANPG was advised that the ACID Programme had been formally launched in January 2010 and that programme management was being carried out by a dedicated sub group of the ANSB, the Aircraft Identification Programme Steering Group (AIPSG). A Programme Management Plan and Programme Risk Register had been approved by the Provisional Council as the principal means to track programme development.

4.2.12 The EANPG recalled that the ACID Programme was designed to implement an Initial Operational Capability in February 2012 which would integrate different operational methods for establishing aircraft identification for the purposes of providing ATS Surveillance Services. The operational methods would be the use of ELS enabled by Mode S along with use of Mode 3/A SSR codes. To ensure efficient use of Mode 3/A codes, States which have not deployed ELS in 2012 would manage Mode 3/A codes through the Centralized Code Assignment Method System (CCAMS) or though Enhanced Originating Code Assignment Method (eORCAM) capabilities in local systems.

4.2.13 To expedite the necessary amendments to the *Regional Air Navigation Plan – Europe* (Doc 7754, EUR ANP) the EANPG had mandated the COG to act on its behalf (*EANPG Decision 51/2 – Development of proposal for amendment to ICAO Doc 7754 regarding ORCAM and Enhanced ORCAM* refers). At its 47th meeting, the COG had approved the publication of the EUR SSR CMP. Along with endorsing the EUR SSR CMP, the COG also requested ICAO to take the necessary steps to develop an amendment to the EUR ANP to remove material contained in the EUR SSR CMP and re-issue the ICAO EUR Region Code Allocation List as an Attachment to the new document (*COG Decision 47/2 - Publication of* European Secondary Surveillance Radar (SSR) Code Management Plan *(EUR Doc 023), First Edition* refers).

4.2.14 The EANPG noted that the ACID Programme was affected by two European Commission Implementing Rules (IR) (the ACID IR and the Network Management Function IR (Scarce Resources provisions)). The ACID IR material had been delivered to the European Commission in June 2010 and the NMF IR was in the consultation process. It was noted that a number of Programme risks existed because the regulatory regime was not mature and its implications not always widely understood by stakeholders. The Programme was working with stakeholders and the regulatory authorities to ensure that such risks would not escalate and prevent successful execution.

4.2.15 The EANPG was advised that a major programme risk was created by the ad hoc changes being proposed by stakeholders to the planned Initial Operating Capability 2012 as approved by the Provisional Council. A number of ANSPs had either changed their position and plans from that agreed in the original Provisional Council decision, or had declared they were still reviewing their options for 2012 operations. Apart from the risk that some ANSPs might breach regulatory requirements by 2012, the lack of clear commitment was hampering the detailed operational analysis required to develop the 2012 edition of the EUR SSR CMP. This was viewed as the single greatest risk to the successful execution of the ACID Programme and realisation of its benefits. Unless ANSPs had completed clear implementation planning and contractual arrangements by the end of November 2010, they were unlikely to be in a position to implement the declared operational capability in February 2012.

4.2.16 The EANPG was provided with a map detailing the situation as assessed at the end of November 2010, as contained at **Appendix H**, which highlighted the medium and high risk ANSPs. The EANPG agreed that the lack of clear commitment by a number of states and ANSPs and the failure to properly plan and prepare for implementation of the initial operating capability in February 2012 remained a major risk for achieving the benefits of the ACID Programme. Additionally, the current level of uncertainty was hampering the ability of the SSR Code Secretariat to produce a valid and effective EUR SSR CMP beginning in 2012. Therefore the EANPG agreed to the following:

EANPG Conclusion 52/7 - Aircraft Identification Solutions

> That the ICAO Regional Director, Europe and North Atlantic, invite States, as a matter of urgency, to confirm their intentions regarding implementation of aircraft identification solutions beyond February 2012.

All Weather Operations

4.2.17 The EANPG took note of the outcome of the sixteenth meeting of the All-Weather Operations Group of the European Air Navigation Planning Group (AWOG/16) which was held in the EUR/NAT Office of ICAO, Paris, from 7 to 8 September 2010.

4.2.18 The EANPG was presented with the significant ICAO and international aviation developments on the aspects of Low Visibility Procedures (LVP) provisions, the harmonisation of global and regional provisions related to Instrument Landing System (ILS) operations and the reports from the ICAO Navigation System Panel. However, it was felt that attempting a worldwide harmonisation of LVP in the short term was impractical and that there were merits in addressing the LVP harmonisation issue from the EUR regional perspective within an ICAO EUR/NAT group. Therefore it was also recalled that all efforts should be made to avoid any duplication of work and that synergies would be sought for instead and the EANPG agreed that the EUR/NAT Office of ICAO will invite EASA and FAA to assist in this work:

EANPG Conclusion 52/8 - Harmonisation process of LVP provisions

That the ICAO Regional Director, Europe and North Atlantic, invite the European Commission and the United States of America to participate (through EASA and the FAA) in the harmonisation process of LVP provisions.

4.2.19 With regard to the follow-up action on the Recommendations of the High-level Safety Conference (HLSC) 2010, the EANPG endorsed the AWOG proposal (related to the improvements of the safety of approach and landing operations) to organize, in coordination with major stakeholders (e.g. EUROCONTROL, EASA) and international organizations (e.g. IATA, ACI, IFALPA, IFATCA) a regional runway safety seminar before the end of 2012:

EANPG Conclusion 52/9 - Runway Safety Seminar

That the ICAO Regional Director, Europe and North Atlantic organise, in coordination with EASA, EUROCONTROL and other international organisations, a Regional Runway Safety Seminar before the end of 2012.

4.2.20 The EANPG noted the working arrangements on the revisions of the *All-Weather Operations Manual* (Doc. 9365) and the *Global Navigation Satellite System GNSS Manual* (Doc 9849), the provisions regarding the amendments to EUR Doc 013 (optimised operations in LVC, GBAS protection requirements, ILS CSA) and the work on EUR Doc 015 (wind turbines impact on surveillance systems). An updated version of the ICAO *European Transition Methodology for the Introduction and Application of Non-visual Aids to All-weather Operations* (EUR Doc 017) companion document (Transition Key Issues) was presented to the EANPG and after due consideration the EANPG agreed to the following:

EANPG Conclusion 52/10 - Revised ICAO EUR Doc 017

That the ICAO Regional Director, Europe and North Atlantic undertake necessary action to publish the revised EUR Doc 017 companion document (Transition Key Issues) endorsed by the EANPG, as provided in **Appendix I** to this report.

Outcome of the Thirteenth meeting of the Route Development Group - East (RDGE/13)

4.2.21 The EANPG noted the outcome of the Thirteenth Meeting of the Route Development Group – Eastern Part of the ICAO EUR Region (RDGE/13) which took place in the EUR/NAT Office of ICAO from 21 to 24 September.

4.2.22 The EANPG was informed of the significant ICAO and international aviation developments, the report from EUROCONTROL on activities of the Route and Network Design Sub-Group, the report from States on ATS route development activities and the IATA presentation on the results of studies regarding the traffic flow optimisation between Europe and Northern Asia that had been discussed at RDGE/13. The EANPG also congratulated the Russian Federation on their successful implementation of a major package of amendments to federal aviation rules that became effective in November 2010.

4.2.23 The EANPG took note of the outcome of the Route Development Sub-Group - Baltic Sea Area which reviewed a total of 34 existing proposals and where 8 new routes were agreed for incorporation into the Baltic ATS Route Catalogue.

4.2.24 The EANPG also took note of the outcome of the Route Development Sub-Group - Black Sea and South Caucasus Area which reviewed a total of 25 existing proposals and where 2 new routes were agreed for incorporation into the Black Sea and South Caucasus ATS Route Catalogue.

4.2.25 Due to the absence of States from the Route Development Sub-Group – Middle Asia and due to the lack of information from States, the EANPG was apprised of the fact that none of the proposals in the Middle Asia ATS route catalogue could be updated and supported the RDGE concerns that the lack of coordination for airspace improvements in the interface with these States hindered overall progress in optimizing the ATS route network in the Eastern part of the EUR region.

4.2.26 Based on the discussions about the importance of State representation at these important meetings in order to ensure the necessary coordination of the airspace improvements in the EUR Middle Asia area and to ensure the successful EURASIA RVSM implementation, the EANPG agreed to the following:

EANPG Conclusion 52/11 - Importance of States participation to the Route Development Group - East

That the ICAO Regional Director, Europe and North Atlantic urge States in the Middle Asia area of the ICAO European Region to ensure:

a) continuous coordination of airspace improvements and optimization of the ATS route network through the RDGE ATS route catalogues; and

b) participation in the next RDGE meeting, as this would be the last opportunity to agree the ATS route structure changes prior to the EURASIA RVSM implementation date (November 2011).

ICARD (ICAO Five Letter Name Codes and Route Designators)

4.2.27 The EANPG was informed about the successful transfer of the ICARD (ICAO Five Letter Name Codes And Route Designators) database from EUROCONTROL to the ICAO Headquarters portal on 27 August 2010, and took note of the outcome of the ICARD User Forum (with attendance from over 50 participants from 25 States and 3 international organizations) which was held in the EUR/NAT Office of ICAO from 20 to 21 September 2010.

4.2.28 The EANPG noted the new guidelines for user registration and the use of 5-Letter Name Codes (5LNC), the integration plans for all ICAO regional offices (with the current requirements for regional 5LNC coordination unchanged) and the plans to merge the 5LNC reserve lists into one global list in the first half of 2011. As a result of the discussion, the EANPG agreed to the following conclusion:

EANPG Conclusion 52/12 - Guidance on the use of five-letter name-codes

That the ICAO Regional Director, Europe and North Atlantic undertake the necessary action to provide clarification and guidance regarding the:

a) use of five-letter name-codes (5LNC) and the use of alpha-numeric codes in ICAO Five Letter Name Codes And Route Designators (ICARD);

b) related publication process in the national Aeronautical Information Publication (AIP); and

c) required correction process (e.g. granularity of data/accuracy of coordinates, deviation parameters, tolerance values, etc).

4.2.29 The EANPG COG took note of the ATS Route Designator (RD) issues and the proposed procedures for coordination of reservation of designators for ATS routes which do and do not form part of the regional networks through the ICARD RD coordinators. The EANPG was also informed that, based on the initial results from the ICAO questionnaire on the removal of the distinction (letter U) between lower and upper ATS route designators and the operational feedback on the introduction of new basic letters for ATS route designators (Annex 11 change), further analysis would be required in these areas.

4.2.30 Considering the information given, the EANPG agreed to the following:

EANPG Conclusion 52/13 - Guidance on the use of ATS Route Designators

That the ICAO Regional Director, Europe and North Atlantic undertake the necessary action to provide guidance regarding:

a) the time buffer required before a released ATS route designator can be re-used; and

b) ways to ensure, at the global level, the uniqueness of designators for ATS routes which do not form part of the regional networks.

EANPG Conclusion 52/14 - Optimisation of use of existing and future reservations of ATS route designators

That, in order to optimise the use of existing and future reservations of ATS route designators in ICAO Five Letter Name Codes And Route Designators (ICARD), the ICAO Regional Director, Europe and North Atlantic, invite the ICARD Route Designator Coordinators:

a) to carry out a rationalisation process of existing ATS route designators; and

b) to ensure, for future requests, upgrade of the status of regional route designators from “requested” to “allocated”, once they are informed of the implementation of the associated ATS routes.

4.2.31 The EANPG also took note of the discussions on issues related to the duplication of 5LNC and problems and potential safety issues with sound-like 5LNCs and agreed to the User Forum conclusions that the current system/algorithm needed to be optimised. Therefore the EANPG agreed to the following:

EANPG Conclusion 52/15 - Five-letter name-codes duplication issues

That, considering the safety issues caused by the use of duplicated five-letter name-codes (5LNC), the ICAO Regional Director, Europe and North Atlantic initiate the necessary action to:

a) provide an exhaustive list of duplicate 5LNCs used at regional level and at global level; and

b) co-ordinate between the ICAO Regional Offices and all States in order to remove the 5LNC duplicates.

4.2.32 The EANPG noted the conclusions from the ICARD User Forum and supported the view that there was an increasing demand to use ICARD for additional functions than it had been initially designed for. Therefore the EANPG supported the COG endorsement of a multi-disciplinary Task Force in order to investigate the identified aspects as well as to develop requirements in these several areas. It was noted that the composition of the COG ICARD TF, which will be opened to interested participants from States and International Organisations within the ICAO EUR Region, could also include nominated persons from outside this Region. The short timeframe for this work is related to the evolution process of ICARD into a global system and the experience gained from the ICARD operation within the ICAO EUR Region could also be beneficial to other ICAO regions. Therefore the EANPG agreed to the following conclusion:

EANPG Conclusion 52/16 - Further development of the ICARD database

That, from the recommendations provided by the ICAO Five Letter Name Codes And Route Designators (ICARD) user forum and the future ICARD Task Force, the ICAO Regional Director, Europe and North Atlantic initiate the necessary action to enhance the ICARD database in order to optimize the efficiency of the tool to be used globally.

4.3 AERONAUTICAL INFORMATION MANAGEMENT

Status of implementation of the required AIS/MAP facilities and services

4.3.1 The EANPG reviewed the status of implementation of the required AIS/MAP facilities and services in the ICAO EUR Region based on the information provided by both EUROCONTROL (for the ECAC States) and the COG/AIM TF/19 meeting for the States of the Eastern part of the ICAO EUR Region. It was highlighted that the implementation of the current ICAO Annex 4 and Annex 15 provisions represents a pre-requisite for the transition from AIS to AIM and as such the status of implementation of the following steps of Phase 1 of the ICAO Roadmap for the transition from AIS to AIM (Consolidation) was particularly reviewed:

- P-03 — AIRAC adherence monitoring;
- P-04 — Monitoring of States' differences to Annex 4 and Annex 15;
- P-05 — WGS-84 implementation;
- P-17 — Quality.

4.3.2 With regard to the AIRAC adherence (P-03), the EANPG noted that Italy, Spain, Kyrgyzstan, Tajikistan and Turkmenistan have not fully complied with the AIRAC procedures, in accordance with Annex 15 provisions. In particular, the EANPG noted with concern that recently, Italy and Spain have made a last minute postponement of AIRAC AIP amendments (Italy affecting Bari and Spain affecting Barcelona and Valencia). The consequences of such postponements could have resulted in serious flight safety issues for both airline operators and ATC, as it would be impossible in many cases to revert to the previous version of the airborne navigation databases. In such circumstances, the correct data would not be available to flight crews. Charts (for use in the cockpit and by ATC) having a different production schedule may be updated to reflect the postponement but would contradict with the airborne navigation databases.

4.3.3 The EANPG recalled that the COG/44 meeting in June 2009 noted with concern that Greece, Spain and Italy were not complying with the AIRAC procedures and made last minute postponements of major changes. Accordingly, COG developed Conclusion 44/1 and as a follow-up action, the EUR/NAT

Office of ICAO through State Letter Ref.: EUR/NAT 09-376.RD dated 3 September 2009, invited the above-mentioned States to comply with the AIRAC procedures and COG Conclusion 44/1.

4.3.4 The EANPG noted also that, recently the Russian Federation published an AIRAC AIP Amendment with an effective date which does not correspond to an AIRAC date. However, the Russian Federation ensured that this AIRAC AIP Amendment does not bring major changes and accordingly does not compromise safety; in addition, this represents a single occurrence of non-adherence to the AIRAC procedures and ensured that the Russian Federation has a mechanism in place to ensure full compliance to the AIRAC system in the future.

4.3.5 It was highlighted that the AIRAC system has proved to be an effective means of regulating and controlling the provision of aeronautical information affecting operation of aircraft. In addition, the AIRAC system has been used as a basic source of information for the updating of computer-based navigation systems. The EANPG agreed that, in order for the AIRAC system to operate satisfactorily, it is essential that the technical branches of the State aviation authority that are assigned the responsibility of supplying raw data to the AIS be thoroughly familiar with the AIRAC procedures. In particular, it was emphasized that implementation dates other than AIRAC effective dates must not be used for pre-planned, operationally significant changes requiring cartographic work and/or updating of navigation databases. Furthermore, in accordance with Annex 15 and the EUR Basic ANP provisions, it was recalled that whenever major changes to the air navigation system are planned (i.e. extensive changes to procedures or services which will impact international air transport), an advance notice of 56 days, i.e. twice the minimum AIRAC cycle, should be used.

4.3.6 Based on the above, the EANPG agreed to the following:

EANPG Conclusion 52/17 - Late postponement of AIRAC AIP Amendment

That, considering the serious impact the late postponements of AIRAC AIP Amendments have on efficient operations and flight safety, the ICAO Regional Director, Europe and North Atlantic on behalf of the EANPG:

a) urge States to avoid any last minute postponement of major changes published in those cases when the reinstatement of the old situation is required; and

b) invite States to perform a thorough and timely planning of all major aeronautical information changes involving all parties concerned.

4.3.7 The EANPG noted with concern that only 17 ECAC States have fulfilled their obligations with respect to the filing of differences related to Annexes 4 and 15, in accordance with Article 38 of the Chicago Convention. It was further noted that six (6) States from the Eastern Part of the ICAO EUR Region have not notified ICAO of their differences to Annex 4 and/or Annex 15.

4.3.8 With regard to WGS-84 implementation (P-05), it was noted with concern that no significant progress has been achieved. In this regard, the EANPG noted that, with a view to expedite the implementation of WGS-84 in the Eastern Part of the ICAO EUR Region, the COG/AIM TF/19 meeting was of view that the Interstate Aviation Committee (IAC), which is responsible for the certification of aerodromes in some States of the East-European Region, should be invited to include the implementation of WGS-84 and aeronautical data quality requirements in the list of minimum requirements for the certification of aerodromes. Accordingly, the EANPG agreed to the following:

EANPG Conclusion 52/18 - WGS-84 implementation in the Eastern Part of the ICAO EUR Region

> That, with a view to expedite the completion of WGS-84 implementation in the Eastern Part of the ICAO EUR Region, the ICAO Regional Director, Europe and North Atlantic invite the Interstate Aviation Committee (IAC), which is responsible for the certification of aerodromes in some States of the East-European Region, to consider the inclusion of the WGS-84 implementation and aeronautical data quality requirements in the list of minimum requirements for the certification of aerodromes.

4.3.9 With regard to the status of implementation of Quality Management System (P-17), the EANPG noted with satisfaction that lately the AISs of Azerbaijan, Moldova and Serbia have been certified ISO 9001. However, eleven (11) States have not yet implemented a Quality Management System for their AIS/MAP Services (Belarus, Bosnia and Herzegovina, Georgia, Greece, Kazakhstan, Kyrgyzstan, Malta, Tajikistan, The Former Yugoslav Republic of Macedonia, Turkmenistan and Uzbekistan). Accordingly, they were reflected in the list of air navigation deficiencies.

4.3.10 The EANPG noted that, as a follow up action to the EANPG Conclusion 51/21, a QMS for AIS/MAP Services Implementation Workshop was held in Tashkent, Uzbekistan from 13 to 15 July 2010.

Aeronautical Information Management (AIM)

4.3.11 The EANPG was apprised of the latest developments related to AIM and reiterated the need for a strategic and harmonized transition from AIS to AIM. In this regard, the EANPG noted the progress made by ICAO in the transition towards AIM by addressing the recommendations resulting from the 2006 Global Aeronautical Information Services (AIS) Congress and through amendments to Annexes 4 and 15 that are designed to progress the global framework required for the implementation of AIM.

4.3.12 The EANPG noted that as a follow-up action to the EANPG Conclusion 51/23, the EUR/NAT Office of ICAO carried out a survey related to National Plans for the transition from AIS to AIM. The EANPG reviewed the replies received from twenty (20) States (Azerbaijan, Belgium, Estonia, Finland, France, Germany, Latvia, Lithuania, Moldova, Norway, Poland, Russian Federation, Serbia, Slovak Republic, Spain, Switzerland, Sweden, The Netherlands, Ukraine and United Kingdom) as well as the information related to the status of implementation of the different steps of the ICAO Roadmap for the transition from AIS to AIM emanating from the COG/AIM TF/19 meeting. The EANPG further noted that additional reply has been received from Cyprus during the meeting.

4.3.13 Based on the information provided, the EANPG noted that an important number of States have not yet developed a National Plan for the transition from AIS to AIM and accordingly urged them to do so. The EANPG agreed also that necessary measures should be taken to speed up the completion of Phase 1 of the Roadmap (Consolidation). In particular, it was highlighted that:

- several States have requested assistance from ICAO, especially for the development of additional SARPs and guidance materials to assist States in the transition from AIS to AIM;

- a need to review the Roadmap for the transition from AIS to AIM to provide a more detailed description of the different steps and realistic timelines; and

- the majority of the States that have replied to the questionnaire confirmed that they are encountering/expecting some difficulties during the transition from AIS to AIM. The following difficulties have been highlighted:

    - lack of appropriate resources;

- training of Staff; one of the main difficulties is to develop the required competency for the AIM staff, taking into consideration the absence of an ICAO Training Manual for the AIM personnel;
- increased workload for the regulators to oversight the whole data chain;
- implementation of data quality and data integrity monitoring;
- awareness and commitment of data originators, and adoption of appropriate arrangements with all data originators;
- eTOD implementation;
- necessity to amend the National Regulations to include AIM requirements; and
- institutional issues (especially regarding electronic/digital data).

- a request for the availability of the guidance material related to AIM in the Russian language.

4.3.14 The EANPG agreed therefore to the following:

EANPG Conclusion 52/19 - Transition from AIS to AIM

That, the ICAO Regional Director, Europe and North Atlantic:

a) urge States, that have not yet done so, to:

i) develop their national plans for the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM); and

ii) take necessary measures to speed up the completion of Phase 1 of the Roadmap (Consolidation)

b) invite EUROCONTROL to provide appropriate assistance, as required, to those States and Air Navigation Service providers experiencing difficulties to transition from AIS to AIM in an expeditious manner.

EANPG Conclusion 52/20 - SARPs and Guidance material for the Transition from AIS to AIM

That, the ICAO Regional Director, Europe and North Atlantic undertake the necessary action to:

a) review the Roadmap for the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM) to provide a more detailed description of the different steps and realistic timelines;

b) expedite the development of necessary SARPs and additional guidance material to assist States in the transition from AIS to AIM, in particular those related to:

i) data interchange and systems interoperability;

ii) Aerodrome Mapping (P-15);

iii) Electronic Aeronautical Charts (P-20);

iv) Interoperability with MET products (P-19);

v) Unique identifiers (P-7);

vi) Communication networks (P-10);

vii) Quality Management System (AIM Quality Manual); and

viii) AIM Staff Training (AIM Training Manual).

4.3.15 The EANPG was apprised of the EUROCONTROL developments in the AIM field related mainly to aeronautical data quality implementation, Aeronautical Information Exchange Model (AIXM 5.1), digital NOTAM and System Wide Information Management (SWIM).

Aeronautical data and aeronautical information quality

4.3.16 The EANPG recalled that the European Commission adopted on 26 January 2010 the Regulation 73/2010 laying down requirements on the quality of aeronautical data and aeronautical information for the Single European Sky (ADQ). The EANPG was informed about the steps taken by EUROCONTROL with a view to actively support the implementation by States. In particular, the EANPG noted that an ADQ Implementation Support Cell (ADQ-ISC) has been established to provide support and guidance to States. The following support tasks are addressed through the ADQ-ISC:

- Implementation Support;
- Development and Provision of Awareness and Training;
- Establishment and Maintenance of a Website;
- ADQ Guide Maintenance and Evolution;
- Development of further guidance material.

4.3.17 It was highlighted that further information related to ADQ is available at: http://www.eurocontrol.int/adq.

Aeronautical Information Exchange Model (AIXM 5.1)

4.3.18 With regard to AIXM 5.1, the EANPG noted that an AIXM Change Management Process proposal was developed by EUROCONTROL and FAA taking into consideration the guidance provided by various AIXM stakeholders, in particular ANSP and manufacturing industry. It was highlighted that the key to success for management of an AIXM Change Control Board (CCB) is the identification of the main AIXM stakeholder groups and their specific interests. The CCB would be primarily responsible for the maintenance of the AIXM model. The EANPG noted that further information related to AIXM 5.1 is available at: http://www.aixm.aero.

Digital NOTAM

4.3.19 The EANPG recalled that digital NOTAM is an element of the ICAO Roadmap for the transition from AIS to AIM, which is based on AIXM version 5 and on a concept developed jointly by EUROCONTROL and the Federal Aviation Administration of the United States (FAA). It was noted that an implementation roadmap for digital NOTAM in the ECAC Area was developed in consultation with stakeholders and an incremental approach was endorsed.

4.3.20 The EANPG noted that a clear scope is proposed for the Increment #1 of the digital NOTAM Implementation, in the form of eight categories of "events":

- Airspace activation / reservations / warning areas / CTR (that are not H24);
- Route closures1 (CDR1, CDR 2, other routes);
- Navaid events (enroute and airport, including ILS);
- Airport/Runway closures;
- Taxiway closures;
- Obstacles;
- SNOWTAM;

- All other NOTAM as Text NOTAM associated with the feature.

4.3.21 It was further noted that detailed rules for the encoding of the information that is associated with these event scenarios are developed in the form of a digital NOTAM Event Specification. An implementation schedule is proposed for the first increment, which includes the EAD plans for delivering a digital NOTAM (initial capability by 2012). The proposed objective is to achieve a complete implementation of the first increment by 2016.

4.3.22 The EANPG noted that the results of the digital SNOWTAM Trial, which was conducted in December 2009 by EUROCONTROL confirmed the benefits that digital NOTAM brings both for data originators (airports) and data users (airlines): better data quality, faster and more effective data processing and consultation, graphical visualisation and improved data filtering capabilities. It was highlighted that based on the outcome of the trial a SNOWTAM Harmonisation Guidelines and a proposal for improving the ICAO SNOWTAM SARPs were developed.

4.3.23 For further information related to digital NOTAM, States were invited to consult the following website: http://www.eurocontrol.int/aim/public/standard_page/xnotam.html.

System Wide Information Management

4.3.24 The ICAO Global Air Traffic Management Operational Concept depends upon a System Wide Information Management (SWIM). The EANPG recalled that through SESAR developments, the main Information Management (IM) deliverables requiring global standardization are the ATM Information Reference Model (AIRM) and Information Service Reference Model (ISRM). These will establish the framework which defines seamless information interchange between all providers and users of shared ATM information, so as to enable the assembly of the best possible integrated 4D picture of the past, present and (planned) future state of the ATM situation.

4.3.25 Considering all of the foregoing, the EANPG agreed to the following:

EANPG Conclusion 52/21 - EUROCONTROL AIM developments

That, the ICAO Regional Director, Europe and North Atlantic, on behalf of the EANPG:

a) advise the States of the Eastern Part of the ICAO EUR Region of the EUROCONTROL developments in the Aeronautical Information Management (AIM) field, in particular those related to Aeronautical Information Exchange Model (AIXM) and digital NOTAM;

b) encourage the States of the Eastern Part of the ICAO EUR Region to take into consideration these developments in the process of planning and implementation of the transition from Aeronautical Information Services (AIS) to AIM; and

c) invite EUROCONTROL to provide regular updates on the AIM developments and related activities to EANPG and its Programme Coordinating Group (COG).

Electronic Terrain and Obstacle Data (eTOD)

4.3.26 The EANPG noted that Amendment 36 to Annex 15 introduced major changes to the eTOD provisions related especially to Area 2. It was recognized that this Amendment brought stability, clarity and less stringent SARPs related to eTOD. In particular, it was noted that the applicability date for Areas 2 and 3 has been changed from 15 November 2012 to 12 November 2015. In addition, it was highlighted that the provisions related to Areas 2 and 3 are applicable to the aerodromes regularly used by international civil aviation.

4.3.27 The EANPG noted that as a follow-up action to the EANPG Conclusion 51/22, the EUR/NAT Office of ICAO through State Letter Ref.: EUR/NAT 10-0326.TEC dated 7 April 2010 informed States about the latest developments related to eTOD introduced by Amendment 36 to Annex 15 and highlighted that the Draft eTOD FASID Table endorsed by the EANPG/51 meeting through Conclusion 51/22, is no longer suitable and needs adjustment. In this regard, it was highlighted that the EANPG/51, through Conclusion 51/24, agreed that the whole part of the EUR ANP related to AIS/AIM should be reviewed in order to introduce necessary planning material related to the transition from AIS to AIM, including eTOD. The EANPG noted that States were requested to provide their eTOD implementation plans specifying clearly the status of implementation of Area 1 and Area 4 which have been applicable since November 2008.

4.3.28 The EANPG reviewed the replies received from nineteen (19) States (Belgium, Czech Republic, Estonia, Finland, France, Germany, Greece, Latvia, Moldova, Norway, Poland, Romania, Serbia, Slovak Republic, Sweden, Switzerland, Turkey, United Kingdom and Uzbekistan) and noted that no significant progress has been achieved in the implementation of eTOD provisions. Accordingly, the EANPG invited States that have not yet done so to develop an implementation plan for the provision of eTOD indicating clearly the intended dates of implementation, especially with regard to Area 1 and Area 4 and eventually notify ICAO of any difference related to the provision of eTOD for Area 1 and Area 4.

4.3.29 From the 19 replies received, the following was highlighted:

- States are at different stages with regard to the implementation of eTOD provisions for Area 1 and Area 4;

- no State has met the ICAO timescales for the implementation of eTOD provisions for Area 1 and Area 4 (20 November 2008). However, a number of States are planning to provide eTOD data for Area 1 and Area 4 with different dates of implementation (end of 2010 up to 2016);

- some States have not yet developed an eTOD implementation plan;

- two (2) States indicated that they are planning to develop an AIS/AIM plan by end of 2010; this plan would include an eTOD implementation plan;

- one (1) State indicated that an eTOD implementation plan would be of interest after the implementation of WGS-84;

- some States have already notified ICAO about a difference for the provision of eTOD for Area 1 and Area 4.

4.3.30 The EANPG was apprised also of the outcome of the COG/AIM TF/19 meeting related to the implementation of eTOD in the Eastern Part of the ICAO EUR Region.

4.3.31 The EANPG noted that although Amendment 36 to Annex 15 has brought stability, clarity and less stringent requirements to SARPs related to eTOD, a number of minor inconsistencies have been identified. It was highlighted that these inconsistencies, which will be addressed/resolved through Amendment 37 to Annex 15 (in 2013) are related mainly to Area 2 and do not impede States to implement Annex 15 provisions related to Area 1 and Area 4, applicable since November 2008 and to start the planning for the implementation of Area 2 and eventually Area 3 provisions. Furthermore, the EANPG noted that EUROCONTROL has released a Draft TOD Manual in June 2010 (formal release expected early 2011). It was highlighted that the inconsistencies identified in Amendment 36 to Annex 15 have been also addressed in this Manual.

4.3.32 Based on the above, the EANPG agreed to disregard the Draft eTOD FASID Table endorsed by the EANPG/51 meeting through Conclusion 51/22. Therefore, the EANPG agreed to the following:

EANPG Conclusion 52/22 - Electronic Terrain and Obstacle Data (eTOD)

That, the ICAO Regional Director, Europe and North Atlantic invite States that have not yet done so to:

a) amend their national regulations to reflect the eTOD provisions in accordance with Annex 15 – *Aeronautical Information Services* (as amended by Amendment 36);

b) notify ICAO of any difference related to the provision of eTOD for Area 1 and Area 4, if any;

c) develop an implementation plan for the provision of eTOD indicating clearly the intended dates of implementation; and

d) use the guidance material provided in the *Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information* (Doc 9881) and EUROCONTROL TOD Manual.

EANPG Conclusion 52/23 - Monitoring the status of implementation of eTOD in the ICAO EUR Region

That, in order to provide regular updates on eTOD related activities to EANPG and its Programme Coordinating Group (COG):

a) EUROCONTROL be invited to monitor the status of implementation of eTOD in the ECAC Area and provide necessary assistance to States; and

b) the COG/AIM Task Force monitor the status of implementation of eTOD in the Eastern part of the ICAO EUR Region and provide necessary guidance to States.

4.4 COMMUNICATION, NAVIGATION AND SURVEILLANCE

Aeronautical Fixed Service (AFS)

4.4.1 The EANPG was presented with the progress of the various planning and implementation programmes related to the EUR AFS evolution as coordinated through the work of the EANPG AFSG.

4.4.2 In particular, the work in support of the ongoing planning and implementation of the Internet Protocol (IP) based EUR regional networks was noted. It was recalled that the EUR ANP envisioned a transition to the IP based EUR AFS and that States had embarked on planning and implementation activities in line with this regionally agreed roadmap. In this regard information on the status of the Pan-European Networks (PENS) programme that started its roll-out in 2010 was noted. It was recalled that the PENS was a required common facility for AMHS deployment in the EUR alongside with other AFS components and was essential in providing an initial underlying communications backbone in support of the future SWIM concept.

4.4.3 In this regard, the discussion regarding the possible use of IPv4 and/or IPv6 by AMHS and other AFS systems was noted. Recognising the benefits of IPv6 and in order to support the evolution of the EUR IP based AFS networks and ensure unique and unambiguous addressing of systems utilizing IP network services, the EANPG agreed to the following:

EANPG Conclusion 52/24 - Development of IP based EUR networks

That the ICAO Regional Director, Europe and North Atlantic, invite States to:

a) develop national plans, in line with the ICAO *Manual on the Aeronautical Telecommunication Network (ATN) using Internet Protocol Suite (IPS) Standards and Protocols* (Doc 9896), for migration to IPv6 taking the existing IPv4 based aeronautical systems into account;
b) consider the use of IPv4/IPv6 protocol translation devices only as a provisional solution during the migration; and
c) include a requirement for both IPv4 and IPv6 in their ongoing Air Traffic Services (ATS) Message Handling System (AMHS) implementation programmes in order to ensure seamless transition and interoperability.

4.4.4 Furthermore, the EANPG noted that in response to Conclusions EANPG 49/23 and EANPG 49/24, an ICAO State Letter with a subject of management and update of air traffic services (ATS) message handling system (AMHS) address information ref (AN 7/49.1-09/34) was circulated on 14 April 2009. This letter had informed States that in the short- to medium-term ICAO will utilize the EUR ATS Messaging Management Centre (AMC) to coordinate the allocation and management of AMHS addresses. All States were therefore invited to designate representatives to register as AMC users using the procedure described in the Attachment to the letter. Another attachment included procedures for AMHS address coordination through the AMC. The letter urged States and ANSPs, operating international COM Centres, with the intention of implementing AMHS in the foreseeable future, to engage themselves into the AMHS address coordination process through the AMC without delay.

4.4.5 The EANPG was also informed that in response to Conclusion EANPG51/14, the ICAO EUR FASID would now encompass the EUR Aeronautical Fixed Telecommunication Network (AFTN)/Common ICAO Data Interchange Network (CIDIN)/AMHS, ATS on-line data interchange (OLDI) and ATS Direct Speech international connectivity. This would be achieved through the expansion of the coverage of the EUROCONTROL maintained Flight Message Transport Protocol (FMTP) and ATM Ground Voice Network (AGVN) database inventories to cover the entire EUR Region and provide the respective international connectivity tables in the agreed format on a periodic basis for the purpose of the ICAO EUR Air Navigation Plan.

EUR aeronautical radio frequency spectrum requirements

4.4.6 The EANPG was provided with a chart providing a visual indication of the degree to which aeronautical frequency spectrum requirements could be satisfied in each aeronautical frequency band for each year until 2025. The information provided in the chart was based on historical data contained in the ICAO EUR Air Navigation Plan Tables and the satisfaction ratio of the FMG BPMs.

4.4.7 The chart indicated that congestion in the VHF COM and NAV bands persisted and was particularly acute in the areas with the highest density of flights in the EUR Region. It was projected that more than 50% of the VHF COM frequency requirements would not be satisfied in the high traffic density parts of the EUR Region in the coming years. Spectrum access problems, although to a lesser degree and caused by different reasons, also existed in other frequency bands, including HF, SSR and AMS(R)S.

4.4.8 The EANPG noted the progress of various ongoing activities aimed at alleviating the current and future forecasted frequency spectrum congestion. It was recalled that in regard to the VHF COM band, it was demonstrated that only the full implementation of 8,33KHz VHF COM channel spacing would permit all VHF COM frequency demand to be met in the ICAO EUR Region until at least 2025. In this regard and recognising the progress and applicability area of the currently being reviewed European Commission (EC)

Regulation 1265/2007 on Air-Ground Voice Channel Spacing (A-VCS), EANPG/52 had agreed to urge States to proceed with the full implementation of 8.33 kHz channel spacing by 2018 with an intermediate phase by 2014.

4.4.9 The EANPG recalled that work was being undertaken within ICAO to develop future communication systems to address the future operational needs in the 2025+ timeframe. It was noted that taking into account the usual timeframes for the design, standardization, certification and equipage of any aviation equipment, it was questionable if the future communication systems will be available to equip a sufficient number of aircraft by 2025.

4.4.10 In addition, it was noted that the main thrust of this work was on meeting the future operational requirements in data link communications. However, as illustrated by the chart, the most urgent issue for the EUR was located in the VHF COM band. Therefore, the EANPG had concurred that there was an urgent need to accelerate the work undertaken on the development of the future communication systems and specifically target them on meeting the future VHF voice requirements.

4.4.11 With regards to the VHF NAV band, it was observed that this band was occupied by a multitude of conventional and future aeronautical systems. It was felt that the need for multitude systems to be operated for the same purpose should be minimised. It was recalled that in line with the EUR Air Navigation Plan the use of VORs and NDBs should be gradually reduced and eventually removed from service by 2020. This would allow alleviating congestion in the VHF NAV band but also reducing the fuel consumption and CO2 emissions.

4.4.12 With this in mind, the EANPG agreed to the following:

EANPG Conclusion 52/25 - Addressing aeronautical frequency spectrum congestion

That the ICAO Regional Director, Europe and North Atlantic:

a) recognising the progress and applicability area of the currently being reviewed European Commission (EC) Regulation 1265/2007 on Air-Ground Voice Channel Spacing (A-VCS), urge States to proceed with the full implementation of 8.33 kHz channel spacing by 2018 with an intermediate phase by 2014;

b) recognising the continued congestion in the aeronautical VHF voice band in the European Region, initiate development of the future operational requirements for VHF voice communications with the goal to reorient the ICAO work on future communication systems in order to address the future operational needs with regards to aeronautical VHF voice communications; and

c) remind States to adhere to the provisions of the ICAO EUR Air Navigation Plan with regards to the gradual removal of VORs and NDBs from service by 2020.

ICAO position for ITU WRC-12

4.4.13 The EANPG noted the progress of ICAO preparation to the 12th International Telecommunication Union (ITU) World Radiocommunication Conference (WRC-12) and examined the strategy for establishing and promoting the ICAO Position on the issues of critical concern for international civil aviation to be discussed at WRC-12. It was agreed that in order to balance the increased attention, pressure and resources given to the ITU WRC process by other (non-aviation) services, aviation must similarly increase its profile in this process. To this end, it needed to be ensured that necessary resources, as described in Assembly Resolution A36-25 and discussed at the 37th Assembly, were made available for the ITU WRC process.

4.4.14 In this regard, the EANPG recalled the ICAO Position had been circulated via State Letter E 3/5-09/61 dated 30 June 2009 and that the previous EANPG had endorsed Conclusions 51/6 and 51/7 whereby States were urged to ensure, via their National Telecommunication Agencies, that the ICAO position would be taken into account in the national and regional preparatory activities for WRC-12 and civil aviation experts would be made available to assist in various national and regional WRC-12 preparatory activities. The same Conclusions had also invited International Organisations (IATA, NATO, EC, ECAC, EUROCONTROL) and other organisations to ensure coherence with the ICAO position and support ICAO during various regional WRC-12 preparatory activities. The EANPG had agreed that Conclusions 51/6 and 51/7 would remain valid. It was noted that further updates would be provided to the next meeting and that an ICAO EUR preparatory workshop for ITU WRC-12 would be held on 17-18 March 2011 in Paris.

4.5 HUMAN RESOURCES

Report on Outcomes of Initiatives Regarding Next Generation of Aviation Professionals

4.5.1 The EANPG was provided with a progress report on the next generation of aviation Professionals (NGAP) initiatives that were launched by ICAO to ensure that an adequate number of qualified and competent aviation professionals would be available to operate, manage and maintain the future international air transport system.

4.5.2 The EANPG noted that a NGAP Task Force was created in May 2009 and the NGAP Symposium held at ICAO Headquarters (1 to 4 March 2010) supported the establishment of a work programme to address the enhancement of training for flight crew, air traffic management and aircraft maintenance personnel to meet the demands of new procedures and increasingly complex technologies, while the High-level Safety Conference (HLSC), held in Montréal in March 2010 recommended that States and international organizations should support the work of the NGAP Task Force. This subject was also supported by the 37th session of ICAO Assembly held in September/October 2010.

4.5.3 The EANPG, when discussing the initiatives of the next generation of aviation professionals, was informed by the Secretariat of the assistance that Regional Officers from EUR/NAT Office of ICAO were providing to training institutes in France, Austria and among others and that one internship position had been created to support young aviation professionals to obtain experience with ICAO.

4.5.4 The EANPG noted the global developments in the field of recruitment, education, training and retention of next generation of aviation professionals and agreed that they would take them into account when working its regional strategy/work programme.

Language Proficiency Requirements

4.5.5 The EANPG was informed on the developments related to the ICAO language proficiency requirements implementation and in particular on the outcome of the Language Proficiency Requirements Implementation (LPRI) workshop held in Rome, Italy, from 3 to 5 March 2010 and recalled the COG/47 Conclusions in this respect:

That the ICAO Regional Director, Europe and North Atlantic:

a) encourage States to use the updated Recommended Action Plan 2010-2011;

b) coordinate with ICAO Headquarters the urgent need to put in place language proficiency (LP) test endorsement process;

c) encourage States to initiate regulatory oversight of all aspects of aviation language proficiency training and testing, including LP maintenance and sustainability;

d) encourage States to apply safety management principles, namely risk assessment for scenario after 5 March 2011;

e) in close coordination with COG/TNG TF, organize a workshop on LP maintenance and sustainability before end 2010.

4.5.6 The EANPG was informed that:

- the up-dated version of the Recommended LPRI Action Plan is published on the ICAO EUR/NAT web site;

- that ICAO would establish a mechanism which will provide States with impartial recommendations in the selection or development of aviation English language licensing tests that meet ICAO criteria and foster licensing test quality as specified in ICAO guidance among as many test providers as possible and that the first endorsement processes was tentatively planned to start by the end of 2010;

- some States in the ICAO EUR Region conducted regulatory oversight of aviation training and testing, including language proficiency maintenance, however, this would be a subject for the ICAO workshop on LPRI for the EUR States to be conducted in Paris from 8 to 10 December 2010.

4.5.7 The EANPG was also informed about the initiative of the Russian Federation to host the ICAO LPRI workshop with the special emphasis on the importance of the language proficiency as a contributing factor to the safety. It is planned that this workshop will be held in St. Petersburg in March 2011.

4.6 PERFORMANCE BASED NAVIGATION IMPLEMENTATION

Status of the PBN implementation

4.6.1 The EANPG was presented with the status of implementation of the ICAO Assembly Resolution 36-23 on PBN global goals that urged all States to implement Area Navigation (RNAV) and required navigation performance (RNP) Air Traffic Services (ATS) routes and approach procedures in accordance with the ICAO Performance Based Navigation (PBN) concept as laid down in the ICAO PBN Manual (Doc 9613). It was noted that the foregoing Resolution was superseded by the 37th ICAO Assembly (Resolution 37-11 refers) to state that States are urged to complete a PBN implementation plan as a matter of urgency to achieve implementation of:

- RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and

- approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; and

- straight-in LNAV only procedures, as an exception to 2) above, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certificated take-off mass of 5 700 kg or more.

4.6.2 It was recalled that the ICAO EUR PBN Task Force (PBN TF) was established in order to foster PBN implementation in the ICAO EUR Region. The PBN TF regularly provided reports to the

EANPG and COG on any work completed and/or issues identified. As part of its work programme the PBN TF had developed a methodology and certain tools in order to track PBN implementation progress in the ICAO EUR Region:

- a questionnaire was drafted with the intention of assisting States and service providers in developing their national plans, and to elicit information on the status and future plans related to the implementation of PBN (in en-route and terminal airspace) and APV;
- a new Supplement Table (CNS4b) was designed to track the progress of instrument approach procedures and associated navigation services and facilities, including information on existing and planned APV implementation.

4.6.3 In this regard, the EANPG recalled that with the aim of assessing the readiness of the States in the ICAO EUR Region to comply with the provisions of Assembly Resolution 36-23, EANPG/51 (1-3 December 2009) endorsed Conclusion 51/17 urging States to provide information on the status of their national PBN implementation planning. A questionnaire was circulated to ICAO EUR States on 15 January 2010 (EUR/NAT 10-28.TEC).

4.6.4 The responses received were collated by the Secretariat and included in **Appendix J** to this report. Information provided in Appendix J also included the status of PBN planning and implementation as collected via the EUROCONTROL LSSIP programme and with the assistance of the EUROCONTROL RNAV Approaches Task Force (RATF). The EANPG based on the information provided in Appendix J had concluded that the ICAO EUR Region was in general in compliance with the requirements of the Assembly Resolution, in particular with regards to PBN implementation in en-route and terminal airspace.

4.6.5 However, taking the outcome of the discussions of the 37th ICAO Assembly into account, it was agreed that a reminder to the ICAO EUR States to continue their PBN planning and implementation activities in accordance with the ICAO PBN concept as laid down in Doc 9613 and provide information on the status of implementation to the EUR/NAT Office of ICAO would be timely and helpful to foster implementation.

4.6.6 Similarly, the EANPG had noted information collected via the EUR ANP Supplement Table (CNS4b) that was designed to track the progress of APV implementation (**Appendix K** refers). It was noted in this regard, that only a small number of States had provided information on their national APV plans and even fewer had informed of their compliance with the deadlines of the Assembly Resolution. Therefore, the EANPG agreed to the following:

EANPG Conclusion 52/26 - Status of PBN Implementation

That the ICAO Regional Director, Europe and North Atlantic, invite States to update or confirm information on the status of Performance Based Navigation (PBN) implementation in the ICAO EUR Region, as provided in **Appendices J and K** to this report.

4.6.7 In regard to the progress of APV implementation, the EANPG had recalled that several issues were identified and reported that could potentially preclude the ICAO EUR States from complying with the provisions of Assembly Resolution 36-23. The list of issues included the following:

a) decisions to implement APV often rested within the remits of aerodrome operators or service providers. These decisions were taken on the basis of the cost and benefit analysis and associated safety cases. States, while taking a proactive approach to APV implementation, had often a limited influence on business decisions of service providers and aerodrome operators in the implementation of APV;

b) Global Navigation Satellite System (GNSS) was not approved as a valid means of navigation for approach by some regulators;

c) rate of operators' RNP APCH and/or APV approvals was often insufficient and lagged behind the progress of implementation on the ground and aircraft equipage, and

d) some implementation issues needed to be resolved, e.g. insufficient number of trained procedure designers and an urgent need to establish a global or regional SBAS channel number allocation mechanism.

4.6.8 The EANPG had noted that in view of the above, the deadlines of the respective Assembly Resolutions with regards to APV appeared to be challenging for the States in the ICAO EUR Region, unless the foregoing issues were fully addressed as soon as possible. Therefore, the EANPG agreed to the following:

EANPG Conclusion 52/27 - Actions to foster PBN implementation

That the ICAO Regional Director, Europe and North Atlantic:

a) urge States to undertake necessary steps to grant approvals for the use of GNSS as a valid means of navigation for approach;

b) urge States and airspace users to undertake necessary steps to increase the number of operator's RNP APCH/APV Baro-VNAV/LPV/LNAV approvals;

c) urge States, aerodrome and navigation service providers to establish collaborative implementation teams that undertake all necessary steps to increase the number of RNP APCH/APV Baro-VNAV/LPV/LNAV implementations;

d) urge States and service providers to urgently address the need to increase the number of qualified procedure designers to foster RNP APCH/APV Baro-VNAV/LPV/LNAV implementation; and

e) acknowledging the need for a single SBAS channel number assignment solution, coordinate the establishment of a globally agreed mechanism that would meet this requirement.

4.6.9 The EANPG noted that the ICAO EUR PBN TF would continue its work in line with the directives of COG Decision 47/1. In particular, the ICAO EUR PBN TF would focus its work on developing the regional APV implementation guidance material to assist ICAO EUR States in APV implementation. The EUR/NAT Office of ICAO in cooperation with the ICAO EUR PBN TF members would continue to assist the EUR States to progress the PBN implementation by organising workshops. One of such workshops was suggested to be organised in 2011 with particular focus on implementation of APV and data handling and integrity. Therefore, the EANPG agreed to the following:

EANPG Conclusion 52/28 - ICAO EUR APV implementation workshop

That the ICAO Regional Director, Europe and North Atlantic make necessary arrangements to conduct an approach procedure with vertical guidance (APV) implementation workshop for ICAO EUR States in 2011.

4.6.10 In concluding this subject, the EANPG noted the update provided on the progress of the PBN implementation in other ICAO Regions and the progress recorded by the global PBN Task Force.

4.7 METEOROLOGY

Outcome of the Twentieth Meeting of the Meteorology Group of the EANPG

4.7.1 The EANPG noted that the Twentieth Meeting of the Meteorology Group (METG/20) had been held 6 to 10 September 2010 and attended by 79 experts from 35 States in the EUR Region, Iceland and 2 International Organizations (EUROCONTROL and IATA). The EANPG was informed that the METG had noted with some concern that the World Meteorological Organization (WMO) and International Federation of Airline Pilots' Associations (IFALPA) had been unable to attend METG for the second year running. Noting these remarks, IFALPA informed the EANPG that an appropriate expert had since been identified who would participate in future activities of the METG.

4.7.2 The EANPG was informed that METG/20 had discussed a range of topics including, but not limited to, the implementation of the WAFS, SADIS and MET warnings and advisories; requirements for OPMET data and status of OPMET data exchange; implementation of MET services for low-level flights; implementation of MET services in the Eastern part of the ICAO EUR Region; MET support to ATM; and the identification, assessment and reporting of MET deficiencies. The EANPG noted that METG/20 had formulated eight draft Conclusions and four Decisions. In the context of the eight draft Conclusions, the EANPG noted that COG/48 had adopted three as COG/48 Decisions and one as a COG/48 Conclusion, whilst the remainder were presented for EANPG consideration. In the context of the four METG Decisions, the EANPG noted that no action was required on the part of the EANPG or COG. The EANPG was provided with a brief overview of those METG/20 Decisions and COG/48 Conclusion/Decisions accordingly.

Update to EUR Doc 019 / NAT Doc 006 Part II

4.7.3 In light of the eruption of the Eyjafjallajökull volcano in Iceland in April and May 2010, and as a follow-on to the considerable work undertaken by the EUR/NAT Volcanic Ash Task Force in the context of a revision to a common Volcanic Ash Contingency Plan of the EUR and NAT Regions (EUR Doc 019/NAT Doc 006 Part II), hereunder called the Plan, the EANPG noted that METG/20 had prepared a revision to the Plan endorsed by EANPG and NAT SPG in July 2010. The revision was principally intended to ensure greater consistency of Meteorological Watch Office (MWO) and Volcanic Ash Advisory Centre (VAAC) actions to be undertaken during the proactive phase of an eruption with ICAO provisions contained in Annex 3.

4.7.4 The EANPG was informed that the proposals had been reviewed by COG/48, and that COG/48 had supported the changes and proposed others of a generally minor editorial nature. In addition, noting that the Plan was common to the ICAO EUR and NAT Regions, the EANPG was informed that the 36th meeting of of NAT Air Traffic Management Group (ATMG) (20 to 24 September 2010) and the 37th meeting of the NAT Implementation Management Group (IMG) (2 to 5 November 2010) had been apprised of the proposed changes. Following consultation, the changes proposed had met with the general support of NAT ATMG/36 – although concerns with regards to the practicality of employing certain provisions in the Plan, such as NOTAM and SIGMET notification, had been expressed. In this regard, the NAT IMG/37 had tasked the NAT ATMG to further investigate the concerns in time for NAT IMG/38. Consequently, NAT IMG/37 had agreed to recommend that the revised Plan, as proposed following METG/20 and COG/48 consideration, be forwarded for consideration and endorsement of the EANPG/52 (and the NAT SPG through correspondence).

4.7.5 In view of the foregoing, the EANPG reviewed the proposed revision to the Plan, supported the changes therein, and agreed to accommodate additional minor editorial changes (to paragraphs 1.4.1 and 2.2.3a) of the Plan) as proposed by IFALPA. Therefore, the EANPG agreed to the following:

EANPG Conclusion 52/29 - Revision to EUR Doc 019/NAT Doc 006 Part II

That, the ICAO Regional Director, Europe and North Atlantic, undertake the necessary actions to publish the revised *Volcanic Ash Contingency Plan for the EUR and NAT Regions* (EUR Doc 019/NAT Doc 006 Part II) as presented at **Appendix L** to this report.

4.7.6 Recognizing that the Plan was regional guidance material (i.e. non-binding) and a living document that was to be reviewed on a regular basis and updated as appropriate based on, not least, lessons learned and experiences gained within the ICAO EUR and NAT Regions, and acknowledging that a fresh eruption within the Regions could happen at any time, the EANPG recommended that the ICAO Regional Director should be authorized to update the Plan with changes of an editorial nature (such as cross-referencing to new guidance material emerging from the work of groups such as the International Volcanic Ash Task Force (IVATF) airworthiness sub-group) in a timely and efficient manner. In addition, noting ongoing work within the IVATF concerning improvements to volcanic ash contingency procedures, the EANPG recommended that any updates to the Plan should be communicated to the IVATF accordingly.

4.7.7 In view of the foregoing, the EANPG agreed to the following:

EANPG Decision 52/4 - Editorial updates to EUR Doc 019 / NAT Doc 006 Part II

That, the ICAO Regional Director, Europe and North Atlantic:

a) be authorized to make necessary editorial changes to the *Volcanic Ash Contingency Plan of the European and North Atlantic Regions* (EUR Doc 019/NAT Doc 006 Part II) to incorporate cross-references to new guidance material as and when available; and

b) immediately advise the Secretary of the International Volcanic Ash Task Force (IVATF) of any updates to EUR Doc 019/NAT Doc 006 Part II.

Language proficiency of aeronautical MET personnel performing oral pre-flight briefings

4.7.8 The EANPG noted that a METG project team on regional harmonization of MET services for low-level flights (PT/LLF) had convened a user consultation workshop on the subject of harmonization of MET services for low-level flights in the ICAO EUR Region (in response the EANPG Conclusion 50/37). Notable findings and recommendations to emerge from the user consultation workshop had been reviewed by METG/20, including the need to improve the exchange and accessibility of LLF forecasts across the EUR Region, increase forecast consistency and achieve a more harmonized layout, and improved basic skills in the English language for MET personnel performing oral pre-flight briefings.

4.7.9 In the context of the need for improved basic skills in the English language of MET personnel performing oral pre-flight briefings, the EANPG was informed that communication problems between MET personnel and flight crew members during pre-flight briefings for low-level flights, and a lack of mutual understanding, could have an impact on the level of weather-related awareness and consequently the safety of air operations. In view of the working arrangements between ICAO and WMO contained in ICAO Doc 7475, the EANPG was informed that WMO was responsible for specifying the requirements for meteorological knowledge of meteorological personnel engaged in the provision of meteorological service for international air navigation. Accordingly, it was noted that one of the listed job competency requirements in aeronautical meteorology as defined in WMO No. 258 Supplement No. 1 was to: "*...communicate effectively, using appropriate language, with aeronautical users, including oral briefings to pilots and dispatchers as necessary*". Additionally, the EANPG was informed that provisions requiring certain language proficiency of flight crew members and ATS personnel were part of ICAO Annex 1.

4.7.10 Accordingly, METG/20 had proposed to invite WMO to develop additional job competency requirements concerning English language proficiency of aeronautical MET personnel providing oral pre-flight briefings, provided that any new requirements gave due consideration to the potential cost implications for MET service providers. The EANPG noted that COG/48 had strongly supported the METG considerations and expressed a need for some urgency.

4.7.11 In view of the foregoing, the EANPG agreed to the following:

EANPG Conclusion 52/30 - English language proficiency of aeronautical meteorological personnel providing oral pre-flight briefings

That, ICAO urge the World Meteorological Organization (WMO) to develop additional job competency requirements concerning English language proficiency for aeronautical meteorological personnel providing oral pre-flight briefings to operators and flight crew members performing international flights, in view of ensuring weather-related awareness of users and safety of air operations, whilst also paying due respect to associated cost implications for meteorological service providers.

*Note: The competency requirements developed by WMO should be similar to those contained in Annex 1 (*Personnel Licensing*) Appendix 1 Attachment A (*ICAO Language Proficiency Rating Scale*), and be included in WMO No. 258 Supplement No. 1 (*Training and qualification requirements for aeronautical meteorological personnel*).*

Proposal for amendment to Part VI (MET) of the EUR Air Navigation Plan

4.7.12 The EANPG noted that in accordance with the standing proposal for amendment procedure, and partially in response to EANPG Conclusion 51/32, the Secretariat had undertaken a comprehensive amendment to Part VI (MET) of the EUR Basic ANP and FASID since METG/19. In addition, the EANPG noted that METG/20 had undertaken a further review of FASID Tables MET 1A and 2A in order to ensure the latest MET requirements at aerodromes and exchange requirements respectively were included. METG/20 had noted that the information contained in FASID Table MET 2A was derived from FASID Table MET 1A in respect of AOP aerodromes and the SADIS Operations Group (SADISOPSG) in respect of non-AOP aerodromes. In order to ensure the relative currency of the information contained in FASID Table MET 1A, and consequently the AOP information contained in FASID Table MET 2A, METG/20 had prepared a proposal for amendment thereto. Moreover, noting that a global OPMET database was maintained by ICAO Headquarters (based on data originating from the ICAO Regions and the SADISOPSG) from which regional versions of the table could be derived, the EANPG noted that METG/20 had recommended that FASID MET 2A should be replaced by a hyperlink to the global OPMET database since the process of amending FASID Table MET 2A (and Table MET 1A) would be unaffected by this change.

4.7.13 In view of the foregoing, and taking into consideration a proposal formulated by METG PT/LLF in the context of harmonizing MET support for low-level flights, the EANPG noted that amendments to the EUR Basic ANP and FASID were necessary in relation to three further specific topics considered by METG:

i) [Basic ANP and FASID] The completed transition from the MOTNE (MET Operational Telecommunications Network Europe) system to EUR RODEX (European Regional OPMET Data Exchange) system, and the replacement of the METG Bulletin Management Group by the METG EUR OPMET Data Management;

ii) [FASID] The inclusion of information concerning meteorological observations and reports from offshore structures in support of helicopter operations; and

iii) [Basic ANP] The elimination of the requirement for voice routine reporting as a consequence of Amendment 75 to ICAO Annex 3.

4.7.14 In view of the foregoing, the EANPG agreed to the following:

EANPG Conclusion 52/31 - Proposal for amendment to Part VI (MET) of the EUR Regional Air Navigation Plan

That, the ICAO Regional Director, Europe and North Atlantic, undertake the necessary action to amend Part VI (MET) of the *EUR Regional Air Navigation Plan* (Doc 7754) as follows:

a) Volume I (Basic ANP) shown at **Appendix M** to this report concerning the elimination of the requirement for voice routine reporting, the completed transition from MOTNE to EUR RODEX, the replacement of the METG Bulletin Management Group by the METG EUR OPMET Data Management Group, and enhanced regional requirements concerning MET support for low-level flights; and

b) Volume II (FASID) as given at **Appendix N** to this report concerning meteorological observations and reports from offshore structures in support of helicopter operations, meteorological service required at aerodromes, and exchange requirements of METAR/SPECI and TAF.

Meteorological information from offshore structures to support helicopter operations

4.7.15 The EANPG noted that METG/20 had considered matters concerning the supply of MET information from offshore structures to support helicopter operations, and recalled that FASID Table MET 1C had been introduced to the EUR ANP in 2009 since the supply of MET information to support such operations was subject to regional air navigation agreement. METG/20 had been pleased to note that representatives from four States in the EUR Region with offshore commitments had met in June 2010 to discuss, in more detail, issues relating to meteorological reports from and forecasts for offshore installations provided in support of offshore helicopter operations. The States concerned (Denmark, Netherlands, Norway and United Kingdom) had formed a mutual alliance called the "MET Services for Aviation Offshore North Sea" (MetSAO North Sea) group, and had discussed a range of topics including regulations for the provision of MET information to offshore structures (including ICAO and national regulations), observations, education and skills for MET observers offshore, MET equipment, and forecasts.

4.7.16 Recognizing that supplementary information such as sea surface temperature and state of the sea from MET stations established on offshore structures in support of helicopter operations should be included in METAR (and SPECI) in accordance with regional air navigation agreement, the EANPG was informed that three of the four States involved in the MetSAO North Sea alliance were providing METAR that were compliant with the requirements and, in the majority of cases, providing AUTO METAR on a regular basis. The EANPG was informed that METG/20 had acknowledged that the Eighth Meeting of the Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG/8 held 15 to 18 February 2010) had proposed that in order to disseminate the actual wave height, the reporting of 'wave height' as an alternative to that of 'state of the sea' should be allowed (through an Amendment to Annex 3 provisions). Whilst the addition of wave height would provide a greater level of detail and was required by the North Sea helicopter operators, the AMOFSG had determined that such a change would be costly, as it would involve a change to the aeronautical meteorological codes. Accordingly, the AMOFSG had determined that a more robust user requirement should be sought from other States operating in the North Sea area in view of forming a common position.

4.7.17 In view of the foregoing, METG/20 had noted that the four States in the EUR Region involved in the MetSAO North Sea alliance had agreed that it would be beneficial if wave height (specifically *significant* wave height) could be reported as an alternative to that of state of the sea, and that an option should be provided in the METAR/SPECI as supplementary information. Acknowledging the

METG/20 view that the introduction of (significant) wave height into METAR/SPECI would have *no* bearing on those States *without* offshore operations, and would provide a greater level of detail for those States *with* offshore operations, the EANPG agreed to the following:

EANPG Conclusion 52/32 - Significant wave height as supplementary information in METAR and SPECI

That, ICAO be invited to consider the use of 'significant wave height' as an alternative to 'state of the sea' when providing supplementary information in METAR and SPECI in support of helicopter operations at offshore structures.

Activities in the context of volcanic ash contingency

4.7.18 To facilitate awareness, the EANPG was informed of actions undertaken by ICAO at a regional and global level in response to the eruption of the Eyjafjallajökull volcano in Iceland during April and May 2010. Specifically, the EANPG was informed of the activities of the EUR/NAT Volcanic Ash Task Force (EUR/NAT VATF), which had completed its necessary and urgent work in June 2010 to update the prevailing regional volcanic ash contingency plan. In addition, the EANPG was informed of the recent and ongoing activities of the International Volcanic Ash Task Force (IVATF), which was assisting the Secretariat in developing a global safety risk management framework that would make is possible to determine the safe levels of operation in airspace contaminated by volcanic ash.

4.7.19 Recalling events particularly during the first and second week of the eruption of Eyjafjallajökull in April 2010, Turkey questioned the EANPG as to whether a 60NM buffer zone that had been included on volcanic ash concentration charts (produced by EUROCONTROL and certain States in the ICAO EUR Region) had been removed at the discretion of EUROCONTROL, the States concerned or ICAO. In response, the United Kingdom outlined the decision making processes that had taken place within Europe, and that, from a United Kingdom perspective, the decision to remove the buffer zone had been taken once sufficient scientific evidence had been available to support the volcanic ash concentration forecasts. The United Kingdom outlined that the rationale that had led to this decision had been published in UK CAA communication at the time.

4.7.20 In recalling the wording in the prevailing Volcanic Ash Contingency Plan for the European and North Atlantic Regions (EUR Doc 019/NAT Doc 006 Part II), France expressed some concern regarding an inference that Area Control Centres (ACC) rather than Air Traffic Services (ATS) were responsible for issuing NOTAM, given Annex 11 (*Air Traffic Services*) provisions in this regard. In response, the Secretariat outlined that the current wording in the Plan that ACCs were "responsible for ensuring that NOTAM were issued" was intended to remove any impression that the ACC was required to publish the NOTAM, which was the responsibility of the International NOTAM Office of the State concerned.

4.7.21 The EANPG noted information provided by the United Kingdom that *Guidance Material on Management of Flight Operations with Known or Forecast Volcanic Ash Cloud Contamination* was currently being developed on behalf of the IVATF AIR 04 Team and made available a Draft Version 2 of the material, dated 24 November 2010, for consideration and possible use by the appropriate authorities.

4.7.22 The EANPG was afforded an insight into the activities of the EUR/NAT Volcanic Ash Exercises Steering Group (EUR/NAT VOLCEX/SG), which included, amongst others, the conducting of regular volcanic ash contingency exercises and volcanic ash awareness events in the ICAO EUR and NAT Regions. The EANPG noted that the EUR/NAT VOLCEX/SG had scheduled a planning meeting in Paris on 16 and 17 December 2010 to prepare the aims/objectives and scenario for the next regional volcanic ash exercise that was expected to take place circa April 2011. The EANPG was informed that in view of the lessons learned from the real eruption of Eyjafjallajökull during April and May 2010, the EUR/NAT VOLCEX/SG had determined that there should be *at least* 3 months between the planning and execution of a regional exercise. In addition, taking into consideration ongoing developments such as EUROCONTROL's

EVITA tool (European Crisis Visualization Interactive Tool for ATFCM), the EANPG acknowledged that the EUR/NAT VOLCEX/SG was not in a position to hold the next exercise any earlier than April 2011. The EANPG was pleased to note that the United States intended to participate in the next regional exercise, and that the level of interest already shown amongst airline operators had shown marked improvements when compared to similar exercises held over recent years.

4.7.23 The EANPG was informed that COG/48 had recently agreed that a Volcanic Ash Exercises Steering Group for the (far) Eastern part of the ICAO EUR Region (EUR (EAST) VOLCEX/SG) be established in order to increase awareness and initiate volcanic ash exercises with impact scenarios on trans-east, trans-polar, cross-polar routes. The EANPG was informed that further details on this initiative were available in the COG/48 report.

Activities of the meteorological/air traffic management task force of the EANPG COG (MET/ATM TF)

4.7.24 To facilitate awareness, particularly amongst the ATM community, the EANPG was informed of the ongoing activities of the Meteorological/Air Traffic Management Task Force (MET/ATM TF) of the EANPG COG, which had been tasked to pursue matters related to the development of integrated MET and ATM requirements supporting the regional implementation of the *Global ATM Operational Concept* (Doc 9854). The EANPG was informed that the work of MET/ATM TF was taking into account ATM developments such as SESAR and NextGen and the need to ensure seamlessness and interoperability across the EUR/NAT interface and other regional developments, and that the MET/ATM TF was expected to complete its task in time for COG/51 and, as appropriate, EANPG/53 consideration in 2011.

4.7.25 The EANPG supported this initiative and encouraged States and International Organizations to ensure that necessary ATM expertise was offered to assist the work of the MET/ATM TF.

Reforming the structure of meteorological services for civil aviation in the Russian Federation

4.7.26 The EANPG was apprised of changes in aeronautical meteorological services in the Russian Federation made by the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet). The structure of meteorological services for civil aviation in Roshydromet was being reformed to fully meet the obligations of the Russian Federation arising from the Convention on International Civil Aviation and the State Programme on flight safety issued by the Russian Federation government on 6 May 2008. The objective to the Programme was to alleviate deficiencies and implement a flight safety management system that would enable steady reduction in the number of accidents and casualties together with the increasing rates of modernization in the aviation industry.

4.7.27 The EANPG welcomed the ongoing and phased approach to reform that the Russian Federation had embarked upon in this regard, and noted that the Russian Federation would ensure that resultant changes to the meteorological facilities and services would be communicated to the Regional Office, as and when appropriate, to ensure necessary reflection in Part VI (MET) of the EUR Air Navigation Plan.

4.8 IMPLEMENTATION OF THE NEW CONTENTS OF THE FPL IN 2012

Implementation of flight plan amendments for 2012

4.8.1 The EANPG recalled that it had requested EUROCONTROL to expand its planning activities with regard to the CFMU implementation of Amendment 1 to the PANS-ATM, 15th edition[1] to include all States in the ICAO EUR Region. Specifically, EUROCONTROL had been invited to develop an implementation plan of the new contents to the ICAO FPL for the ICAO EUR Region and to coordinate and

[1] State Letter AN 13/2.1-08/50 dated 25 June 2008 refers.

monitor the progress of the Plan to ensure its timely implementation (*EANPG Conclusion 50/40 – Implementation of the new contents of the Flight Plan (FPL)* refers). Much of this work was being carried out under the auspices of the EUR Region 2012 FPL Task Force, which was jointly supported by EUROCONTROL and the EUR/NAT Office of ICAO.

4.8.2 The EANPG was advised that, despite repeated requests, some States had still not provided information concerning their implementation plans and that many States which had provided initial information had not provided updates or detailed information regarding their implementation plans. To date, 40 (70%) of States had indicated their intention to be ready on time (i.e. by 15 November 2012, the applicability date of Amendment 1), while 2 States had provided feedback but had not yet been willing to express their readiness. Two States had indicated they would not be ready until mid 2013 or later. As a result, thirteen States had not yet provided an indication as to their intentions, 10 of which (18%) were providing an area control service.

4.8.3 The EANPG agreed that it was not possible to ensure a regionally coordinated implementation without the necessary information and that it was also crucial that information be updated in order to ensure the continuing robustness of the implementation planning. Finally, the EANPG was advised that EUROCONTROL, in coordination with the EUR/NAT Office of ICAO, intended to develope a form or questionnaire to assist States in providing the necessary detailed information for updating the technical aspects of the EUR FPL 2012 Implementation Plan. Therefore the EANPG agreed on the following:

EANPG Conclusion 52/33 - Request States to confirm intentions regarding implementation of FPL 2012

That the ICAO Regional Director, Europe and North Atlantic:

a) urge States who have not already done so to confirm their intentions regarding the implementation of Amendment 1 to the *Procedures for Air Navigation Services – Air Traffic Management* (PANS ATM, Doc 4444), 15th Edition; and

b) request States who have already provided information concerning their implementation plans to provide updates and more detailed planning information as it is available.

4.8.4 As regards the translation service being offered by the Initial Flight Plan Processing System (IFPS), it was confirmed that such a service was in conformance with the applicable European Commission regulation. It was pointed out that the obligation of States under the regulation was to ensure that the IFPS checked the flight plans for correct format, completeness, accuracy and took action, if necessary, to make the flight plan acceptable to the air traffic services. Accordingly, if States wished to have this translation service provided, they would need to formally make a request. It was also noted that it was incumbent upon the State to ensure, together with its ANSP, that the operational consequences, if any, of such a request were fully mitigated throughout the period the translation service was being requested. Finally, it was expected that a request for translation beyond March 2013 should be accompanied by a clear commitment from the State as to its implementation planning of the necessary changes.

4.8.5 The EANPG noted that the EUR Region 2012 FPL Task Force had identified a number of issues that required clarification by ICAO, as had been reported during the 48th meeting of the EANPG COG (*COG Conclusion 48/02 – European requirement for additional indicators in Item 18 of FPL from 15 November 2012* refers). These clarifications would be communicated to the Task Force when available.

4.8.6 The EANPG was advised of issues that had been identified by CFMU in contemplating the implementation of Amendment 1. The amendment placed some restrictions on the contents of Item 18 of the FPL and it was believed that these restrictions would significantly impact current operational procedures in the ICAO EUR Region unless suitable measures were taken. The new provisions required certain potentially operationally-critical information not explicitly addressed by Amendment 1 to be inserted under the RMK/

designator in Item 18. The new provisions also inhibited the possibilities for introducing new procedures in the future until supporting amendments were made to the PANS-ATM.

4.8.7 The EANPG was presented with a proposal to amend the *EUR Regional Supplementary Procedures* (EUR SUPPs, Doc 7030) to permit existing operational procedures to continue despite the above-mentioned restrictions and to provide some flexibility for new procedures to be introduced in the years to come. The EANPG was advised that the ICAO Secretariat had been maintaining close coordination between the EUR/NAT Office and Headquarters specialists regarding the concerns that had been identified with regard to the implementation of Amendment 1 in the ICAO EUR Region.

4.8.8 In the course of this coordination, serious concerns had arisen that the proposal to amend the EUR SUPPs would not be supported because some provisions appeared to be in contradiction to Amendment 1 to the PANS-ATM and it was believed highly likely, based on information received from other Regional Offices, that States outside the ICAO EUR Region would object to the proposal. It was recalled that, in the case of an objection being raised to a proposal to amend the SUPPs, further processing of the proposal would cease until the objection could be resolved or was withdrawn. If either result was not achieved, the matter would be raised to the ANC for resolution. If an amendment to the EUR SUPPs was ultimately not supported, then the only recourse for documenting ICAO EUR Region requirements would be via publication in States' AIPs. The EANPG noted that, even if documented in the EUR SUPPs, there was no guarantee that States in other Regions would comply with the ICAO EUR Region requirements; compliance was seen as less likely if the requirements could only be documented in AIPs.

4.8.9 The EANPG noted that, in Amendment 1, a set of 23 indicators was defined for item 18 of the FPL. They were to be inserted in item 18 in the order given in the amendment, with STS/ first and RMK/ last. Truncations of the flight plan message would usually result in the truncation of information in RMK/. In the view of some, RMK/ would contain less important information than the other indicators, in which case truncation of RMK/ might be tolerable. It was expected that the number of truncated FPLs would increase after 15 November 2012 because Amendment 1 would lead to longer FPL messages. It was also noted that automated extraction and syntax checking of information in RMK/ in FPL messages would be difficult, if not impossible, because this was a free text field.

4.8.10 The EANPG reaffirmed that the proposed EUR/ indicators were necessary as was the retention of the RVR/ and RFP/ indicators and concurred that it was important for this necessity to be understood and supported when the proposal was circulated for comments. In order to improve the chances that the proposal would be supported, the EANPG agreed that supporting analyses, including the potential effects on flight operations, should be provided to support the creation of the EUR/ indicator and the retention of the RVR/ and RFP/ as flight planning requirements in the ICAO EUR Region.

4.8.11 It was noted that the necessary expertise existed within the EUR Region FPL 2012 Task Force to provide this information in as short a time as possible. The EANPG was advised that timelines were limited, due to the lead times required for States to finalize requirements with their FDPS suppliers. As a result, it was agreed that this information should be provided no later than the end of January 2011, but in any case the processing of the amendment would be initiated immediately upon the supporting material being received by the EUR/NAT Office of ICAO. Therefore the EANPG agreed on the following:

EANPG Conclusion52/34 - European requirement for additional indicators in Item 18 of FPL from 15 November 2012

That:

a) the EUR Region FPL 2012 Task Force develop supporting analyses to justify the ICAO EUR Region requirements intended to be maintained in or added to the *European Regional Supplementary Procedures* (EUR SUPPs, Doc 7030) as detailed in the proposal for amendment contained at **Appendix O** to this report; and

b) the ICAO Regional Director, Europe and North Atlantic, on behalf of EANPG, process the proposal for amendment to the EUR SUPPs contained at Appendix O to this report immediately upon receiving the material referred to in a) above.

4.8.12 The EANPG was advised that this issue had also been discussed during TRASAS/3 and that the following conclusion had been agreed:

TRASAS Conclusion 03/04 – Inter-regional coordination of implementation solutions
That, the ICAO Regional Directors, Asia and Pacific (APAC), Europe and North Atlantic (EUR/NAT) and North America, Central American and Caribbean (NACC):

a) facilitate regular coordination between the task forces established in their regions to support the implementation of Amendment 1 to Procedures for Air Navigation Services – Air Traffic Management *(PANS-ATM) (Doc 4444), Fifteenth Edition;*

b) coordinate with the Regional Directors in adjacent Regions to facilitate the participation of as many regional task forces as possible in the activity described in a) above;

c) acknowledging the EUR specific requirements, coordinate with ICAO Headquarters to develop a mechanism to agree, on a multi-regional basis, specific flight planning requirements that are not currently documented in PANS ATM; and

d) take all possible steps to discourage States from implementing solutions that are not documented in PANS ATM or agreed through the multi-regional process described above.

4.8.13 The EANPG welcomed this information and hoped that this would result in the necessary level of inter-regional coordination for the implementation of Amendment 1. Such coordination was seen as crucial for a successful, globally interoperable implementation of the new provisions that would meet the operational needs of all Regions.

Activities related to the implementation of flight plan amendments for 2012 in EUR and NAT Regions

4.8.14 The EANPG was informed that, in response to EANPG Conclusion 51/34 – FPL 2012 awareness workshops, an ICAO EUR Workshop on the new format of flight plan (FPL2012) was generously hosted by Ukraine in Kiev from 29 June to 1 July 2010. The Workshop was attended by 52 participants from 18 States and 3 international organisations. All documentation from the workshop along with other documentation concerning the implementation of Amendment 1 to the PANS-ATM, 15th edition, was available on the ICAO EUR/NAT website under *Other Meetings, Seminars & Workshops >> FPL 2012* or via the following URL:

http://www.paris.icao.int/documents_open_meetings/files.php?subcategory_id=114.

4.8.15 The Workshop provided an opportunity to review the status of FPL2012 implementation planning by various stakeholders in the ICAO EUR Region, with participating States presenting their individual updates. The Workshop confirmed that the overwhelming majority of the States in the ICAO EUR Region intended to complete their ANS system upgrades by the applicability date of 15 November 2012. The only known exceptions at the time of the Workshop were Greece, Spain and Ukraine, but Ukraine had recently informed of its intention to comply with the 15 November 2012 implementation deadline. In the case of Spain, transition should be achieved by the end of 2013 and Greece did not participate at the workshop. It was emphasized that necessary arrangements should be in place to ensure that the delays in technical systems readiness would not cause any problems for airspace users or neighbouring ATC systems. Following the workshop, a State Letter was circulated requesting updates from all States in the ICAO EUR Region and the EUR Region FPL2012 Implementation Plan was subsequently updated; updated versions of the plan were posted to the FPL 2012 area of the ICAO EUR/NAT website, as described in paragraph 4.8.14 above.

4.8.16 The Workshop noted that the interim text of the Amendment circulated with the ICAO State Letter dated 25 June 2008 contained some inconsistencies which were expected to be corrected when Amendment 1 would be distributed (planned for March 2012). The Workshop emphasized that in view of the ongoing implementation planning, the availability of the final official version of Amendment 1 was essential to finalising operational and technical specifications required to secure contracts with system providers and enable the timely completion of the FPL2012 programme. The EANPG was informed that it had been agreed by ICAO to provide, on the Flight Plan Implementation Tracking System (FITS)[2], information concerning the changes that would be made to the content in order to finalize the amendment. In view of the high workload associated with the 37th Assembly, it was not foreseen that this information would be available on FITS prior to January 2011.

4.8.17 The EANPG noted that the participants had found the Workshop extremely helpful in clarifying some questions, sharing experiences and gauging the implementation progress. It was requested that a follow up workshop be organized to further support the implementation of FPL2012 provisions. The EANPG was advised that ICAO, in coordination with the ICAO EUR FPL2012 Task Force and EUROCONTROL would endeavour to create some technical material to assist in the implementation, e.g. developing a regional safety case.

4.8.18 The EANPG was advised that, in the ICAO NAT Region, the NAT Implementation Management Group (NAT IMG) had developed and was maintaining the "NAT Region FPL 2012 Implementation Plan", which contained information on contact points and national implementation plans from NAT provider States and ANSPs. A recent review of the NAT Region FPL 2012 Implementation Plan resulted in an agreement that a Test Readiness Date (TRD) should be established. "Test Readiness" meant readiness to accept the new ICAO flight plan form on a test basis from airlines and from the EUROCONTROL CFMU. It was noted that it was not feasible and practicable to agree on a common TRD for all ICAO NAT Region service providers; nevertheless, target TRDs were provided and included in the NAT Table of implementation dates. The ICAO NAT Region TRDs ranged from the third quarter of 2011 to the second quarter of 2012.

4.8.19 The EANPG was informed that, in parallel to the implementation of the new flight planning provisions, the ICAO NAT Region planned to achieve full ATS Interfacility Data Communications (AIDC) implementation by the same date as the deadline for the implementation of the new flight plan provisions (15 November 2012). The AIDC implementation was based on the NAT AIDC Interface Control Document (ICD), which was being reviewed to identify any amendments necessary to account for Amendment 1 to the PANS-ATM. Coordination was also taking place with the ICAO APAC Region with the goal of producing a harmonised pan-regional ICD for oceanic AIDC.

5. MONITORING

Report on the Altimetry System Error

5.1 The EANPG took note of the comprehensive results of the first Workshop on Altimetry System Error (ASE) held at EUROCONTROL in Brussels in September 2010. This first workshop was well attended by 90 participants. The workshop provided the regulators, manufacturers and operators with increased confidence in accuracy of current RVSM height monitoring systems. The workshop reinforced the need to properly address RVSM approval requirements, in particular ensuring that altimetry system error is contained within limits. Regarding RVSM operations, changes to Annex 11 and Annex 6 have fixed the requirement for continuous long term monitoring of aircraft to assess altimetry system error. Training,

[2] State Letter AN 13/2-2010/31, dated 29 March 2010 refers

exchange of information and increase awareness of all stake holders are important. The EANPG was advised that it was intended to organize another ASE Workshop in mid-September 2011.

5.2 Considering the paramount importance of the altimetry system accuracy and its preservation over a long time period (10 years survey) in the RVSM environment, the EANPG agreed to the following:

EANPG Conclusion 52/35 - Altimetry System Error

That, during the first quarter of 2011, the ICAO Regional Director, Europe and North Atlantic:

a) urge the States (Regulatory Authorities) to:
   i) ensure the adequacy of current altimetry maintenance procedures and schedules to respond to the RVSM data package requirements;
   ii) ensure through training the aircraft engineers awareness of the causes of altimetry system error as well as rectification and calibration procedures;
   iii) ensure that the RVSM performance requirements are appropriately addressed during aircraft modifications and repairs;
   iv) consider the service life of altimeter system components;
b) remind States of their responsibilities with regard to the RVSM certification, operations approval and continued airworthiness; and
c) initiate the process to request that EUROCAE WG-68 (Altimetry) be re-activated.

Regional Monitoring Agency (EUR RMA) Annual Report

5.3 The EANPG was presented with the main results of the EUR RMA 2010 Safety Monitoring Report for the European RVSM Airspace and the action taken by the EUR RMA since EANPG/51. The four Safety Objectives set out in the EUR RVSM Safety Policy were met. The first objective, the height-keeping performance (for which the Target Level of Safety (TLS) was 2.5×10^{-9} fatal accidents per flight hour) had an estimated figure for 2010 of 0.03×10^{-9}. The second objective was the overall vertical collision risk with the TLS being 5×10^{-9}, and the estimation for 2010 of 0.4×10^{-9} fatal accidents per flight hour. The third objective, the requirement that the continuous operation of EUR RVSM had not adversely affected the overall risk of en-route mid-air collision. The fourth objective required that all issues that were active when the 2009 Safety Monitoring Report was issued have been addressed satisfactorily.

5.4 Therefore the EANPG agreed to the following:

EANPG Statement 52/1 – Reduced Vertical Separation Minimum

That, the EANPG, noting the report provided by the European Regional Monitoring Agency, is satisfied that Reduced Vertical Separation Minimum (RVSM) operations in the ICAO European Region met the safety objectives for the year 2009.

5.5 Another important activity of the EUR RMA was the provision of assistance to Russian Federation and other States in the creation of the EURASIA RVSM area.

5.6 With respect to the difficulties encountered in the domains of reporting of altitude deviations, of RVSM technical and operational approvals as well as notification of approvals to the accredited RMA, the EANPG agreed to the following:

a) Related to altitude deviation reporting by States to the RMA, the EANPG agreed to the following conclusion:

EANPG Conclusion 52/36 - Reporting altitude deviations to the EUR RMA

That, the ICAO Regional Director, Europe and North Atlantic, urge States to report regularly to the EUR Regional Monitoring Agency the altitude deviation occurrences within the EUR Reduced Vertical Separation Minimum (RVSM) airspace.

b) Related to the reporting of RVSM technical- and RVSM operational- approvals to the RMA, the EANPG agreed to the following conclusion:

EANPG Conclusion 52/37 - Reporting technical and operational approvals for RVSM operations to the EUR RMA

That, the ICAO Regional Director, Europe and North Atlantic, invite States to report to the EUR Regional Monitoring Agency the technical as well as operational approvals for Reduced Vertical Separation Minimum (RVSM) operations.

c) Considering the lack of requirement for notification of RVSM technical as well as operational approvals to the accredited RMA, the EANPG agreed to the following conclusion:

EANPG Conclusion 52/38 - Requirement for States for Reporting of technical and of operational approvals for RVSM operations to the RMA

That, the ICAO Regional Director, Europe and North Atlantic, undertake necessary action to amend the *EUR Regional Supplementary Procedures* (SUPPs, Doc 7030) to incorporate a requirement for notification by States to the accredited Regional Monitoring Agency (RMA) of the Reduced Vertical Separation Minimum (RVSM) technical as well as the operational approvals for RVSM operations.

6. DEFICIENCIES

Review of the deficiencies

6.1 The EANPG noted information concerning Air Navigation Deficiencies in the ICAO EUR Region agreed with the suggested editorial updates and deletions. With respect to the newly identified deficiencies, Italy explained the difficulties encountered with a service supplier, in relation to their identified deficiency for non-adherence to AIRAC dates. Ukraine mentioned their efforts for the implementation of WGS84, which was in the final stage of implementation. IFALPA questioned the absence of deficiencies in the MET domain when considering the outcome of the METG/20 meeting. The Secretariat agreed to review the report of the METG/20 meeting, to analyse the identified MET “deficiencies” and assess their eligibility for inclusion to the List of Air Navigation Deficiencies.

Updated List of Deficiencies

6.2 The EANPG endorsed all editorial changes and agreed to all suggested deletions of deficiencies (total of 7) as substantiated by the reports of expert groups or service providers. The EANPG also agreed to the inclusion of 15 new deficiencies (registered in two categories: *Non-adherence to AIRAC Procedures* and *Aeronautical charts and flight instrument procedures*). The approved version of the List of Air Navigation Deficiencies is presented at **Appendix P** to this report.

7. ANY OTHER BUSINESS

Safety training

7.1 The Czech Republic informed the EANPG that four international aviation safety training courses would take place in Prague in May 2011:

- Human Factors for Accident Investigators (Prague, 2-6 May 2011);
- Investigation Management (Prague, 9-13 May 2011);
- Safety Management Systems Complete (Prague, 16-20 May 2011);
- Investigation in Safety Management Systems (Prague, 23-27 May 2011).

Detailed information for these events can be found at the following website address: www.scsi-inc.com.

Departure of Mr Karsten Theil

7.2 The EANPG was informed that Mr Karsten Theil, the ICAO Regional Director, Europe and North Atlantic and Secretary of the EANPG, would retire at the end of the year. Recalling with appreciation his many years of contributions to the ICAO EUR and NAT Regions and as an ICAO Council Member prior to his current role, the EANPG wished him a very happy retirement. Many well-wishers recalled with thanks his tremendous efforts to unify the planning and support activities within the ICAO EUR Region, bringing the common interests of both the Eastern and Western parts of the Region together. Mr Theil thanked the EANPG for the gracious words and expressed his sincere hope that his next endeavours would involve working with them again in a different capacity.

Next Meeting

7.3 The EANPG agreed to convene its next meeting in Paris in the European and North Atlantic Office from 28 November to 1st December 2011 (1st day starting at 14:00).

APPENDIX A – LIST OF PARTICIPANTS

(paragraph 0.2 refers)

CHAIRMAN
Phil ROBERTS

BALTIC STATES (Estonia, Latvia, Lithuania)
Algimantas RAŠČIUS (Lithuania)
Kazimieras JAKAS (Lithuania)
Andrej DUDAREVS (Latvia)

BELARUS
Mr/Mrs

BULGARIA
Plamen Ivanov TASEV

CZECH Republic
Ladislav MIKA (EANPG Vice Chairman)

CYPRUS
Nicos NICOLAOU
Eva YIASEMIDOU

FRANCE
Thierry LEMPEREUR
Denis LEMARCHAND
Yann MENET
Annick SARRADE
Sébastien TRAVADEL

GEORGIA
Igor GORDIENKO
Giorgi EDISHERASHVILI
Levan KARANADZE

GERMANY
Karsten Dr BAUMANN
Bernd RANDECKER
Nancy SICKERT
Dirk ENGELBART

GREECE
Elpida KORYFIDOU
Vasileios TAGKALOS

IRELAND
Malcom CAMPBELL
Terry TREANOR

ITALY
Alessandro GHILARI
Pierluigi D'ALOIA

NETHERLANDS
Robin VALKENBURCHT

NORDIC STATES (Denmark, Norway, Sweden)
Kirsten SONDERBY
Anne-Marie RAGNARSSON

POLAND
Wieslaw BACZEWSKI
Piotr GOZDZIK

PORTUGAL
Carlos ALVES

RUSSIAN FEDERATION
Dmitriy SAVITSKIY
Sergey POGREBNOV
Alexander POLYAKOV
Galina SAVINA
Elena STEPANOVA
Vasily TOPCHIEV
Elena GRACHEVA

SAUDI ARABIA (observer)
Khaled ATTIAH
DRIDI Ridha

SERBIA
Zoran DJURANOVIC

SLOVAKIA
Jan BREJA

SWITZERLAND
Thomas BUCHANAN

THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

Jasmin MALINKOV

Vladimir TRPKOVSKI

TUNISIA

Hatem OUESLATI

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Andy LEWIS

Tony LICU

Gerry McAULEY

EUROPEAN COMMISSION

Marinus DE JONG

IAC

Oleg ERMOLOV

Nikilai ZOBOV

IFALPA

Paul VISSERS

Heinz FRÜHWIRTH

APPENDIX A – LIST OF PARTICIPANTS

(paragraph 0.2 refers)

CHAIRMAN
Phil ROBERTS

BALTIC STATES (Estonia, Latvia, Lithuania)
Algimantas RAŠČIUS (Lithuania)
Kazimieras JAKAS (Lithuania)
Andrej DUDAREVS (Latvia)

BELARUS
Mr/Mrs

BULGARIA
Plamen Ivanov TASEV

CZECH Republic
Ladislav MIKA (EANPG Vice Chairman)

CYPRUS
Nicos NICOLAOU
Eva YIASEMIDOU

FRANCE
Thierry LEMPEREUR
Denis LEMARCHAND
Yann MENET
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Vasileios TAGKALOS

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NORDIC STATES (Denmark, Norway, Sweden)
Kirsten SONDERBY
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Alexander POLYAKOV
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Khaled ATTIAH
DRIDI Ridha

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Thomas BUCHANAN

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TUNISIA

Hatem OUESLATI

TURKEY

Mustafa OZTOPRAK

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UNITED STATES

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APPENDIX B

REVISED TERMS OF REFERENCE OF THE EUROPEAN AIR NAVIGATION PLANNING GROUP (EANPG)
(C-WP/13558, C 190/4 on 25 May 2010)

(paragraph 1.11 refers)

1. **Membership**

All ICAO Contracting States, who are service providers in an air navigation region and part of that region's ANP, should be included in the membership of that region's PIRG. Furthermore, user States are entitled to participate in any other PIRG meetings as a non-member. International organizations recognized by the Council may be invited as necessary to attend PIRG meetings as observers.

2. The **terms of reference of the European Air Navigation Planning Group (EANPG)** are to:

a) ensure the continuous and coherent development of the European Air Navigation Plan and other relevant regional documentation in a manner that is harmonized with adjacent regions and consistent with global requirements;

Note: *The successful execution of this item presupposes timely promulgation by ICAO of the EUR Regional Air Navigation Plan, the Regional SUPPs (Doc 7030) and related material, including the amendment thereto.*

b) develop amendment proposals for the update of the European Air Navigation Plan necessary to satisfy any changes in the requirements, thus removing the need for regular regional air navigation meetings;

c) provide input to the work of appropriate ICAO bodies in the field of air navigation;

d) monitor implementation of air navigation facilities and services and, where necessary, ensure harmonization, taking due account of cost/benefit analyses, business case development, environmental benefits and financing issues;

e) ensure the conduct of any necessary systems performance monitoring, identify specific problems in the Air Navigation field, especially in the context of safety and security, and propose action aimed at solving any identified problems;

f) ensure close cooperation with relevant organizations and State groupings to optimize the use of available expertise and resources;

g) identify possible safety threats and consequently develop a safety analysis that would result in the allocation of priorities to address deficiencies using the Global Air Safety Plan (GASP) as a model;

h) ensure the development and implementation of an action plan by States to resolve identified deficiencies, where necessary;

i) conduct the above activities in the most efficient manner possible, with a minimum of formality and documentation, and call meetings of the EANPG only when required, commensurate with developments in the aeronautical field and with progress of the work of the Group; and

Note: At this time (2002), the ideal meeting cycle for the EANPG is once per year to maintain full control over the work programme. This cycle will be reviewed by the EANPG at each of its meetings in light of work progress and emerging issues, as well as in response to air navigation issues and implementation needs.

j) coordinate with respective RASG on safety issues.

APPENDIX C - PROPOSED AMENDMENT TO PANS OPS, VOLUME I

(paragraph 4.1.18 refers)

Editorial note: Amendments are arranged to show deleted text using strikeout (~~text to be deleted~~) and added text with grey shading (text to be inserted).

Amend Paragraph 1.3, "Use of Mode S", as follows:

~~1.3~~1.3.1 USE OF MODE S

Pilots of aircraft equipped with Mode S having an aircraft identification feature shall set the aircraft identification in the transponder. This setting shall correspond to the aircraft identification specified in item 7 of the ICAO flight plan, or, if no flight plan has been filed, the aircraft registration.

Note 1. — All Mode S equipped aircraft engaged in international civil aviation are required to have an aircraft identification feature.

Note 2. — Instructions for the completion of the ICAO Flight Plan, including Item 7, are contained in PANS ATM, Appendix 2.

1.3.2 Operation of Mode S transponders on the aerodrome movement area.

Mode S transponders shall be operated on movement areas in accordance with the following provisions:

Departing aircraft:

a) Set aircraft identification and, when received, set assigned Mode A code,
b) Immediately prior to request for push back or taxi, whichever is earlier, select "automatic mode" (e.g.: **AUTO**) or, if automatic mode is not available, select "on" (e.g. **ON** or **XPDR**),
c) Only when approaching the holding position of the departure runway, select "TCAS" (e.g.: **TA/RA**).

Arriving aircraft:

a) As soon as practicable after landing de-select "TCAS" (e.g.: deselect **TA/RA**),
b) Select "automatic mode" (e.g.: **AUTO**) or, if automatic mode is not available, select "on" (e.g. **ON** or **XPDR**),
c) Continue to squawk last assigned Mode A code until fully parked,
d) When fully parked, select "standby" (e.g.: **STBY**).

Proposer's reason for amendment: Mode S transponders support the use of Advanced Surface Movement Guidance and Control Systems (A-SMGCS). Consistent application by flight crew of global provisions for operation of Mode S transponders on movement areas will ensure effective use of A-SMGCS for aerodrome surveillance applications by ATS, proper functioning of ACAS as well as supporting mitigation of 1030/1090 MHz RF congestion resulting from non-appropriate setting of transponders of aircraft operating on movement areas.

SUPPORTING MATERIAL - Excerpt from COG/38 WP/17: "Mode S Transponder Operating Procedures – Proposal for Amendment to the ICAO PANS-OPS, DOC 8168" (Submitted by EUROCONTROL)

1. Introduction

1.1 The use of Mode S multilateration techniques in the context of European implementations of A-SMGCS is dependant on flight crew ensuring proper functioning of aircraft Mode S transponders. In this context, the proper setting(s) of Mode S transponders by flight crew, when operating on aerodrome movement areas, is central to ensuring the integrity of the A-SMGCS aerodrome surveillance function for the benefit of ATS.

2. Rational for amendment

2.1 Improper settings of Mode S transponders can negatively impact the performance of both A-SMGCS and ACAS. In addition, such improper settings can also have very significant negative impacts on the 1030/1090 RF environment.

2.2 The EUROCONTROL A-SMGCS Project has developed and promulgated generic AIC text, intended to support flight crew in their understandings of appropriate Mode S transponder settings while operating on aerodrome movement areas.

2.3 The generic AIC has also been the subject of consultations with: FAA (USA), various airport associations (European and global, including Beijing, Hong Kong, Singapore, Kuala Lumpur), IATA, JAA, IFALPA, IFATCA, and Air Services Australia.

2.4 It is relevant to note that Mode S transponder settings need not by necessity be related to any particular aerodrome surveillance infrastructure. Indeed, operation of Mode S transponders by flight crew should be consistent regardless of any aerodrome surveillance infrastructure.

2.5 It is submitted that operating procedures for Mode S transponders, while operating on aerodrome movement areas, should be proposed for global promulgation.

2.6 It is expected that a global promulgation of these provisions by ICAO will provide the basis for eventual adaptation of flight crew aircraft operating checklists as regards appropriate transponder settings. It is considered that checklists should be seen as an ultimate objective supporting the requirements of Mode S, A-SMGCS and ACAS.

3. EANPG/48 Report, paragraph 4.42

3.1 EANPG/48 Report, paragraph 4.42 – A proposal to amend the ICAO PANS-OPS – Doc 8168 on the subject of Mode S transponder operating procedures did not meet the agreement of France and IATA. The Group agreed that the proposal should be further developed and presented at a next opportunity.

4. Coordination following EANPG/48

4.1 EUROCONTROL identified and contacted the following organisations and airlines, to clarify any possible misunderstandings; as follows:

4.1.1 January 2007 BMI/Senior Management Pilots - reasons behind the requirement for not selecting TCAS before approaching the runway holding position were clarified and explained; BMI now supports the procedure.

4.1.2 March 2007 IFALPA/Technical Director - the application of the procedure to the two major types of transponder control panels were demonstrated; IFALPA now supports the procedure.

4.1.3 March 2007 DGAC/ Deputy Director and Senior Operational and Technical Experts – presentation of rationales behind the proposed procedure; DGAC were looking for further justification for the limitation concerning the use of TCAS in line with the proposal to ICAO (provided as described in §4.1.6).

4.1.4 April 2007 IATA/AOT representative – the benefits from a world wide procedure were discussed; IATA supports the procedure

4.1.5 May 2007 Additional E-mail consultation with Airlines such as PrivatAir and Swiss, further explaining rationales behind the draft procedure text.

4.1.6 May 2007 DGAC – EUROCONTROL provided additional TCAS-related documents to DGAC further substantiating the procedures' contributions to mitigating TCAS performance degradations and requesting support for the draft procedure.

5. Conclusion

5.1 Following the widespread implementation of A-SMGCS and to avoid the proliferation of different transponder operation procedures within States, a world wide harmonised transponder procedure has been consistently requested by Airlines, ANSPs and Airports. This proposal aims as meeting this need, while recognising current best practice to TCAS operation.

5.2 On the basis of the alleviation of the previous concerns of IATA and IFALPA and on the basis of the consultations between EUROCONTROL and the DGAC (France) it is suggested that:

The ICAO Regional Director submit, on behalf of EANPG, the draft proposal for amendment to the PANS-OPS, Doc 8168 on the subject of Mode S transponder operating procedures.

Appendix D
EANPG Report
(paragraph 4.1.25 refers)

Global Operational Data Link Document (GOLD)

This edition has been approved by the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) and the North Atlantic Systems Planning Group (NAT SPG)

First Edition — 14 June 2010

International Civil Aviation Organization

This document is available from the following web sites:

http://www.ispacg-cra.com

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/data_link/

This document was administered by the GOLD Ad Hoc Working Group. This group will continue to assist the participating ICAO Regional Offices in the global coordination and acceptance of future amendments. For more information, contact tom.kraft@faa.gov.

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AMENDMENTS

The issue of amendments is announced by the ICAO Regional Offices concerned, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by

CORRIGENDA			
No.	Date applicable	Date entered	Entered by

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FOREWORD.

1. Historical background

1.1 The *Global Operational Data Link Document* (GOLD) is the result of the progressive evolution of the *FANS 1/A Operations Manual*, prepared initially by the Informal South Pacific Air Traffic Services Coordinating Group (ISPACG), and the *Guidance Material for ATS Data Link Services in North Atlantic Airspace*, produced by the North Atlantic FANS Implementation Group (NAT FIG), on behalf of the North Atlantic Systems Planning Group (NAT SPG).

1.2 Each of the two founding documents provided guidance on a regional basis. However, in recognition of the need to provide globally harmonized guidance on data link operations, the GOLD became effective on 14 June 2010.

1.3 This edition, re-titled *Global Operational Data Link Document* (GOLD), provides for a comprehensive update of the guidance as well as a major reorganization of the contents of the founding documents. This includes the incorporation of performance-based specifications and associated guidance on data collection, monitoring, and analysis.

2. Scope and purpose

2.1 The GOLD provides guidance and information concerning data link aspects of aeronautical activity and is intended to facilitate the uniform application of Standards and Recommended Practices contained in Annex 2 — *Rules of the Air* and in Annex 11 — *Air Traffic Services*, the provisions in the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) and, when necessary, the *Regional Supplementary Procedures* (Doc 7030).

2.2 This guidance material is intended to maximize operational benefits in data link operations by promoting seamless and interoperable data link operations throughout the world. This edition limits itself to those data link operations that apply to the use of FANS 1/A and its applications: automatic dependent surveillance — contract (ADS-C), controller-pilot data link communications (CPDLC) and the flight management computer waypoint position reporting (FMC WPR). It also addresses the performance of the data link applications taking into consideration the transmission media used by those applications. Future editions are expected to incorporate guidance that applies to the planned expansion of ATN CPDLC in core Europe as well as the use of FANS 1/A in continental Europe.

2.3 While directed primarily at air traffic services personnel and flight crews, the following personnel should be familiar with various aspects of its contents: regulators, airspace planners, aircraft operators, dispatchers, communication service providers and radio operators, training organizations, central monitoring and reporting agencies, automation specialists at centers and radio facilities, and aircraft manufacturers and equipment suppliers.

2.4 The guidance will support the following activities:

a) the States' roles and responsibilities in relation to the following:

   1) safety regulatory oversight of air navigation services;

   2) operational authorizations, flight crew training and qualification;

   3) design approval of aircraft data link systems

b) the development of agreements and/or contractual arrangements between air traffic service providers and aircraft operators and their respective communication service providers;

c) development of operational procedures; and

d) operational monitoring, analysis, and exchange of operational data among regions, States, and communication service providers.

3. Status

This guidance may contain material that may eventually become Standards and Recommended Practices (SARPs), or PANS provisions when it has reached the maturity and stability necessary for adoption or approval. It may also comprise material prepared as an amplification of the basic principles in the corresponding SARPs, and designed particularly to assist the user in the application of the SARPs and PANS.

4. Implementation

The implementation of procedures is the responsibility of Contracting States; they are applied in actual operations only after, and in so far as, States have enforced them. However, with a view to facilitating their processing towards implementation by States, this complementary guidance material has been prepared in language which will permit direct use by air traffic services personnel and others associated with the provision of air traffic services to international air navigation.

5. Promulgation of information

Information relating to the establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations should be notified and take effect in accordance with Annex 15 — Aeronautical Information Services.

6. References

6.1 The following references are cited in this document:

a) ICAO Annex 1 — *Personnel Licensing*

b) ICAO Annex 2 — *Rules of the Air*

c) ICAO Annex 4 — *Aeronautical Charts*

d) ICAO Annex 6 — *Operation of Aircraft – Part I — International Commercial Air Transport — Aeroplanes*

e) ICAO Annex 10 — *Aeronautical Telecommunications – Volume II* — Communication Procedures including those with PANS status

f) ICAO Annex 10 — *Aeronautical Telecommunications – Volume III* — Communication Systems

g) ICAO Annex 11 — *Air Traffic Services*

h) ICAO Annex 15 — *Aeronautical Information Services*

i) *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, ICAO Doc 4444)

j) *Regional Supplementary Procedures* (Regional SUPPs, ICAO Doc 7030)

k) *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (PANS-ABC, ICAO Doc 8400)

l) *Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services* (ICAO Doc 8585).

m) *Aircraft Type Designators* (ICAO Doc 8643)

n) *Manual on Airspace Planning Methodology for the Determination of Separation Minima* (ICAO Doc 9689)

o) *Performance-based Navigation Manual* (PBN) (ICAO Doc 9613)

p) *Manual on Required Communication Performance* (RCP) (ICAO Doc 9869)

q) *Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace* (Oceanic SPR Standard, RTCA DO-306/EUROCAE ED-122).

r) *Safety and Performance Standard for Air Traffic Data Link Services in Continental Airspace* (Continental SPR Standard, RTCA DO-290/EUROCAE ED-120, Change 1 and Change 2).

s) *Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications* (FANS 1/A INTEROP Standard, RTCA DO-258A/EUROCAE ED-100A).

t) *Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1* (ATN B1 INTEROP Standard, RTCA DO-280B/EUROCAE ED-110B).

u) *Future Air Navigation System 1/A — Aeronautical Telecommunication Network Interoperability Standard* (FANS 1/A — ATN B1 INTEROP Standard, RTCA DO-305/EUROCAE ED-154).

8. Changes to the document

This document is maintained as a regional document in coordination with all ICAO planning and implementation regional groups (PIRGs) providing data link services within their region. Each participating PIRG establishes a mechanism for submitting and administering change proposals.

Change proposals (CPs) can be submitted by any stakeholder participating in data link operations. The stakeholder should submit a Change Proposal to their ICAO regional office (see Appendix E). The ICAO regional office will coordinate the change proposal within its own region, other regions, and ICAO HQ, to determine the acceptability of the change proposal. Once the ICAO regional office has completed coordination and the participating PIRGs accept the change proposal, the change is concluded by each of the PIRGs.

Amendments to the GOLD

Amendment	**Source(s)**	**Subject(s)**	**Approved applicable**
1st Edition (2010)	Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/20 – 2009) North Atlantic Systems Planning Group (NAT SPG/46 – 2010)	*Global Operational Data Link Document* (GOLD)	Applicable within participating Regions on 1 July 2010.

Chapter 1. Definitions

When the following terms are used in the present document they have the following meanings. Where the term has "(ICAO)" annotated, the term has already been defined as such in SARPs and/or PANS.

Term

AAR. The symbol used to designate air-to-air refueling.

ACARS. The symbol used to designate the aircraft communications addressing and reporting system.

ACAS. The symbol used to designate aircraft collision avoidance system. (ICAO)

ACC. The symbol used to designate area control centre. (ICAO)

ACL. The symbol used to designate ATS clearance (data link service).

ACM. The symbol used to designate ATS communications management (data link service).

ACP. The symbol used to designate actual communication performance.

ACTP. The symbol used to designate actual communication technical performance.

ADS. The symbol used to designate automatic dependent surveillance (retained for reference with non-updated documents. This term would normally be used to refer to ADS-C).

ADS-B. The symbol used to designate automatic dependent surveillance – broadcast. (ICAO)

ADS-C service. A term used to indicate an ATS service that provides surveillance information by means of the ADS-C application.

Note.— ICAO Doc 4444 does not include ADS-C in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the ADS-C application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.

ADS-C. The symbol used to designate automatic dependent surveillance – contract. (ICAO)

Aeronautical fixed telecommunication network (AFTN). A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics. (ICAO)

Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation. (ICAO)

Aeronautical operational control (AOC). Communication required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons. (ICAO)

Term

Aeronautical telecommunication network (ATN). A global internetwork architecture that allows ground, air-ground and avionic data subnetworks to exchange digital data for the safety of air navigation and for the regular, efficient and economic operation of air traffic services. (ICAO)

AFN. The symbol used to designate ATS facilities notification.

AFTN. The symbol used to designate aeronautical fixed telecommunication network. (ICAO)

AIDC. The symbol used to designate ATS interfacility data communications. (ICAO)

AIP. The symbol used to designate Aeronautical Information Publication. (ICAO)

Air traffic services provider (ATSP). An organization responsible for the provision of air traffic services.

Air traffic control (ATC) service. A service provided for the purpose of:

a) preventing collisions:

   1) between aircraft, and

   2) on the manoeuvring area between aircraft and obstructions; and

b) expediting and maintaining an orderly flow of air traffic. (ICAO)

Air traffic management (ATM). The dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions. (ICAO)

Air traffic service (ATS). A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service). (ICAO)

Air traffic services unit (ATSU). A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office. (ICAO)

Airborne collision avoidance system (ACAS). An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders. (ICAO)

Aircraft active flight plan. (See flight plan).

Aircraft address. A unique combination of 24 bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance. (ICAO)

Term

Aircraft identification. A group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft call sign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground air traffic services communications. (ICAO)

Note 1.— The aircraft identification does not exceed 7 characters and is either the aircraft registration or the ICAO designator for the aircraft operating agency followed by the flight identification.

Note 2. ICAO designators for aircraft operating agencies are contained in ICAO Doc 8585.

Aircraft registration. A group of letters, figures or a combination thereof which is assigned by the State of Registry to identify the aircraft.

Note. Also referred to as registration marking.

Aircraft system availability ($A_{AIRCRAFT}$). The required probability of available capability on an aircraft with an average flight of 6 hours.

Note.— The actual aircraft system availability is computed assuming that the service is available in the relevant airspace.

AIREP. The symbol used to designate an air-report. (ICAO)

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting. (ICAO)

Altitude reservation (ALTRV). Airspace utilization under prescribed conditions normally employed for the mass movement of aircraft or other special requirements which cannot otherwise be accomplished.

ALTRV. The symbol used to designate altitude reservation.

AMC. The symbol used to designate ATS microphone check (data link service).

AMS(R)S. The symbol used to designate aeronautical mobile satellite (route) service. (ICAO)

AOC. The symbol used to designate aeronautical operational control. (ICAO)

Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned. (ICAO)

Appropriate authority.

a) Regarding flight over the high seas: The relevant authority of the State of Registry.

b) Regarding flight other than over the high seas: The relevant authority of the State having sovereignty over the territory being overflown. (ICAO)

ARCP. The symbol used to designate air refueling control point. (ICAO abbreviation?)

Term

Area control centre (ACC). A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction. (ICAO)

AREX. The symbol used to designate air refueling exit point. (ICAO abbreviation?)

ARIP. The symbol used to designate air refueling initial point. (ICAO abbreviation?)

ARP. The symbol used to designate an air-report message. (See AIREP)

ATC. The symbol used to designate air traffic control. (ICAO)

ATC waypoint. A waypoint contained in Field 15 of the ICAO flight plan, or as amended by ATC.

Note.— A waypoint inserted by the flight crew for purposes of conducting flight operations such as points of no return are not ATC waypoints.

ATM. The symbol used to designate air traffic management. (ICAO)

ATN. The symbol used to designate aeronautical telecommunication network. (ICAO)

ATN B1. The symbol used to designate aeronautical telecommunication network baseline 1, as defined by RTCA DO-280B/EUROCAE ED-110B.

Note.— ATN B1 generally means that the data link system on an aircraft, the ATSU ground system, and communication service provision comply with the standard as adapted by Eurocontrol Specification on Data Link Services (EUROCONTROL-SPEC-0116). ATN B1 consists of the following data link applications:

a) Context management (CM) for data link initiation capability (DLIC); and

b) Limited CPDLC for ATS communications management (ACM), ATS clearance (ACL), and ATC microphone check (AMC).

ATS interfacility data communication (AIDC). Automated data exchange between air traffic services units, particularly in regard to co-ordination and transfer of flights. (ICAO)

ATSP. The symbol used to designate air traffic service provider.

ATS surveillance service. A term used to indicate a service provided directly by means of an ATS surveillance system. (ICAO)

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

(ICAO)

Term

ATS. The symbol used to designate air traffic service. (ICAO)

ATSU. The symbol used to designate ATS unit. (ICAO, sort of)

Automatic dependent surveillance — broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link. (ICAO)

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports. (ICAO)

Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

C for RCTP. The proportion of intervention messages and responses that can be delivered within the specified RCTP time for intervention.

C for $RCTP_{AIR}$. The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{AIR}$ time for intervention.

C for $RCTP_{ATSU}$. The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{ATSU}$ time for intervention.

C for $RCTP_{CSP}$. The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{CSP}$ time for intervention.

C for $RSTP_{AIR}$. The proportion of surveillance messages that can be delivered within the specified $RSTP_{AIR}$ time.

C for $RSTP_{ATSU}$. The proportion of surveillance messages that can be delivered within the specified $RSTP_{ATSU}$ time.

C for $RSTP_{CSP}$. The proportion of surveillance messages that can be delivered within the specified $RSTP_{CSP}$ time.

C for TRN. The proportion of intervention messages and responses that can be delivered within the specified TRN time for intervention.

CADS. The symbol used to designate centralized ADS-C system.

Call sign. The designator used in air-ground communications to identify the aircraft and is equivalent to the encoded aircraft identification.

Term

CDA. The symbol used to designate current data authority. (See ICAO definition for current data authority)

CFRS. The symbol used to designate centralized FMC waypoint reporting system.

Closed message. A message that:

a) contains no message elements that require a response; or

b) has received a closure response.

Closure response. A message containing a message element that has the ability to close another message.

CM. The symbol used to designate context management (data link application).

CNS. The symbol used to designate communications, navigation and surveillance. (ICAO)

CNS/ATM. The symbol used to designate communications, navigation and surveillance/air traffic management. (ICAO)

Compulsory reporting point. An ATC waypoint for which a position report is required by the aircraft.

Control area (CTA). A controlled airspace extending upwards from a specified limit above the earth. (ICAO)

Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications. (ICAO)

CPDLC. The symbol used to designate controller pilot data link communications. (ICAO)

CPDLC dialogue. (See ICAO definition for "dialogue.")

a) a single message that is a closed message; or

b) a series of messages beginning with an open message, consisting of any messages related to the original open message and each other through the use of a Message Reference Number (MRN) and ending when all of these messages are closed.

CRC. The symbol used to designate cyclic redundancy check.

CSP. The symbol used to designate communication service provider.

CTA. The symbol used to designate control area. (ICAO)

Current data authority (CDA). The designated ground system through which a CPDLC dialogue between a pilot and a controller currently responsible for the flight is permitted to take place. (ICAO)

Term

Current flight plan. (See flight plan).

D-ATIS. The symbol used to designate data link – automatic terminal information service (data link service).

DARP. The symbol used to designate dynamic airborne reroute procedure.

DCL. The symbol used to designate departure clearance (data link service).

Dialogue. A co-operative relationship between elements which enables communication and joint operation. (ICAO)

DM. The symbol used to designate downlink message.

Downlink message (DM). A CPDLC message sent from an aircraft.

DSC. The symbol used to designate downstream clearance (data link service).

Dynamic airborne reroute procedure (DARP). The procedure for executing a reroute clearance initiated by a request from AOC.

EMERG. The symbol used to designate emergency. (ICAO)

ETD. The symbol used to designate estimated time of departure or estimating departure. (ICAO)

FANS 1/A. The symbol used to designate the initial future air navigation system, as defined by RTCA DO-258A/EUROCAE ED-100A, or previous standards that defined the FANS 1/A capability.

Note.— FANS 1/A generally means that the data link system on an aircraft, the ATSU ground system, and communication service provision comply with the standard. In certain cases, specific reference is made to a particular type of FANS 1/A aircraft as follows:

a) FANS 1/A+ means that the aircraft completely complies with Revision A of the standard, which includes message latency timer; and

b) FANS 1/A ADS-C means that the aircraft complies with AFN and ADS-C applications, but does not include the CPDLC application.

FANS. The symbol used to designate future air navigation system.

FDPS. The symbol used to designate flight data processing system. (ICAO)

FIR. The symbol used to designate flight information region. (ICAO)

Filed flight plan. (See flight plan).

FL. The symbol used to designate flight level.

Term

Flight identification. A group of numbers, which is usually associated with an ICAO designator for an aircraft operating agency, to identify the aircraft in Item 7 of the flight plan.

Flight information region (FIR). An airspace of defined dimensions within which flight information service and alerting service are provided. (ICAO)

Flight level (FL). A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals. (ICAO)

Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.

Note 2.— The terms "height" and "altitude", used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft. (ICAO)

A flight plan can take several forms, such as:

Current flight plan (CPL). The flight plan, including changes, if any, brought about by subsequent clearances. (ICAO)

Note 1.— When the word "message" is used as a suffix to this term, it denotes the content and format of the current flight plan data sent from one unit to another.

Filed flight plan (FPL). The flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes. (ICAO)

Note 2.— When the word "message" is used as a suffix to this term, it denotes the content and format of the filed flight plan data as transmitted.

Aircraft active flight plan. The flight plan used by the flight crew. The sequence of legs and associated constraints that define the expected 3D or 4D trajectory of the aircraft from takeoff to landing. (RTCA/EUROCAE)

FLIPCY. The symbol used to designate flight plan consistency (data link service).

FMC WPR service. A term used to indicate an ATS service that provides surveillance information by means of the FMC WPR application.

Note.— ICAO Doc 4444 does not include FMC WPR in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the FMC WPR application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.

FMC WPR. The symbol used to designate flight management computer waypoint position reporting.

Term

FMC. The symbol used to designate flight management computer.

FMS. The symbol used to designate flight management system.

Figure of merit. An indication of the aircraft navigation system's ability to maintain position accuracy.

Free text message element. (usually referred to as a free text message) A message element whose content is variable, i.e. composed by the sender. The ATS provider may construct a set of preformatted free text messages to relieve controllers of the burden of repeatedly composing commonly used messages. Such a set should include an explanation as to the intended meaning of each message.

GPS. The symbol used to designate global positioning system (USA).

HF. The symbol used to designate high frequency (3-30 Mhz). (ICAO)

IATA. The symbol used to designate International Air Transport Association.

ICAO. The symbol used to designate International Civil Aviation Organization. (ICAO)

ICD. The symbol used to designate interface control document.

Lateral deviation event (LDE). A type of event that triggers an ADS-C report when the absolute value of the lateral distance between the aircraft`s actual position and the aircraft`s expected position on the aircraft active flight plan becomes greater than the lateral deviation threshold.

LDE. The symbol used to designate lateral deviation event.

Level range deviation event (LRDE). A type of event that triggers an ADS-C report when the aircraft`s level is higher than the level ceiling or the aircraft`s level is lower than the level floor.

Note.— *Sometimes referred to as altitude range change event or altitude range event.*

LRDE. The symbol used to designate level range deviation event.

MARSA. The symbol used to designate military assumes responsibility for separation of aircraft.

MAS. The symbol used to designate message assurance.

MASPS. The symbol used to designate minimum aviation system performance standards.

Maximum accumulated unplanned outage time (min/yr). Measured by accumulating ***only*** the duration times for unplanned outages greater than the unplanned outage duration limit during any 12-month period. The accumulation is performed separately for each relevant operational airspace or FIR.

Term

Maximum number of unplanned outages. Measured separately for each relevant operational airspace or Flight Information Region (FIR) over any 12-month period.

MEL. The symbol used to designate minimum equipment list. (ICAO)

Message. Basic unit of user information exchanged between an airborne application and its ground counterpart or between two ground applications. Messages are passed in one or more data blocks from one end user to another through different subnetworks. (ICAO)

Note.— A basic unit of user information can consist of one or more message elements.

Message closure. Providing the closure response. Irrespective of the number of elements that require a response contained in an open message, each open message will be closed by a single message element, determined by the particular mix of attributes assigned to the elements contained in the open message.

Message element. A component of a message used to define the context of the information exchanged. (ICAO)

Message element identifier. The ASN.1 tag of the ATCUplinkMsgElementId or the ATCDownlinkMsgElementId. (ICAO)

Message identification number (MIN). An integer in the range 0 to 63 (inclusive) that uniquely identifies specific uplink and downlink messages for each CPDLC connection.

MET. The symbol used to designate meteorological or meteorology. (ICAO)

Military assumes responsibility for the separation of aircraft (MARSA). Procedures between the controller and the aircraft that delegate the separation responsibility temporarily to the military authority operating the flights, thereby relieving ATC of the separation workload.

MIN. The symbol used to designate message identification number.

Minimum equipment list (MEL). A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type. (ICAO)

Monitored operational performance (TRN). The portion of the transaction time (used for intervention) that does not include the times for message composition or recognition of the operational response.

MRN. The symbol used to designate message reference number.

MTBF. The symbol used to designate mean time between failures.

MTTR. The symbol used to designate mean time to repair.

Term

NDA. The symbol used to designate next data authority. (See ICAO definition for next data authority.)

Next data authority. The ground system so designated by the current data authority through which an onward transfer of communications and control can take place. (ICAO)

NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations. (ICAO)

Open message. A message that contains at least one message element that requires a response. An open message remains open until the required response is received.

Operational communication transaction. The process a human uses to initiate the transmission of an instruction, clearance, flight information, and/or request, and is completed when that human is confident that the transaction is complete.

ORT. The symbol used to designate operational requirements table.

PANS-ATM. The symbol used to designate Procedures for Air Navigation Services — Air Traffic Management (ICAO Doc 4444). (ICAO)

PORT. The term used to designate pilot operational response time.

POS. The term used to designate ICAO position report message.

Preformatted free text message. A standardized free text message that is created and formatted automatically by the aircraft system or ground system, so that the content may be used by the message recipient's automation.

RCP. The symbol used to designate required communication performance.

RCP availability (A). The required probability that an operational communication transaction can be initiated when needed.

RCP continuity (C). The required probability that an operational communication transaction can be completed within the communication transaction time, either ET or TT 95%, given that the service was available at the start of the transaction.

RCP expiration time (ET). The maximum time for the completion of the operational communication transaction after which the initiator is required to revert to an alternative procedure.

RCP integrity (I). The required probability that an operational communication transaction is completed with no undetected errors.

Note.— Whilst RCP integrity is defined in terms of the "goodness" of the communication capability, it is specified in terms of the likelihood of occurrence of malfunction on a per flight hour basis, e.g. 10-5, consistent with RNAV/RNP specifications.

Term

RCP nominal time (TT 95%). The maximum nominal time within which 95% of operational communication transactions is required to be completed.

RCP type. A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.

RCTP. The symbol used to designate required communication technical performance.

$RCTP_{AIR}$. The summed critical transit times for an ATC intervention message and a response message, allocated to the aircraft system.

$RCTP_{ATSU}$. The summed critical transit times for an ATC intervention message and a response message, allocated to the ATSU system.

$RCTP_{CSP}$. The summed critical transit times for an ATC intervention message and a response message, allocated to the CSP system.

Required communication performance (RCP). A statement of the performance requirements for operational communication in support of specific ATM functions. (ICAO)

Required communication technical performance (RCTP). The portion of the (intervention) transaction time that does not include the human times for message composition, operational response, and recognition of the operational response.

Required surveillance technical performance (RSTP). The technical transit time for surveillance data delivery from the time associated with the aircraft's position to when the recipient (e.g. ATSU) receives the report, but does not include the generation or processing of the report.

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace. (ICAO)

Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.

Responder performance criteria. The operational portion of the transaction time to prepare the operational response, and includes the recognition of the instruction, and message composition, e.g. flight crew/HMI for intervention transactions.

RGS. The symbol used to designate radio ground station.

RNAV. The symbol used to designate area navigation.

RNP. The symbol used to designate required navigation performance.

RSTP. The symbol used to designate required surveillance technical performance.

Term

$RSTP_{AIR}$. The overdue (OD) and nominal (DT) transit times for surveillance data from the aircraft system to the antenna.

$RSTP_{ATSU}$. The overdue (OD) and nominal (DT) transit times for surveillance data from the CSP interface to the ATSU's flight data processing system.

$RSTP_{CSP}$. The overdue (OD) and nominal (DT) transit times for surveillance data allocated to the CSP.

SARPs. The symbol used to designate Standards and Recommended Practices. (ICAO)

SATCOM. The symbol used to designate satellite communication. (ICAO)

SELCAL. The symbol used to designate selective calling system. (ICAO)

Service availability (A_{CSP}). The required probability that the communication service is available to all users in a specific airspace when desired.

Standardized free text message. A free text message format that has been agreed by the stakeholders as a message that should be used for the purpose/intent shown in this document.

Standard message element. Any message element defined by ICAO Doc 4444 that does not contain the [free text] parameter.

Surveillance availability (A). The required probability that surveillance data can be provided when needed.

Surveillance continuity (C). The required probability that surveillance data can be delivered within the surveillance delivery time parameter, either OT or DT 95%, given that the service was available at the start of delivery.

Surveillance data. Data pertaining to the identification of aircraft and/or obstructions for route conformance monitoring and safe and efficient conduct of flight.

Surveillance data delivery. The process for obtaining surveillance data.

Surveillance data transit time. The required time for surveillance data delivery.

Surveillance integrity (I). The required probability that the surveillance data is delivered with no undetected error.

Note 1.— Surveillance integrity includes such factors as the accuracy of time, correlating the time at aircraft position, reporting interval, data latency, extrapolation and/or estimation of the data.

Note 2.— Whilst surveillance integrity is defined in terms of the "goodness" of the surveillance capability, it is specified in terms of the likelihood of occurrence of malfunction on a per flight hour basis, e.g. 10-5, consistent with RCP and RNAV/RNP specifications.

Term

Surveillance nominal delivery time (DT 95%). The maximum nominal time within which 95% of surveillance data is required to be delivered.

Surveillance overdue delivery time (OT). The maximum time for the successful delivery of surveillance data after which the initiator is required to revert to an alternative procedure.

Surveillance performance. A statement of the performance requirements for operational surveillance in support of specific ATM functions.

Surveillance performance type. A label (e.g. type 180) that represents the values assigned to surveillance performance parameters for surveillance data transit time, continuity, availability and integrity.

TA. The symbol used to designate tailored arrival.

Tailored arrival (TA). A 4-dimentional (4-D) arrival procedure, based on an optimized ATC clearance, including, as necessary, vertical and/or speed restrictions, from the aircraft's current position, normally just prior to top of descent, to the designated destination runway. The TA clearance is issued via CPDLC data link message(s) to the aircraft and automatically loaded into the aircraft's 4-D trajectory guidance capability.

TRN. The symbol used to designate monitored operational performance.

UM. The symbol used to designate uplink message.

Unplanned outage duration limit (minutes). Time after the unplanned outage begins at which there is an operational impact. Measured from when an unplanned outage begins to when the ATSU receives notification that the service has been restored.

Unplanned outage notification delay (min). Notification to the ATSU of an unplanned outage. Measured from when the unplanned outage begins to when the ATSU receives notification.

Uplink message (UM). A CPDLC message sent from a ground system.

UPR. The symbol used to designate user preferred route.

VDL M0/A. The symbol used to designate VHF data link mode 0/A subnetwork.

VDL M2. The symbol used to designate VHF data link mode 2 subnetwork,

VHF. The symbol used to designate very high frequency (30-300 Mhz). (ICAO)

Vertical rate change event (VRE). A type of event that triggers an ADS-C report when the aircraft`s rate of climb or descent is greater than the vertical rate threshold.

VRE. The symbol used to designate vertical rate change event.

Term

Waypoint change event (WCE). A type of event that triggers an ADS-C report when there is a change in the next waypoint or the next plus 1 waypoint on the aircraft active flight plan.

WCE. The symbol used to designate waypoint change event.

Chapter 2. Overview of data link operations

2.1 Data link systems and operational capabilities

2.1.1 Data link systems – Interoperability

2.1.1.1 "Data link" is a generic term that encompasses different types of data link systems and subnetworks. Figure 2-1 provides an overview of a data link system, including subnetworks. It is noted that not all aircraft have satellite, VHF and/or HF data link capability. Similarly, not all CSPs have HF data link capability.

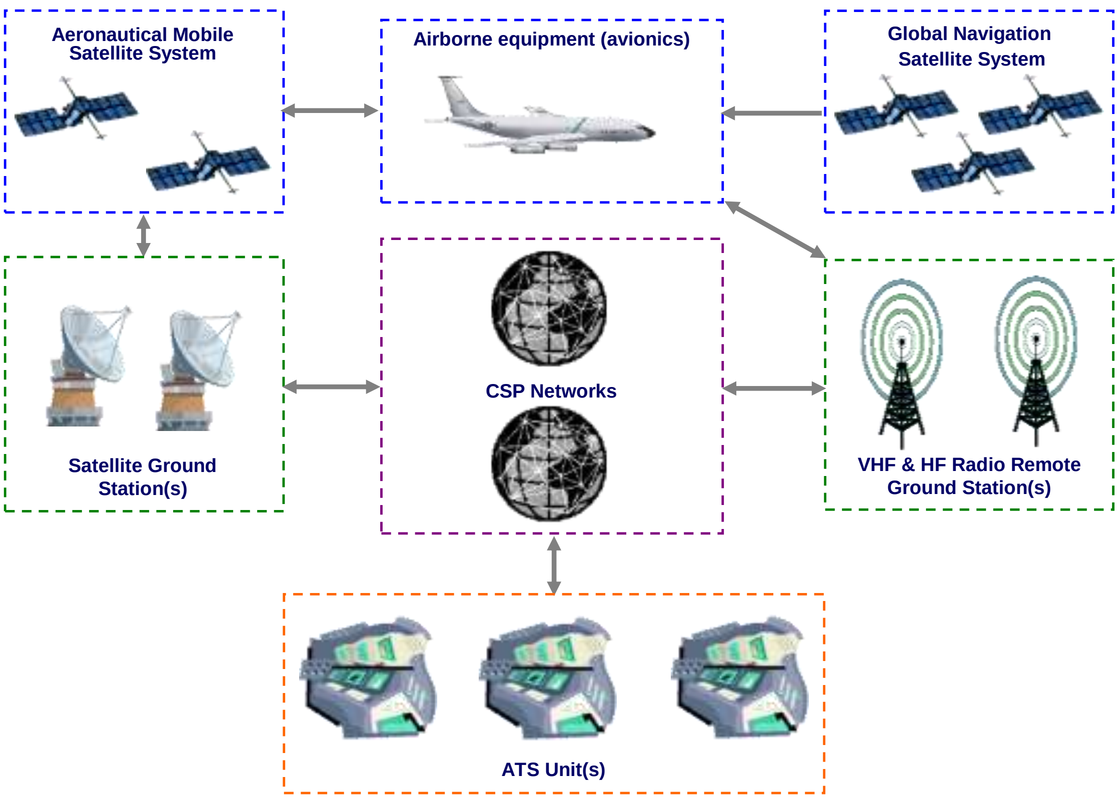


Figure 2-1. Overview of a data link system

2.1.1.2 Figure 2-2 shows different ATSU (ground) systems and aircraft systems that are interoperable. A designator is assigned to each type of ATSU and aircraft data link system. Table 2-1 provides a brief description for each designator and identifies the applicable interoperability standards. It is noted that a single aircraft or a single ATSU may employ multiple types of data link systems.

2.1.1.3 Table 2-2 provides a brief description of each type of subnetwork that supports the different data link systems and identifies the applicable interoperability standards. A designator is assigned to each type of subnetwork shown in Figure 2-1.

2.1.1.4 The applicable interoperability standards for each type of data link system and each type of subnetwork allocate requirements to the operator, the aircraft data link system, and the air traffic service provider to ensure that the aircraft system, the ground system, and subnetworks are compatible.

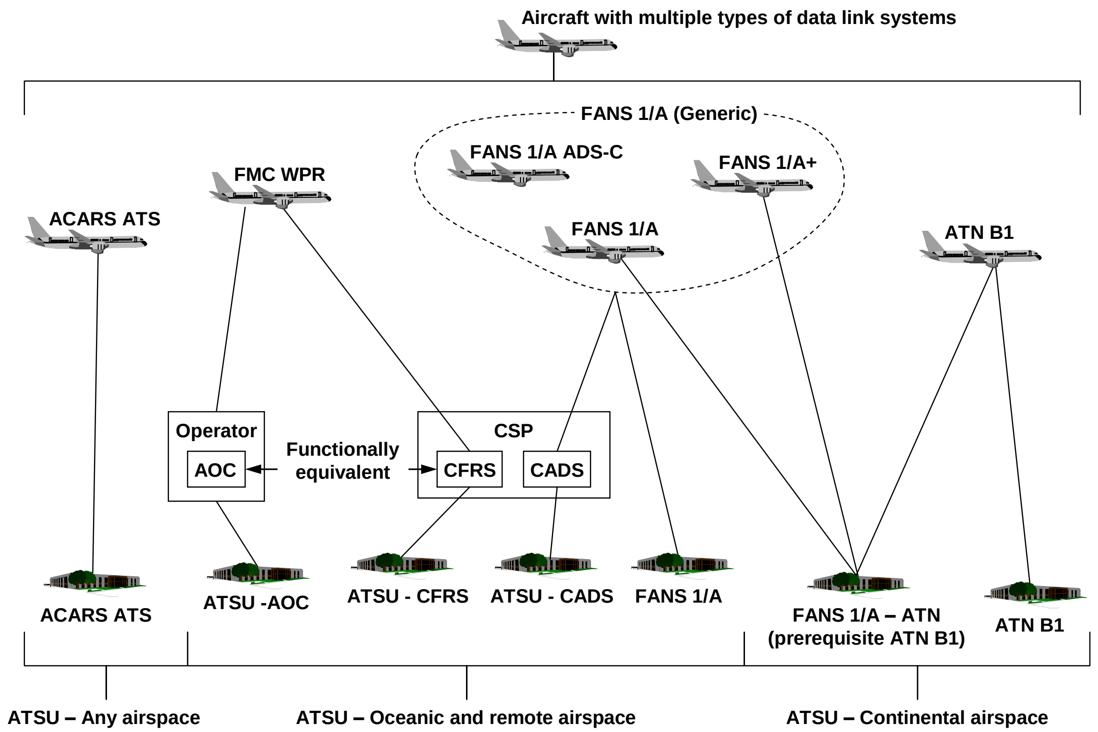


Figure 2-2. Different ATSU/aircraft interoperable connectivity

Table 2-1. Designators for aircraft and ATSU (ground) data link systems

Designator	Description of designator	Applicable interoperability standard(s)	Applicable system
ACARS ATS	ATS applications, departure clearance (DCL), oceanic clearance (OCL) and data link – automatic terminal information service (D-ATIS), supported by aircraft communications addressing and reporting system (ACARS).	a) ED-85A (DCL) b) ED-106A (OCL) c) ED-89A (D-ATIS) d) ARINC 623-3	ATSU and Aircraft
FMC WPR	Flight management computer waypoint position reporting (FMC WPR) ATS application, generates and sends waypoint position reports, supported by flight management system and ACARS.	ARINC 702A-3	Aircraft
ATSU CFRS	Communication service provider's (CSP's) centralized flight management computer waypoint reporting system (CFRS) enables ATSU to receive waypoint position reports in ICAO format from any FMC WPR aircraft.	a) ARINC 702A-3 b) CFRS Common Specification, Version 2.0, April 2004 (Available from ICAO Regional Office in Paris)	ATSU
ATSU AOC	Operator's aeronautical operational control (AOC) facility enables ATSU to receive waypoint position reports in ICAO format from the operator's FMC WPR aircraft.	a) ARINC 702A-3 b) Aeronautical fixed telecommunication network (AFTN) specifications	ATSU
ATSU CADS	CSP's centralized ADS-C system (CADS) enables an ATSU without FANS 1/A capability to receive ADS-C reports from any FANS 1/A, FANS 1/A+ or FANS 1/A ADS-C aircraft.	a) DO-258A/ED-100A, or previous versions. b) CADS Common Specification, Version 2.0, April 2004 (Available from ICAO Regional Office in Paris)	ATSU
FANS 1/A	Initial future air navigation system (FANS 1/A) ATS applications, AFN, CPDLC and ADS-C, supported by FANS 1/A over ACARS. Note.— *FANS 1/A typically involve communication (CPDLC), navigation (RNAV/RNP) and surveillance (ADS-C). This document refers to the FANS 1/A for the data link system, which includes the CPDLC and ADS-C applications. Refer to ICAO Doc 9613 for guidance material on navigation (RNAV/RNP) qualification and use.*	a) DO-258A/ED-100A, or previous versions. b) Boeing document D6-84207, Loading of ATC Clearances into the Flight Management System (FMS), August 2009	ATSU and Aircraft

Designator	Description of designator	Applicable interoperability standard(s)	Applicable system
FANS 1/A+	Same as FANS 1/A, except with additional features, such as the message latency timer function, described in DO-258A/ED-100A, paragraph 4.6.6.9. See also this document, paragraph 4.2.7, for procedures on its use. FANS 1/A+ - complies with Revision A of the standard (i.e., not previous versions)	a) DO-258A/ED-100A only b) Boeing document D6-84207, Loading of ATC Clearances into the Flight Management System (FMS), August 2009	Aircraft
FANS 1/A ADS-C	ATS applications, AFN and ADS-C, supported by FANS 1/A over ACARS. FANS 1/A ADS-C - complies with AFN and ADS-C applications, No CPDLC.	DO-258A/ED-100A	Aircraft
ATN B1	ATS applications, CM and CPDLC, supported by aeronautical telecommunication network – baseline 1 (ATN B1): a) Context management (CM) application for data link initiation capability (DLIC); b) CPDLC for ATS communications management (ACM), ATS clearance (ACL), and ATC microphone check (AMC), except that: 1) UM 135 CONFIRM ASSIGNED LEVEL and UM 233 USE OF LOGICAL ACKNOWLEDGEMENT PROHIBITED will not be used by the ATSU; and 2) DM 38 ASSIGNED LEVEL (level) is not required by the aircraft. *Note.— Interoperability for departure clearance (DCL), downstream clearance (DSC), data link – automatic terminal information service (D-ATIS), and flight plan consistency (FLIPCY) data link services, which are defined in DO 280B/ED 110B, are not supported.*	a) DO-280B/ED-110B b) Eurocontrol Specification on Data Link Services (EUROCONTROL-SPEC-0116)	ATSU and Aircraft
FANS 1/A - ATN	Enables ATSU with ATN B1 ground system to provide data link service to FANS 1/A aircraft.	a) ATN B1 standards are applicable and, in addition, b) DO-305/ED-154	ATSU

Table 2-2. Designators for subnetworks

Designator	Description of designator	Applicable standard(s)
VDL M0/A	Very high frequency data link – mode 0/A	ARINC 618-6 (INTEROP) for air/ground protocol
VDL M2	Very high frequency data link – mode 2	a) ICAO Annex 10, Vol III b) ICAO Doc 9776, Manual on VDL Mode 2 c) RTCA DO-224 (MASPS) d) ARINC 631-5 (INTEROP)
HFDL	High frequency data link	a) ICAO Annex 10, Vol III b) ICAO Doc 9741, Manual on HF Data Link c) RTCA DO-265 (MASPS) d) ARINC 753-3 (INTEROP)
SATCOM (Inmarsat)	Inmarsat or MT-SAT – aero classic satellite communications	a) ICAO Annex 10, Vol III b) ICAO Doc 9925, AMS(R)S Manual c) RTCA DO-270 (MASPS) d) ARINC 741P2-10 (INTEROP)
SATCOM (Iridium)	Iridium short burst data satellite communications	a) ICAO Annex 10, Vol III b) ICAO Doc 9925, AMS(R)S Manual c) RTCA DO-270, Change 1 (MASPS) d) ARINC 741P2-10 (INTEROP)

2.1.2 Data link services - RCP types and surveillance performance specifications

2.1.2.1 RTCA DO-306/EUROCAE ED-122 (Oceanic SPR) provides operational, safety and performance criteria for data link services that are applicable in oceanic and remote airspace for normal ATC communication and surveillance to support separation assurance, route conformance monitoring, reroute, and weather deviation management. These criteria include specifications for required communication performance (RCP) and surveillance performance, taking into consideration the following data link applications:

a) AFN for data link initiation capability (DLIC)

b) CPDLC for normal ATC communication

  1) RCP 240 operations

  2) RCP 400 operations

c) ADS-C for surveillance - automatic position reporting

  1) Periodic report

  2) Event report

    i) Waypoint change event report

    ii) Level range deviation event report

iii) Lateral deviation event report

iv) Vertical rate change event report

d) FMC WPR for surveillance - automatic position reporting at ATC waypoints

2.1.2.2 If the data link operation is dependent on certain performance, then the ATSP may prescribe RCP types and/or surveillance performance specifications. Table 2-3 provides examples of intended uses for which the RCP types defined in Appendix B are applicable. Table 2-4 provides examples of intended uses for which the surveillance performance specifications defined in Appendix C are applicable.

Table 2-3. Examples of applying RCP types to intended uses

RCP type	Intended uses for which the RCP type is applicable
RCP 240	When CPDLC is the normal means of communications supporting the application of 30 NM lateral separation and reduced longitudinal separation minima.
RCP 400	When a technology other than HF voice radio is the normal means of communication supporting the application of lateral separation greater than or equal to 50 NM and time-based longitudinal separation.
	When a technology other than HF voice radio is the alternative means of communication supporting the application of 30 NM lateral separation and reduced longitudinal separation minima.

Table 2-4. Examples of applying surveillance performance specifications to intended uses

Surv type	Intended uses for which the surveillance type is applicable
Type 180	When ADS-C is the normal means of surveillance supporting the application of 30 NM lateral separation and reduced longitudinal separation minima.
Type 400	When ADS-C or FMC WPR is the normal means of surveillance supporting the application of lateral separation greater than or equal to 50 NM and time-based longitudinal separation.
	When a technology other than HF voice radio provides an alternative means of surveillance, e.g. position reporting via satellite voice, supporting the application of 30 NM lateral separation and reduced longitudinal separation minima.

Note 1.— For example, satellite voice and CPDLC over the HFDL subnetwork may provide ATC communication other than by HF voice radio. Appendix B and Appendix C provide criteria only when the communication is a data link system.

2.1.2.3 Data link operations that use certain subnetworks, e.g. HFDL, or take place in subnetwork transition areas, e.g. VHF fringe coverage area, may not meet the criteria for some RCP types or surveillance specifications.

2.1.2.4 Aircraft capability that supports multiple RCP type or surveillance operations needs to include appropriate indications and/or procedures to enable the flight crew to notify ATC when aircraft equipment failures result in the aircraft's ability to no longer meet its criteria for any of the RCP types or surveillance specifications. (See Appendix B and Appendix C.)

2.1.2.5 An ATSU that supports multiple RCP type or surveillance operations needs to include appropriate indications and/or procedures to enable the controller to notify all affected aircraft when infrastructure failures result in the ground system's inability to meet its criteria for any of the RCP types or surveillance specifications.

2.1.2.6 If no RCP type or surveillance specification is prescribed for the data link operation, then any subnetwork provided in Table 2-2 is applicable, unless otherwise prescribed by airspace requirements.

2.1.2.7 RTCA DO-290/EUROCAE ED-120, Change 1 and Change 2 (Continental SPR) provides operational, safety and performance criteria for data link services that are applicable in airspace where radar services are provided, referred to as continental airspace.

2.1.2.8 While no RCP types or surveillance specifications have been developed for the data link services in continental airspace, the VDL M2 subnetwork is the only subnetwork that has been prescribed for data link services in continental airspace.

2.1.3 Operational capabilities supported by data link services

2.1.3.1 The data link system in oceanic and remote airspace, as shown in Figure 2-2, comprises a variety of ground systems that may provide data link services to FANS 1/A (generic) aircraft, FMC WPR aircraft and ACARS ATS aircraft.

2.1.3.2 The data link services improve communications and surveillance to support operational capabilities that enable:

a) Reduced separations, for example, the following reduced separations require FANS 1/A aircraft, FANS 1/A ATSU, RCP 240 and surveillance performance type 180;

1) 50 NM longitudinal separation;

2) 30 NM separation;

3) 30 NM lateral separation;

b) User preferred route (UPR) may require data link in some airspace;

c) Reroute, may require data link in some airspace, dynamic airborne reroute procedure (DARP) requires FANS 1/A aircraft and FANS 1/A ATSU;

d) Weather deviation management may require data link in reduced separation environments; and

e) Improved ATC communication, surveillance and route conformance monitoring through the use of data link may enable more efficient air traffic management and increases in airspace capacity. For example, ADS-C provides automatic surveillance capability that an ATSP may use to replace CPDLC and/or voice position reporting in airspace where the ATSP applies procedural separation.

2.1.3.3 The data link system in continental airspace, as shown in Figure 2-2, comprises a variety of ground systems that may provide data link services to ATN B1 aircraft, FANS 1/A aircraft and ACARS ATS aircraft.

Note 1.— FANS 1/A aircraft are interoperable with a FANS 1/A-ATN ATSU. However, it may not be operationally acceptable, for example, data link operations may require FANS 1/A+ aircraft (refer to Table 2-1).

Note 2.— Since FANS 1/A aircraft or FANS 1/A+ aircraft automatically switch among available subnetworks, ATSUs that provide data link service to these aircraft in continental airspace will need to manage the subnetworks that are used to ensure their use of the VDL M2 subnetwork.

2.1.3.4 The data link services provide limited ATC communications in continental airspace that support operational capabilities that enable more efficient air traffic management and increases in airspace capacity.

2.1.3.5 Table 2-5 provides an overview of the operational capabilities in oceanic/remote and continental airspace that are supported by each of the different data link systems.

Table 2-5. Types of data link systems and operations

Aircraft equipment and capability	**Airspace type/ground data link system**				
	Any airspace ACARS ATS	**Oceanic/ Remote CADS, CFRS or AOC**	**Oceanic/ Remote FANS 1/A**	**Continental ATN B1**	**Continental FANS 1/A - ATN**
ACARS ATS	Limited ATC communication • DCL or PDC • OCL Flight information • D-ATIS	N/A	N/A	N/A	N/A
FMC WPR	N/A	Surveillance • FMC WPR (CFRS or AOC)	N/A	N/A	N/A
FANS 1/A ADS-C	N/A	Surveillance • ADS-C (CADS)	Surveillance • ADS-C	N/A	N/A
FANS 1/A	N/A	Surveillance • ADS-C (CADS)	Normal ATC communication • CPDLC Surveillance • ADS-C	N/A	*(See Note)*
FANS 1/A+	N/A	Surveillance • ADS-C (CADS)	Normal ATC communication • CPDLC Surveillance • ADS-C	N/A	Limited ATC communication • CPDLC for ACM, ACL, and AMC data link services
ATN B1	N/A	N/A	N/A	Limited ATC communication • CPDLC for ACM, ACL, and AMC data link services	Limited ATC communication • CPDLC for ACM, ACL, and AMC data link services
Note.— Same as for FANS 1/A+, if operationally acceptable. FANS 1/A aircraft are interoperable, but may not be operationally acceptable in some continental airspace (refer paragraph 2.1.3.3).					

2.2 FANS 1/A data link system

2.2.1 General

2.2.1.1 The FANS 1/A (including FANS 1/A+, and FANS 1/A ADS-C defined in paragraph 2.1.1) data link system relies on the ACARS network, which is provided and maintained by various communication service providers (CSPs).

2.2.1.2 The ACARS network evolved from the need to be able to exchange messages between an aircraft and its AOC.

2.2.1.3 The ACARS network consists mainly of VHF (VDL M0/A and VDL M2) and satellite subnetworks, but also includes the HFDL subnetwork. The performance characteristics of each subnetwork varies and its use for ATC will depend on the performance required for the intended operation (refer paragraph 2.1.2).

Note 1.— There are some exceptions when the ATSU will not be able to determine if a report was not delivered, e.g. the lateral deviation event report. The ATSU does not rely solely on these reports for protecting airspace.

2.2.1.4 There are no technical provisions for the ATSU to ensure that a message has been delivered to the aircraft and is available for display to the flight crew. However, the ACARS network does support the following network acknowledgements:

a) The ATS system will receive a message assurance (MAS) success indication to an uplink message indicating that the message has been delivered to the aircraft, as shown in Figure 2-3.

Note 2.— It is possible for the uplink message to be delivered to the aircraft, but for the MAS success to not be delivered to the ATSU. Therefore, the non-receipt of MAS or receipt of MAS fail does not provide a positive indication that the uplink message was not successfully delivered to the aircraft.

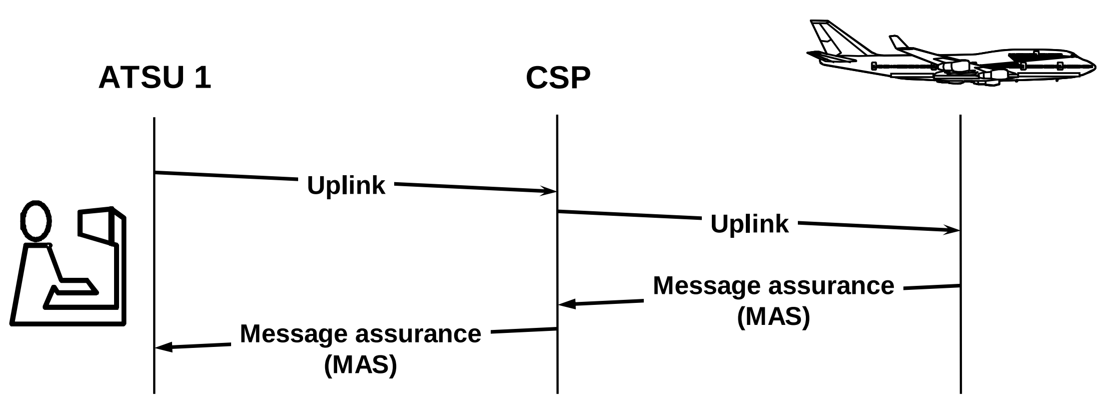


Figure 2-3. Uplink and message assurance

b) The aircraft system will receive a network acknowledgement to a downlink message indicating that the message has been delivered to the CSP system as shown in Figure 2-4.

Note 3.— Some aircraft may re-send the downlink if the network acknowledgement is not received within a system parameter. This may result in the ATSU receiving a duplicated downlink message.

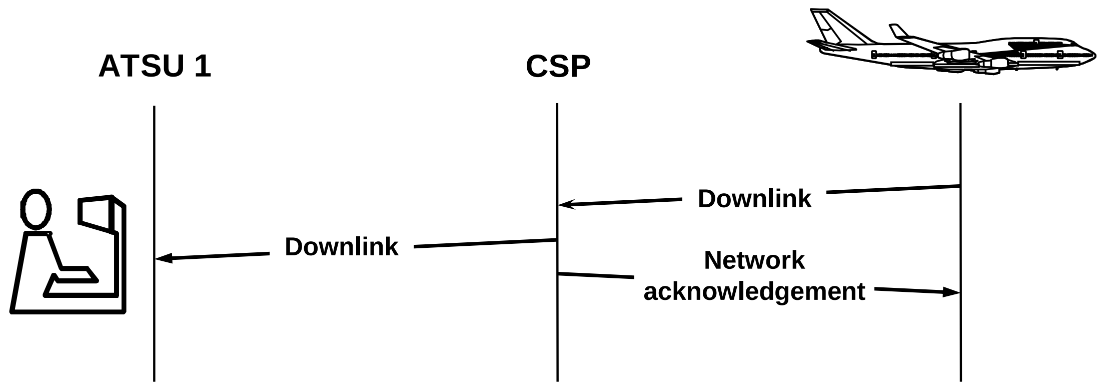


Figure 2-4. Downlink and network acknowledgement

2.2.1.5 Even though the controller does not have an indication to ensure whether or not a clearance was delivered to the aircraft, procedures are in place to mitigate the effects of non-delivery. When a clearance is sent to the aircraft, the controller continues to protect the airspace associated with the existing clearance until an appropriate operational response is received from the flight crew. If an expected operational response to a clearance is not received, the controller will initiate appropriate action to ensure that the clearance was received by the flight crew. Similarly, the controller will initiate appropriate action if an expected CPDLC and/or ADS-C report is not received.

2.2.2 ATS facilities notification (AFN) logon

2.2.2.1 Purpose of the AFN logon

2.2.2.1.1 The AFN logon is the first step in the data link process. The receipt of an AFN logon from an aircraft is performed prior to the ATSU establishing CPDLC and/or ADS-C connections. The purpose of the AFN logon is to:

a) Provide the ATSU with the data link application "context" of the aircraft, namely:

1) The ATS data link applications supported by the aircraft system (e.g. CPDLC, ADS-C), and the associated version numbers of these applications; and

2) The unique ACARS address of the aircraft.

b) Provide the ATSU with information such as the aircraft identification, aircraft registration and (optionally) the aircraft address. This information allows the ATSU to correlate the AFN logon information with its corresponding current flight plan.

Note.— An ATSU cannot establish a CPDLC connection without first completing the AFN logon.

2.2.2.2 Timing of the initial AFN logon

2.2.2.2.1 When CPDLC and/or ADS-C services are available for the flight, the flight crew initiates an AFN logon in accordance with the guidelines provided in paragraph 5.2.

2.2.2.3 The initial AFN logon

2.2.2.3.1 An initial AFN logon is needed when the aircraft does not already have an ADS-C or CPDLC connection, such as when:

a) The aircraft is preparing to depart; or

b) The aircraft will enter an area where data link services are available from an area where data link services are not available; or

c) Instructed by ATC (e.g. following a failed data link transfer).

2.2.2.3.2 To perform an initial AFN logon the flight crew enters flight-specific information (e.g. aircraft identification and aircraft registration) into the aircraft system. The flight crew also enters the four character ICAO identifier of the ATSU to which the AFN logon is to be sent.

2.2.2.3.3 To avoid an automatic rejection of the AFN logon, the flight crew ensures that the aircraft identification and aircraft registration entered into the FMS are the same as the corresponding details filed in item 7 and item 18 (preceded by REG/) of the flight plan.

Note 1: The aircraft identification entered into the FMS is either the ICAO designator for the aircraft operating agency followed by the flight identification or the aircraft registration, in accordance with ICAO Doc 4444.

Note 2.— The aircraft registration entered into the FMS can include a hyphen(-), even though the aircraft registration provided in the filed flight plan message cannot include a hyphen.

2.2.2.3.4 When the flight crew performs the AFN logon, the aircraft system transmits the logon information in an AFN CONTACT (FN_CON) message to the specified ATSU.

Note.— If the flight crew subsequently realizes that they have entered incorrect aircraft identification and aircraft registration prior to transmitting the AFN logon, they will need to reinitiate the AFN logon with a correct information.

2.2.2.4 Response to an AFN logon

2.2.2.4.1 As shown in Figure 2-5, on receipt of an AFN CONTACT (FN_CON) message, the ground system automatically responds with an AFN ACKNOWLEDGEMENT (FN_AK) to the aircraft. The FN_AK message provides information to the aircraft system concerning whether:

a) The AFN logon was "accepted" (e.g. could be correlated with a flight plan); or

b) The AFN logon was "rejected" (e.g. could not be correlated with a flight plan). This is an indication that information in the AFN logon was incorrect, or differed from the information in the flight plan. Refer to paragraph 3.1.2.1.1 for condition when an ATSU rejects a logon.

2.2.2.4.2 The FN_AK message also provides information concerning which ATS data link applications the ATSU supports.

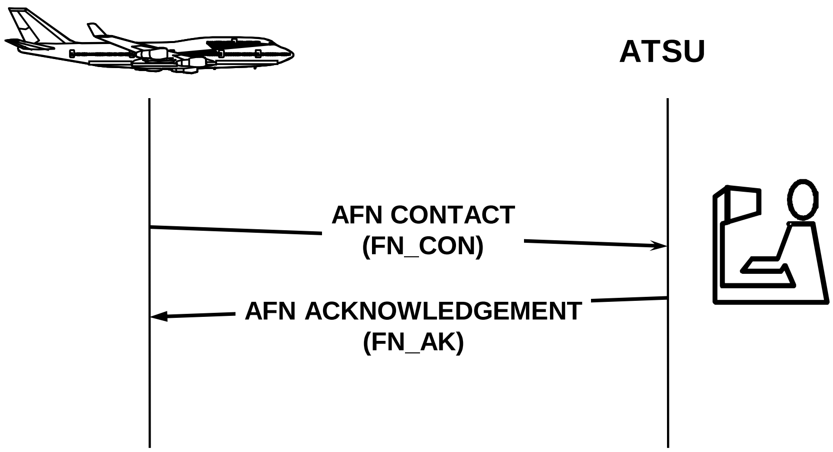


Figure 2-5. Initial AFN logon

2.2.2.4.3 If the AFN logon is rejected, the flight crew confirms that the aircraft identification and aircraft registration in the FMS matches the information provided in the flight plan and, as appropriate:

a) Makes the necessary corrections; or

b) Contacts ATC or AOC to correct the flight plan; and then.

c) Reinitiates the AFN logon.

2.2.2.5 Address forwarding AFN logon

2.2.2.5.1 An address forwarding AFN logon occurs without flight crew input when the flight is leaving one ATSU where a logon had already been completed and the flight is transferred to another ATSU. (See paragraph 2.2.3.6 for details)

Note.— The functionality associated with address forwarding can also be imitated using the AIDC FAN message. Refer to the Asia Pacific or North Atlantic ATS Interfacility Data Communications Interfacility Control Documents (AIDC ICDs) for further information.

2.2.2.6 Correlating an AFN logon with a flight plan

2.2.2.6.1 On receipt of an AFN logon, the ATSU correlates the AFN logon information with the relevant information in the flight plan held by the ATSU. This ensures that any automation associated with ADS-C reports or CPDLC messages updates the correct flight plan.

2.2.2.6.2 When making this correlation, the ground system:

a) Ensures that the aircraft identification and at least one of either the aircraft registration and/or aircraft address in the AFN logon match corresponding items in the ICAO flight plan, item 7 and item 18, preceded by REG/ and/or CODE/, respectively; and

b) Only uses the information contained within the portion of the AFN logon message that is protected by the cyclic redundancy check (CRC).

Note.— The aircraft identification in the ACARS message header is not protected by the CRC and the flight crew does not use this information to verify aircraft identification. Additionally, the format for the aircraft identification in the ACARS message header is different than the format used by the ground system. For example, the ground system uses a two alpha character ICAO designator for the operating agency followed by up to four numeric characters for the flight identification.

Example
The following example of an AFN logon indicates what information in the ACARS message the ATSU uses to correlate the AFN logon with a flight plan.
QU <ACARS "TO" address> . <ACARS "FROM" address> 010000 AFD FI AB0123/AN ST-XYZ DT QXT POR1 010000 J59A - AFN/FMH***ABC123,.ST-XYZ,DEF456***,000002/FPOS30000E160000,0/FCOADS,01/ FCOATC,01<CRC>
The ATSU only uses the information in the CRC-protected portion of the ACARS message. In the example above, the CRC portion is highlighted, and contains the following information: • aircraft identification is ABC123 (not the AB0123 contained in the ACARS header); • aircraft registration is ST-XYZ (hyphen is removed by ATS automation per paragraph 3.1.2.1.2); and • aircraft address is DEF456.
Note.— Some ATSUs may operate a ground system that does not integrate data link capability with a flight data processing system. Under these circumstances, the ATSU will need to ensure that the logon information is available for the controller to manually cross-check the information with the details in the flight plan.

2.2.3 FANS 1/A CPDLC connection management

2.2.3.1 Purpose of a CPDLC connection

2.2.3.1.1 The purpose of a CPDLC connection is to allow the exchange of CPDLC messages between an aircraft and an ATSU. FANS-1/A aircraft can have two CPDLC connections established concurrently, each with a different ATSU. Only one of these connections can be active at any given time – the other connection is inactive.

2.2.3.2 Active and inactive CPDLC connections

2.2.3.2.1 A CPDLC connection is active if the ATSU and the aircraft can exchange CPDLC messages. The ATSU with which an aircraft has an active CPDLC connection is referred to as the current data authority (CDA).

2.2.3.2.2 A CPDLC connection is inactive if the ATSU and the aircraft cannot exchange CPDLC messages. The ATSU with which the aircraft has an inactive CPDLC connection is referred to as the next data authority (NDA).

2.2.3.2.3 An inactive connection becomes active when the active connection is terminated.

2.2.3.3 Establishing an active CPDLC connection

2.2.3.3.1 The ATSU initiates a CPDLC connection by uplinking a CPDLC CONNECTION REQUEST (CR1) to the aircraft.

2.2.3.3.2 Provided that there is not an existing CPDLC connection, the aircraft system:

a) Accepts this CR1;

b) Establishes this CPDLC connection as the active connection; and

c) Responds with a CPDLC CONNECTION CONFIRM (CC1).

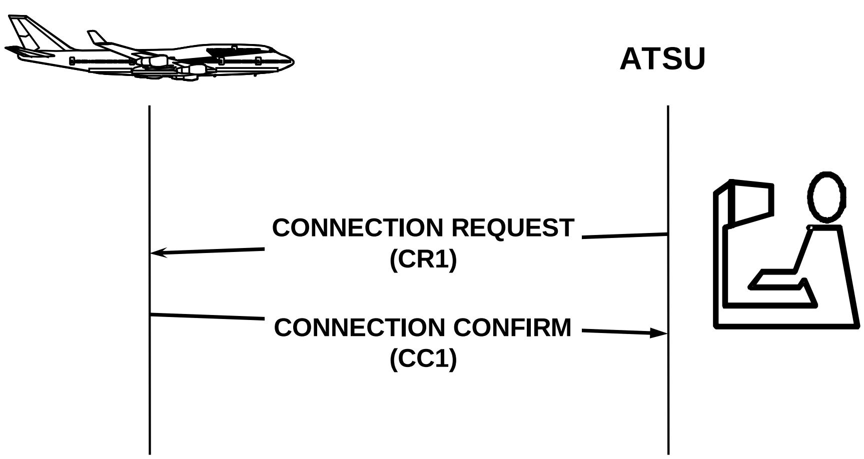


Figure 2-6. CPDLC connection sequence

2.2.3.3.3 The ATSU can establish an initial CPDLC connection only after it has successfully completed an AFN logon that was initiated by the flight crew per paragraph 2.2.2. Depending on the functionality of the ground system, the ATSU may uplink the CR1 either upon completion of the AFN logon, or at some later time (e.g. as the aircraft approaches the ATSU's airspace).

2.2.3.4 Transferring CPDLC connections

2.2.3.4.1 ATSUs manage CPDLC connections to ensure that the ATSU with control for the flight holds the active CPDLC connection, except in certain circumstances. (See paragraph 4.1.1.1). The flight crew can also terminate an inappropriate CPDLC connection. (See paragraph 5.2.5).

2.2.3.4.2 Under normal circumstances, the controlling ATSU, or current data authority, will initiate CPDLC transfers to adjacent ATSUs as the aircraft transits from one CPDLC-capable ATSU to another. These transfers are normally automatic, without flight crew action. Paragraph 2.2.3.12 provides non-standard events associated with CPDLC transfers that may require controller action per paragraph 4.1 and/or the flight crew action per paragraph 5.2.3.

2.2.3.4.3 The controlling ATSU performs the following steps to transfer a CPDLC connection to the next ATSU:

a) Notifies the aircraft of the identity of the next ATSU permitted to establish a CPDLC connection (NDA message);

b) Instructs the aircraft to initiate an AFN logon to the next ATSU (FN_CAD message); and

c) In the vicinity of the FIR boundary, terminates the CPDLC connection with the aircraft (END SERVICE message).

2.2.3.5 Next data authority notification (NDA message)

2.2.3.5.1 The purpose of the CPDLC UM 160 NEXT DATA AUTHORITY [facility designation] (NDA) message is to allow the controlling ATSU to notify the aircraft of the identity of the next ATSU authorized to establish an inactive CPDLC connection. The aircraft system will only accept a CPDLC CR1 from the ATSU specified in the [facility designation] of the NDA message.

2.2.3.5.2 The [facility designation] is the four-character ICAO identifier for the appropriate ATSU.

2.2.3.5.3 Only the current data authority can specify the next data authority.

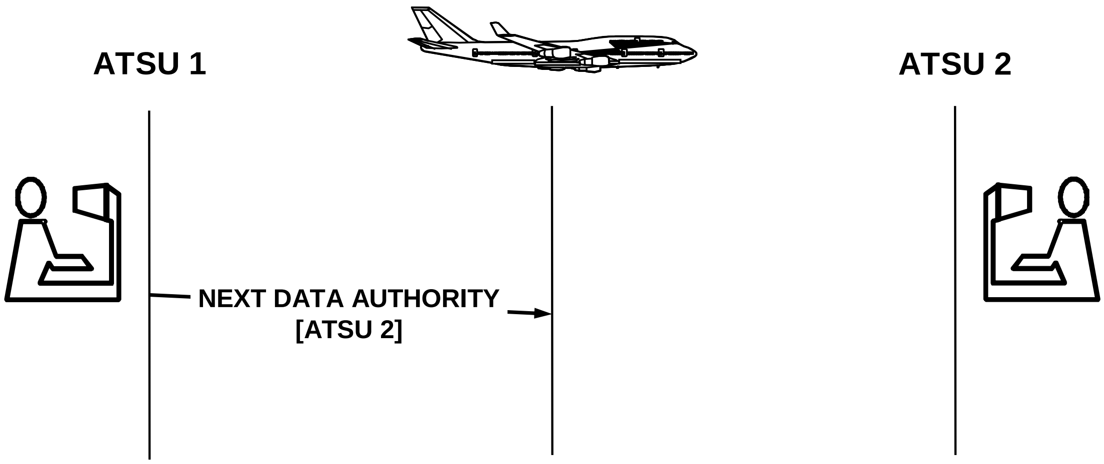


Figure 2-7. Next data authority notification

2.2.3.6 AFN logon triggered by address forwarding (FN_CAD message)

2.2.3.6.1 Address forwarding is the process whereby one ATSU instructs the aircraft system to initiate an AFN logon to another ATSU.

2.2.3.6.2 The current data authority typically initiates address forwarding to a downstream or adjacent ATSU to permit them to establish an inactive CPDLC connection and/or an ADS contract for monitoring purposes.

2.2.3.6.3 Any ATSU can initiate address forwarding by sending an AFN CONTACT ADVISORY (FN_CAD) message to the aircraft. Upon receipt, the aircraft automatically transmits an AFN logon to the ATSU whose address was included in the FN_CAD message.

2.2.3.6.4 The sequence of messages associated with address forwarding is listed in the Table 2-6, and depicted in Figure 2-8.

2.2.3.6.5 Where the functionality is available, an ATSU can imitate address forwarding by the AIDC FAN message. The AIDC FAN message contains the same information as an AFN logon, but is transmitted by one ATSU to another as depicted in Figure 2-9 using ground – ground links as a substitute for address forwarding.

Note.— Refer to the Asia Pacific AIDC ICD and North Atlantic Common Coordination ICD for more information concerning the AIDC FAN message.

2.2.3.6.6 To allow an uninterrupted transfer of the CPDLC connection at the FIR boundary, the current data authority initiates address forwarding at least 15 minutes prior to the estimate for the FIR entry position. (Refer to paragraph 3.1.2.2 and paragraph 3.1.4.8).

2.2.3.6.7 The ATSU initiating the address forwarding receives indication of successful delivery of FN_CON or FN_AK messages upon receipt of the AFN COMPLETE (FN_COMP) message.

2.2.3.6.8 The flight crew does not receive an indication as to whether or not the FN_CON or FN_AK messages have been delivered correctly. However, the flight crew receives an indication of a change to the active ATSU following a successful CPDLC connection transfer.

Table 2-6. Address forwarding messages

Message	Abbreviation	Purpose
AFN CONTACT ADVISORY	FN_CAD	Uplink message sent by an ATSU instructing an aircraft to send an FN_CON (AFN logon) to a specified ATSU.
AFN RESPONSE	FN_RESP	Downlink response sent by the aircraft to the ATSU that initiated the FN_CAD indicating an intent to send an FN_CON to the specified ATSU.
AFN CONTACT	FN_CON	AFN logon message sent by the aircraft to the specified ATSU.
AFN ACKNOWLEDGEMENT	FN_AK	Uplink response sent by the ATSU receiving the AFN logon message to the aircraft providing the status of the AFN logon attempt.
AFN COMPLETE	FN_COMP	Response sent by the aircraft to the ATSU initiating the FN_CAD providing the status of the AFN logon to the specified ATSU.

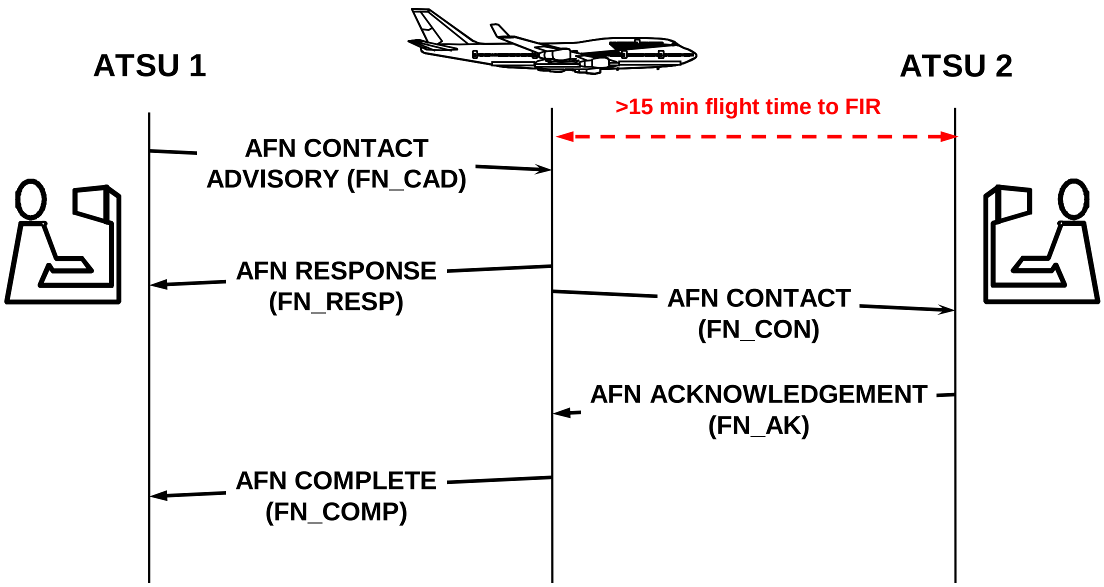


Figure 2-8. Address forwarding message sequence (Transfer between areas where data link is provided)

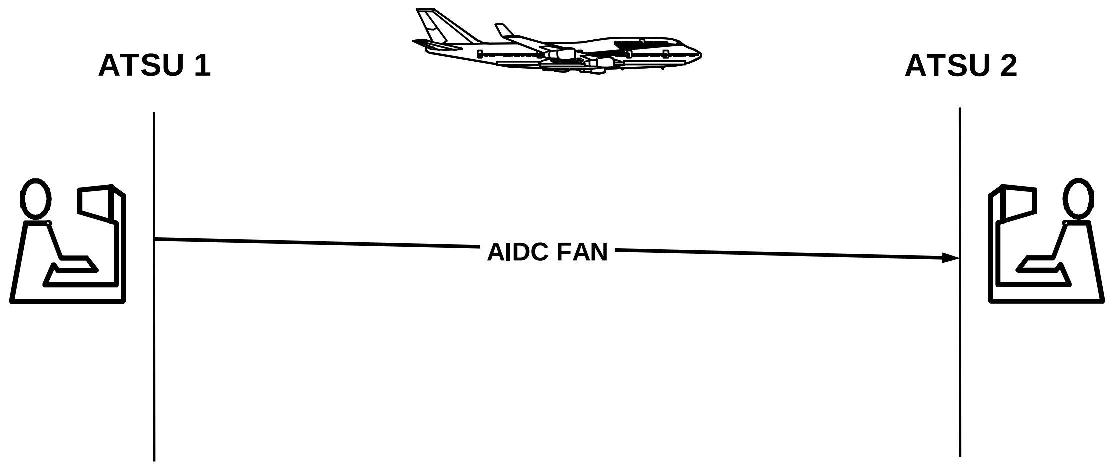


Figure 2-9. Transferring an AFN logon using the AIDC FAN message

2.2.3.7 Establishing an inactive CPDLC connection

2.2.3.7.1 The effect of receiving AFN logon information via address forwarding is the same as receiving it when the flight crew performs an initial ATN logon. However, when the next ATSU uplinks a CPDLC CR1 to establish an inactive CPDLC connection, the aircraft system follows a different set of rules to those described in paragraph 2.2.3.3.2.

2.2.3.7.2 If there is an existing CPDLC connection, on receipt of a CPDLC CR1, the aircraft system verifies that the ATSU sending the CPDLC CR1 has been specified as the next data authority. If so, the aircraft system:

a) Accepts the CPDLC CR1;

b) Establishes the connection as the inactive connection; and

c) Responds with a CPDLC CC1.

Otherwise:

d) Rejects the CPDLC CR1 by sending a DR1 message that also contains the identity of the current data authority.

2.2.3.7.3 Because the next data authority holds an inactive CPDLC connection as shown in Figure 2-10, the next data authority and the flight crew cannot exchange CPDLC messages.

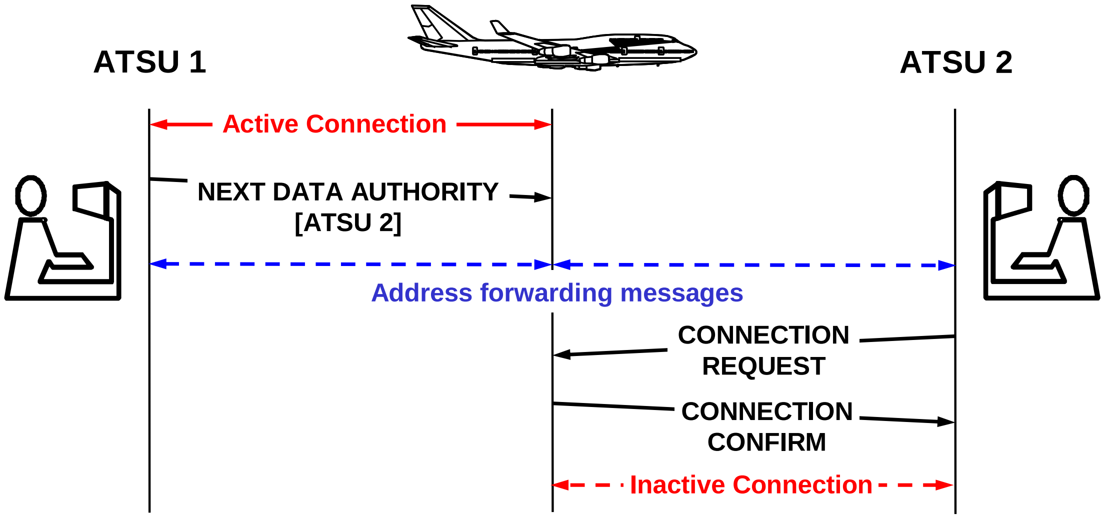


Figure 2-10. Successful attempt to establish an inactive CPDLC connection

Note.— If ATSU 1 does not establish a CPDLC connection, then some aircraft will reject a CR1 received from ATSU 2 after an FN CAD initiated communications transfer. Refer to Appendix F, paragraph F.3.

2.2.3.7.4 Figure 2-11 shows the effect of the next ATSU attempting to establish an inactive CPLDC connection when the UM 160 NEXT DATA AUTHORITY [facility designation] message has not been delivered to the aircraft (or was not sent in the first place). The aircraft system rejects the CPDLC CR1, and responds with a DR1 downlink message that also contains the identity of the ATSU with the active CPDLC connection.

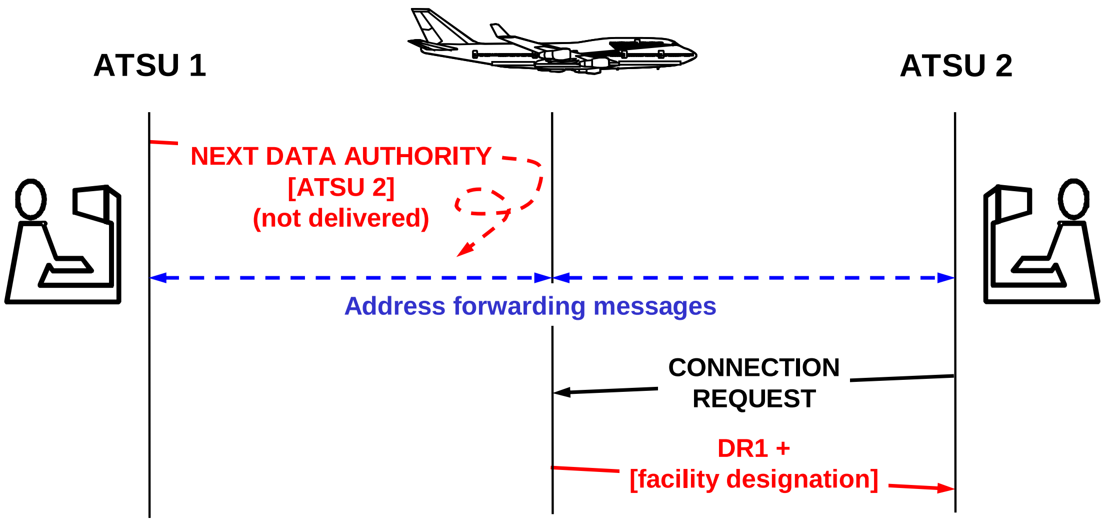


Figure 2-11. Unsuccessful attempt to establish an inactive CPDLC connection

2.2.3.8 Sequence of the NDA and FN_CAD messages

2.2.3.8.1 Some ATSUs initiate a CPDLC CR1 immediately following receipt of an AFN logon. If this CPDLC CR1 is received prior to receipt of an appropriate NDA message, the aircraft system will reject the CPDLC CR1.

2.2.3.8.2 To prevent such a rejection of the CPDLC CR1, the current data authority sends the NDA message prior to initiating address forwarding to the next ATSU (Refer to paragraph 3.1.2.2).

2.2.3.9 Terminating the active CPDLC connection (END SERVICE message)

2.2.3.9.1 Under normal conditions, the current data authority initiates the termination of the CPDLC connection by sending an UM 161 END SERVICE message to the aircraft as depicted in Figure 2-12 and Figure 2-13. On receipt of an UM 161 END SERVICE message:

a) The aircraft system will downlink a CPDLC DISCONNECT REQUEST (DR1) message. The aircraft system will consider the aircraft to be disconnected as soon as the DR1 message has been sent.

b) The current (active) CPDLC connection will be terminated, activating the inactive connection (if one exists). The next data authority becomes the current data authority and is now able to exchange CPDLC messages with the aircraft.

2.2.3.9.2 If the aircraft is entering an FIR where data link services are not available, no Next Data Authority message is uplinked, nor is the Address Forwarding process carried out. On receipt of an UM 161 END SERVICE message:

a) The aircraft system will downlink a CPDLC DISCONNECT REQUEST (DR1) message. The aircraft system will consider the aircraft to be disconnected as soon as the DR1 message has been sent

b) The current (active) CPDLC connection will be terminated, leaving the aircraft without a CPDLC connection.

c) If no NDA exists, then receipt of the END SERVICE message will leave the aircraft without a CPDLC connection.

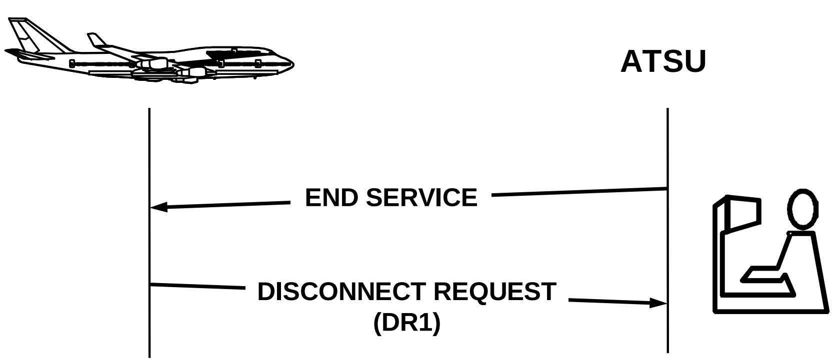


Figure 2-12. Termination of the CPDLC connection

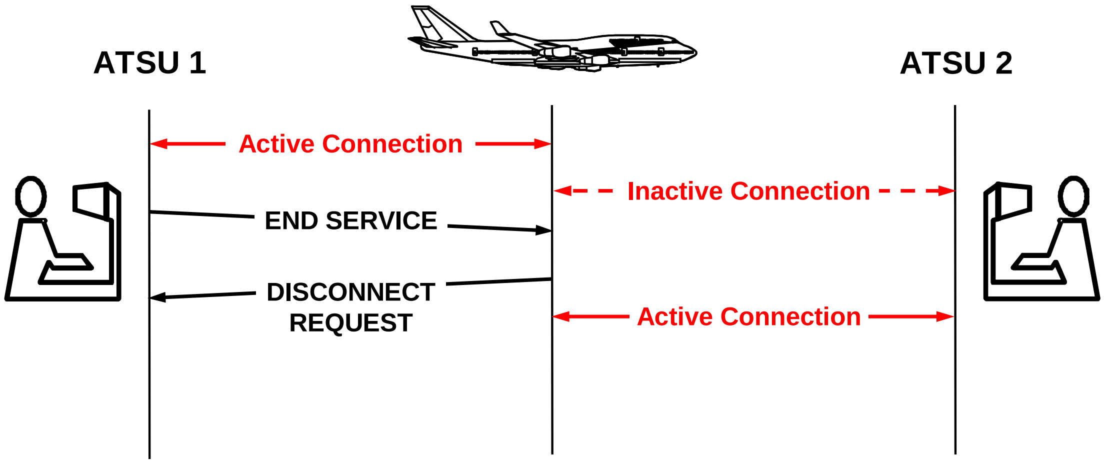


Figure 2-13. CPDLC transfer sequence of an aircraft between two ATSUs

2.2.3.9.3 The new current data authority has no indication that they have the active CPDLC connection until a CPDLC downlink is received from the aircraft (See paragraph 2.2.3.11.2).

2.2.3.9.4 Alternatively, implementation of the AIDC FCN message depicted in Figure 2-14 can be used to provide notification to the next ATSU that the previous ATSU has terminated their CPDLC connection.

Note.— Only the current data authority can terminate their CPDLC connection. If the next data authority attempts to uplink an UM 161 END SERVICE message to the aircraft, the aircraft system will reject the uplink message.

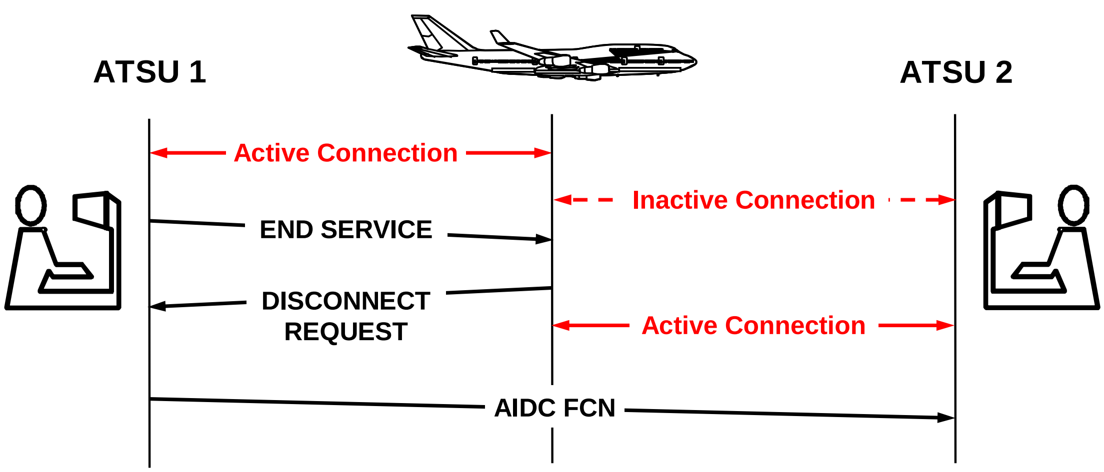


Figure 2-14. Use of the AIDC FCN message

2.2.3.9.5 A successful CPDLC transfer is dependent upon the next ATSU establishing its own CPDLC connection prior to the UM 161 END SERVICE message being received by the aircraft. Failure of the next ATSU to establish a CPDLC connection before the UM 161 END SERVICE message reaches the aircraft will leave the aircraft without CPDLC connectivity.

2.2.3.9.6 The previous ATSU will no longer be able to exchange CPDLC messages with the aircraft. The first ATSU to send a CPDLC CR1 message to the aircraft will become the current data authority, provided that an AFN logon has been completed with that ATSU.

2.2.3.9.7 The sequence of messages from the initial AFN logon to the completion of the CPDLC transfer is depicted in Figure 2-15. Figure 2-16 shows the same sequence of messages, with the AIDC FAN message being used instead of address forwarding.

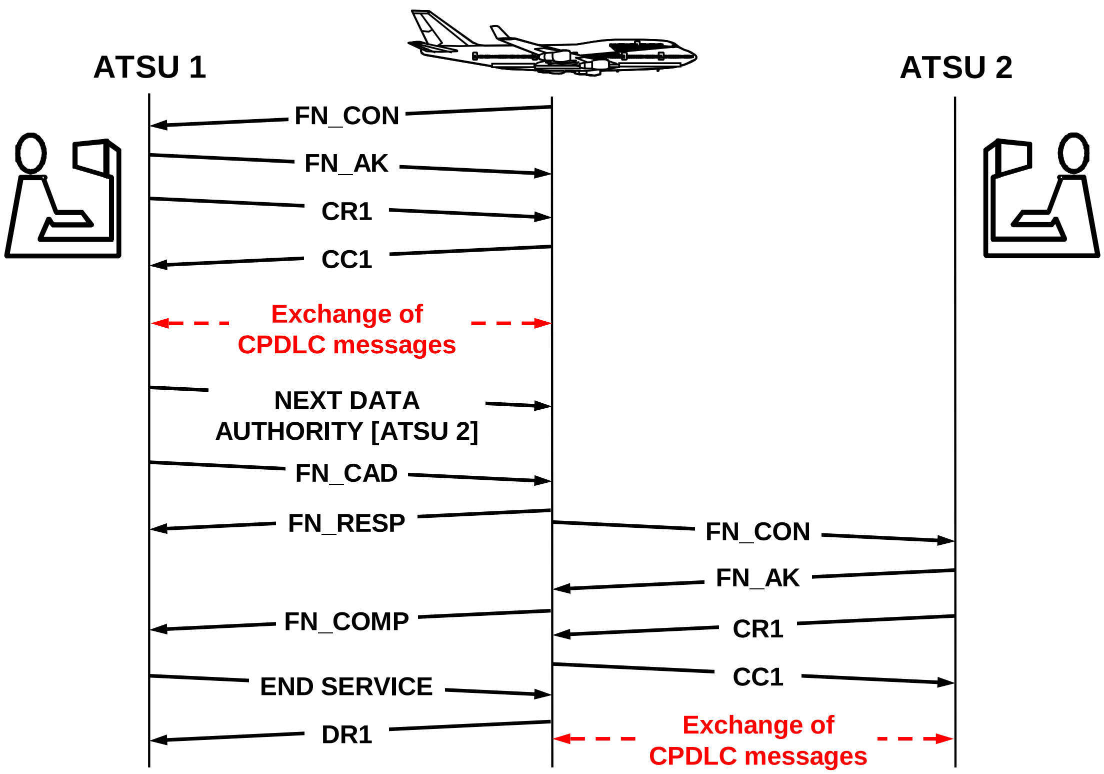


Figure 2-15. Initial AFN logon transfer of CPDLC connection using address forwarding

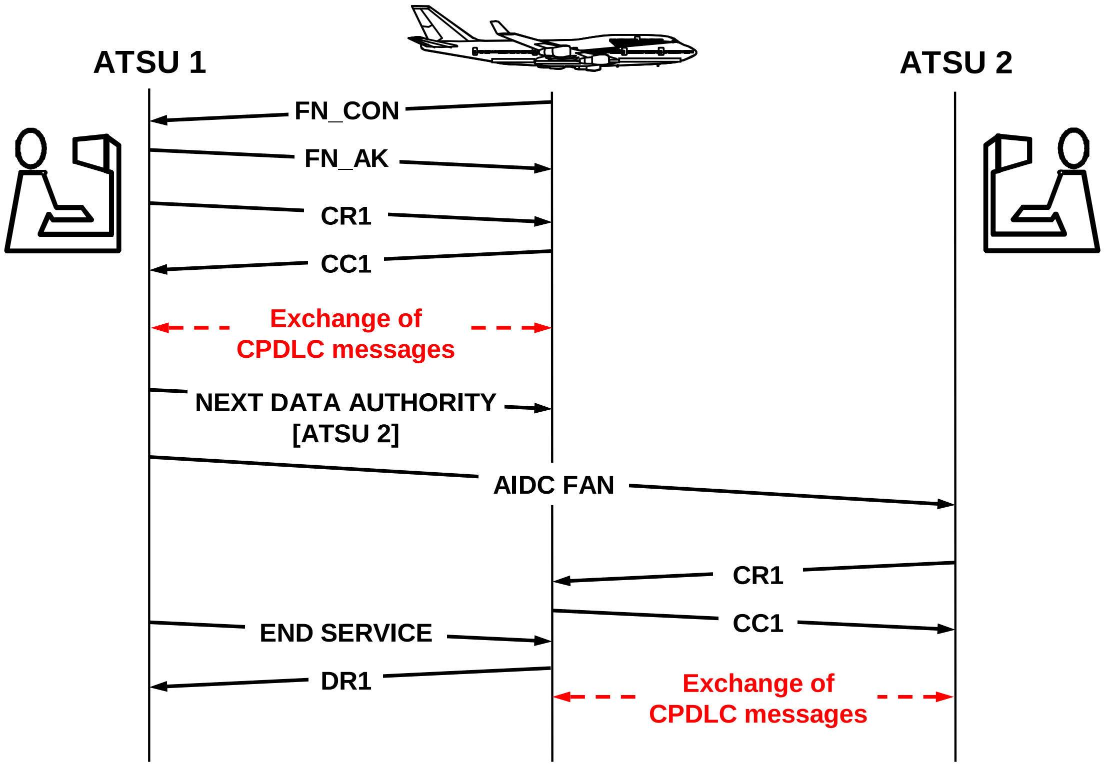


Figure 2-16. Initial AFN logon to transfer CPDLC connection using the AIDC FAN message

2.2.3.10 The CPDLC connection sequence

2.2.3.10.1 As the aircraft transits from one CPDLC-capable ATSU to another, the same CPDLC transfer process repeats itself. The cyclical nature of this process is depicted in Figure 2-17.

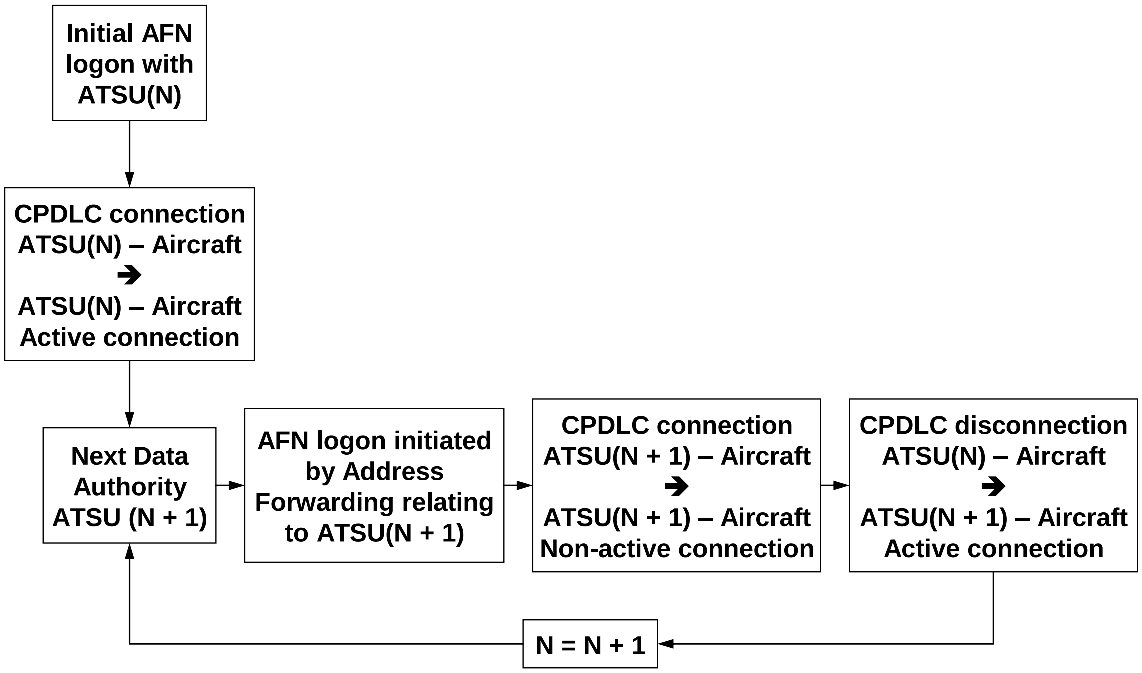


Figure 2-17. Life cycle of the CPDLC connection process

2.2.3.11 Determining an active CPDLC connection

2.2.3.11.1 CPDLC messages can only be exchanged between the aircraft and the current data authority. If the ATSU with the inactive connection uplinks a CPDLC message to the aircraft, the aircraft system rejects the message and sends DM 63 NOT CURRENT DATA AUTHORITY to the ATSU.

2.2.3.11.2 The receiving ATSU can use the following methods to confirm a CPDLC connection is active:

a) Wait until a CPDLC downlink message is received from the aircraft;

b) Send a message to the aircraft with the possibility of receiving a DM 63 NOT CURRENT DATA AUTHORITY message if the connection is inactive as shown in Figure 2-18; or

c) Wait until an AIDC FCN message for the flight is received from the transferring ATSU.

Note.— Non-receipt of a DM 63 NOT CURRENT DATA AUTHORITY message does not necessarily confirm that a CPDLC connection is active.

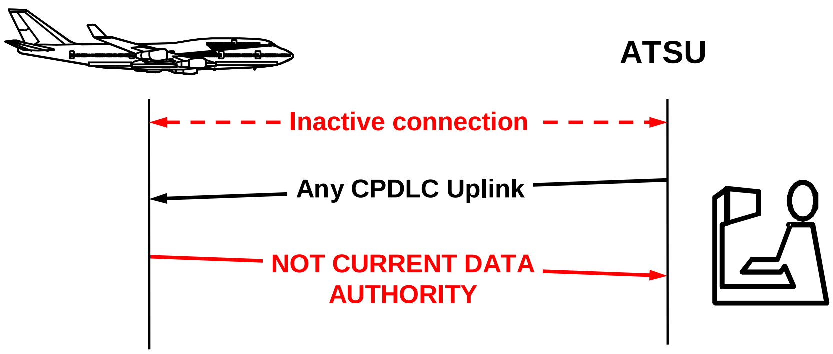


Figure 2-18. Avionics reject CPDLC uplinks sent by the ATSU with the inactive connection

2.2.3.12 Non-standard events associated with CPDLC transfers

2.2.3.12.1 Multiple NDA messages

2.2.3.12.1.1 Under normal circumstances, the current data authority sends only a single NDA message to an aircraft. Exceptions to this may include:

a) Following a re-route (e.g. due to weather) that affects the identity of the next ATSU whose airspace the aircraft will enter;

b) If the initial NDA message was not delivered to the aircraft.

2.2.3.12.1.2 When a UM 160 NEXT DATA AUTHORITY [facility designation] is received, the aircraft system replaces any previous NDA message the aircraft may have received unless the facility designation in the message is the same as the facility designation already held by the aircraft system. If the facility designation is different, the aircraft terminates any inactive CPDLC connection that an ATSU may have established.

Note.— Some aircraft types may terminate an inactive CPDLC connection even if the facility designation in NDA message is the same. See Appendix F, paragraph F.3.

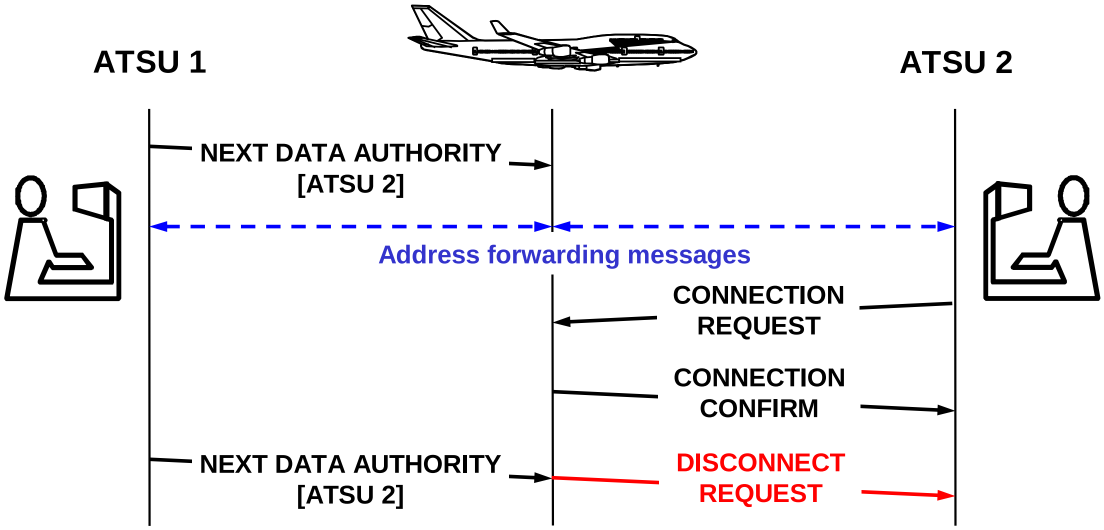


Figure 2-19. Effect of uplinking duplicate (or multiple) NDA messages

2.2.3.12.2 Amendment to the identity of the next data authority

2.2.3.12.2.1 If the identity of the next data authority changes after the transferring ATSU has already sent the initial NDA message, the transferring ATSU will need to send a new NDA message containing the identity of the (new) next ATSU. The aircraft system will replace the original NDA message with the new NDA message and will disconnect any inactive connection that an ATSU may have already established.

2.2.3.12.2.2 In Figure 2-20, the next ATSU on the aircraft's route was ATSU 2. Shortly after ATSU 1 had commenced the CPDLC transfer sequence to ATSU 2, the aircraft was re-rerouted in such a way that ATSU 3 is now the next ATSU.

2.2.3.12.2.3 Figure 2-21 shows that ATSU 1 sends a new NDA message nominating ATSU 3 as the next data authority. On receipt of this NDA message, the aircraft disconnects its CPDLC connection from ATSU 2 (if they had already established an inactive connection). In addition, ATSU 1 initiates address forwarding for the aircraft to ATSU 3.

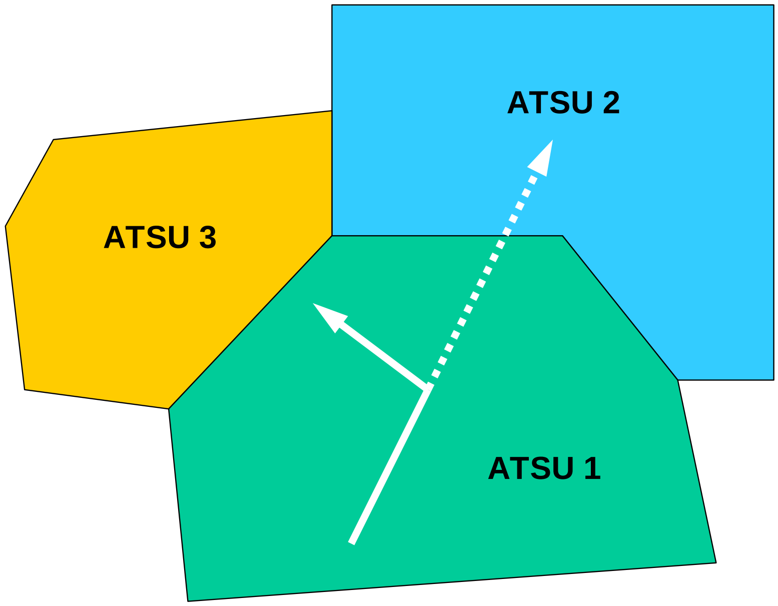


Figure 2-20. Depiction of the change in route of an aircraft

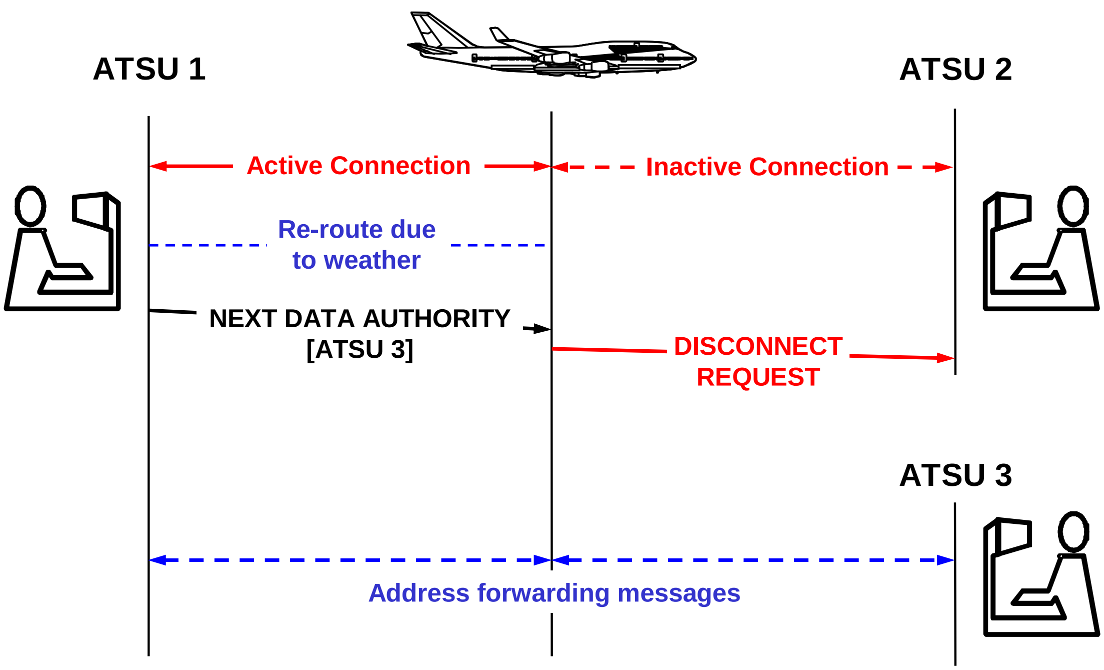


Figure 2-21. Uplinking a new NDA following a re-reroute

2.2.3.12.3 Failures of the CPDLC CR1 message

2.2.3.12.3.1 The aircraft system will reject the CPDLC CR1 message and send a message to the next ATSU containing the identity of the current data authority, as shown in Figure 2-22, when:

a) the aircraft system receives the CPDLC CR1 message from the next ATSU before the UM 160 NEXT DATA AUTHORITY [facility designation] message from the current data authority; or,

b) the aircraft system receives the UM 160 NEXT DATA AUTHORITY [facility designation] message, but the ATSU specified in it is different to the identity of the ATSU uplinking the CPDLC CR1.

2.2.3.12.3.2 The flight crew has no indication that the CPDLC CR1 has been rejected.

2.2.3.12.3.3 If the controlling ATSU sends to the aircraft another UM 160 NEXT DATA AUTHORITY [facility designation] message nominating the correct ATSU, the next ATSU will need to send a subsequent CPDLC CR1 to establish the connection, as shown in Figure 2-23.

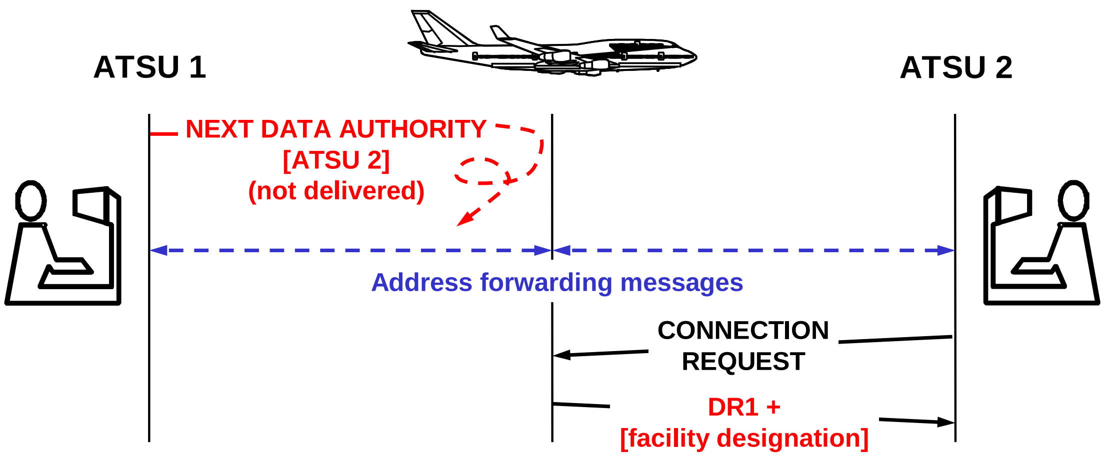


Figure 2-22. Non-delivery of the NDA message

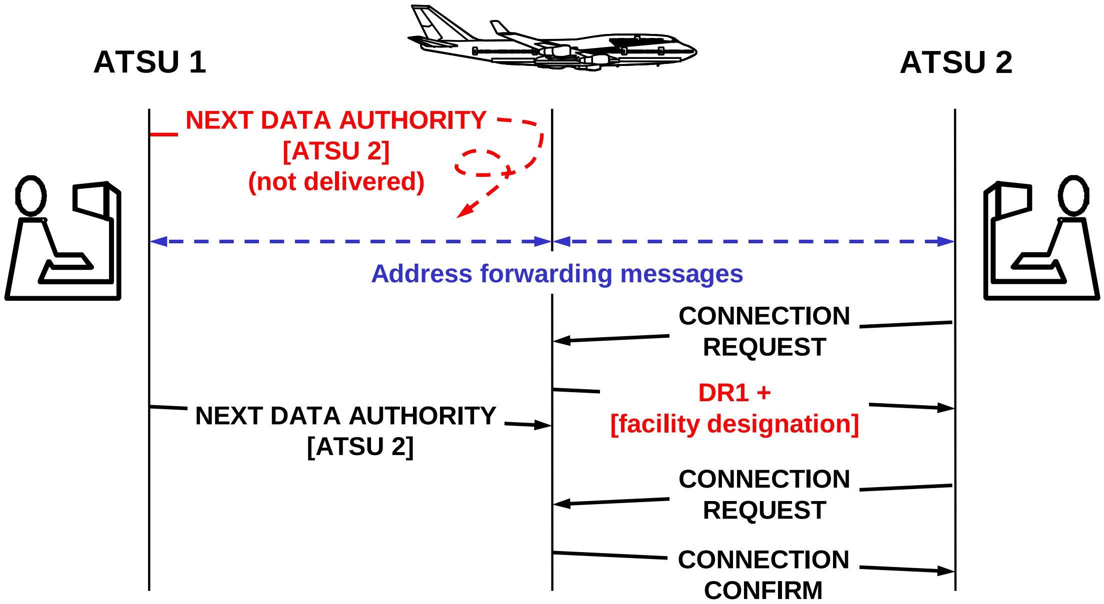


Figure 2-23. Successful CPDLC connection following a re-send of the NDA message

2.2.3.12.4 Termination of both active and inactive CPDLC connections

2.2.3.12.4.1 Normally, on receipt of an UM 161 END SERVICE message, the aircraft system will only terminate the active CPDLC connection. However, under certain circumstances, the aircraft system will terminate all CPDLC connections (active and inactive) when:

a) Any CPDLC uplink message remains open when the aircraft receives the UM 161 END SERVICE message as shown in Figure 2-24; or

b) If the UM 161 END SERVICE message element is part of a multi-element message, where none of the elements require a WILCO/UNABLE (W/U) response as shown in Figure 2-25.

Note 1.— Refer to Appendix F, paragraph F.8 for variations in aircraft processing of open uplinks at time of transfer of communications.

Note 2.— The UM 161 END SERVICE message element is not normally sent as part of a multi-element message.

Note 3.— See Appendix A for message elements that require a W/U response.

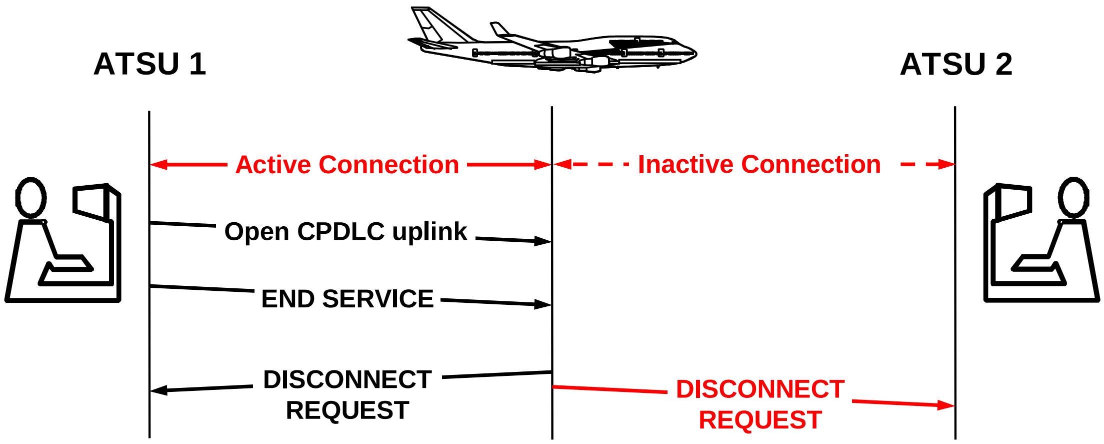


Figure 2-24. Disconnection of both active and inactive connections (open uplink)

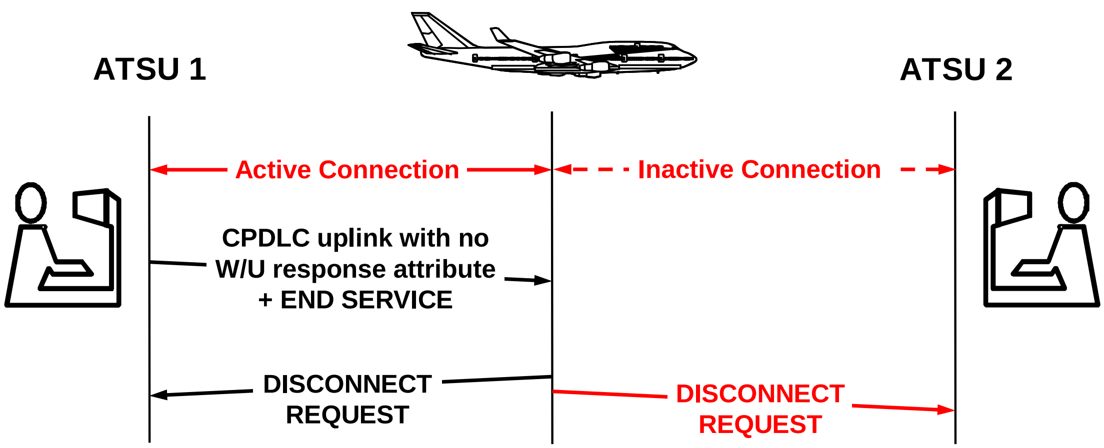


Figure 2-25. Disconnection of both active and inactive connections (CPDLC uplink contains END SERVICE message element)

2.2.4 Controller-pilot data link communications (CPDLC)

2.2.4.1 CPDLC - general

2.2.4.1.1 CPDLC is a data link application that supports the exchange of data messages directly between a controller and a flight crew.

2.2.4.1.2 CPDLC greatly improves communication capabilities in oceanic and remote airspace, especially in areas where the controller and the flight crew previously had to rely on a third party HF voice communications.

2.2.4.1.3 Generally, when a CPDLC aircraft is operating in an airspace beyond the range of VHF voice communications, CPDLC is available, and other local rules do not apply, then:

a) CPDLC will be the normal means of communication, and

b) Voice will be used as the alternative means of communication (for example, direct HF, third party HF or Satcom voice).

2.2.4.1.4 In airspace with VHF coverage, an ATSU may provide CPDLC service as a normal means of communication to alleviate frequency congestion or to enable the use of automation associated with the use of CPDLC. In such airspace, VHF voice communication is the alternative means of communication for CPDLC aircraft.

2.2.4.1.5 In addition to the benefits of the direct communications link, and depending on the specific implementation, other advantages associated with CPDLC could potentially include:

a) Allowing the flight crew to print messages;

b) Allowing messages to be stored, and reviewed as needed;

c) Reducing flight crew-input errors, by allowing the loading of information, such as route clearances or frequency change instructions, from specific uplink messages into other aircraft systems, such as the FMS or radios;

d) Allowing the flight crew to downlink a complex route clearance request, which the controller can respond to without having to manually enter a long string of coordinates;

e) Reducing flight crew workload by supporting automatically transmitted reports when a specific event, such as crossing a waypoint, occurs;

f) Reducing controller workload by providing automatic update of the flight plan when a specific downlink message (and the response to some uplink messages) is received.

2.2.4.2 CPDLC message set

2.2.4.2.1 The CPDLC message set consists of a set of message elements most of which correspond to a radiotelephony phraseology.

2.2.4.2.2 CPDLC message elements are referred to either as:

a) Uplinks (message elements that are sent to an aircraft); or

b) Downlinks (message elements that are sent by the aircraft).

2.2.4.2.3 Each message element has a number of attributes associated to it, including:

a) A message number that uniquely identifies each type of message element. Uplink message elements are prefixed UM and downlink messages prefixed with DM;

b) A response attribute that defines whether or not a response is required for a message element, and if so, what type of response is required.

Note.— Other attributes include the urgency and alert attributes to specify priority in message delivery and indication to the recipient. These attributes are currently not used.

2.2.4.2.4 The CPDLC message set including the possible responses associated with each response attribute is included in Appendix A.

2.2.4.2.5 Table 2-7 provides examples of responses that may be required for a CPDLC uplink message depending on its response attribute. See Appendix A, paragraph A.1 for a complete description of the responses associated with each response attribute.

Table 2-7. Examples of responses to CPDLC uplink messages

Response attribute	Description
W/U	A DM 0 WILCO or DM 1 UNABLE is required in response to this CPDLC uplink message element
A/N	An DM 4 AFFIRM or DM 5 NEGATIVE is required in response to this CPDLC uplink message element
R	A DM 3 ROGER is required in response to this CPDLC uplink message element
NE	A response is not required to close the uplink message even though a response may be required operationally.

2.2.4.3 CPDLC messages

2.2.4.3.1 A CPDLC message consists of either a single message element, or a combination of up to five message elements. A CPDLC message that consists of more than one message element is a multi-element message.

Note.— As a general rule, the size of a CPDLC message needs to be kept to a minimum. Refer to paragraphs 4.2.5, 4.3.4, and 5.4.1.4 for guidelines on use of multi-element messages.

2.2.4.4 Responses to CPDLC messages

2.2.4.4.1 Even though a multi-element CPDLC message may contain a number of message elements each of which requires a response, the flight crew or controller only provides a single response for the entire CPDLC message.

2.2.4.4.2 The flight crew or controller responds to a multi element message associated with the highest priority response type for the elements in the message. Table 2-8 lists the priority order to determine the highest priority response type.

Table 2-8. Priority of CPDLC responses

Priority	Response type
1	W/U
2	A/N
3	R
4	NE

2.2.4.4.3 Table 2-9 provides examples on the appropriate responses to various multi-element CPDLC uplinks.

Table 2-9. Examples of multi-element CPDLC messages

Multi-element message	(Individual) response required for each message element	(Single) response required for entire message
UM 20 CLIMB TO AND MAINTAIN FL370 UM 129 REPORT LEVEL FL370	W/U R	W/U
UM 106 MAINTAIN M083 OR LESS UM 150 CAN YOU ACCEPT FL370 AT 2200	W/U A/N	W/U
UM 147 REQUEST POSITION REPORT UM 169 ADS-C HAS FAILED	NE R	R
UM 150 CAN YOU ACCEPT FL370 AT 2200 UM 130 REPORT PASSING MINNY	A/N R	A/N

2.2.4.5 Open and closed CPDLC messages

2.2.4.5.1 A CPDLC message is open if the aircraft or ground system expects a response, and has not yet received it.

2.2.4.5.2 A CPDLC message is closed if the aircraft or ground system either:

a) does not expect a response; or

b) does expect a response and has already received it.

Note.— UM 1 or DM 2 STANDBY and UM 2 REQUEST DEFERRED do not close a CPDLC message.

2.2.4.6 CPDLC dialogues

2.2.4.6.1 Messages that are related – e.g. a CPDLC downlink request and the corresponding CPDLC uplink clearance – are CPDLC dialogues.

a) A CPDLC dialogue is open if any of the CPDLC messages in the dialogue are open;

b) A CPDLC dialogue is closed if all CPDLC messages in the dialogue are closed.

Note.— A dialogue can be technically closed, but still be operationally open. For example, when a DM 3 ROGER has been sent for a UM 129 REPORT MAINTAINING [level], the dialogue is technically closed, but not operationally closed until the ATSU receives the DM 37 MAINTAINING [level].

2.2.4.6.2 Some CPDLC dialogues may consist of a single CPDLC message.

2.2.4.6.3 Table 2-10 provides examples on the message status of various CPDLC dialogues.

Table 2-10. Examples of CPDLC message status

CPDLC message	Message status	Dialogue status
UM 30 MAINTAIN BLOCK FL330 TO FL350	OPEN	OPEN
DM 27 REQUEST WEATHER DEVIATION UP TO 15NM LEFT OF ROUTE UM 1 STANDBY	OPEN CLOSED	OPEN
DM 22 REQUEST DIRECT TO MICKY UM 2 REQUEST DEFERRED UM 74 PROCEED DIRECT TO MICKY	CLOSED CLOSED OPEN	OPEN
DM 9 REQUEST CLIMB TO FL370 UM 20 CLIMB TO AND MAINTAIN FL370 UM 129 REPORT LEVEL FL370 DM 0 WILCO	CLOSED CLOSED CLOSED	CLOSED
UM 150 CAN YOU ACCEPT [level] AT [time] DM 5 NEGATIVE	CLOSED CLOSED	CLOSED
UM 147 REQUEST POSITION REPORT	CLOSED	CLOSED
DM 37 LEVEL FL370	CLOSED	CLOSED

2.2.4.7 Message identification numbers (MIN)

2.2.4.7.1 For each CPDLC connection, the aircraft and ground systems assign every CPDLC uplink and downlink message an identifier, known as a message identification number (MIN). The MIN is an integer in the range 0 to 63 (inclusive). The ground system assigns the MIN for uplink messages, and the aircraft system assigns the MIN for downlink messages.

2.2.4.7.2 The aircraft and ground systems generally assign MINs sequentially, although this is not a technical requirement. A MIN is not re-used during a flight until all other available MINs have been used.

2.2.4.8 Message reference numbers (MRN)

2.2.4.8.1 The aircraft and ground systems assign a message reference number (MRN) to a CPDLC message when it is a response to another CPDLC message. The MRN of the response message is the same as the MIN of the corresponding CPDLC message in the dialogue.

2.2.4.8.2 The aircraft and ground systems associate corresponding CPDLC messages within a dialogue by their message identification numbers and message reference numbers.

2.2.4.8.3 This functionality ensures that the aircraft and ground systems associate a CPDLC response message with the correct CPDLC message in the dialogue.

2.2.4.8.4 Table 2-11 provides an example of a CPDLC dialogue to illustrate the way in which the aircraft and ground systems track the CPDLC messages using the MIN and MRN. In this example, the last MIN assigned by the aircraft system was 7 and by the ground system was 11.

Table 2-11. Example of CPDLC dialogue

CPDLC message	MIN	MRN	Comment
DM 6 REQUEST FL350	8		The aircraft system assigns a MIN of 8 to this message. The downlink request is open.
UM 1 STANDBY	12	8	The ground system assigns a MIN of 12 to this uplink. Because this uplink is a response to the downlink, the ground system assigns the MRN equal to the MIN of the downlink request (i.e., MRN = 8). UM 1 STANDBY is not a closure message. The status of the downlink request is open.
UM 20 CLIMB TO AND MAINTAIN FL350 UM 129 REPORT LEVEL FL350	13	8	The ground system assigns a MIN of 13 to this uplink (i.e., the ground system increments the MIN of the previous uplink message by one). Because this uplink is a response to the downlink, the ground system assigns the MRN equal to the MIN of the downlink request (i.e. MRN = 8).
DM 0 WILCO	9	13	The aircraft system assigns a MIN of 9 to this downlink (i.e., the aircraft system increments the MIN of the previous downlink message by one). Because this downlink is a response to the uplink, the aircraft system assigns the MRN equal to the MIN of the uplink (i.e., MRN = 13). DM 0 WILCO is a closure message. The status of the uplink message is closed.

CPDLC message	MIN	MRN	Comment
DM 37 LEVEL FL350	10		The aircraft system assigns a MIN of 10 to this downlink (i.e., the aircraft system increments the MIN of the previous downlink message by one). The ground system does not assign an MRN because it is not associated with an uplink message. The ground system does not respond to this downlink because it is a self-closing message.

2.2.5 Automatic dependent surveillance – contract (ADS-C)

2.2.5.1 ADS-C – general

2.2.5.1.1 ADS-C is an application that enables one or more ground systems (supporting ATS or AOC) to establish an ADS contract with an aircraft. The ADS contract instructs the aircraft system to automatically provide ADS-C reports that contain certain parameters (e.g. position, altitude, and speed) and intent information for surveillance and route conformance monitoring. Some of these parameters are mandatory, while others are optional and are defined in the ADS contract uplinked by the ground system.

2.2.5.1.2 Although the terms are similar, ADS-C and ADS-B are two different applications. ADS-C permits as many as five different ground systems to establish a contract with an aircraft. Each facility specifies to the aircraft system the information to be included in a report and the conditions on when to send it. The aircraft sends the report only to the ground system(s) that have established the contract.

Note.— In comparison, an ADS-B-capable aircraft broadcasts information equivalent to radar at a relatively high rate (i.e., one message per second), and any appropriate receiver on the ground or in another aircraft within range can receive the information.

2.2.5.2 ADS contract

2.2.5.2.1 After receiving an AFN logon, the ATSU will need to establish ADS contract(s) with the aircraft before it can receive any ADS-C reports. There are three types of ADS contracts:

a) Periodic contract;

b) Demand contract;

c) Event contract.

2.2.5.2.2 The establishment of ADS contracts is initiated by the ground system and does not require flight crew action providing that ADS-C in the aircraft system is not off. The flight crew has the ability to cancel all contracts by selecting ADS-C off and some aircraft systems allow the flight crew to cancel an ADS contract with a specific ATSU.

2.2.5.2.3 Periodic contract

2.2.5.2.3.1 A periodic contract allows an ATSU to specify:

a) The time interval at which the aircraft system sends an ADS-C report; and

b) The optional ADS-C groups that are to be included in the periodic report. Each optional group may have a unique modulus which defines how often the optional group is included with the periodic report, e.g. a modulus of five indicates that the optional group would be included with every fifth periodic report sent.

2.2.5.2.3.2 The ground system may permit the controller to alter the periodic reporting interval to allow for situations where the controller desires a longer or shorter reporting interval. The controller may select a short reporting interval, for example, during an off track deviation or an emergency.

Note.— The ATSP ensures that separation minima are applied in accordance with appropriate standards. The ground system may prevent the controller from selecting a periodic reporting interval that is longer than the minimum interval specified in the standard for the separation minima being applied.

2.2.5.2.3.3 An ATSU can establish only one periodic contract with an aircraft at any one time. A number of ATSUs can each establish their own periodic contract and specify their own conditions for the report with the same aircraft at the same time.

2.2.5.2.3.4 A periodic contract remains in place until it is either cancelled or modified. Whenever an ATSU establishes a new periodic contract, the aircraft system automatically replaces the previous periodic contract with the new one.

2.2.5.2.3.5 Arbitrarily selecting a short periodic reporting interval adds undue economic costs and unnecessarily loads the data link system.

2.2.5.2.3.6 As shown in Figure 2-26, in response to a new ADS-C periodic contract, the aircraft:

a) Sends an acknowledgement; and

b) Sends the first periodic report of the new contract

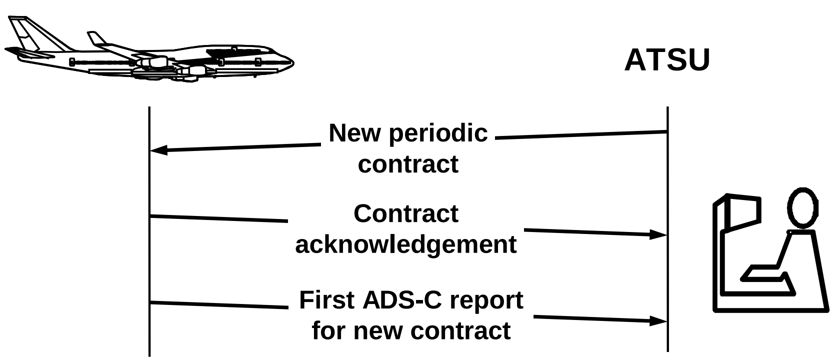


Figure 2-26. ADS-C periodic contract sequence

2.2.5.2.4 Demand contract

2.2.5.2.4.1 A demand contract allows an ATSU to request a single ADS-C periodic report. A demand contract does not cancel or modify any other ADS contracts that may be in effect with the aircraft.

2.2.5.2.5 Event contract

2.2.5.2.5.1 An event contract allows an ATSU to request an ADS-C report whenever a specific event occurs. An ATSU can establish only one event contract with an aircraft at any one time. However, the event contract can contain multiple event types. These types of optional events include:

a) Waypoint change event (WCE)

b) Level range deviation event (LRDE)

c) Lateral deviation event (LDE)

d) Vertical rate change event (VRE)

2.2.5.2.5.2 As shown in Figure 2-27, in response to a new ADS-C event contract, the aircraft separately sends an acknowledgement and then an ADS-C report(s) is transmitted only after one of the specified events occurs.

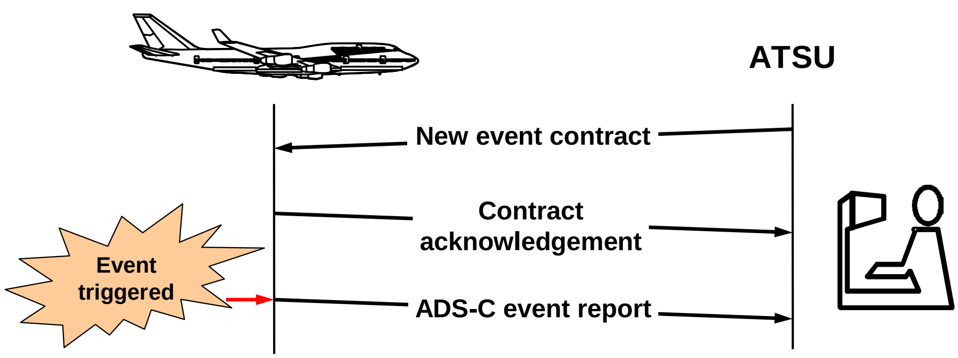


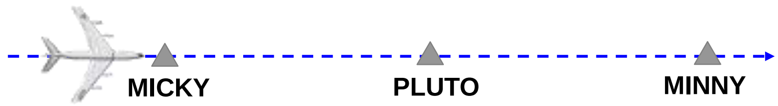
Figure 2-27. ADS-C event contract sequence

2.2.5.2.5.3 An event contract remains in effect until the ATSU cancels it or until the event(s) used to trigger the report occurs. The waypoint change event contract will trigger a report for all waypoint changes. All other event contracts will trigger a report on the first occurrence and then, if necessary, the ATSU will need to request a new contract for the particular event.

2.2.5.2.5.4 Waypoint change event (WCE)

2.2.5.2.5.4.1 The aircraft system sends a WCE report when a change occurs to the Next and/or Next + 1 waypoint in the FMS. The usual cause of this is the aircraft sequencing a waypoint.

2.2.5.2.5.4.2 As shown in Figure 2-28, when the aircraft sequences MICKY, the Next and Next + 1 waypoints contained in the FMS change. This results in sending a WCE report to all ATSUs that have an event contract containing a WCE with this aircraft.



	Next	Next + 1
Before sequencing MICKY	MICKY	PLUTO
After sequencing MICKY	PLUTO	MINNY

Figure 2-28. ADS-C waypoint change event

2.2.5.2.5.4.3 Other events that may cause the aircraft system to send a WCE report include:

a) The flight crew executing a clearance direct to a waypoint (i.e. next waypoint is changed)

b) The flight crew inserting a waypoint ahead of the aircraft (resulting in a change to the Next or Next + 1 waypoint)

c) The flight crew executing a lateral offset (resulting in a change to the Next waypoint).

2.2.5.2.5.4.4 A waypoint change event report contains the following ADS-C Groups:

a) Basic group; and

b) Predicted route group.

2.2.5.2.5.5 Level range deviation event (LRDE)

2.2.5.2.5.5.1 The ATSU specifies the LRDE by defining the lower and upper limits of the level range.

2.2.5.2.5.5.2 For example, in Figure 2-29, the LRDE has been defined with a lower limit of FL368 and an upper limit of FL372.

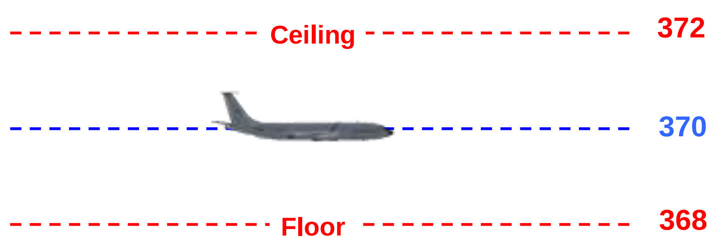


Figure 2-29. ADS-C level range deviation event

2.2.5.2.5.5.3 The aircraft system sends a LRDE report when the aircraft's flight level is outside the level range tolerances defined in the ADS-C event contract (Figure 2-30).

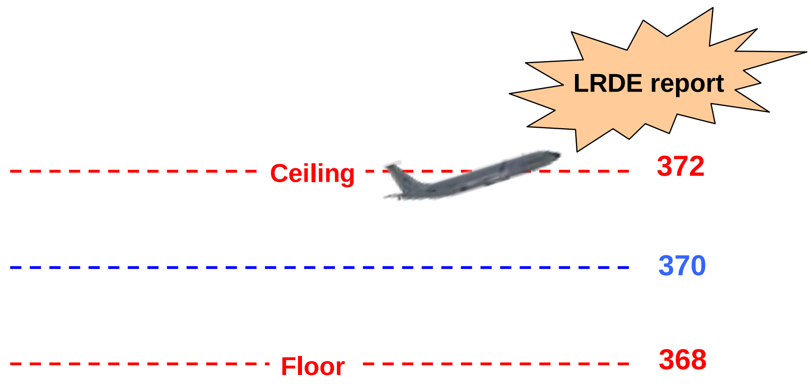


Figure 2-30. ADS-C level range deviation event report

2.2.5.2.5.5.4 Once an aircraft sends an LRDE report, it will not send another LRDE report until the ATSU establishes a new ADS-C LRDE contract.

2.2.5.2.5.5.5 An LRDE report contains the ADS-C Basic group only.

2.2.5.2.5.6 Lateral deviation event

2.2.5.2.5.6.1 The ATSU specifies the lateral deviation event by defining a maximum off track distance. It is not possible to define different distances on each side of track.

2.2.5.2.5.6.2 For example, in Figure 2-31, the lateral deviation event has been defined to be triggered for a deviation of greater than 5NM either side of track.

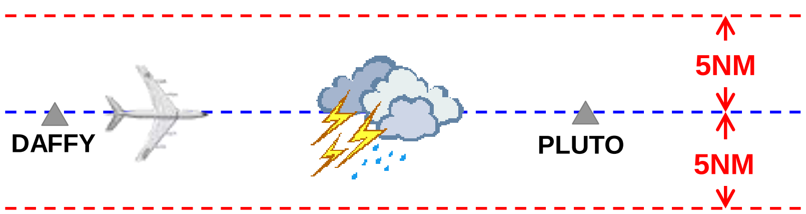


Figure 2-31. ADS-C lateral deviation event

2.2.5.2.5.6.3 The lateral deviation event is triggered when the lateral distance between the aircraft's actual position and its expected position on the aircraft active flight plan exceeds the parameter defined in the ADS-C event contract (Figure 2-32).

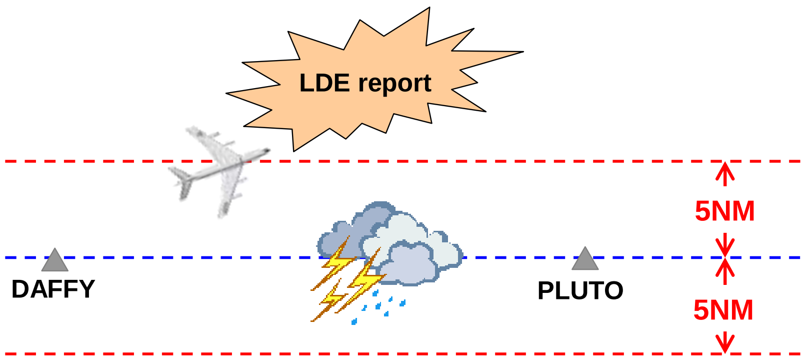


Figure 2-32. ADS-C lateral deviation event report

2.2.5.2.5.6.4 The lateral deviation event is triggered when the off track distance of an aircraft – operating in heading mode – exceeds the parameter defined in the event contract. However under certain circumstances, such as when the flight crew executes an offset that is greater than the lateral deviation event parameter, the aircraft may transmit a false lateral deviation event report.

2.2.5.2.5.6.5 As shown in Figure 2-33, after the offset has been executed, when the aircraft system compares the current position of the aircraft ① with the expected position of the aircraft on the offset path ②, the aircraft is deemed to be off track. If this off-track distance exceeds the lateral deviation parameter, the aircraft will transmit a lateral deviation event report, containing the on-track position of the aircraft.

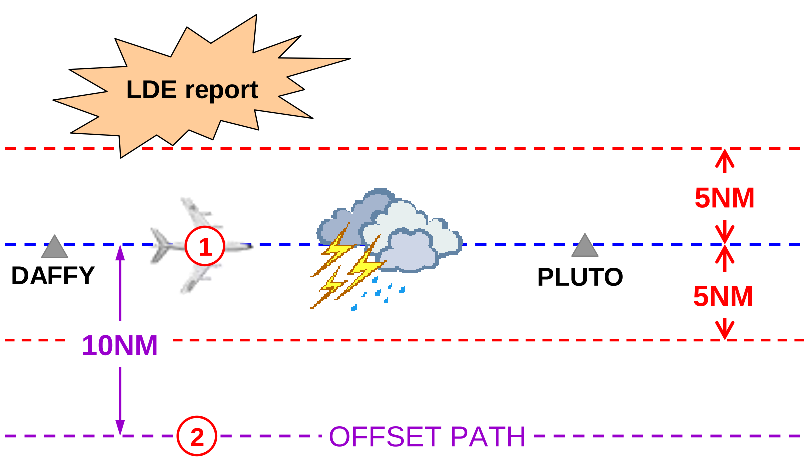


Figure 2-33. Effect of offset on ADS-C lateral deviation event report

2.2.5.2.5.6.6 As shown in Figure 2-34, LDE reports are based on deviations from the active route in the FMC. If the active route is different to the route held by the ATSU, and the aircraft remains within the lateral deviation tolerances (as defined by the ADS contract) of the active route, no lateral deviation event report will be triggered.

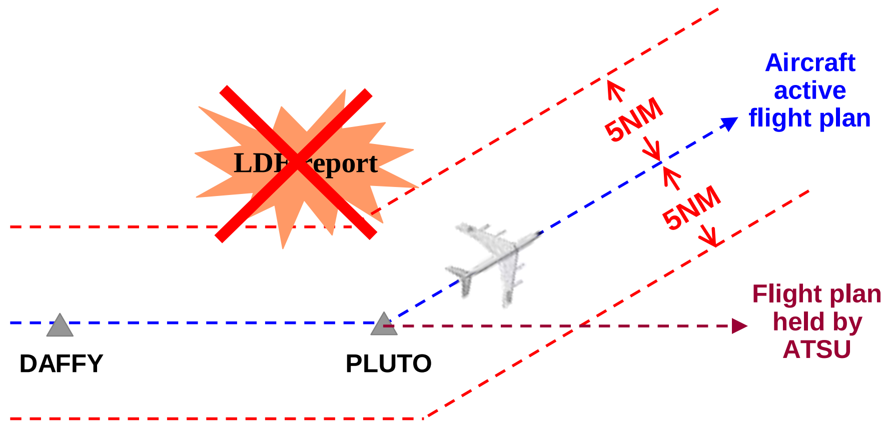


Figure 2-34. No lateral deviation event report if active route is different to route held by ATSU

2.2.5.2.5.6.7 Once an aircraft has downlinked a lateral deviation event report, no further deviations will trigger another report until the ATSU re-establishes an ADS-C event contract containing a lateral deviation event.

2.2.5.2.5.6.8 A lateral deviation event report contains the ADS-C basic group only.

2.2.5.2.5.7 Vertical rate change event (VRE)

2.2.5.2.5.7.1 Vertical rate change event is triggered in one of two ways:

a) Positive vertical rate: aircraft`s rate of climb is greater than the vertical rate threshold; or

b) Negative vertical rate: aircraft`s rate of descent is greater than the vertical rate threshold.

2.2.5.2.5.7.2 A vertical rate change event report contains the following ADS-C groups:

a) ADS-C basic group; and

b) Earth reference group.

2.2.5.2.6 Cancelling ADS contracts

2.2.5.2.6.1 Cancelling ADS contracts assists in:

a) Minimizing costs associated with unnecessary ADS-C reports;

b) Reducing congestion in the communication network

c) Ensuring that subsequent ATSUs can establish ADS contracts with the aircraft (there is a limit to the number of ADS-C connections that an aircraft can support)

2.2.5.2.6.2 The ATSU either automatically or manually cancels an ADS contract when it no longer needs ADS-C reports to avoid situations leading to congestion. The ground system cancels ADS contracts when:

a) The aircraft has crossed the FIR boundary exit position and the transferring ATSU needs no further surveillance information from the flight;

b) The ATSU has cancelled or finished the flight plan for the aircraft; or

c) The controlling authority or an adjacent ATSU needs no further surveillance information from the flight.

2.2.5.2.6.3 The flight crew may terminate ADS-C connections, which cancels ADS contracts, when exiting ADS-C service areas.

2.2.5.3 ADS-C report

2.2.5.3.1 The aircraft system sends specific aircraft data in different groups of an ADS-C report. Each group contains different types of data. An ADS-C event report contains only some of the groups, which are fixed. The ADS-C periodic report can contain any of the ADS-C groups, which the ATSU specifies in the contract request.

2.2.5.3.2 ADS-C groups include:

a) Basic group (Figure 2-35);

b) Flight identification group (Figure 2-36);

c) Earth reference group (Figure 2-37);

d) Air reference group (Figure 2-38);

e) Airframe identification group (Figure 2-39);

f) Meteorological group (Figure 2-40);

g) Predicted route group (Figure 2-41);

h) Fixed projected intent group (Figure 2-42); and

i) Intermediate projected intent group (Figure 2-43).

2.2.5.3.3 At a minimum, all ADS-C reports contain the basic group.

2.2.5.3.4 The contents of the various ADS-C groups are depicted in the following diagrams.

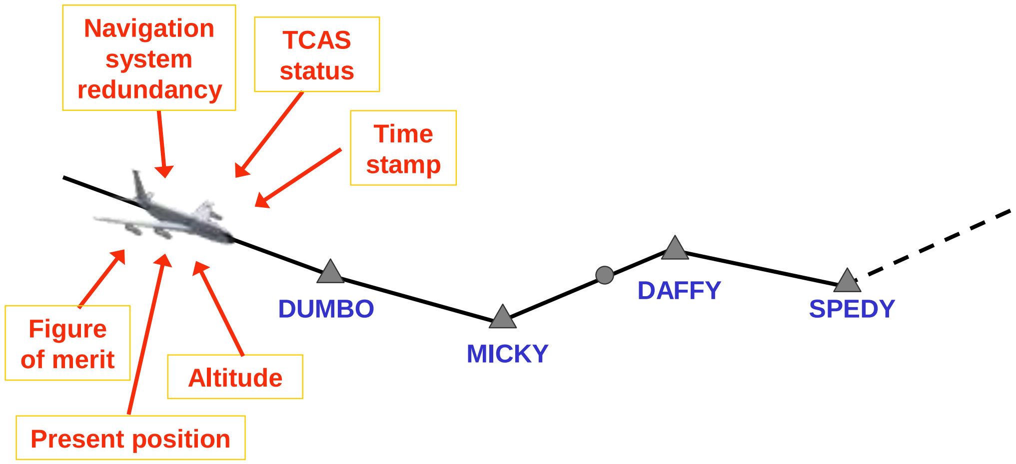


Figure 2-35. ADS-C basic group

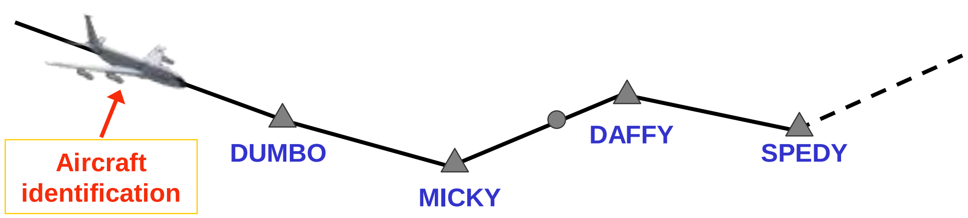


Figure 2-36. ADS-C flight identification group

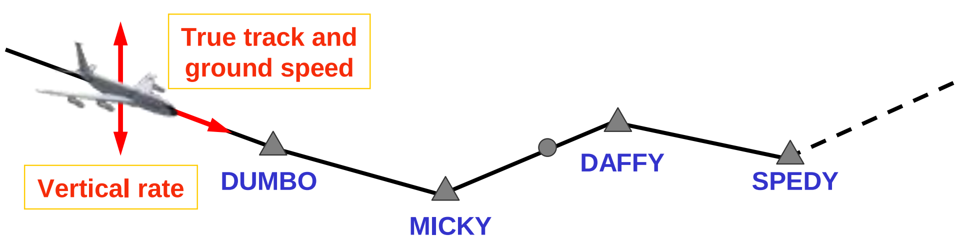


Figure 2-37. ADS-C Earth reference group

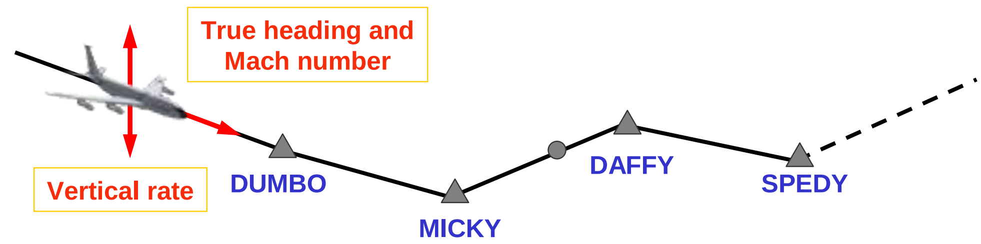


Figure 2-38. ADS-C air reference group

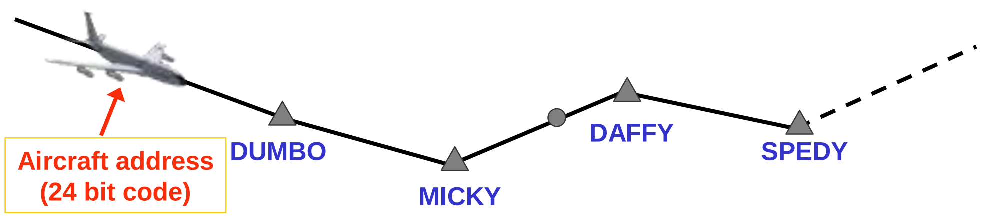


Figure 2-39. ADS-C airframe identification group

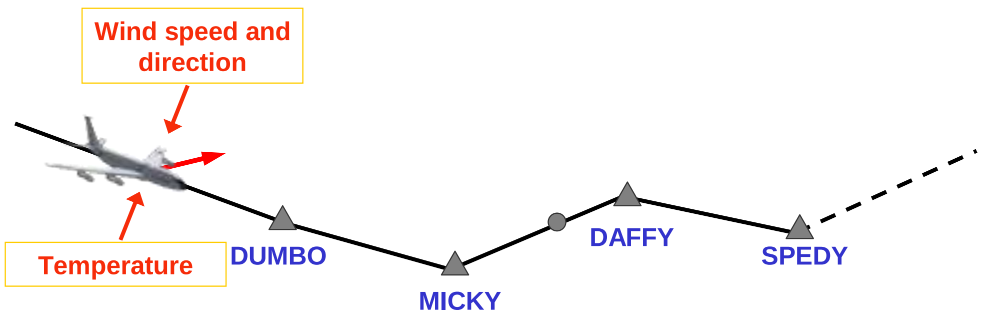


Figure 2-40. ADS-C meteorological group

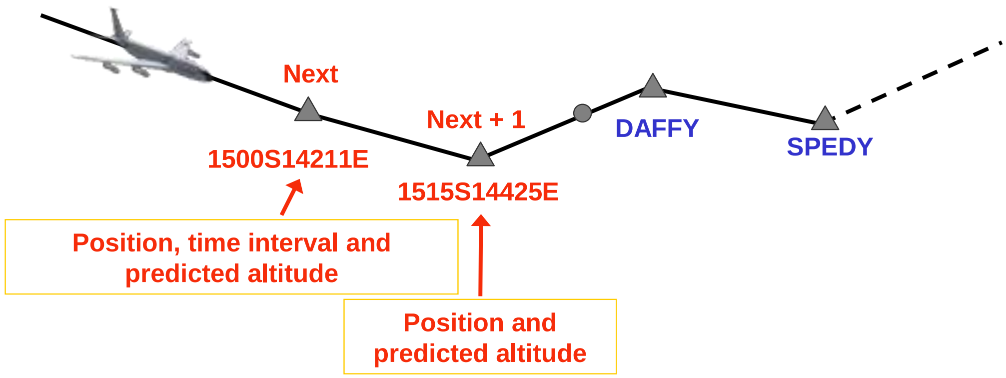


Figure 2-41. ADS-C predicted route group

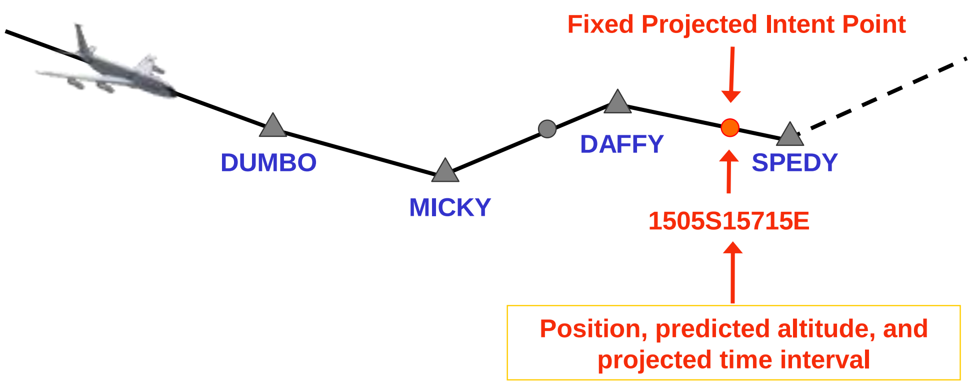


Figure 2-42. ADS-C fixed projected intent group

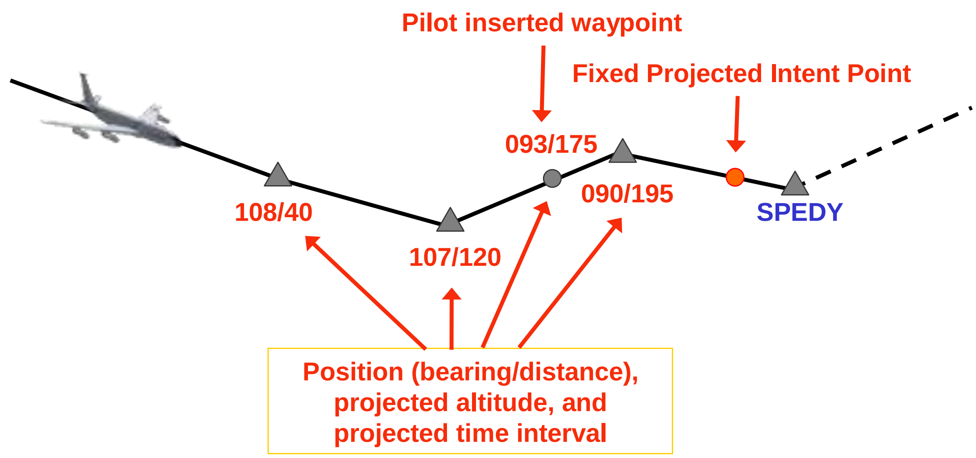


Figure 2-43. ADS-C intermediate projected intent group

Note.— Up to 10 points can be included in the intermediate projected intent group. For a point to qualify to be included in the intermediate projected intent group, the point needs to be:

a) between the current position and the fixed projected point; and

b) associated with a speed, altitude or track change.

2.2.5.4 Contents of ADS-C groups – additional information

2.2.5.4.1 The aircraft system defines the present position (in the basic group), and Next and Next + 1 information (in the predicted route group) as latitude/longitude, and defines positional information in the intermediate projected intent group as a bearing/distance from the present position in the basic group. Positional information in an ADS-C report does not contain the name(s) of waypoints.

Note.— To be eligible for reporting as an intermediate intent point, there needs to be a planned change of aircraft profile associated with the waypoint. A change in profile is defined as a change in speed, altitude, and or a change in direction greater than one degree.

2.2.5.4.2 The time stamp is expressed in seconds past the last hour

2.2.5.4.3 Estimates are expressed as estimated time intervals (in seconds) from the time stamp at the present position in the basic group.

2.2.5.5 Using ADS-C reports

2.2.5.5.1 The ATSU may use an ADS-C report for a variety of purposes. These include:

a) Establishing and monitoring of traditional time-based separation minima;

b) Establishing and monitoring of distance-based separation standards;

c) Flagging waypoints as ‘overflown’;

d) Updating estimates for downstream waypoints;

e) Updating the display of the ADS-C position symbol, and the associated extrapolation;

f) Generating (and clearing) alerts;

g) Generating (and clearing) ADS-C emergencies; and

h) Updating other information in the flight plan held by the ATSU.

2.2.5.5.2 Predicted route conformance

2.2.5.5.2.1 The ATSU may use information from the basic group, the intermediate intent group and the predicted route group for route conformance monitoring.

2.2.5.5.2.2 The ATSU can compare information from the predicted route group or intermediate projected intent group against the expected route in the flight plan to provide an indication to the controller when a discrepancy exists.

Note.— To prevent nuisance indications, route conformance monitoring may include tolerances, consistent with safety criteria, when comparing the reported data against the expected route (e.g. to accommodate 1 or 2 nm strategic lateral offset procedures).

2.2.5.5.2.3 A ground system supporting ATS or AOC can specify periodic and event contracts differently from other ground systems, such as:

a) Different ADS-C groups as shown in Figure 2-44;

b) Different periodic reporting interval as shown in Figure 2-45; and

c) Different types of event contracts as shown in Figure 2-46.

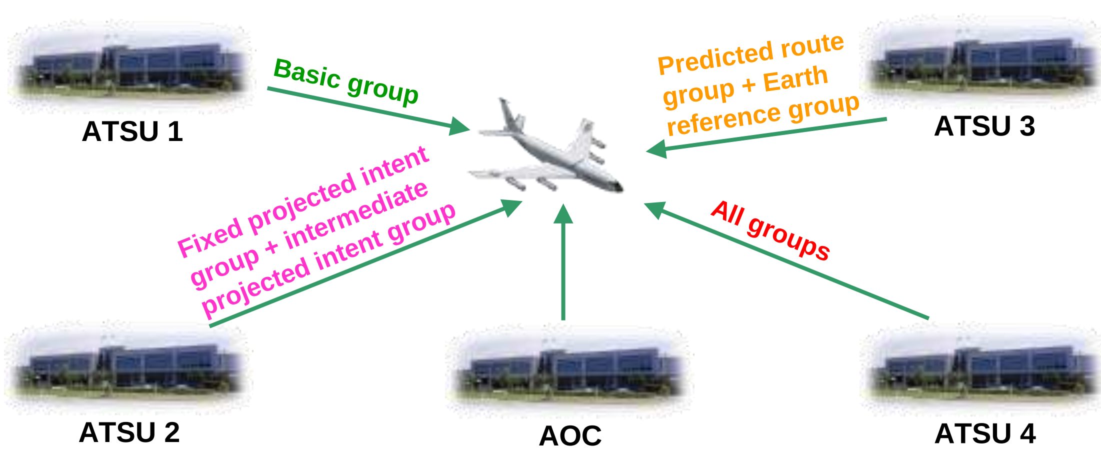


Figure 2-44. Multiple ADS periodic contracts with different groups

Figure 2-45. Multiple ADS periodic contracts with different reporting intervals

Figure 2-46. Multiple and different ADS event contracts

2.2.5.5.3 Figure of merit

2.2.5.5.3.1 The ADS-C basic report contains a figure of merit (FOM) that provides the navigational accuracy of position data in the basic report in accordance with Table 2-12.

Table 2-12. Figure of merit values

Figure of merit value	Accuracy of position	Remarks
0	Complete loss of navigational capabilities	Inability to determine position within 30 nautical miles is considered total loss of navigation. Includes the inability to associate a valid time with the position.
1	< 30 nm	Consistent with inertial navigation on long flight without updates.

Figure of merit value	Accuracy of position	Remarks
2	< 15 nm	Consistent with inertial navigation on intermediate length flight without updates.
3	< 8 nm	Consistent with inertial navigation on short length flight and beyond 50 nautical miles from VOR.
4	< 4 nm	Consistent with VOR accuracies at 50 nautical miles or less and with GPS worldwide.
5	< 1 nm	Consistent with RHO-RHO applications of ground-based DME, RNAV using multiple DME or GPS position updates.
6	< 0.25 nm	Consistent with RNAV using GPS.
7	< 0.05 nm	Consistent with augmented GPS accuracies.

2.2.5.5.4 ADS-C reporting interval

2.2.5.5.4.1 While ADS-C reporting intervals are generally referred to in whole minutes, they are not actually defined that way in the ADS contract. The required ADS-C reporting interval is uplinked to the aircraft in one byte (eight bits) of data, in accordance with Figure 2-47.

<table>
<tr><td colspan="4">Reporting Interval = (1 + Rate) x SF, where</td></tr>
<tr><td>Rate</td><td colspan="3">is the value contained in bits one to six. These six bits allow a range of values between 0 and 63.</td></tr>
<tr><td rowspan="6">SF</td><td colspan="3">is the scaling factor in bits seven and eight where:</td></tr>
<tr><td>Bit 7</td><td>Bit 8</td><td>Definition</td></tr>
<tr><td>0</td><td>0</td><td>0 seconds, used for a Demand Contract Request</td></tr>
<tr><td>1</td><td>0</td><td>1 second</td></tr>
<tr><td>0</td><td>1</td><td>8 seconds</td></tr>
<tr><td>1</td><td>1</td><td>64 seconds</td></tr>
</table>

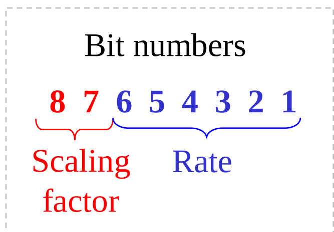


Figure 2-47. Calculation of ADS-C periodic reporting interval

2.2.5.5.4.2 For example, to establish a "40 minute" reporting interval, the SF would equal 64 seconds and the rate would equal 36. The actual reporting interval specified in the ADS contract would be 64 x (1 + 36) = 2368 seconds (39 minutes 28 seconds).

2.3 FMC WPR data link system

2.3.1 FMC WPR - general

2.3.1.1 An aircraft may have ACARS capability, but is not FANS-1/A-equipped. These aircraft can exchange data link messages with the operator's aeronautical operational control (AOC) facility, but not with an ATSU.

2.3.1.2 The operator configures these aircraft to send ACARS position reports to their aeronautical operational control (AOC) facility for flight monitoring. Additional ground-based functionality can reformat the ACARS position report and forward it to an ATSU via AFTN as a replacement for voice position reports.

2.3.1.3 The method of delivery for the ACARS position report from an aircraft to an ATSU is referred to as flight management computer waypoint position reporting (FMC WPR).

2.3.1.4 FMC WPR provides the operator an alternative to FANS 1/A ADS-C position reporting, in cases where FANS 1/A equipage is impractical or cost prohibitive for the operator. FMC WPR is not intended to replace or delay FANS 1/A equipage.

2.3.2 Description

2.3.2.1 In some airspace, the aircraft sends the FMC waypoint position report to a central FMC waypoint reporting system (CFRS) or to the operator's AOC host computer. The CFRS or operator's AOC host computer converts the position report to a suitable format and delivers it via AFTN to appropriate ATSUs. A CFRS may also convert the report to standard AFTN format and deliver it to appropriate meteorological facilities to support weather forecasting.

2.3.2.2 In other airspace, the operator's AOC host computer converts the FMC waypoint position report to an ARP message and delivers it via AFTN to appropriate ATSUs.

Note.— Because there is no format defined, ARP formats may vary slightly between ATSUs. The CFRS or AOC host computer should support different ARP formats for different ATSUs.

2.3.2.3 Appendix E, paragraph E.1 indicates which of the above two approaches each FIR uses.

2.3.3 Position report - description

2.3.3.1 An AFN logon is not necessary to initiate FMC WPR.

2.3.3.2 An FMC WPR is a position report that:

a) consists entirely of data entered automatically by the FMS;

b) consists of data CRC protected by the FMS;

c) consists of data formatted and populated in accordance with the ARINC 702-1A; and

d) does not contain geographic coordinates in ARINC 424 format (Refer to paragraph 5.6.1.2).

2.3.3.3 An FMC WPR can be initiated automatically or manually as prescribed by flight deck procedures (Refer to paragraphs 3.2, 3.4, and 5.6.4).

2.3.3.4 An operator participating in FMC WPR ensures that:

a) The FMC WPR is generated at each ATC waypoint of a cleared route; and

b) The FMC WPR contains data only for an ATC waypoint.

2.4 ATN B1 data link system

(reserved)

Chapter 3. Administrative provisions related to data link operations

This chapter includes the prerequisites for data link operations, including service provision, operator eligibility, and flight planning.

3.1 ATSP service provision

3.1.1 ATSP system validation

3.1.1.1 The ATSP should ensure a validation process that confirms the integrity of their equipment and procedures meets system integrity requirements. This process should include:

a) A system safety assessment which demonstrates that the service provision meets the safety objectives. The ATSP should conduct a system safety assessment through a functional hazard analysis or a documented system safety case for initial implementation as well as for future enhancements. These assessments should include:

1) Identifying failure conditions;

2) Assigning levels of criticality;

3) Determining probabilities for occurrence; and

4) Identifying mitigating measures;

b) Integration test results confirming interoperability for operational use of the aircraft and ground systems; and

c) Confirmation that the ATS operation manuals are compatible with those of adjacent providers.

3.1.1.2 Following the safety assessment, the ATSP should institute measures through automation or procedures to mitigate the identified failure conditions. For example:

a) If the ATSP uses integrated measurement tools for the purpose of determining separation, they may need to publish limitations on the use of such tools for establishing and monitoring separation standards.

b) If an ATSP receives both an ADS-C and a CPDLC position report containing ETA that differ by 3 minutes or more, the controller should query the estimate received in the CPDLC position report and request confirmation of the estimate for the waypoint in question.

c) To fulfill the requirements of Annex 10, paragraph 8.2.8, the controller should be provided with automation and/or procedures to ensure that the appropriate ATC unit has established an active CPDLC connection with the aircraft. Refer to Appendix E, paragraph E.2.2 for mitigating measures for confirming current data authority.

3.1.1.3 The ATSP should ensure that it provides communication services that meet the performance specifications provided at Appendix B and Appendix C, and that the contracted CSP meets its performance allocations. The risks represented by the requirements are regarded as being minimum for the specified ATS function to maintain operational efficiency while meeting its required safety needs.

3.1.1.4 If the ATSP uses free text messages, it should include an evaluation of the effects associated with the use of free text messages in operational and system safety assessments. When the intent/use of the free text message impacts seamless operations, the ATSP should globally coordinate the free text message to define the operational contents, format, and use as a new standardized free text message. The standardized free text messages are provided in Appendix A, paragraph A.4.

a) The results of an operational assessment may conclude that a free text message needs to be pre-formatted and readily available for the flight crew or the controller because it is too workload intensive to manually enter the message. Pre-formatted free text messages should only be selected from standardized free text messages, which are appropriate for the intended use.

b) When the ATSP establishes procedures that require the controller or flight crew to use a free text message element to mimic ICAO Doc 4444 standard message elements, the ATSP should apply the following criteria:

1) The ground system should apply any range, resolution, and units of measure restrictions prior to use of the message.

2) The ground system and aircraft system should provide a human interface for message composition and recognition of free text messages consistent with operational, safety, and performance requirements associated with use of the free text message.

3) The ATSU should not use free text to mimic an ICAO Doc 4444 message element with a W/U response attribute, unless the free text is combined with a standard message element with a W/U response attribute as part of a multi-element message.

4) The ATSU should provide for operational closure of the dialogue that uses a free text message to mimic a message element with a Y response attribute.

Note.— The ground system will technically close the uplink message when it receives the appropriate response from the aircraft.

3.1.1.5 The ATSP should conduct trials with aircraft to ensure that the system meets the requirements for interoperability such as is defined for FANS 1/A in RTCA DO-258A/EUROCAE ED-100A. Refer to paragraph 2.1 for applicable interoperability standards for the different data link system.

3.1.1.6 The ATSP should develop appropriate procedures or other means to:

a) Respond to CPDLC downlink message elements defined in Appendix A. (See paragraph 3.1.4.2 for publication of unsupported downlink messages.)

b) Ensure that data are correct and accurate, including any changes, and that security of such data is not compromised.

c) Notify adjacent ATSUs of system failures, software upgrades (or downgrades) or other changes, which may impact them. Such notification procedures will normally be detailed in letters of agreement between adjacent units.

d) Ensure that the ATSU only establishes an ADS contract with aircraft for which that ATSU has direct control or monitoring responsibility.

Note.— An ATSU may need to establish ADS contracts with aircraft operating in their area of responsibility for purposes other than direct control or monitoring, e.g. testing of ground system software before operational release.

3.1.1.7 The ATSP should ensure that its controllers receive appropriate training in accordance with ICAO Annex 1 and obtain any necessary approval from the State.

3.1.2 ATC automation

3.1.2.1 AFN logon

3.1.2.1.1 To ensure that CPDLC messages are sent only to aircraft for which the ATSU has a flight plan, the ATSU should reject an AFN logon if:

a) there is no flight plan for the flight;

b) the flight plan does not contain the aircraft registration/address; or

c) the aircraft registration/address in the AFN CONTACT message does not match the aircraft registration/address in the flight plan.

3.1.2.1.2 Hyphens contained in an aircraft registration are not valid characters in the ICAO flight plan and therefore are not present in the filed flight plan. The ground system should be configured to prevent the AFN logon being rejected due to hyphens being included in the aircraft registration sent in the AFN CONTACT message, but not in the flight plan.

3.1.2.2 CPDLC and ADS-C connection management

3.1.2.2.1 To prevent rejection of the CPDLC CR1 from the receiving ATSU, the current data authority should wait for the MAS success for the NDA message or allow sufficient time for the aircraft to receive the NDA message prior to initiating address forwarding to the next ATSU.

3.1.2.2.2 To avoid interruption of data link service, the ATSU should initiate address forwarding at least 15 minutes prior to the estimate for the FIR entry position.

3.1.2.2.3 If the ground system does not receive the AFN COMPLETE message within a specified time, e.g. 15 minutes, from sending the AFN CONTACT ADVISORY message, it should provide an indication to the controller. Refer to paragraph 4.1.3 for associated controller procedures.

3.1.2.2.4 If open uplink or downlink messages exist for the aircraft, the ground system should provide indication to the controller and confirm messages are closed prior to sending the END SERVICE message.

3.1.2.2.5 When a CPDLC connection cannot be established by any ATSU, the ground system should indicate to the controller at that ATSU that no connection has been established.

3.1.2.3 Emergency message element handling

3.1.2.3.1 The ground system should provide a clear indication to the controller of downlinked messages that contain any of the message elements from the emergency message elements (see Appendix A, paragraph A.3, for the list of emergency message elements.)

3.1.2.3.2 When the ground system receives an emergency-mode ADS-C report, it should present it to the controller. If a periodic contract is active, the emergency report will be transmitted at the existing periodic interval. Otherwise, the interval will default to a value determined by the aircraft system (see Appendix F, paragraph F.10). Only the flight crew can cancel the emergency mode (see paragraph 4.7.3 for associated controller procedures).

3.1.2.4 Automated responses

3.1.2.4.1 With the exception of UM 1 STANDBY or UM 2 REQUEST DEFERRED, the ground system should assign an MRN to only one uplink message in response to a particular downlink message. If the ground system sends two separate messages with the same MRN, and neither of the messages is UM 1 or UM 2, the aircraft system will discard the second message and not display it to the flight crew.

3.1.2.4.2 The ground system should only assign a MRN to an uplink message that is responding to a downlink message with the associated MIN and the downlink message requires a response. If the ATSU sends an uplink message with a MRN and the downlink message with the associated MIN did not require a response, the aircraft system will discard the uplink message and not display it to the flight crew.

Note.— If an uplink message is discarded for the reasons described in paragraph 3.1.2.4.1 or paragraph 3.1.2.4.2, the aircraft system will send an error message to the ground system indicating that the MRN was not recognized.

3.1.2.4.3 If the ATSU receives a downlink message that they do not support, then it should send free text uplink message UM 169u MESSAGE NOT SUPPORTED BY THIS ATS UNIT rather than terminating the connection. The ATSU should not use UM 162 as the aircraft system may display SERVICE UNAVAILABLE to the flight crew, which is confusing to the flight crew.

3.1.2.4.4 ATSUs may automate the sending of the UM 161 END SERVICE message, based upon the estimated time aircraft are expected to cross CTA/FIR boundaries. Refer to paragraph 2.2.3 and paragraph 4.1 for the proper sequence and timing for sending the UM 161 END SERVICE message and associated controller procedures. Refer to paragraph 3.1.4.8 for guidance on detailing the parameters for this operation in interfacility agreements.

3.1.2.4.5 An ATSU may implement automation to support use of a message latency timer, per paragraph 4.2.7. The extent to which automation supports controller procedures that use the message latency timer is a local matter.

3.1.2.5 Abnormal cases with ADS-C

3.1.2.5.1 When more than one ADS-C report for the same waypoint (or position) are received, the ground system should update the flight data with the first report and provide an indication to the controller if there are significant discrepancies in subsequent reports.

3.1.2.5.2 When the time stamp in the basic group is determined to be invalid for the position in an ADS-C report, the ground system should not use it to update any flight data.

Note 1.— When the time stamp is invalid, the figure of merit (FOM) will be set to 0 and any value could be expected in the basic group.

Note 2.— The time stamp in the a FANS 1/A ADS-C report is provided only in minutes/seconds. Therefore, when an ADS-C report is received with a minutes/seconds greater than the current ground system minutes/second, the time stamp in the report may be related to the previous hour (possibly day/month/year). The ground system may need to determine the full time stamp, i.e., including *hours/day/month/year, for the ADS-C report when determining the validity of the time stamp with the associated position in the ADS-C report.*

3.1.2.5.3 If the aircraft is in heading select mode and the aircraft passes abeam an ATC waypoint by more than a defined distance, the FMS will not sequence this or subsequent waypoints. Consequently, the aircraft will not send an ADS-C waypoint change event report. However, if the aircraft sends an ADS-C periodic report with a predicted route group, the NEXT waypoint data in the report will continue to indicate the waypoint that was passed. As a result, the ground system could use invalid data for display of the aircraft position or extrapolating the correct route for the aircraft. Refer to paragraph 5.6.1.1 for flight crew procedures.

Note.— When the aircraft is in heading select mode, the intent and predicted route information transmitted by the aircraft will contain the next waypoint in the aircraft active flight plan regardless of the actual position and heading of the aircraft. Predicted information is based on the FMS intent, which may not necessarily reflect the intentions of the flight crew.

3.1.2.6 Satcom channel numbers in CPDLC messages. The CPDLC standard provides a [Frequencysatchannel] variable that is intended for ATSUs to send satellite voice telephone numbers in MONITOR and CONTACT messages (UM 117 to UM 122). However, the decoding of this variable varies by aircraft type. Therefore, the ATSU should not use this variable in these messages unless the ground system can determine the appropriate decoding in use by the receiving aircraft and encode the uplink accordingly.

3.1.3 Contractual considerations for CSP

3.1.3.1 The CSP should meet the performance criteria for communication services, in accordance with Appendix B and Appendix C.

3.1.3.2 For those situations when a CSP cannot continue to provide data communications, it should inform ATSPs and operators in accordance with established coordination procedures.

Note.— A CSP that holds a contract with an operator per paragraph 3.2.1.8 but not with the ATSP should notify the ATSP when such situations occur and that operator is conducting data link operations in the ATSP's airspace.

3.1.3.3 In the event of a centralized ADS-C (CADS) failure, the CSP for the CADS service should inform ATS.

3.1.3.4 In the event of a CFRS failure, the CSP for the CFRS service should inform ATS.

3.1.4 Aeronautical information, notifications, and interfacility agreements

3.1.4.1 The ATSP should notify operators of data link services using the AIP or NOTAM. Notification includes:

a) The ICAO 4-letter location indicator assigned to the FIR served by the ATSU;

b) Logon address, The logon address should preferably match the 4-letter location indicator. The ATSP should ensure that the logon address for that FIR is provided on the appropriate aeronautical charts (ICAO Annex 4);

c) Applications, including for each application; application name, version interoperability coverage, scheduled service, shutdowns, and information/alert bulletins;

d) Differences between national regulations and practices, and related ICAO SARPs and procedures;

e) Requirements for use, for example:

1) Procedures for initiation - When an ATSU is unable to accept an AFN logon sent between 15 and 25 minutes prior to either the ETD or the estimate for entering the FIR, the ATSP should publish in appropriate AIP or NOTAM the criteria for when an AFN logon will be accepted. Refer to paragraph 2.2.2.2;

2) ADS-C and CPDLC position reporting requirements;

Note.— The AIP may specify that ADS-C reports may fulfill all normal position reporting requirements. Refer to paragraph 5.6.3 for position reporting guidelines in an ADS-C environment.

3) Supporting reduced separations, reroutes, tailored arrival and associated RCP type(s); and

4) Any required functionality, such as the message latency timer provided by FANS 1/A+ aircraft (Refer to paragraph 4.2.7).

f) Flight plan form and submission requirements.

3.1.4.2 The ATSP should support all downlink message elements as defined in Appendix A, unless the ATSP publishes the differences in the appropriate regional/State supplement along with procedures for handling unsupported message elements.

Note 1.— Emergency messages, as a minimum, are displayed to the controller per paragraph 3.1.2.3.

Note 2.— When a reduced CPDLC message set is used across a group of adjoining ATSUs, the ATSP(s) need to ensure that the reduced message set is common and adequate for the applicable airspace.

3.1.4.3 An ATSP may suspend ADS-C, FMC WPR and/or CPDLC use (including trials) for the control area under its jurisdiction. Notification to affected ATSUs should be carried out in accordance with coordination requirements specified in applicable interfacility agreements.

3.1.4.4 The ATSP should issue a timely NOTAM for scheduled and/or extended outages of the ADS-C or FMC WPR service and advise the operators to conduct position reporting via CPDLC or voice communications.

3.1.4.5 When an ATSP suspends CPDLC operations or when a planned system shutdown of the communications network or the ATS system occurs, the ATSP should publish a NOTAM to inform all affected parties of the shutdown period and advise operators to use voice communications during that time. The ATSP should ensure procedures are established for the ATSU to notify flight crews by voice of any imminent loss of CPDLC service.

3.1.4.6 In the event of an unexpected outage of ADS-C service, the ATSP should establish interfacility agreements with other ATSUs concerned and issue a NOTAM if required to inform affected parties.

3.1.4.7 In the event of an unexpected outage of CPDLC service, or if an ATSU suspends CPDLC operations without prior notice, the ATSP should:

a) inform aircraft currently in communication with the ATSU of the loss of CPDLC service;

b) inform other ATSUs concerned;

c) specifically advise whether the outage also affects ADS-C service; and

d) issue a NOTAM, if required.

3.1.4.8 When one or more ATSPs provide CPDLC service with adjoining ATSUs, the ATSP(s) should establish interfacility agreements to allow the uninterrupted transfer of the CPDLC connection. The interfacility agreements should include:

a) The time at which address forwarding occurs taking into consideration any automation requirements:

b) The time at which UM 161 END SERVICE message is sent (see paragraph 3.1.2.4.4 regarding related ATC automation and paragraph 4.1 for associated ATC procedures) taking into consideration:

1) sufficient time to allow the NDA (if established) to establish an active CPDLC connection prior to the aircraft crossing the common boundary;

2) sufficient time to prevent an inappropriate active CPDLC connection from continuing with an aircraft while it is transiting airspace where CPDLC is not available.

3.1.4.9 When an ATSU will only have control of a FANS 1/A aircraft for a relatively short duration, the ATSP may establish procedures in appropriate interfacility agreements to coordinate the transfer of communications for the aircraft among the controlling and the affected ATSUs. Refer to paragraph 4.1.7.

3.1.4.10 The ATSP should establish interfacility agreements, as appropriate, to ensure that adjacent FIRs can establish ADS contracts to monitor aircraft in the vicinity of the common boundary.

3.1.4.11 When CPDLC is used to assign frequencies, the ATSP should establish the frequencies to be used by interfacility agreements.

3.1.4.12 If the message latency timer described in paragraph 4.2.7 is used, the ATSP should establish interfacility agreements, as necessary, to ensure that its use or non-use is consistent with data link operations in airspace controlled by any of the adjacent ATSUs.

3.1.5 Monitoring and data recording

3.1.5.1 The FANS 1/A CNS/ATM environment is an integrated system including physical systems (hardware, software, and communication network), human elements (the flight crew and the controller), and the related procedures.

3.1.5.2 Because of the integrated nature of the system and the degree of interaction among its components, the ATSP should establish end-to-end system monitoring in accordance with the guidelines provided in Appendix D. The guidelines aim to ensure end-to-end system integrity through post-implementation monitoring, identifying, reporting and tracking of problems, and corrective action.

Note.— The guidelines presented herein do not replace the ATS incident reporting standards and guidelines, as specified in ICAO Doc 4444, Appendix 4; ICAO Air Traffic Services Planning Manual (Doc 9426), Chapter 3; or applicable State regulations, affecting the parties directly involved in a potential ATS incident.

3.1.5.3 The ATSP and its CSP(s) should retain records for at least 30 days to allow for accident/incident investigation purposes. The ATSP and CSPs should make these records available for air safety investigative purposes on demand. These recordings should allow replaying of the situation and identifying the messages that the ATSU sent or received.

3.2 Operator eligibility

3.2.1 Operational authorization to use data link

3.2.1.1 An operator intending to use CPDLC or ADS-C service should obtain an operational authorization with the State of registry or State of the operator, if required, in accordance with their rules and means of compliance. This operational authorization should address flight crew training and qualification, maintenance, MEL, user modifiable software, service agreements with the CSP, and procedures for submitting problem reports and data to the regional/State monitoring agencies. The operator should also ensure that aircraft equipment has been approved for the intended use per interoperability standards and performance specifications, e.g. RCP 240 or RCP 400 operations, described in paragraph 2.1 and in accordance with airworthiness requirements and related means of compliance.

3.2.1.2 The operator is not required to obtain an operational authorization to use FMC WPR. However, the operator should ensure that the aircraft equipment has been approved by the State of Registry or State of the Operator for FMC WPR (e.g. meets appropriate software assurance criteria). See paragraph 3.4 for additional guidance on operational use of FMC WPR.

3.2.1.3 The operator should establish policy and procedures for flight crews and operational staff involved in data link operations, and incorporate them in appropriate operations manuals. The operations manuals should include:

a) Procedures for the data link operations taking into account the guidance provided in Chapter 5 and Chapter 6, as necessary.

b) Minimum equipment lists (MEL) modifications (if required); and

c) Flight crew and operational staff procedures, including procedures for establishing and maintaining voice communications (including any required SELCAL check(s)) with every CTA/FIR along the route of flight.

3.2.1.4 The operator should ensure the flight crews and operational staff, e.g. dispatcher receives appropriate training in accordance with Annex 1 and Annex 6 to the Convention on International Civil Aviation.

3.2.1.5 If applicable, the operator should ensure the operational staff is trained in data link operations. This training should include:

a) Description of the data link network including ACARS, AFTN and SATCOM;

b) Flight planning requirements for data link flights;

c) Implications of flights departing under minimum equipment list (MEL) relief; and

d) Implications of planned and unplanned network outages on data link operations.

3.2.1.6 From time to time aircraft manufacturers release new software which will often rectify in service issues and may add increased functionally. The operator should update their software as new releases become available to ensure best possible performance.

3.2.1.7 The operator should initially coordinate with its CSP(s) to initiate ground system configuration for its aircraft. In operations involving CFRS, to ensure FMC WPR downlinks are properly routed to the appropriate CFRS system(s), the operator should coordinate with their CSP(s) to configure for routing their FMC WPRs to the appropriate CFRS system(s).

3.2.1.8 The operator should ensure that their CSP(s) meets the performance criteria for communication services, in accordance with Appendix B and Appendix C, and notifies them and appropriate ATSPs when data communication services as prescribed for the intended operations cannot be provided..

3.2.1.9 The operator should ensure that flight operations, the flight crews and the appropriate ATSPs are notified of failures with the aircraft equipment or the operator's AOC system related to data link operations (such as when used to provide FMC WPR service to ATSPs).

3.2.1.10 The operator should provide flight operations and the flight crew with procedures, as appropriate, when the following occurs:

a) The operator is notified of data link system failures per paragraph 3.2.1.8, or

b) The AOC system or aircraft equipment fails such that the aircraft capability can no longer meet the performance specifications (Appendix B and Appendix C) prescribed for the intended operation..

3.2.1.11 The operator may be required to make special arrangements with an ATSU for the purposes of undertaking trials using ATC data link equipment.

3.2.2 Regional/State monitoring agencies

Note.— Guidelines on problem reporting and corrective action can be found at Appendix D. Contact information for the appropriate regional/State monitoring agency can be found at Appendix E.

3.2.2.1 The operator should indicate their intention to participate in data link operations by contacting the appropriate regional/State monitoring agency and providing the following information thirty days in advance:

a) operator name;

b) operator contact person; and

c) the appropriate 8-letter aeronautical fixed telecommunication network (AFTN) address(es) if the operator requires receipt of converted ADS-C waypoint change event reports or FMC waypoint position reports.

3.2.2.2 If any of the information provided in paragraph 3.2.2.1 changes,, the operator should advise the appropriate regional/State monitoring agency.

3.2.2.3 The operator should establish procedures to report to the appropriate regional/State monitoring agency any problems its flight crews and dispatchers have with data link operations.

Note.— *Filing a report with regional/State monitoring agencies does not replace the ATS incident reporting procedures and requirements, as specified in ICAO Doc 4444, Appendix 1; ICAO Doc 9426, Chapter 3; or applicable State regulations affecting parties involved in a potential ATS incident.*

3.3 Flight planning

3.3.1 General

3.3.1.1 When participating in data link operations, the operator should file to use these services only if the flight crew is qualified and the aircraft is properly equipped for the data link operation.

3.3.1.2 The operator should ensure that the proper information is included in the ICAO flight plan.

3.3.2 CPDLC and ADS-C

3.3.2.1 ATS systems use Field 10 (Equipment) of the ICAO flight plan to identify an aircraft's data link capabilities. The operator should insert the following items into the ICAO flight plan for FANS 1/A aircraft:

a) Field 10a (Radio communication, navigation and approach equipment); insert the letter "J" to indicate data link equipment.

b) Field 10b (Surveillance equipment); insert the letter "D" to indicate ADS-C capability.

c) Field 18 (Other Information); insert the characters "DAT/" followed by one or more letters as appropriate to indicate the type of data link equipment carried, when the letter "J" is inserted in field 10. (see table below)

Table 3-1 Indicating data link equipment in Field 18

Letter following DAT/	Type of data link equipment
S	Satellite data link
H	HF data link
V	VHF data link
M	SSR Mode S data link

3.3.2.2 The operator should ensure that the correct aircraft registration is filed in Field 18 prefixed by REG/ of the ICAO flight plan. The ATSU compares the aircraft registration of the aircraft contained in Field 18 (Other Information) of the ICAO flight plan with the aircraft registration contained in the AFN logon.

Note.— The hyphen is not a valid character to include in a flight plan. Any hyphen that may be contained in the aircraft registration needs to be omitted when including the aircraft registration in the flight plan.

3.3.3 FMC WPR

3.3.3.1 There are no additional flight planning requirements specific to participation in FMC WPR.

Note.— The aircraft identification (ACID) provided in the FMC WPR is correlated with the ID provided in the filed flight plan and will be rejected if they do not match.

3.4 FMC WPR – additional guidance

3.4.1.1 In addition to the guidelines provided in paragraph 3.2, an operator who intends to participate in FMC WPR data link operations should advise participating ATSPs of the following information at least thirty days in advance:

a) whether the FMC WPRs will be manually triggered by the flight crew or be fully automated;

b) that the necessary coordination has taken place with the CSP, in operations involving a CFRS; and

c) the aircraft type(s) and associated aircraft registration(s) of aircraft, in operations involving a CFRS, since CFRS reports can only be received from aircraft whose aircraft registration is known to the system.

3.4.1.2 The participating operator should demonstrate to the appropriate planning and implementation regional group (PIRG) that they meet the surveillance performance specifications (see Appendix C) for the provision of FMC WPRs for ATS purposes. Once this has been demonstrated, the operator will be able to participate in FMC WPR operations. Utilizing FMC WPR will be at the discretion of the operator.

3.4.1.3 An operator participating in FMC WPR should ensure that:

a) the FMC WPR is generated at each ATC waypoint of a cleared route in airspace where FMC WPR is available;

b) any waypoint uplinked to the FMS for the purposes of generating automatically initiated FMC WPRs is an ATC waypoint; and

c) the FMC WPR contains the data elements that are required for ATC, per ICAO Doc 4444.

3.4.1.4 The operator should use numeric characters in the flight identification portion (e.g. ABC123) of the aircraft identification. When use of alphabetic characters (e.g. ABC123A) in the flight identification is unavoidable, the operator should ensure the flight crew provides position reports by voice.

Note.— If the flight identification portion of the aircraft identification contains an alphabetic character (for example ABC124A or ABC324W, where 124A or 324W is the flight identification), the ground system cannot translate the IATA FI field into the ATC ACID and thus prevent the flight from participating in FMC WPR.

3.4.1.5 Early versions of Airbus software are prone to large errors in position data. Operators should ensure they have updated software before using FMC WPR.

Chapter 4. Controller and radio operator procedures

This chapter provides guidance on procedures and recommended practices for the controller and the radio operator in airspace where data link services are available.

This information is intended to assist in the development of:

a) Local procedures and associated documentation; and

b) Appropriate training programs.

Controllers should be knowledgeable in the ATC automation. Refer to paragraph 3.1.2 for guidelines for implementation of ground systems supporting data link operations.

Controllers should be knowledgeable in data link operations. Refer to Chapter 2. for an overview of data link operations.

Radio operator procedures specific to data link operations can be found in paragraphs 4.7.4 and 4.7.5.

4.1 CPDLC and ADS-C connection management and voice communication transfers

4.1.1 General

4.1.1.1 ATSUs should manage CPDLC connections, including terminating the connection when no longer needed, to ensure that the ATSU with control for the flight holds the active CPDLC connection.

4.1.1.2 An ATSU may have an active connection with an aircraft not in that ATSU's airspace:

a) When an aircraft is transiting a CPDLC serviceable FIR subject to coordination between ATSUs;

b) During the CPDLC connection transfer process;

c) Where the active connection is retained by the transferring ATSU subject to prior coordination;

d) When the aircraft is within a non-serviceable or non-CPDLC FIR and the flight crew initiates a logon to the controlling ATSU for the next FIR; or

e) In emergency circumstances.

4.1.1.3 Regardless of its connection status, an ATSU should never issue a clearance or instruction to an aircraft outside its control area unless it has been requested to do so by the ATSU in whose airspace the aircraft is operating.

4.1.2 Establish CPDLC connection

4.1.2.1 The next ATSU should establish an inactive CPDLC connection prior to the current data authority terminating the active CPDLC connection. See paragraph 2.2.3 for a description of CPDLC connection management.

4.1.3 Transferring the CPDLC connection – abnormal conditions

4.1.3.1 When the NDA delivery has not been successful, the controller should send a second NDA message. If this is also unsuccessful, the controller should then instruct the flight crew to manually terminate the CPDLC connection and then initiate an AFN logon with the subsequent ATSU. An UM 161 END SERVICE message is not needed in this case.

4.1.3.2 The controller should use the following messages via CPDLC. When using voice, use the equivalent voice phraseology:

Controller	UM 117 CONTACT [unit name] [frequency]
	UM 169am SELECT ATC COMM OFF THEN LOGON TO [facility designation]
Flight crew	DM 0 WILCO

Note 1. — The [facility designation] is the relevant four character ICAO code.

Note 2.— Instructing the flight crew to select ATC COMM OFF will result in loss of CPDLC connectivity. This procedure should only be applied approaching the FIR boundary with the next ATSU.

4.1.3.3 If the controller at the ATSU initiating the transfer receives indication that the AFN logon to the NDA is not successful, the controlling ATSU should reinitiate address forwarding with the next ATSU. The controlling ATSU should not re-send the NDA message (see paragraph 3.1.2.2 regarding related ATC automation and paragraph 2.2.3.12 for a description of non-standard events with CPDLC transfers). The controlling ATSU should:

a) Coordinate with the next ATSU, establishing clearly when or where the address forwarding will have to occur.

b) Time the AFN contact advisory to allow the next ATSU to establish an active CPDLC connection prior to the aircraft's crossing the common boundary.

4.1.3.4 If an ATSU requires confirmation that they are active center (Refer Appendix E, paragraph E.2.2) then the ATSP should develop procedures to ensure that this confirmation can be obtained if no CDPLC downlink is received from the aircraft as it crosses the common boundary. This confirmation may take the form of :

a) Receipt of a DM 3 ROGER in response to a UM 169 [free text] uplink message;

b) Receipt of a DM 48 position report in response to a UM 147 REQUEST POSITION REPORT message; or

c) Non-receipt of DM 63 NOT CURRENT DATA AUTHORITY in response to a UM 160 NDA message.

4.1.4 Termination of the CPDLC connection

4.1.4.1 The controlling ATSU should ensure that no uplink messages remain open before sending the UM 161 END SERVICE message.

4.1.4.2 If there is an indication of open uplink CPDLC messages, the controlling ATSU should:

a) uplink the free text message UM 169j CHECK AND RESPOND TO OPEN CPDLC MESSAGES; or

b) coordinate with the receiving ATSU with reference to CPDLC messages that were still open after sending the UM 161 END SERVICE message.

4.1.4.3 The controlling ATSU should respond to open CPDLC downlink messages prior to sending the UM 161 END SERVICE message.

4.1.4.4 Normally, the controlling ATSU should send the UM 161 END SERVICE message after the last position report and prior to crossing the FIR boundary. If for operational reasons the current ATSU intends to delay the CPDLC transfer until after the aircraft has passed the FIR transfer point, the controller should notify the flight crew of the intended delay with the free text message UM 169l EXPECT CPDLC TRANSFER AT [time]

Note. — The controlling ATSU needs to consider sending the UM 161 END SERVICE message in sufficient time, e.g. not less than 5 minutes prior to crossing the FIR boundary or as agreed, for the next ATSU to establish an active CPDLC connection with the aircraft.

4.1.4.5 For aircraft entering airspace where radar and air-ground VHF are available, and the aircraft will not cross the FIR boundary or enter airspace under the control of another ATSU, the current data authority does not need to send an UM 161 END SERVICE message to terminate the active CPDLC connection. In this case, the CPDLC connection may remain active until the flight is terminated. If a subsequent control sector within an ATSU does not have CPDLC capability, and local instructions do not exist to the contrary, the controller with the active CPDLC connection should not issue any clearance to the aircraft while it is under the control of another sector.

4.1.4.6 If the controller receives indication that the UM 161 END SERVICE message was unsuccessful, the controller initially should send another UM 161 END SERVICE message. If this is also unsuccessful, the controller should instruct the flight crew to terminate the CPDLC connection and logon to the next unit. The controller should use the following CPDLC free text or voice equivalent phraseology:

Controller	UM 169am SELECT ATC COMM OFF THEN LOGON TO [facility designation]
Flight crew	DM 3 ROGER

Note.— The [facility designation] is the four character ICAO code.

4.1.5 Transfer voice communications with CPDLC connection transfer

4.1.5.1 When using CPDLC to effect voice communications transfers, the current data authority should complete the voice frequency change process with the CPDLC connection transfer using the CONTACT/MONITOR message elements (UM 117 through UM 122), as shown in Figure 4-1 by:

a) Sending the MONITOR (or CONTACT) [unit name] [frequency] and then, in a separate CPDLC message, sending the UM 161 END SERVICE as soon as possible after the receipt of the DM 0 WILCO response to the MONITOR (or CONTACT) instruction; or

b) Sending the AT [position/time] MONITOR (or CONTACT) [unit name] [frequency] and then, in a separate CPDLC message, sending the UM 161 END SERVICE after the receipt of the DM 0

WILCO response to the MONITOR (or CONTACT) instruction and the aircraft is approaching the FIR boundary.

4.1.5.2 When using the CONTACT/MONITOR message elements, the current data authority should use the facility name for the [unit name] parameter.

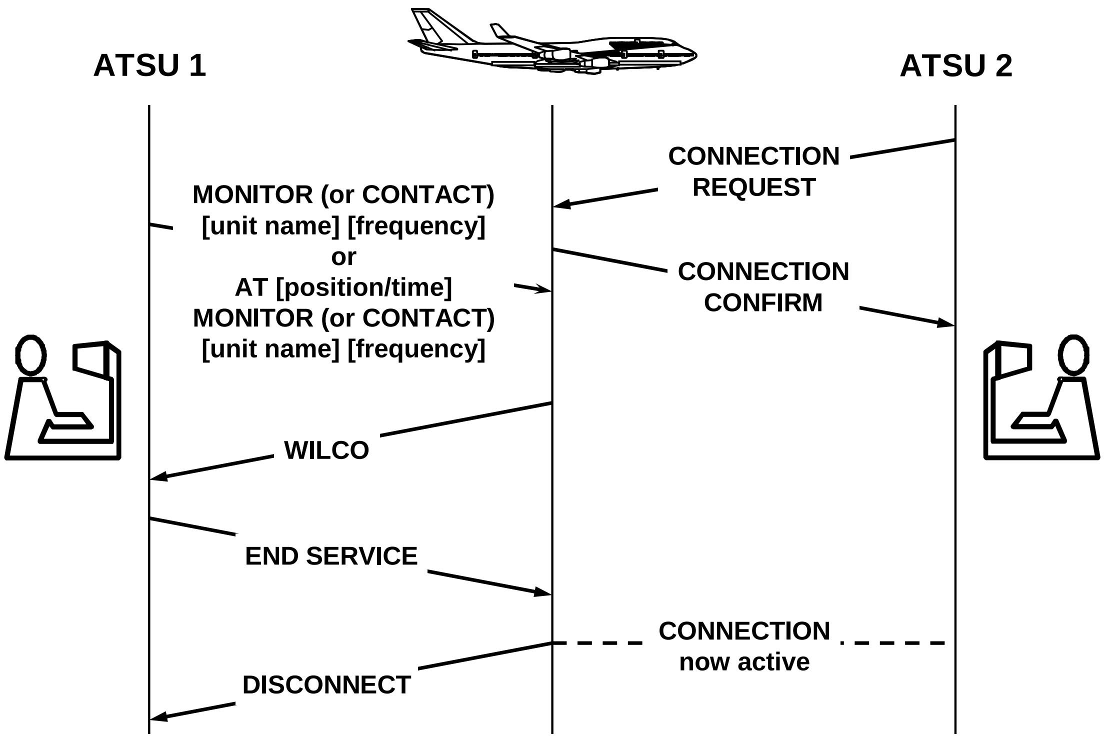


Figure 4-1. CPDLC connection transfer - separate messages

4.1.5.3 Unless otherwise agreed for individual flights per paragraph 4.1.4.4, the controlling ATSU should send the MONITOR (or CONTACT) [unit name] [frequency] prior to the UM 161 END SERVICE message element.

4.1.5.4 Since the CONTACT/MONITOR message elements listed in Table 4-1 include only one [frequency] parameter, the controller should only use these message elements when instructing the flight crew to change the primary frequency. In areas of poor radio coverage, the controller may append the free text message UM 169o SECONDARY FREQUENCY [frequency] to specify a secondary frequency.

Table 4-1. CONTACT/MONITOR message elements

UM Ref	Message element
UM 117	CONTACT [unit name][frequency]
UM 118	AT [position] CONTACT [unit name][frequency]
UM 119	AT [time] CONTACT [unit name][frequency]
UM 120	MONITOR [unit name][frequency]
UM 121	AT [position] MONITOR [unit name][frequency]
UM 122	AT [time] MONITOR [unit name][frequency]

4.1.5.5 In the FANS-1/A message set, the option of RADIO per ICAO Annex 10, Volume II, paragraph 5.2.1.7.1.2 is not a possible value for the [unit name] parameter used in CONTACT and MONITOR messages (UM 117 to UM 122). In the absence of this option, some ATSPs use CENTER to apply to an aeronautical station (RADIO). Other ATSPs use free text UM 169 to mimic the MONITOR/CONTACT instructions and indicate the facility name followed by RADIO.

4.1.6 ADS-C connection management

4.1.6.1 The ATSU should terminate ADS contracts when they are no longer needed.

4.1.6.2 When the ATS ground system receives an AFN logon message, the ATSU may initiate an ADS- C connection by establishing an ADS contract(s) with the aircraft.

4.1.6.3 The FANS 1/A system does not assign any technical priority to ADS-C connections; therefore the controlling ATSU may not be aware of other connections established with the aircraft. As a result, a procedural hierarchy controlled by the address forwarding (FN_CAD message) has been established.

4.1.6.4 Using the address forwarding process, the current controlling ATSU should allocate priority for an ADS-C connection to the next ATSU that will have air traffic control responsibility for the aircraft. The allocation of priority for ADS-C connections should be in the following order:

a) The current ATSU or current data authority;

b) The next ATSU or next data authority;

c) An ATSU requiring a connection for monitoring operations close to a boundary;

d) An AOC facility; and

e) Other miscellaneous connections.

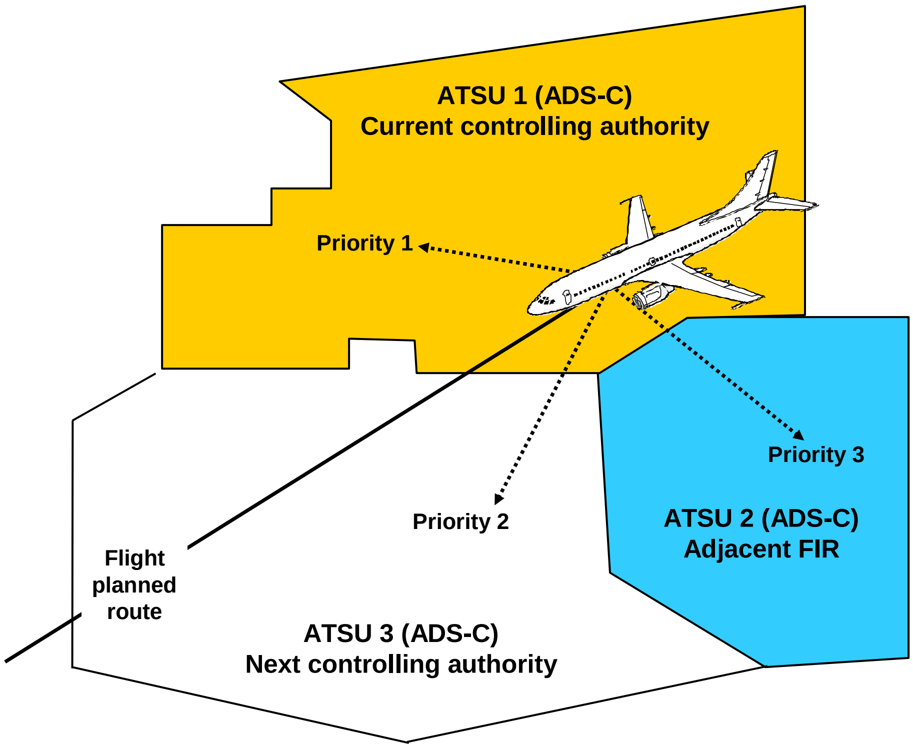


Figure 4-2. Priorities for ADS-C connections

4.1.6.5 For example, as shown in Figure 4-2, an ADS-C contract is required by ATSU 2 to monitor the aircraft's progress near the FIR boundary. To ensure that the next unit with direct control responsibility for the aircraft (ATSU 3) has priority over the ADS-C connections, ATSU 1 should initiate address forwarding to ATSU 3 prior to address forwarding to ATSU 2.

4.1.6.6 When all available ADS-C connections with a particular aircraft have been established, such as shown in Figure 4-3, any other ATSUs attempting to connect with the aircraft will receive a DISCONNECT REQUEST (DIS) message with "reason code 1" (congestion).

4.1.6.7 When DIS message is received by an ATSU that would normally have priority for an ADS-C connection, the ATSU should notify the current controlling ATSU. The controlling ATSU should resolve the situation.

4.1.6.8 The controlling ATSU has a number of options available, such as coordination with the previous ATSU or other adjacent ATSUs to determine if the existing ADS-C connections are still required or, when considered absolutely necessary, instructing the flight crew to terminate ADS-C connections per Appendix F, paragraph F.12. The latter option may terminate all current ADS contracts; therefore, the controlling authority should consider the operational effect on other ATSUs prior to employing this method.

4.1.6.9 Once all contracts have been terminated, the controlling authority should allocate priority for the connections to other ATSUs via the address forwarding process. Only ATSUs with direct control or monitoring responsibilities should re-establish contracts with the aircraft.

4.1.6.10 For example, as shown in Figure 4-3, the aircraft has allocated priority for ADS-C connections with four ATSUs and one AOC facility:

Connection:	1 - with ATSU 1 2 - with ATSU 2 3 - with the previous controlling ATSU 4 - with the AOC facility 5 - with a ground facility collecting test data

ATSU 3, the next controlling authority, is unable to establish an ADS-C connection with the aircraft due to congestion.

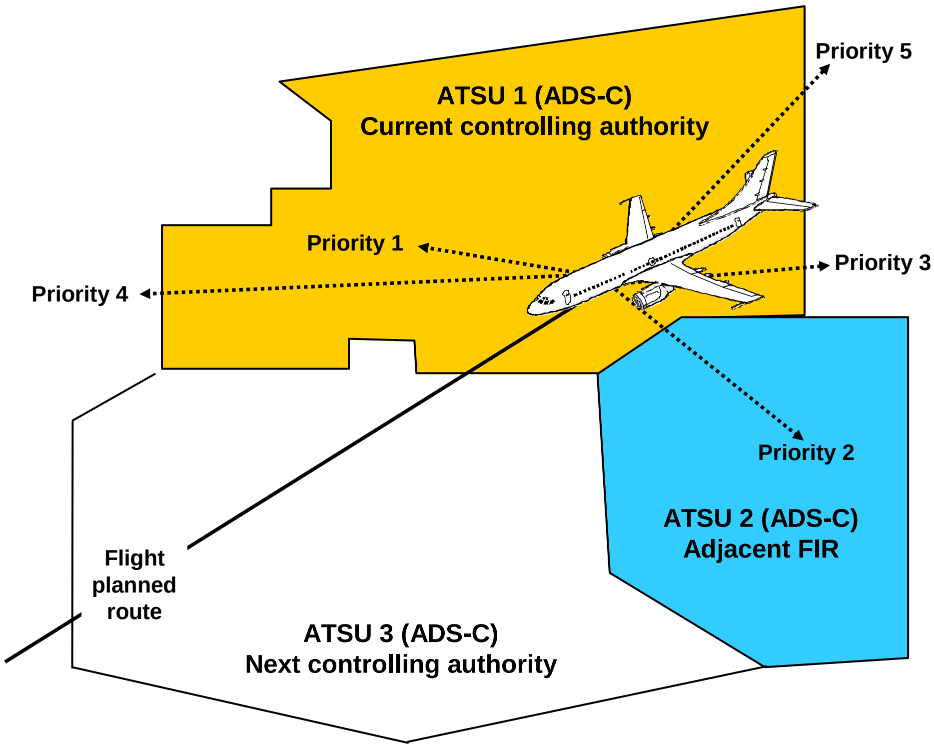


Figure 4-3. ADS-C connection not available due to congestion

4.1.7 Aircraft transiting small data link area

4.1.7.1 Connection transfer failures can be caused by controllers or systems not completing the connection transfer during a short transit time across a portion of the FIR.

4.1.7.2 If any automated transfer process will be affected by the short transit period across its FIR, then the controller should ensure that all messages are sent in the proper sequence at the correct time to successfully transfer the connections to the next ATSU (e.g. NDA, address forwarding, MONITOR/CONTACT, and UM 161 END SERVICE messages), and manually intervene, if necessary.

Note.— The receiving ATSU will need to be the current data authority (CDA) before any of these messages can be sent successfully. For example, if the receiving ATSU tries to send the NDA message prior to becoming the CDA to account for a short transit time, the aircraft system will reject the NDA. This underscores the importance of the upstream ATSU ensuring that the end service message is transmitted in time to permit the transfer to be completed before the aircraft crosses the FIR boundary. See paragraph 4.1.4.4.

4.1.7.3 When an ATSU accepts the transfer of a CPDLC connection for a short transit across its FIR, the receiving controller should ensure that any automated transfer process to the subsequent ATSU will not be impacted by the relatively short transit period across the FIR.

4.1.7.4 If the ATSU concerned requires ADS contracts to monitor the transit of the aircraft across a portion of the FIR, but the transfer of communications is not required, the controlling ATSU should send the NDA message specifying ATSU 3 as the NDA and then perform address forwarding in the order of priority described in Figure 4-4.

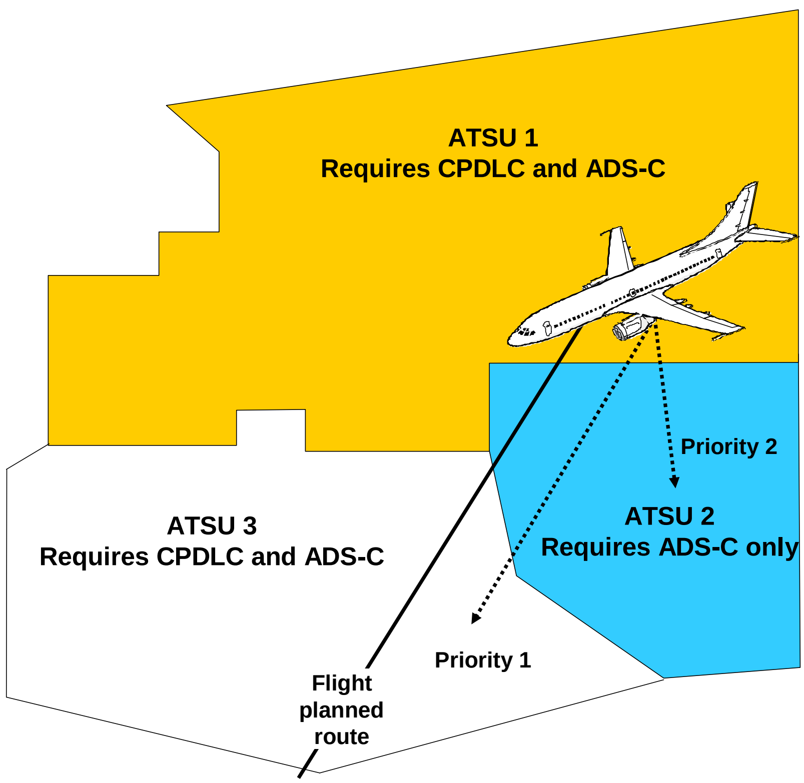


Figure 4-4. Transiting small data link area

4.1.7.5 ATSU 1 and ATSU 3 should coordinate on the connection transfer location and then ATSU 1 should initiate the END SERVICE message at that location to begin transfer of CPDLC connection at that location.

4.1.7.6 In this circumstance, the controller should inform the flight crew by appending the free text message UM 169m EXPECT NEXT CENTER [facility designation]. CONTACT WITH [facility designation] NOT REQUIRED.

Example:

Controller	UM 169m EXPECT NEXT CENTER ATSU 3. CONTACT WITH ATSU 2 NOT REQUIRED.

4.1.7.7 ATSU 1 should initiate address forwarding to ATSU 3 (priority 1) prior to initiating address forwarding to ATSU 2 (priority 2) to ensure that ATSU 3 can establish ADS contracts for monitoring the transit of the aircraft across the relevant portion of the FIR.

4.2 CPDLC – Uplinks

4.2.1 General

4.2.1.1 If the controller receives an unexpected or inappropriate response to a CPDLC uplink message or there is any misunderstanding or doubt about the intent of a CPDLC dialogue, they should initiate voice contact to clarify the meaning or intent. (see Appendix A for intent and use of CPDLC uplink and downlink message elements).

4.2.1.2 If the controller:

a) Does not receive a flight crew response to an open CPDLC uplink message within a reasonable time period and no error message has been received indicating that the message was not delivered; or

b) Receives a DM 2 STANDBY in response to an open CPDLC uplink message but does not receive a closure response within a reasonable period (e.g. 10 minutes); then

the controller should uplink UM 169j CHECK AND RESPOND TO OPEN CPDLC MESSAGES, rather than re-sending the original message. This is to avoid have multiple open messages involving the same instruction. Alternatively, the controller may use voice communication to clarify the status of the open CPDLC uplink.

4.2.1.3 If the controller receives a DM 2 STANDBY response to a message and does not receive another response within a reasonable period of time (e.g. 10 minutes) or as required, the controller should send a UM 169 [free text] inquiry rather than resend a duplicate message.

4.2.1.4 When necessary, the controller should include terms or conditions relating to a specific clearance or instruction in a single uplink message. The controller should not send separate messages. Refer to paragraph 4.2.5, for guidelines on multi-element uplink messages.

4.2.1.5 The controller should generally use standard message elements and should only use standard message elements when issuing a clearance.

Note.— The use of standard message elements will minimize the risk of input errors, misunderstandings and facilitate use by a non-native English speaking controllers and flight crews. The use of standard message elements allows the aircraft and ground systems to automatically process the information in the messages that are exchanged, which allows the flight crew to respond more quickly to a standard clearance. For example, the ground system can automatically update flight plan data for route conformance monitoring, the flight crew can automatically load clearance information into the FMS and review the clearance, and both aircraft and ground systems can associate responses to messages.

4.2.2 Use of free text

4.2.2.1 Whilst the controller should avoid the use of the free text message element, given local constraints and limitations of the data link system, its use may offer a viable solution to enhance operational capability.

4.2.2.2 The controller should only use a free text message when an appropriate standard message element does not exist and the intended use does not change the volume of protected airspace (i.e., not a clearance). Refer to paragraph 4.2.1.5 for issuing clearances.

4.2.2.3 When free text is used, the controller should use standard ATS phraseology and format and avoid nonessential words and phrases. The controller should only include abbreviations in free text messages when they form part of standard ICAO phraseology, for example, ETA.

4.2.3 Vertical clearances

4.2.3.1 The controller should precede conditional vertical clearances containing the word "AT" with UM 19 MAINTAIN [level] indicating to the flight crew to maintain their present level/altitude until the condition of the clearance is satisfied:

Controller	UM 19 MAINTAIN [level] UM 21 AT [time] CLIMB TO AND MAINTAIN [level]
Controller	UM 19 MAINTAIN [level] UM 22 AT [position] CLIMB TO AND MAINTAIN [level]
Controller	UM 19 MAINTAIN [level] UM 24 AT [time] DESCEND TO AND MAINTAIN [level]
Controller	UM 19 MAINTAIN [level] UM 25 AT [position] DESCEND TO AND MAINTAIN [level]

Note.— The potential exists for the restriction "AT" contained at the beginning of certain conditional clearances to be missed by the flight crew and consequently the clearance may be executed prematurely. Including the UM 19 MAINTAIN [level] message element will emphasize that the message contains a conditional level/altitude clearance and may prevent such clearances being executed prematurely.

4.2.3.2 If a CPDLC level report is needed, the controller should append UM 129 REPORT LEVEL [level] to the vertical clearance message element that is used to assign a single level/altitude.

Note 1.— When UM 129 REPORT LEVEL [level] is appended, the flight crew has access to the standard message element DM 37 ***MAINTAINING [level]*** *or LEVEL [altitude]. If the report request is not appended, the flight crew may not report when they are maintaining the cleared flight level.*

Note 2.— Some States may not request a CPDLC level report when using ADS-C.

Example: The controller issues a conditional clearance to a flight currently cruising at FL310 requesting climb to FL350 when the climb can not be executed until the aircraft is at MICKY. The controller appends a request for a report when level at FL350.

Controller	UM 19 MAINTAIN FL310 UM 22 AT MICKY CLIMB TO AND MAINTAIN FL350 UM 129 REPORT LEVEL FL350

4.2.3.3 The controller should not use UM 175 REPORT REACHING [level].

Note.— ICAO Doc 4444 has reserved this message element. The programmed intent of this message element was to request a report if the aircraft occupies the specified level, which occurs as the aircraft is about to level at the specified level, but also occurs if the aircraft passes through the specified level during a climb or descent. The purpose of reporting intermediate levels should be served by ADS-C.

4.2.3.4 To cancel a previously issued vertical range, i.e., block level, clearance and limit the aircraft to one specific level, the controller should issue an appropriate vertical clearance.

Example:

Controller	UM 19 MAINTAIN FL350 UM 20 **CLIMB TO FL390 or** *CLIMB TO AND MAINTAIN FL390* UM 129 **REPORT MAINTAINING FL390** or *REPORT LEVEL FL390*
Flight crew	DM 0 WILCO

Note.— The DM 0 WILCO response to the vertical clearance uplink cancels any previously issued vertical range clearance.

4.2.3.5 Depending on circumstances, the controller may use CPDLC message elements provided in Table 4-2 to issue a level restriction as either:

a) A "stand-alone" clearance; or

b) A level requirement for an interim level, when appended to another CPDLC vertical clearance.

Table 4-2. Conditional vertical clearances

UM #	Message element
UM 26	CLIMB TO REACH [level] BY [time]
UM 27	CLIMB TO REACH [level] BY [position]
UM 28	DESCEND TO REACH [level] BY [time]
UM 29	DESCEND TO REACH [level] BY [position]

Example 1: The controller clears the aircraft to climb to FL 390, and is maintaining FL 390 AT or BEFORE 2200.

Controller	UM 26 CLIMB TO REACH FL390 BY 2200

Example 2: The controller issues a requirement for an interim level. The controller clears the aircraft to climb to FL 390, and reach FL 370 (or higher) AT or BEFORE 0100.

Controller	UM 20 **CLIMB TO FL390** or *CLIMB TO AND MAINTAIN FL390* UM 26 CLIMB TO REACH FL370 BY 0100 UM 129 REPORT LEVEL FL390

Note.— A more appropriate procedure would be for the controller to use the message element UM 192 REACH [level] BY [time], defined in ICAO Doc 4444. However, this message element is not available in the FANS 1/A message set. The example includes UM 129 REPORT LEVEL FL 390 to highlight the final level intended by the clearance.

4.2.3.6 The controller should not send a vertical clearance in a CPDLC message and then subsequently send a related level restriction in a separate message. If the controller decides to add a level restriction after sending the initial clearance, they should restate the entire clearance, as presented in paragraph 4.2.3.5, Example 2.

Note.— If the controller sends the vertical clearance and the related level restriction in two separate CPDLC messages, the controller would be unintentionally amending the final cleared level of the aircraft (to FL 370) with the level restriction. The flight crew may misinterpret the two separate instructions.

Example: The following procedure is not a recommended practice. The controller does not send a vertical clearance and a related level restriction in separate messages.

~~Controller~~	~~CLIMB TO AND MAINTAIN FL390~~
~~Flight crew~~	~~WILCO~~
	~~followed by~~
~~Controller~~	~~CLIMB TO REACH FL370 BY 2200~~

4.2.3.7 If the controller is unable to approve a request to climb or descend to a particular level, but is able to approve a climb or descent to an intermediate level, then the controller should:

a) Respond to the request with UM 0 UNABLE; and

b) Issue a separate message to clear the aircraft to climb to the intermediate level.

4.2.4 Report/confirmation requests

4.2.4.1 If the controller requests the aircraft's Mach number or indicated airspeed, then the controller should use the standard message element UM 134 CONFIRM SPEED.

4.2.4.2 If a scheduled CPDLC position report is not received, the controller may request the report by uplinking message UM 147 REQUEST POSITION REPORT.

4.2.5 Creating multi-element uplink messages

4.2.5.1 The controller should minimize the use of CPDLC multi-element uplink messages and keep their size to a minimum.

4.2.5.2 The controller should only combine clearance message elements that are related into a single uplink message so the flight crew can provide a single unambiguous response.

Note.— The flight crew may misinterpret messages that contain unrelated elements or reject (DM 1 UNABLE) the entire message when the flight crew could have accepted (DM 0 WILCO) one of the elements on its own.

Example: The controller sends a multi-element uplink clearance as a single message.

Controller	UM 164 WHEN READY (or UM 177 AT PILOTS DISCRETION) UM 23 DESCEND TO AND MAINTAIN FL280 UM 129 REPORT LEVEL FL280

4.2.5.3 Two independent clearances should never be transmitted in a single message because the flight crew has no way individually respond to each clearance, if necessary, e.g. WILCO one clearance and UNABLE the other.

Example: The following is not recommended..

Controller	~~CLIMB TO AND MAINTAIN FL350~~ ~~INCREASE SPEED TO .84~~

4.2.5.4 The controller should send all elements of a dependent clearance in a single unambiguous uplink message.

Note 1.— A dependent clearance is a message consisting of more than one clearance element, where the flight crew needs to comply with each of the elements. A rejection of any of the elements, either singly or in combination, renders the entire clearance invalid.

Note 2.— Sending the elements as individual messages may compromise safety or separation if the flight crew accepts the first uplink of a dependent clearance, complies with the instruction, and then responds UNABLE to the next message when received.

Note 3.— The flight crew will respond to the multi-element uplink message with either DM 0 WILCO or DM 1 UNABLE, which applies to the entire message. The flight crew cannot respond to individual elements of a multi-element message.

Example 1: The controller sends a single multi-element uplink message containing an amended route clearance that is dependent on a vertical clearance. To eliminate any potential ambiguity, the controller carefully chose the second element to reinforce that the flight crew needs to comply with the vertical clearance prior to complying with the amend route clearance.

Controller	UM 20 CLIMB TO AND MAINTAIN FL330 UM 78 AT FL330 PROCEED DIRECT TO TUNTO UM 129 REPORT LEVEL FL330.

Example 2: The following procedure is not a recommended practice. The controller does not send the dependent clearance in a single multi-element uplink message because the message element UM 165

THEN followed by the route clearance UM 74 PROCEED DIRECT TO TUNTO is ambiguous. It does not clearly convey that the flight crew needs to complete the climb clearance prior to commencing the route clearance.

Controller	~~CLIMB TO AND MAINTAIN FL330~~ ~~THEN~~ ~~PROCEED DIRECT TO TUNTO~~

4.2.6 Weather deviations

4.2.6.1 A weather deviation clearance remains in effect until either:

a) A "back on route" report is received; or

b) The aircraft reaches a subsequent waypoint to which it has been cleared when clear of weather.

4.2.6.2 When issuing a deviation clearance, the controller should append the clearance with UM 127 REPORT BACK ON ROUTE.

4.2.6.3 When the controller issues a clearance direct to a waypoint, the controller will need to determine where the aircraft is or protect the airspace granted by the weather deviation until the aircraft sequences the waypoint to which the flight crew was cleared.

4.2.7 Message latency timer

4.2.7.1 It is possible for a CPDLC message to be excessively delayed but still be delivered to the aircraft, possibly even when that same aircraft is on a different flight. The use of the message latency timer, available on some aircraft, can provide the ATSP a means to mitigate the effects of a delayed CPDLC message that is delivered to the aircraft, and contributes to meeting the safety requirements, SR-1a and SR-9 for the ATSU, and SR-1a and SR-15 for the aircraft (Refer to Appendix B).

Note.— The ATSP considers the effects of a delayed CPDLC message in accordance with paragraph 3.1.1.1, and identifies mitigating measures. If the message latency timer is not used, the ATSP may identify other mitigating measures. For example, to mitigate the effects of a delayed CPDLC message, the ATSP may specify, in a contract or service agreement with the communication service provider, provisions that would preclude the delivery of a delayed CPDLC message to an aircraft.

4.2.7.2 An aircraft compliant with RTCA DO 258A/ED 100A, referred to as a FANS 1/A+ aircraft, has a message latency timer. To use the message latency timer on the aircraft, the ATSU ground system will need to include a valid timestamp in uplink CPDLC messages. The message latency timer monitors the time from when an ATSU sends a CPDLC message, determined from the timestamp in the uplink message, to when it is received on the aircraft and compares the calculated delay time to a pre-specified value for the [delayed message parameter]. The value can be set to an integer value from 1 to 999 seconds or the message latency timer can be switched off.

4.2.7.3 When the message latency timer is available for use, its defaulted mode can be off or set with a default value for the [delayed message parameter]. On some aircraft types, the operator can specify during maintenance, the defaulted mode of the message latency timer. Once in operation, the flight crew can change the mode of the message latency timer, which will replace the defaulted mode. If the flight crew changes the mode of the message latency timer, the aircraft system will retain that mode until the end of each active CPDLC connection or the end of the last active CPDLC connection for the flight. At that time, the aircraft system will reset the message latency timer to the defaulted mode.

4.2.7.4 When the message latency timer is available for use and an integer value for the [delayed message parameter] has been set, except when the message consists of the single message element UM 161 END SERVICE, and the calculated delay time of the CPDLC uplink message exceeds that value, the aircraft system will either:

a) Display the message to the flight crew with a delayed message indication and allow the flight crew to respond to the message with the appropriate response per the uplink response attribute, or

b) Discard the message without any indication to the flight crew and notify the ATSU with a message consisting of DM 62 ERROR [error information] and DM 67 [free text].

Note 1.— Refer to Appendix F, paragraph F.1, for availability of a FANS 1/A+ upgrade on different types of aircraft.

Note 2. The ATSU cannot rely solely on technical means to determine if the message latency timer is available for use. However, the ATSU may employ a combination of procedures and technical means to minimize sending related messages to aircraft for which the message latency timer is not available.

Note 3.— The message latency timer is available for use when the aircraft is FANS 1/A+ and the message latency timer is activated, While operators may have FANS 1/A+ aircraft, a maintenance action may be necessary to activate the message latency timer.

Note 4.— Refer to Appendix F, paragraph F.11, for the specifications of the message latency timer on different types of aircraft.

4.2.7.5 If the message latency timer is not intended to be used, the ATSP may need to:

a) Notify the operator to provide procedures to their flight crews to switch off the message latency timer; and

b) Establish procedures for the ATSU to instruct the flight crew to confirm that the message latency timer is off as described in Table 4-3. Figure 4-5 provides an overview of confirming the message latency timer on FANS 1/A+ aircraft is off. Note that while the table includes procedures for an aircraft for which the message latency timer is not available, the figure does not show these aircraft.

Table 4-3. Confirm message latency timer off – not used

<table>
<tr><th>Who</th><th colspan="2">Procedures</th></tr>
<tr><td>ATSU
1A</td><td colspan="2">When an active CPDLC connection has been established with a FANS 1/A+ aircraft or the ATSU receives from the aircraft an indication of a delayed message (refer to Table 4-4, steps 4B and 5B), the ATSU (current data authority) should uplink the [free text] message:

UM 169(New) CONFIRM MESSAGE LATENCY TIMER OFF

Note 1.— The ATSU may need to send this message in the case of re-establishing a lost active CPDLC connection.

Note 2.— Any ATSU that will hold the flight plan for a FANS 1/A+ aircraft and is not using the message latency timer may need to uplink the CPDLC free text message after an active CPDLC connection has been automatically transferred. (Refer to paragraph 4.2.7.3). If an ATSU is using the message latency timer, see paragraph 4.2.7.6.</td></tr>
<tr><td rowspan="2">Flight crew
2A</td><td>FANS 1/A+ aircraft</td><td>Message latency timer not available</td></tr>
<tr><td>The flight crew will:

a) confirm that the message latency timer is off; and

b) accept (DM 3 ROGER) the uplink [free text] message.</td><td>The flight crew will accept (DM 3 ROGER) the uplink [free text] message and append the [free text], TIMER NOT AVAILABLE.</td></tr>
<tr><td>ATSU/ controller
3A</td><td colspan="2">The DM 3 ROGER response closes the uplink message. If the ATSU receives the free text message TIMER NOT AVAILABLE, the message latency timer is not available on that aircraft.</td></tr>
<tr><td>Aircraft system
6A</td><td colspan="2">When the active CPDLC connection is transferred, the aircraft system may automatically set a pre-specified default value for the [delayed message parameter], retain the existing value, or switch the message latency timer off.

Note.— Refer to Appendix F, paragraph F.11 for the specifications on the message latency timer implemented in different types of aircraft.</td></tr>
</table>

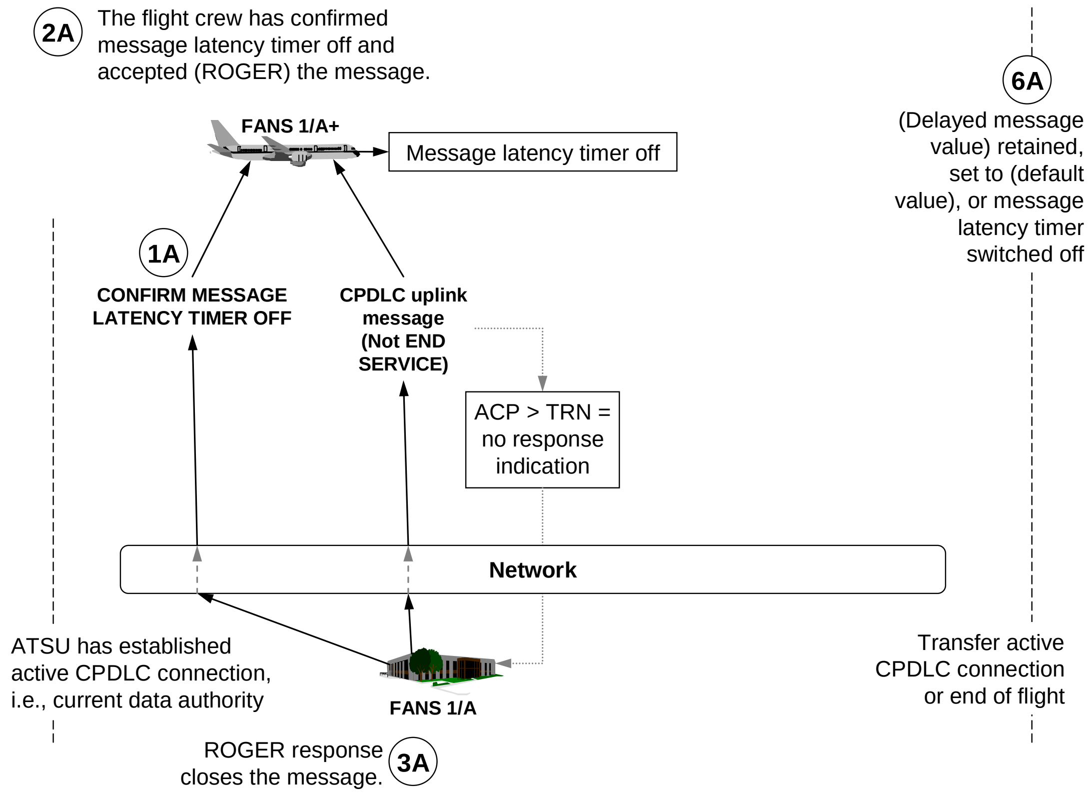


Figure 4-5. Confirm message latency timer off – not used

4.2.7.6 If the message latency timer is intended to be used, the ATSP should:

a) Prescribe the requirements for use of the message latency timer on FANS 1/A+ aircraft in appropriate documents, e.g. Regional SUPPs and/or AIPs, per paragraph 3.1.4.1, so the operator can ensure that their aircraft are properly equipped and that their training program adequately addresses its use, per paragraph 3.2.1.1.

b) Establish interfacility agreements, as necessary, with adjacent ATSUs on the use and/or non-use of the message latency timer, per paragraph 3.1.4.12.

c) Establish procedures for the ATSU to instruct the flight crew to set a value for the [delayed message parameter] as described in Table 4-4. Figure 4-6 provides an overview of using the message latency timer on FANS 1/A+ aircraft. Note that while the table includes procedures for an aircraft for which the message latency timer is not available, the figure does not show these aircraft.

Table 4-4. Using the message latency timer – set delay message value

<table>
<tr><th>Who</th><th colspan="2">Procedures</th></tr>
<tr><td>ATSU
1B</td><td colspan="2">When an active CPDLC connection has been established with a FANS 1/A+ aircraft, i.e., the message latency timer is available, the ATSU (current data authority) should uplink the [free text] message:

UM 169w SET MAX UPLINK DELAY VALUE TO [delayed message parameter] SEC

where the [delayed message parameter] is an integer value at least greater than the TRN value expressed in seconds, but not greater than 999 seconds. When multiple adjacent ATSUs use the message latency timer, the value should be standardized as much as possible via interfacility agreements per paragraph 3.1.4.12.

Note 1.— Refer to Appendix B for TRN values associated with different RCP types.

Note 2.— The ATSU may need to send this message in the case of re-establishing a lost active CPDLC connection.

Note 3.— Any ATSU that is using the message latency timer and will hold the flight plan for a FANS 1/A+ aircraft may need to uplink the CPDLC free text message after an active CPDLC connection has been established. (Refers paragraph 4.2.7.3). If an ATSU is not using the message latency timer, see paragraph 4.2.7.5.</td></tr>
<tr><td rowspan="2">Flight crew
2B</td><td>FANS 1/A+ aircraft</td><td>Message latency timer not available</td></tr>
<tr><td>The flight crew will:
a) set the value; and
b) accept (ROGER) the uplink message.</td><td>The flight crew will accept (ROGER) the uplink [free text] message and append the [free text], TIMER NOT AVAILABLE.</td></tr>
<tr><td>ATSU/ controller
3B</td><td colspan="2">The ROGER response closes the uplink message. If the ATSU receives the free text message TIMER NOT AVAILABLE, the message latency timer is not available on that aircraft.

Note.— The provision of CPDLC service to aircraft for which the message latency timer is not available is a local matter.</td></tr>
</table>

Who	Procedures	
Flight crew/ aircraft system (4B)	**FANS 1/A+ aircraft (flight crew)**	**FANS 1/A+ aircraft (aircraft system)**
	When the aircraft system detects a delayed CPDLC uplink message, the flight crew may receive an indication of a delayed CPDLC uplink message, in which case the flight crew will: a) respond, appropriately, to close the message, i.e. reject all clearance and negotiation messages (DM 1 UNABLE or DM 5 NEGATIVE), or accept (DM 3 ROGER) any message that cannot be rejected; b) when using CPDLC, send a free text message, as necessary, to provide the reason for rejecting the message, e.g. DELAYED CPDLC MESSAGE RECEIVED or NOT CONSISTENT, PLEASE RE-SEND; and c) if deemed necessary, further advise the controller of the situation and/or request verification of ATC intent, via CPDLC or voice.	When the aircraft system detects a delayed CPDLC uplink message, the aircraft system may automatically discard the message without any indication to the flight crew and send a message containing DM 62 ERROR [error information] and DM 67 [free text] to notify the ATSU of the delayed CPDLC message.
	Note. — Refer to Appendix F, paragraph F.11 for the specifications on the message latency timer implemented in different types of aircraft.	
ATSU/ controller (5B)	When a message containing the DM 62 ERROR [error information] or a flight crew response is received, the ATSU or controller should respond according to local procedures established by the ATSP to ensure that in the case of a flight crew response, the flight crew does not potentially execute a delayed clearance.	
Aircraft system (6B)	When the active CPDLC connection is transferred, the aircraft system may automatically set a pre-specified default value for the [delayed message parameter], retain the existing value, or switch the message latency timer off. *Note. — Refer to Appendix F, paragraph F.11 for the specifications on the message latency timer implemented in different types of aircraft.*	

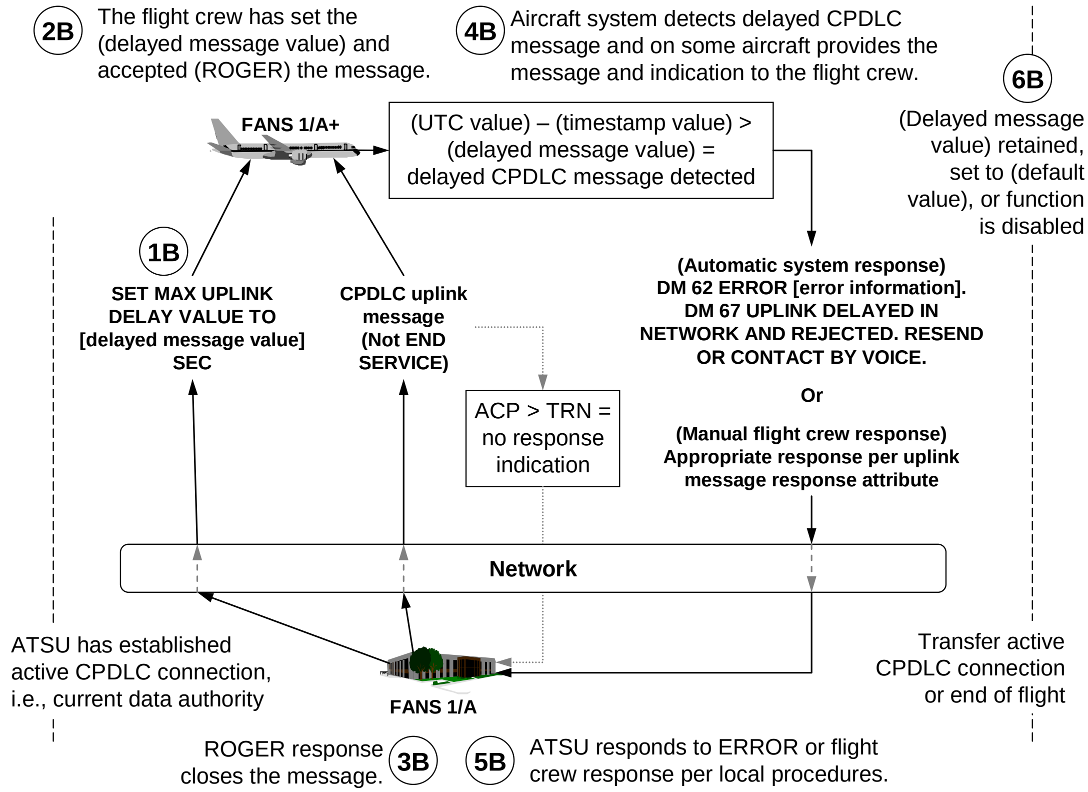


Figure 4-6. Using the message latency timer – set delay message value

4.3 CPDLC – Downlinks

4.3.1 General

4.3.1.1 The ATSU should respond to a downlink message that it does not support according to paragraph 3.1.2.4.3.

4.3.1.2 The controller should respond to an incoming request as soon as practicable to avoid receiving a duplicate request.

4.3.2 Clarifying a downlink message

4.3.2.1 In the case of a controller having any doubt as to the intent of a downlink message, or if any other ambiguity exists, the controller should seek clarification using CPDLC or voice. The controller should then respond with a CPDLC message consistent with the clarification to prevent confusion and to close the open downlink message.

4.3.3 Responses/acknowledgements

4.3.3.1 The controller should not use UM 3 ROGER or UM 4 AFFIRM to respond to a clearance request. The controller should only approve a clearance request by issuing a clearance using an appropriate message element.

4.3.3.2 When a clearance request is denied, the controller should use the element UM 0 UNABLE (not UM 5 NEGATIVE) in the uplink response. The controller should not restate the aircraft's current clearance.

4.3.3.3 When issuing negative responses to clearance requests, the controller should append a standard message element (e.g. UM 166 DUE TO TRAFFIC) to provide a reason for the non-availability of a clearance.

4.3.3.4 The controller should use the uplink UM 1 STANDBY message element to provide advice to the flight crew that their requested clearance is being assessed, but is not readily available, for example, due to traffic or delays in coordination with the next sector or ATSU.

4.3.3.5 The ATSU should not automatically or manually send a UM 1 STANDBY to unconditionally acknowledge that it received a downlink request.

4.3.3.6 If the controller sends a UM 1 STANDBY response, the controller should subsequently respond again within a reasonable period of time, e.g. 10 minutes, or as required.

Note.— The downlink message remains open. If the controller does not respond within this time, the flight crew will query the controller per paragraph 5.4.1.5.

4.3.3.7 If the controller receives a second identical CPDLC request prior to having responded to the first one, the controller should respond to both of the downlink requests in order to ensure all downlink messages are closed. Depending on the ground system, the closure response for the second request may be:

a) a re-iteration of the closure response for the first downlink request (e.g. a clearance, UM 0 UNABLE etc); or

b) some other uplink that does not contradict any previous clearance that may have been uplinked (i.e. avoid sending a clearance to one downlink request and UM 0 UNABLE to the duplicated downlink)

4.3.3.8 If a UM 1 STANDBY message had previously been uplinked when a duplicated request is received, and additional time is required before the clearance is available, the controller should respond with UM2 REQUEST DEFERRED.

Example 1:

	Dialogue 1	**Dialogue 2**
Flight crew	REQUEST CLIMB TO FL370	
Flight crew		REQUEST CLIMB TO FL370
Controller	UNABLE	
Controller		UNABLE

Example 2:

	Dialogue 1	**Dialogue 2**
Flight crew	REQUEST CLIMB TO FL370	
Flight crew		REQUEST CLIMB TO FL370
Controller	CLIMB TO AND MAINTAIN FL370	
Controller		CLIMB TO AND MAINTAIN FL370; or (for example) UM 169 CLEARANCE ALREADY SENT
Flight crew	WILCO	
Flight crew		WILCO or ROGER, as appropriate

Example 3:

	Dialogue 1	**Dialogue 2**
Flight crew	REQUEST CLIMB TO FL370	
Controller	STANDBY	
Flight crew		REQUEST CLIMB TO FL370
When more time is required until clearance is available.		
Controller		REQUEST DEFERRED
Controller	CLIMB TO AND MAINTAIN FL370	
Controller		CLIMB TO AND MAINTAIN FL370
Flight crew	WILCO	
Flight crew		WILCO

4.3.4 Responding to multi-element requests

4.3.4.1 While the flight crew is advised to avoid sending multiple clearance requests, the controller may receive a multiple clearance request in a single downlink message.

4.3.4.2 If the controller receives multiple clearance requests in a single message and can approve all clearance request elements, the controller should specifically respond to each clearance request element in the message.

Example:

Flight crew	DM 9 REQUEST CLIMB TO [level] DM 22 REQUEST DIRECT TO [position]
Controller	UM 20 CLIMB TO AND MAINTAIN [level] UM 74 PROCEED DIRECT TO [position]

4.3.4.3 If the controller receives multiple clearance requests in a single message and cannot approve any of the clearance request elements, the controller should respond with UM 0 UNABLE, which applies to all elements of the original message. The controller should not restate the aircraft's current clearance.

Example:

Flight crew	DM 9 REQUEST CLIMB TO [level] DM 22 REQUEST DIRECT TO [position]
Controller	UM 0 UNABLE

4.3.4.4 If the controller receives multiple clearance requests in a single message and can approve some of the clearance request elements, the controller should send, in a single message, UM 0 UNABLE, include a reason to remove any ambiguity and, if appropriate, information on when the clearance to that part of the request might be expected.

a) The controller may, following the UM 0 UNABLE [reason] message, send a separate CPDLC message (or messages) to respond to those elements for which they can grant the request.

b) The controller should not uplink a single message containing only the word UNABLE for the part that cannot be granted and a clearance for the part that can.

Example:

Flight crew	DM 9 REQUEST CLIMB TO [level] DM 22 REQUEST DIRECT TO [position]
Controller (provide reason using standard message element)	UM 0 UNABLE. UM 166 DUE TO TRAFFIC
Controller (separate message element)	UM 74 PROCEED DIRECT TO [position]

4.3.5 Offering alternative clearances to requests

4.3.5.1 If the clearance contained in a downlink request is not available, the controller should uplink an UNABLE to deny the request prior to issuing any subsequent clearances. The controller should not simply respond to the downlink request with the alternative clearance.

a) If an alternative clearance (intermediate level or deferred climb) is available, the controller may subsequently uplink the clearance in a separate CPDLC message.

b) If an alternative clearance that the flight crew might not be able to accept (higher level or route modification) is available, the controller should negotiate the clearance with the flight crew prior to granting it.

Example 1: The aircraft is at FL330. The controller is unable to grant the flight crew request and issues an alternative clearance.

Flight crew	DM 9 REQUEST CLIMB TO FL370
Controller	UM 0 UNABLE. UM 166 DUE TO TRAFFIC
Controller	UM 20 CLIMB TO AND MAINTAIN FL350. UM 129 REPORT LEVEL FL350

Example 2: The following procedure is not a recommended practice. The controller does not provide the correct ATC response.

Flight crew	DM 9 REQUEST CLIMB TO FL370
Controller	~~UNABLE. CLIMB TO AND MAINTAIN FL350. REPORT LEVEL FL350~~

4.4 ADS-C

4.4.1 General

4.4.1.1 ADS-C reports contain FMS information relating to the figure of merit (FOM), ACAS and the aircraft's navigational redundancy. Some automated ground systems use the FOM value received in an ADS-C report to determine whether to display the report to controllers, or to display a "high" or "low" quality ADS-C symbol.

4.4.1.2 FOM data is not required for the use of current separation standards. However, where the separation standard being applied requires specific navigational accuracy, such as RNP, the controller should rely on flight crew advice as to the extent of any navigational degradation and adjust separation accordingly.

4.4.1.3 If a flight crew inserts a non-ATC waypoint into the aircraft active flight plan, the aircraft may send a waypoint change event report, which contains information on the non-ATC waypoint in the predicted route group, as well as the intermediate and fixed projected intent groups of the report. The ATSU may receive information on the next, or the next-plus-one waypoints from that report that do not correlate with the waypoint information provided in the current flight plan or flight data record held by the ATSU. Refer to Appendix F, paragraph F.5 for FMS processing of waypoints on different aircraft types.

Note.— The flight crew normally would not insert non-ATC waypoints per paragraph 5.6.4.4..

4.4.1.4 Unless required for safety purposes, such as to monitor aircraft operating close to, but not entering the FIR, the ATSU should only establish ADS contracts for aircraft within their area of responsibility.

4.4.1.5 A controller who becomes aware of corrupt or incorrect data from an ADS-C report should establish voice contact with the aircraft concerned in order to correct the situation.

4.4.1.6 When an ATSU is using both ADS-C and CPDLC position reporting and detects a discrepancy of 2 minutes or less between the reports, the controller should reconcile the time difference.

Where the time difference is 3 minutes or more, the controller should query the estimate received in the CPDLC position report and request confirmation of the estimate for the waypoint in question.

Note.— CPDLC and ADS-C estimates received from the same aircraft for the same position may differ as a result of the ADS-C application reporting time to the second and the time reported by CPDLC application either being truncated or rounded to the nearest full minute (depending on aircraft type). The flight crew also has the ability to modify the estimate for the next position in the CPDLC position report. Any such modification will not be reflected in the ADS-C report.

4.4.1.7 Whenever an ADS-C report (either a periodic or waypoint change event report) is not received within a parameter of the expected time, the controller may initiate a demand contract request, re-establish a new periodic contract with the aircraft, or request a CPDLC or voice position report. See also paragraph 4.7.5.4.3.

4.4.1.8 If the controller becomes aware of a data link communications failure, the controller should advise affected aircraft to revert to voice position reporting in accordance with paragraph 4.7.5.

4.4.2 ADS contract - periodic

4.4.2.1 When setting a default periodic reporting interval, the ATSP should take into account requirements for the separation standard in use, conformance monitoring, traffic levels, and alerting service. Typically, default periodic contract intervals are set to satisfy the position reporting requirements of the default separation standard in use.

4.4.2.2 The ATSP should avoid arbitrarily selecting short periodic default intervals because of the economic cost to the users and the unnecessary system loading imposed by these short default intervals.

4.4.2.3 There are a number of situations where a controller or ground automation may use a reporting interval other than the default interval in the periodic contract. A change to the default interval for an aircraft may be required:

a) When the aircraft is cleared to deviate from areas of known significant weather;

b) When the application of a smaller separation standard requires a shorter periodic interval;

c) During periods of turbulence;

d) When an unauthorized deviation from the clearance is detected; or

e) When the aircraft is approaching a crossing route on which there is other traffic.

4.4.2.4 The ATSP should ensure that the periodic reporting interval in use is in accordance with the position reporting requirements of the separation standard being used. When not required for the application of separation, or other factors, the ATSP should return to a longer periodic reporting interval to reduce overall costs to the system.

4.4.2.5 The controlling ATSU should not establish ADS-C periodic reporting at an interval shorter than five minutes. An adjacent non-controlling ATSU should not establish ADS-C periodic reporting at an interval shorter than what is required for application of any reduced separation in effect for the flight.

4.4.3 ADS contract - waypoint change event

4.4.3.1 A waypoint event report will be sent at any non-compulsory reporting point and reflected in the predicted route group.

4.4.4 ADS contract - vertical range change and lateral deviation events

4.4.4.1 When the level range deviation event and lateral deviation event contracts are established, the controller will only be alerted to vertical or lateral variations that exceed the associated tolerances.

Note.— If a regular periodic report is sent as the aircraft is deviating from cleared level or route (but still within the level or lateral tolerances) the controller will still be alerted to the variation despite no event report having been sent.

4.5 Separation

4.5.1 General – ADS-C

4.5.1.1 The ATSU may use ADS-C for the application of procedural separation within a mixed environment, such as airspace where position reports are provided by a mixture of aircraft reporting by ADS-C and aircraft reporting by other means.

4.5.1.2 For example, the ATSU may use a combination of ADS-C, voice reports, radar or ADS-B information to determine separation between two or more aircraft.

4.5.1.3 When ADS-C is used for reroute conformance monitoring to support the separation, the ATSU should establish appropriate ADS contracts that specify the periodic reporting interval and tolerances on events in accordance with separation standards.

Note.— This will ensure that estimates being used for route conformance monitoring are acceptable for the separation and the controller receives an indication when the aircraft is not in conformance with its current flight plan.

4.5.1.4 The controller should advise the flight crew when the controller observes that the aircraft has deviated significantly from its cleared flight profile. The controller should take action as appropriate if the deviation is likely to affect the air traffic service being provided.

4.5.2 Vertical separation –ADS-C

4.5.2.1 Where practical, the tolerances used to determine whether a specific level is occupied by an ADS-C reporting aircraft within the airspace of a specific ATSU should be consistent with other tolerances used throughout the airspace. For example, the vertical tolerances for ADS-C should be consistent with vertical tolerances used for level adherence monitoring by other forms of surveillance, such as radar.

4.5.2.2 Where other vertical tolerances do not exist, the ATSU should apply a vertical tolerance of +/– 300 feet for ADS-C applications. However, an individual ATSU may specify in local instructions and the AIP that it uses a tolerance of not less than +/– 200 feet to provide consistency with other vertical tolerances applied within the FIR.

4.5.2.3 If displayed ADS-C level information does not satisfy the required tolerance for an individual ATSU, then the controller should advise the flight crew accordingly and request confirmation of the aircraft's level. If following confirmation of the level, the displayed ADS-C level information is still beyond the required tolerance, the controller may need to apply another method of separation or another method of determining level information.

4.5.2.4 When displayed ADS-C level information is within the specified tolerance of the expected or cleared flight level, the ATSU may use the ADS-C level information to apply vertical separation and to determine that an aircraft has reached or is maintaining a specified level.

4.5.2.5 The controller can consider that an aircraft has left a specified level when the displayed ADS-C level information indicates that the aircraft has passed the level in the required direction by more than the required tolerance.

4.5.3 Lateral separation – ADS-C

4.5.3.1 An ATSU can use ADS-C report information to automatically detect conflicts and provide indication to the controller to confirm whether or not an aircraft is within or beyond an area of lateral conflict.

4.5.3.2 When conflict detection tools are not available, the controller can determine lateral conflicts by observing the ADS-C report information and determining if the aircraft is within or outside the area of conflict.

Note.— The adequacy of the procedures used to detect lateral conflicts is a matter of the State.

4.5.4 Longitudinal separation – ADS-C

4.5.4.1 ATSUs that use approved or integrated measurement tools for the purpose of determining screen-based separation should publish in local documentation any limitations on the use of such tools for the establishment and monitoring of separation standards.

4.5.4.2 The ATSU may use ADS-C reports to establish and monitor longitudinal time and distance separation standards.

4.5.4.3 Some ground systems display an extrapolated or interpolated ADS-C symbol between the receipt of ADS-C reports. Provided that the periodic reporting interval in use is in accordance with any maximum reporting interval specified by the separation standard, the ATSU may determine separation between the extrapolated/interpolated symbols by the use of screen-based measurement tools, or by the use of automated conflict detection tools.

4.5.4.4 When the ATSU uses extrapolated or interpolated ADS-C symbols to provide separation and any doubt exists as to the integrity or validity of the information being presented, the controller should send a demand contract to update the relevant information. If doubt still exists, the controller should consider using an alternative method of separation.

4.5.4.5 The ATSU may use ground system flight data records updated by ADS-C reports in the application of appropriate time-based separation standards. Methods of determination may include reference to:

a) Estimates at waypoints;

b) Calculated estimates for positions not contained in the flight plan;

c) Screen-based measurement tools; or

d) Automated conflict detection tools.

4.5.4.6 The ATSU may use ADS-C reports for the application of appropriate longitudinal distance standards. Methods of determination may include:

a) The use of automated system tools to measure the displayed positions of two or more aircraft reporting by ADS-C;

b) Comparing the displayed position of an ADS-C aircraft with the position of another aircraft determined by an alternative form of surveillance; or

c) The use of automated conflict detection tools.

4.5.5 Using FMC WPR for position reporting

4.5.5.1 Whenever an FMC waypoint position report is overdue by more than a specific interval, as determined by ATC, the controller should take action to advise the aircraft concerned and request a voice position report. If either the flight crew or the controller notices intermittent operation, either may revert to voice reporting at any time. (The flight crew would be expected to report by voice for the remainder of the flight.)

4.5.5.2 A controller who becomes aware of corrupt or incorrect data in the FMC waypoint position report should establish voice contact with the aircraft concerned in order to correct the situation.

4.5.5.3 A controller who becomes aware of a FMC WPR service failure should advise affected aircraft to revert to voice position reporting in accordance with paragraph 4.7.5.

4.6 Alerting service

For ADS-C aircraft, the ATSU should base the provision of the alerting service on any missed scheduled report (i.e. provided by either the periodic contract or the waypoint event contract).

4.7 Emergency and non-routine procedures

4.7.1 General

4.7.1.1 The flight crew will use whatever means are appropriate, i.e. CPDLC and/or voice, to communicate during an emergency.

4.7.1.2 During an emergency, a controller would normally expect the flight crew to revert to voice communications. However, the flight crew may use CPDLC for emergency communications if it is either more expedient or if they are unable to establish voice contact.

4.7.1.3 Whilst the emergency communication may be acknowledged by CPDLC, the controller may also attempt to make voice contact with the aircraft.

4.7.1.4 The controller should follow normal emergency response procedures, as appropriate, depending on the nature of the emergency.

4.7.1.5 Refer to current ICAO procedures for standards and recommended practices on complete communications failure (CPDLC and voice).

4.7.1.6 The procedures described in the following paragraphs are relevant only to the use of CPDLC and ADS-C during an emergency.

4.7.2 CPDLC and ADS-C emergency

4.7.2.1 If the ATSU receives an ADS-C emergency report without a corresponding CPDLC emergency message, then the controller should request confirmation of the emergency in accordance with the guidelines provided in paragraph 4.7.3.

4.7.2.2 The controller should treat any CPDLC downlink message that contains an emergency message element (see Appendix A, paragraph A.3 for the list of emergency message elements) as an emergency message, with the exception of DM 80 **DEVIATING UP TO [specified distance] [direction] OF ROUTE** or *DEVIATING [distanceoffset] [direction] OF ROUTE*.

4.7.2.3 If the ATSU receives a CPDLC emergency message such as DM 56 MAYDAY MAYDAY MAYDAY or DM 55 PAN PAN PAN, with or without a corresponding ADS-C emergency report, the controller should acknowledge receipt of the CPDLC message using the most appropriate means (voice or CPDLC). If responding by CPDLC, the controller should use either of the following free text message elements (as appropriate):

a) UM 169r ROGER PAN if the downlink message contains DM 55 PAN PAN PAN; or

b) UM 169q ROGER MAYDAY if the downlink message contains DM 56 MAYDAY MAYDAY MAYDAY.

Note.— For FANS 1/A, the CPDLC emergency messages do not require a closure response. Therefore, the aircraft system will reject receipt of any technical response (i.e. including a MRN), such as the UM 3 ROGER message element.

4.7.2.4 Whilst this uplink free text message element requires a closure response (DM 3 ROGER), depending on flight crew workload and the nature of the emergency, the controller may not receive this response.

4.7.2.5 The controller should attempt to determine the nature of the emergency and ascertain any assistance that may be required.

Note.— When the ATSU receives DM 55 or DM 56, additional message elements (e.g. DM 61 DESCENDING to [level]) may be appended. Any information appended to DM 55 or DM 56 may not accurately reflect the current level/altitude, attitude, tracking information, or the intentions of the flight crew.

4.7.2.6 If CPDLC is the normal means of ATC communication for the aircraft, then the ATSU should maintain the active connection until suitable voice communication becomes available. In this case, the ATSU should not transfer the CPDLC connection to another ATSU.

4.7.2.7 If a transfer of the CPDLC connection does not occur, then the current ATSU retains the responsibility for maintaining communications with the aircraft.

4.7.2.8 The ATSU with control responsibility for the flight may choose to:

a) Shorten the ADS-C periodic reporting interval to 5 minutes; or

Note 1.— Shortening the ADS-C reporting interval reduces the period between cancellation of the ADS-C emergency and receipt of the ADS-C CANCEL EMERGENCY message.

Note 2.— Adjacent ATSUs should not shorten the ADS-C periodic reporting interval.

b) Send a demand contract request.

Note 3.— This is not required if the periodic reporting interval has been shortened – an ADS-C report will have already been triggered by the aircraft when the new periodic contract is received.

4.7.3 ADS-C emergency report without a CPDLC emergency message

4.7.3.1 When an ATSU not having control responsibility for the aircraft receives an indication of an ADS-C emergency, they should coordinate with the controlling authority to ensure that they received the emergency report (see paragraph 3.1.2.3.2 for related information).

4.7.3.2 When an ATSU having control responsibility for the aircraft receives an indication of an ADS-C emergency report without either a CPDLC emergency message or voice confirmation, then it is possible that the aircraft may be subject to unlawful interference or inadvertent activation of the ADS-C emergency mode. If a subsequent ADS-C report indicates that the aircraft is maintaining normal operations (i.e. the aircraft is operating in accordance with its clearance), the controller should confirm the ADS-C emergency using CPDLC or voice.

4.7.3.3 To check for covert or inadvertent activation of the ADS-C emergency mode using CPDLC, the controller should send the following CPDLC free text uplink. (If voice is used for confirmation, the same message text should be used in the voice transmission).

Controller	UM 169ak CONFIRM ADS-C EMERGENCY

4.7.3.3.1 If the emergency mode has been activated inadvertently, the flight crew will cancel the ADS-C emergency and advise the controller either by voice or the following CPDLC free text downlink.

Flight crew	DM 3 ROGER, then DM 67ab ADS-C RESET

4.7.3.3.2 If the aircraft continues with the ADS-C emergency mode activated, the controller should assume the aircraft is in emergency conditions and follow normal alerting procedures.

Note. The aircraft may not send the ADS-C CANCEL EMERGENCY message until the next ADS-C periodic report is due.

4.7.4 Voice communications related to data link

4.7.4.1 When CPDLC fails and the controller reverts to voice communications, the controller should consider all open messages not delivered and re-commence any dialogues involving those messages by voice.

4.7.4.2 The controller or radio operator should use the standard voice phraseology under certain conditions as indicated in Table 4-5.

Table 4-5. Voice phraseology related to CPDLC

Condition	Voice phraseology
To instruct the flight crew to manually initiate an AFN logon to the subsequent ATSU	SELECT ATC COMM OFF THEN LOGON TO [facility designation] *Note 1.— The [facility designation] is the four character ICAO code.* *Note 2.— Use this phraseology when the CPDLC transfer to an adjacent ATSU has failed.*
To advise the flight crew that the data link has failed and instruct them to continue on voice.	ATC DATA LINK FAILED. SELECT ATC COMM OFF. CONTINUE ON VOICE
To advise the flight crew prior to the commencement of a FANS 1/A data link shutdown and instruct them to continue on voice.	ATC DATA LINK WILL BE SHUT DOWN. SELECT ATC COMM OFF. CONTINUE ON VOICE.
To advise the flight crew that the transmission is being made due to a CPDLC failure	CPDLC FAILURE. *Note.— This phraseology should only be included with the first transmission made for this reason.*

Condition	Voice phraseology
To advise the flight crew of a complete ground system failure	ALL STATIONS CPDLC FAILURE [identification of station calling].
To advise the flight crew that the data link system has resumed operations	ATC DATA LINK OPERATIONAL. LOGON TO [facility designation]

4.7.5 Data link service failures

4.7.5.1 CPDLC connection failure

4.7.5.1.1 If a CPDLC dialogue is interrupted by a data link service failure, the controller should re-commence the entire dialogue by voice communication.

4.7.5.1.2 When the controller recognizes a failure of the CPDLC connection, the controller should instruct the flight crew to terminate the connection, by selecting ATC COM OFF, and then initiate another AFN logon. The controller or radio operator should use the following voice phraseology:

Controller (or radio operator)	ATC DATA LINK FAILED. SELECT ATC COMM OFF THEN LOGON TO [facility designation]
Flight crew	ROGER

Note.— The [facility designation] is the 4 character ICAO code.

4.7.5.1.3 Once the AFN logon is established, the ATS system should send a CPDLC CR1 message to re-establish the connection.

4.7.5.2 Data link service failure

4.7.5.2.1 In the event of an unplanned data link shutdown, the relevant ATSU should inform:

a) All affected aircraft using the following voice phraseology:

Controller (or radio operator)	ATC DATA LINK FAILED. SELECT ATC COMM OFF. CONTINUE ON VOICE
Flight crew	ROGER

b) The adjacent ATSUs by direct coordination; and

c) All relevant parties via the publication of a NOTAM, if appropriate.

Note.— In the event of a planned or unexpected network or satellite data service outage (e.g. ground earth station failure), the CSP will notify all ATSUs within the affected area in accordance with paragraph 3.1.3.1 so the controller can inform affected aircraft.

4.7.5.3 Planned data link shutdown

4.7.5.3.1 During the time period of a planned data link shutdown, the ATSP will advise the operators of the requirements to use voice communication procedures.

4.7.5.3.2 When advising the flight crew prior to the commencement of a planned data link shutdown, the controller should use the following CPDLC message or the radio operator should use the equivalent voice phraseology:

Controller (or radio operator, if voice)	UM 169 DATA LINK WILL BE SHUT DOWN. SELECT ATC COMM OFF. CONTINUE ON VOICE *Note 1.— The controller could optionally provide the voice frequency.*
Flight crew	DM 3 ROGER *Note 2.— The flight crew should select ATC Comm Off when the message is received.*

4.7.5.4 CPDLC or ADS-C service failure

4.7.5.4.1 Some ATSUs are not equipped with both CPDLC and ADS-C and consequently may experience a failure of either the CPDLC or ADS-C service. For ATSUs that have both CPDLC and ADS-C it is not likely that just one component will shutdown, however it is possible.

4.7.5.4.2 When the ADS-C service is shut down, the affected ATSU should inform all other affected parties of the shutdown and likely period.

4.7.5.4.3 If the CPDLC service is still available, the controller should revert to either CPDLC or voice to fulfill the position reporting requirement. The controller should then send a CPDLC message to the flight crew notifying reporting requirements using either of the following free text messages:

Controller	UM 169ao ADS-C SHUT DOWN REVERT TO CPDLC POSITION REPORTS
Flight crew	DM 3 ROGER

or

Controller	UM 169at ADS-C SHUT DOWN REVERT TO VOICE POSITION REPORTS
Flight crew	DM 3 ROGER

4.7.5.4.4 If ADS-C is still available, the controller may use voice to notify the flight crew to continue position reporting using ADS-C.

4.7.5.4.5 When an ADS-C contract cannot be established, or if ADS-C reporting from an aircraft ceases unexpectedly, if CPDLC is still available, the controller should send a CPDLC message to the flight crew, using the following free text message:

Controller	UM 169an CONFIRM ADS-C ARMED
Flight crew	DM 3 ROGER

Note.— The flight crew may have inadvertently selected ADS-C off. If ADS-C had been turned off, re-arming it will not re-initiate previous ADS contracts. The ATSU will need to establish new ADS contracts.

4.7.5.5 The controller or radio operator should use the following voice phraseology to advise the flight crew that the data link system has resumed operations.

Controller (or radio operator)	DATA LINK OPERATIONAL LOGON TO [facility designation]
Flight crew	LOGON [facility designation]

Note.— The [facility designation] is the 4 character ICAO code.

4.7.6 Using CPDLC to relay messages

4.7.6.1 When an ATSU and an aircraft cannot communicate, the controller may use CPDLC to relay messages via an intermediary CPDLC-capable aircraft. Depending on circumstances, the controller may first confirm that the CPDLC-capable aircraft is in contact with the subject aircraft, and obtain concurrence from the flight crew that they will act as an intermediary. The controller should only use free text, with the following form:

Controller	UM 169ap RELAY TO [call sign] [facilityname] [text of message to be relayed] Where: • [call sign] is expressed as the radiotelephony call sign, rather than the ICAO three letter or IATA two letter designator; • [facilityname] is expressed as the radiotelephony name, not the 4-character code; and • [text of message to be relayed] conforms to the guidelines provided paragraph 3.1.1.4 and 4.2.2, e.g. CLEARS [call sign] CLIMB TO AND MAINTAIN FL340. *Note.— The use of standard message elements is prohibited because the intermediary aircraft's FMS could be unintentionally armed.*

Example:

Controller	UM 169ap RELAY TO UNITED345 OAKLAND CLEARS UNITED345 CLIMB TO AND MAINTAIN FL340
Flight crew	DM 3 ROGER
Flight crew	DM 67ae RELAY FROM UNITED345 CLIMBING FL340

Chapter 5. Flight crew procedures

5.1 Overview

5.1.1 Operational differences between voice communications and CPDLC

5.1.1.1 Development, testing, and operational experience have highlighted fundamental differences between CPDLC and voice communications. These differences need to be considered when developing or approving flight crew procedures involving the use of CPDLC.

5.1.1.2 For example, when using voice communications, each flight crew member hears an incoming or outgoing ATS transmission. With voice, the natural ability for each flight crew member to understand incoming and outgoing transmissions for their own aircraft has provided a certain level of situational awareness among the flight crew. With CPDLC, flight crew procedures need to ensure that the flight crew has an equivalent level of situational awareness associated with understanding the content and intent of a message in the same way.

5.1.1.3 The operator should develop flight crew procedures to ensure that each flight crew member (e.g. pilot flying and pilot monitoring - communicating) independently reviews each CPDLC uplink prior to responding and/or executing a clearance that it may contain and each CPDLC downlink message prior to transmission.

5.1.1.4 An operator who uses augmented crews should ensure procedures include instructions to flight crew carrying out 'handover' briefings. The flight crew member carrying out the 'handover' briefing should thoroughly brief the 'changeover' flight crew or flight crew member on the status of ADS-C and CPDLC, including a review of stored uplink and downlink CPDLC messages.

5.1.1.5 Uplink messages require special attention to prevent the flight crew from accepting a clearance but not complying with that clearance. When ATC sends an uplink message to an aircraft that is accepted (WILCO) by the flight crew, ATC expects the flight crew to comply with the clearance. An effective method for minimizing errors for CPDLC uplink messages is for each flight crew member to read the uplinked message independently (silently) before initiating a discussion about whether and how to act on the message. Reading a message independently is a key element to ensure that each flight crew member does not infer any preconceived intent different from what is intended or appropriate. Use of this method can provide a flight crew with an acceptable level of situational awareness for the intended operations.

5.1.1.6 In a similar manner, CPDLC downlink messages should typically be independently reviewed by each applicable flight crew member before the message is sent. Having one flight crew member (e.g. the pilot monitoring) input the message and having a different flight crew member (pilot flying) review the message before it is sent promotes an adequate level of situational awareness, comparable to or better than when using voice transmissions.

5.1.1.7 The flight crew should coordinate uplink and downlink messages using the appropriate flight deck displays. Unless otherwise authorized, the flight crew should not use printer-based information to verify CPDLC messages as printers are not usually intended for this specific purpose.

Note.— Printers may be used for other purposes in CPDLC operations, such as for archiving CPDLC messages.

5.1.2 Operational authorization to use CPDLC and ADS-C

5.1.2.1 The operator needs to be authorized by the State of the Operator or State of Registry to use CPDLC and ADS-C services in accordance with paragraph 3.2.

5.1.3 When to use voice and when to use CPDLC

5.1.3.1 When operating within airspace where CPDLC is available and local ATC procedures do not state otherwise, CPDLC should be the primary means of communication. Voice should be used as the backup communication medium (e.g. direct VHF, direct HF, third party HF, Satellite voice).

5.1.3.2 While the CPDLC message set defined in Appendix A provides for ATC communications, voice may be a more appropriate means depending on the circumstances, e.g. some types of non-routine communications. Refer to paragraph 5.8 for guidelines on use of voice and data communications in emergency and non-routine situations.

5.1.3.3 During an emergency, the flight crew would normally revert to voice communications. However, the flight crew may use CPDLC for emergency communications if it is either more expedient or if they are unable to establish voice contact. Refer to paragraph 5.8.2 for guidelines on use.

5.1.3.4 The response to a CPDLC message should be via CPDLC, and the response to a voice message should be via voice.

5.1.3.5 If a conflicting CPDLC and voice clearance/instructions is received, the flight crew should obtain clarification using voice.

5.1.3.6 If the intent of an uplinked message is uncertain, the flight crew should reject (UNABLE) the message. The flight crew may use either CPDLC or voice to confirm the intent of the message.

5.1.3.7 Regardless of whether CPDLC is being used as the primary means for communication, the flight crew should continuously monitor VHF/HF/UHF guard frequency. In addition, the flight crew should continuously maintain a listening or SELCAL watch on the specified backup or secondary frequency (frequencies). On aircraft capable of two SATCOM channels, one channel may be selected to the phone number for the radio facility assigned to the current flight information region (FIR) to enable timely voice communications with ATS. The second channel may be selected to the company phone number to enable timely voice communications with company dispatch.

5.1.4 Loss of SATCOM data communications

5.1.4.1 Aircraft crew alerting systems notify the flight crew when aircraft SATCOM data link system fails. When operating CPDLC over SATCOM for primary communications and the flight crew is notified of a failure of the SATCOM system, the flight crew should notify the air traffic service unit (ATSU) of the failure. Timely notification is appropriate to ensure that the ATSU has time to assess the situation and apply a revised separation standard, if necessary.

5.2 Logon

5.2.1 General

5.2.1.1 Data link systems such as the aircraft communication addressing and reporting system (ACARS) typically establish a connection with AOC dispatch ground automation systems automatically when the system is powered.

5.2.1.2 A CPDLC connection requires a successfully completed logon before the ATSU can establish a CPDLC connection with the aircraft. Refer to paragraph 2.2.2 for an overview of the logon.

5.2.1.3 Prior to initiating the logon, the flight crew should verify the following:

a) the aircraft identification provided when initiating the logon exactly matches the aircraft identification (Item 7) of the filed flight plan;

b) the flight plan contains the correct aircraft registration in Item 18 prefixed by REG/;

c) the flight plan contains the correct aircraft address in Item 18 prefixed by CODE/, when provided; and

d) the aircraft registration provided when initiating the logon exactly matches the aircraft placard, when the flight crew manually enters the aircraft registration. Refer to Appendix F, paragraph F.1 for aircraft types that require manual entry.

5.2.1.4 If any of the items in paragraph 5.2.1.3 do not match, the flight crew will need to contact AOC or ATC, as appropriate, to resolve the discrepancy.

Note 1: The aircraft identification entered into the FMS is either the ICAO designator for the aircraft operating agency followed by the flight identification or the aircraft registration, in accordance with ICAO Doc 4444.

Note 2.— The aircraft registration entered into the FMS can include a hyphen(-), even though the aircraft registration in the flight plan message cannot include a hyphen.

Note 3.- The ATSU correlates the data sent in a logon message with flight plan data. If the data does not match, the ATSU will reject the logon.

5.2.1.5 The flight crew should then manually initiate a logon in accordance with Table 5-2 using the 4-letter FIR location indicator or, if the logon address is different, as indicated on aeronautical charts (See Figure 5-1 for example).

Note.— Often the logon address is the same as the 4-letter FIR location identifier but in some airspace a different CPDLC logon address is used. Refer to Appendix E, paragraph E.1.

Error! Objects cannot be created from editing field codes.

Figure 5-1. FIR designator and CPDLC logon address on en route chart

5.2.1.6 If after 10 minutes, there are no indications that the logon attempt was unsuccessful, the flight crew can assume that the system is functioning normally and that they will receive a CPDLC connection prior to entry into the FIR.

5.2.1.7 If the flight crew receives an indication that the logon attempt was unsuccessful, the flight crew should reconfirm that the logon data are correct per paragraphs 5.2.1.3 and 5.2.1.5 and reinitiate a logon.

5.2.1.8 Each time a connection is established, the flight crew should ensure the identifier displayed on the aircraft system matches the logon address for the controlling authority.

5.2.1.9 In the event of a disconnect, the flight crew should reinitiate an AFN logon to resume FANS 1/A data link operations.

5.2.1.10 The flight crew may receive a free text message from the ATSU or a flight deck indication regarding the use of the message latency timer on FANS 1/A+ aircraft. When these messages or indications are received, the flight crew should respond as described in Table 5-1 and in accordance with procedures for the specific aircraft type.

Table 5-1. Messages and indications regarding use of message latency timer

	Instruction to switch message latency timer off	
ATSU	CONFIRM MESSAGE LATENCY TIMER OFF	
Flight crew	**FANS 1/A+ aircraft**	**Message latency timer not available**
	The flight crew should: a) confirm that the message latency timer is off; and b) accept (ROGER) the uplink [free text] message.	The flight crew should accept (ROGER) the uplink [free text] message and append the [free text], TIMER NOT AVAILABLE.
	Instruction to set the maximum uplink delay value	
ATSU	SET MAX UPLINK DELAY VALUE TO [delayed message parameter] SECONDS where the [delayed message parameter] is an integer value, e.g., 360.	
Flight crew	**FANS 1/A+ aircraft**	**Message latency timer not available**
	The flight crew should: a) set the value; and b) accept (ROGER) the uplink message.	The flight crew should accept (ROGER) the uplink [free text] message and append the [free text], TIMER NOT AVAILABLE.

	Indication of delayed CPDLC uplink message (Some FANS 1/A+ aircraft only)
ATSU/ aircraft system	(any CPDLC uplink message displayed with indication of delayed message)
Flight crew	**Some FANS 1/A+ aircraft only** The flight crew should: a) respond, appropriately, to close the message, i.e. reject all clearance and negotiation messages (UNABLE or NEGATIVE), or accept (ROGER) any message that cannot be rejected; b) when using CPDLC, send a free text message, as necessary, to provide the reason for rejecting the message, e.g., DELAYED CPDLC MESSAGE RECEIVED or NOT CONSISTENT, PLEASE RE-SEND; and c) if deemed necessary, further advise the controller of the situation and/or request verification of ATC intent, via CPDLC or voice.

Note.— Refer to paragraph 4.2.7 for specific controller procedures. Refer to Appendix F, paragraph F.1, for availability of a FANS 1/A+ upgrade on different types of aircraft. Refer to Appendix F, paragraph F.11, for the specifications of the message latency timer on different types of aircraft.

5.2.2 When to initiate an AFN logon

5.2.2.1 When CPDLC and/or ADS-C services are available for the flight, the flight crew should initiate an AFN logon in accordance with the conditions provided in Table 5-2.

Table 5-2. Conditions for initiating logon

Condition(s)	When	Logon address of ATSU
Prior to takeoff, where permitted or required	No earlier that 45 minutes prior to ETD	Current ATSU for the FIR that the departure airport is located within
15 minutes or more prior to FIR boundary estimate	above 10,000 feet	Current ATSU for the FIR in which the aircraft is operating
Less than 15 minutes prior to FIR boundary estimate	above 10,000 feet	Next ATSU that provides CPDLC and/or ADS-C services for the FIR on that flight
Following an unsuccessful data link transfer to another ATSU (See also paragraph 5.2.3.8)	When detected by the flight crew or upon receipt of instruction from ATC	As instructed or per above

5.2.2.2 When the aircraft system/flight crew recognizes abnormal behavior of the CPDLC connection, the flight crew should terminate the connection and initiate a new AFN logon with the current ATSU.

5.2.3 Automatic transfer of CPDLC and ADS-C services between FIRs

5.2.3.1 When transferring CPDLC and ADS-C services between FIRs, the flight crew should not need to reinitiate a logon. Under normal circumstances, the current and next ATSUs automatically transfer CPDLC and ADS-C services. The transfer is seamless to the flight crew.

5.2.3.2 The flight crew should promptly respond to CPDLC uplinks to minimize the risk of an open CPDLC uplink message when transferring to the next ATSU.

Note. — If a flight is transferred to a new ATSU with an open CPDLC message, the message status will change to ABORTED. If the flight crew has not yet received a response from the controller, the downlink request will also display the ABORTED status. Refer also to Appendix F, paragraph F.8.

5.2.3.3 Prior to the point at which the current ATSU will transfer CPDLC and ADS-C services, the flight crew may receive a response to close any open CPDLC message.

5.2.3.4 Starting approximately 10 minutes prior to the FIR boundary, the pilot monitoring communications should look for the successful transfer from the current ATSU to the next ATSU by observing the change in the active center indication provided by the aircraft system.

5.2.3.5 Since the transfer of communications at FIR boundaries is not explicitly indicated to the receiving ATSU, the only way to confirm that it has taken place is for the aircraft and ATSU to exchange a CPDLC message. The exchange can be initiated by the crew, e.g. by transmitting a CPDLC POSITION REPORT [position report] report or some other CPDLC message, or by the ground (refer to Appendix E, paragraph E.2.2).

5.2.3.6 When notified that a new active CPDLC connection has been established, and if entering an FIR that requires the crew to send a CPDLC position report to confirm current data authority status (refer Appendix E, paragraph E.2.2), the flight crew should send a CPDLC position report without delay unless advised through a CONTACT or MONITOR instruction of a specific transfer point.

5.2.3.7 Where the normal mode is for the ground to initiate the exchange to confirm CDA (or when transmission of the required message is unduly delayed), the ATSU will initiate the process by transmitting a message requiring a response from the aircraft or flight crew.

5.2.3.8 If the automatic transfer does not occur at the FIR boundary and if leaving a FIR that requires a CPDLC position report to confirm current data authority status (refer Appendix E, paragraph E.2.2), the flight crew should:

a) send a CPDLC position report to the transferring ATSU after crossing the boundary, and then

b) if the connection is not transferred within 3 minutes after sending a CPDLC position report, the flight crew should terminate the current CPDLC connection and initiate a logon with the next ATSU.

5.2.3.9 If the automatic transfer does not occur at the FIR boundary and if leaving a FIR that does not use a CPDLC position report to confirm current data authority status the flight crew should contact the transferring ATSU by voice or CPDLC free text advising them that the transfer has failed.

5.2.4 Transfer voice communications with the CPDLC connection transfer

5.2.4.1 Prior to crossing the boundary, the active center may initiate transfer of voice communications with the CPDLC connection transfer using any of the message elements containing CONTACT or MONITOR. Refer to paragraph 4.1.5 for guidelines on the controller's use of these message elements.

5.2.4.2 A CONTACT or MONITOR uplink message instructs the flight crew to change to the specified frequency and may include a position or time for when to change to the new frequency.

a) When the flight crew receives a MONITOR uplink message, they should change to the specified frequency upon receipt of the instruction or at the specified time or position. The flight crew should not establish voice contact on the frequency.

b) When the flight crew receives a CONTACT messages, they should change to the specified frequency upon receipt of the instruction or at the specified time or position, and establish voice contact on the frequency.

Note.— If the next ATSU provides CPDLC services, the flight crew should not expect that CPDLC will be terminated or suspended once voice contact is established per receipt of a CONTACT message, unless otherwise advised per paragraph 4.1.4.6.

5.2.4.3 If the ATSU assigns a single HF frequency for backup, the flight crew should select another frequency from the same 'family' as a secondary frequency.

Note.— In areas of poor radio coverage, the controller may append the message SECONDARY FREQUENCY [frequency] to specify a secondary frequency.

5.2.5 Exiting CPDLC and ADS-C service areas

5.2.5.1 Approximately 15 minutes after exiting CPDLC and ADS-C service areas, the flight crew should ensure there are no active CPDLC or ADS-C connections. Ensuring that connections are not active eliminates the possibility of inadvertent or inappropriate use of the connections, and reduces operating costs and loading of the system.

Note.— Some ATSUs may maintain ADS contracts with an aircraft for a period of time (e.g. 15 minutes) after the aircraft has left the airspace.

Note.— The flight crew should not inadvertently select ADS-C emergency mode when selecting ADS-C OFF.

5.3 CPDLC – ATS uplinks

5.3.1 General

5.3.1.1 To ensure situational awareness is maintained, when a CPDLC uplink is received, each flight crew member should read the message independently. Once the message has been independently read, the flight crew should then discuss whether to accept or reject the message.

5.3.1.2 Due to constraints associated with use of the flight deck printer, the flight crew should read CPDLC messages using the flight deck displays.

5.3.1.3 When processing an uplink multi-element message, the flight crew should carefully refer to screen page numbers to ensure that the entire uplink has been read and understood in the correct sequence prior to responding.

Note.— An uplink multi-element message contains multiple clearances and/or instructions. It is possible for CPDLC multi-element messages to be displayed on more than one screen page.

Example:

Controller	CLIMB TO AND MAINTAIN FL350. REPORT LEAVING FL330. REPORT LEVEL FL350.
Flight crew	WILCO

5.3.1.4 If the flight crew cannot comply with any portion of a multi-element message, the flight crew will need to reject (UNABLE) the entire message, and should not execute any clearance portion of the message.

Note.— The flight crew can only provide a single response to the entire multi-element uplink message. The flight crew cannot respond to individual elements of a multi-element message.

5.3.1.5 When uplinks are accepted (WILCO), the flight crew should take appropriate actions to comply with the clearance or instruction and, if necessary, properly configure the aircraft data link system to receive subsequent uplink messages.

Note.— The flight crew may need to perform some action before another subsequent CPDLC message can be displayed or they may miss it.

5.3.1.6 The flight crew should respond to an uplink message with the appropriate response, e.g. WILCO or UNABLE, as provided in Appendix A, paragraph A.3.

5.3.1.7 When the flight crew receives a message containing only free text, or a free text element combined with elements that do not require a response, they should respond to the free text with a ROGER response before responding to any query that may be contained in the free text message element.

Example:

Controller	REPORT GROUND SPEED.

(free text)	
Flight crew	ROGER
Flight crew (free text)	GS 490

5.3.2 Flight crew response times for uplinked messages

5.3.2.1 System performance requirements have been established to support reduced separation standards. Specific latency times have been allocated to the technical performance, based on flight crew and controller response times. Regional/State monitoring agencies monitor performance to ensure the technical and operational components of the system meet required standards. To support RCP 240 operations (e.g. 30 nautical mile longitudinal separation) the flight crew should respond to an uplink message within one minute.

Note.— Transmission times for messages may vary for a number of reasons including the type of transmission media, network loading, or the criteria for transitioning from one media to another, e.g. VHF/Satcom. Operational response times may vary depending on workload and complexity of the instruction or clearance.

5.3.2.2 Flight crew procedures should be developed to respond to uplinks as soon as practical after they are received. For most uplinks, the flight crew will have adequate time to read and respond within one minute. However, the flight crew should not be pressured to respond without taking adequate time to fully understand the uplinked message and to satisfy other higher priority operational demands.

5.3.2.3 If the flight crew determines they will need a significant amount of time to respond to a message, they should send a STANDBY response.

5.3.2.4 If the flight crew has sent a STANDBY response, they should provide a closure response to the uplink within a reasonable period of time, e.g. 5 minutes, or as required.

Note.— The uplink message remains open. If the flight crew does not subsequently respond, the controller will query the flight crew per paragraph 4.2.1.3.

5.3.3 Conditional clearances

5.3.3.1 Conditional clearances require special attention by the flight crew. Following guidelines provided in paragraphs 5.1.1 and 5.3.1, such as each flight crew member independently reading the uplinked clearances and conducting briefings with augmented crews, should aid in reducing errors.

5.3.3.2 An operator should specify procedures to ensure that the flight crew correctly responds to conditional clearances taking into account the guidelines provided herein and any automation features provided by the aircraft systems.

5.3.3.3 An operator should ensure that their training and qualification program clearly addresses use of words “AT” or “BY” as used in conditional clearances, particularly for a non-native English speaking flight crew. Table 5-3 clarifies the intended meaning for conditional clearance message elements. (Refer also to Appendix A, paragraph A.2.)

Table 5-3. Conditional clearance clarification of vertical clearances

Message Intent	Message element
Instruction that at the specified time a climb to the specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that, NOT BEFORE the specified time, a climb to the specified level is to commence and, once reached, the specified level is to be maintained.* *Note 2.— Precede this message element with MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [time] CLIMB TO [level]** Or *AT [time] CLIMB TO AND MAINTAIN [altitude]*
Instruction that at the specified position a climb to the specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that, AFTER PASSING the specified position, a climb to the specified level is to commence and, once reached, the specified level is to be maintained.* *Note 2.— Precede this message element with MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [position] CLIMB TO [level]** Or *AT [position] CLIMB TO AND MAINTAIN [altitude]*
Instruction that at a specified time a descent to a specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that, NOT BEFORE the specified time, a descent to the specified level is to commence and, once reached, the specified level is to be maintained.* *Note 2.— Precede this message element with MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [time] DESCEND TO [level]** Or *AT [time] DESCEND TO AND MAINTAIN [altitude]*
Instruction that at the specified position a descent to the specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that, AFTER PASSING the specified position, a descent to the specified level is to commence and, once reached, the specified level is to be maintained.* *Note 2.— Precede this message element with MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [position] DESCEND TO [level]** Or *AT [position] DESCEND TO AND MAINTAIN [altitude]*
Instruction that a climb is to commence at a rate such that the specified level is reached at or before the specified time. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note.— Instruction that a climb is to commence at a rate such that the specified level is reached NOT LATER THAN the specified time.*	CLIMB TO REACH [level] BY [time]

Message Intent	Message element
Instruction that a climb is to commence at a rate such that the specified level is reached at or before the specified position. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note.— Instruction that a climb is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.*	CLIMB TO REACH [level] BY [position]
Instruction that a descent is to commence at a rate such that the specified level is reached at or before the specified time. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note.— Instruction that a descent is to commence at a rate such that the specified level is reached NOT LATER THAN the specified time.*	DESCEND TO REACH [level] BY [time]
Instruction that a descent is to commence at a rate such that the specified level is reached at or before the specified position. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note.— Instruction that a descent is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.*	DESCEND TO REACH [level] BY [position]

5.3.4 "EXPECT" uplinks

5.3.4.1 Contrary to ICAO Doc 4444 requirements and associated guidelines provided at Appendix A, paragraph A.2, it is possible that an ATSU will uplink an unsolicited EXPECT message, such as EXPECT CLIMB AT [time], which provides advice to the flight crew of the extent of the delay before a requested level becomes available. The operator should ensure that their flight crews are trained not to execute an EXPECT message as if it were a clearance. The training should include procedures, consistent with ICAO standards, for handling EXPECT messages in the event of a total communication failure (loss of data and voice).

5.3.5 Uplinks containing FMS-loadable data

5.3.5.1 One of the safety advantages of using CPDLC is the capability to exchange route clearance messages that can be automatically loaded directly into an FMS. The flight crew can use this capability to minimize the potential for data entry errors when executing clearances involving loadable data. It also enables advanced data link operations, such as a reroute or a tailored arrival, as described in Chapter 6, which otherwise may not be possible via voice.

5.3.5.2 If a clearance is received that can be automatically loaded into the FMS, the flight crew should load the clearance into the FMS and review it before accepting (WILCO) the clearance.

5.3.5.3 The flight crew should verify that the route modification in the FMS is consistent with the clearance and the aircraft active flight plan does not contain any discontinuities.

5.3.5.4 The flight crew should reject (UNABLE) the clearance when:

a) the FMS indicates that it cannot load the clearance (e.g. partial clearance loaded or unable to load); or

Note.— The FMS checks the clearance to ensure it is correctly formatted and compatible with the FMS navigation database.

b) the FMS indicates any inconsistencies or discontinuities with the route modification that are not addressed by AIPs or local procedures.

5.3.5.5 The flight crew should use CPDLC or voice to clarify a rejected clearance due to any loading failures, route discontinuities or inconsistencies.

5.3.5.6 If the clearance loads successfully and is acceptable, the flight crew may execute an FMS route modification and accept (WILCO) the clearance.

5.4 CPDLC – ATS downlinks

5.4.1 General

5.4.1.1 Downlink messages can only be sent to the ATSU that is the active ATSU. To provide situational awareness, procedures should ensure that each flight crew member has read each downlink message before it is sent.

5.4.1.2 When the aircraft has an active CPDLC connection with an ATSU, the flight crew should downlink a clearance request only if the flight is in that ATSU's airspace.

5.4.1.3 The flight crew should use standard downlink message elements to compose and send clearance requests, CPDLC position reports, and other requested reports. Additional qualifying standard message elements, such as DUE TO WEATHER, should also be used as needed.

Note.— The use of standard message elements will minimize the risk of input errors, misunderstandings, and confusion, and facilitate use by a non-native English speaking flight crew. The use of standard message elements allows the aircraft and ground systems to automatically process the information in the messages that are exchanged. For example, the flight crew can automatically load clearance information into the FMS and review the clearance, the ground system can automatically update flight plan data for route conformance monitoring, and both aircraft and ground systems can associate responses to messages.

5.4.1.4 To avoid potential ambiguity, the flight crew should avoid sending multiple clearance requests in a single downlink message. For example, the flight crew should send separate downlink messages for REQUEST CLIMB TO [level] and REQUEST DIRECT TO [position] unless there is an operational need to combine them in a single message (i.e., the flight crew does not want to climb unless they can reroute).

5.4.1.5 If the flight crew:

a) Does not receive a controller response to an open CPDLC downlink message within a reasonable time period and no error message has been received indicating that the message was not delivered; or

b) Receives a STANDBY message in response to an open CPDLC downlink message but does not receive a closure response within a reasonable period of time, e.g. 5 minutes; then

the flight crew should send a query using one of the Negotiation Requests messages or a [free text] message rather than resending the clearance request message. This is to avoid having multiple open downlink messages for the same request. Alternatively, they may use voice communication to clarify the status of the open downlink.

Example:

Flight crew	REQUEST CLIMB TO FL350
	Reasonable period of time has passes
Flight crew	WHEN CAN WE EXPECT HIGHER ALTITUDE (or LEVEL) or WHEN CAN WE EXPECT CLIMB TO FL350

5.4.1.6 If the flight crew receives an indication of non-delivery of a downlink message, they may elect to re-send an identical message. Alternatively, they may use voice communication to clarify the status of the downlink.

5.4.2 Free text

5.4.2.1 While the flight crew should avoid the use of the free text message element, its use may offer a viable solution to enhance operational capability, given due consideration to local conditions and limitations with the use of standard message elements.

5.4.2.2 Free text messages should be used only when an appropriate standard message element does not exist.

5.4.2.3 When composing a free text message, the flight crew should use standard ATS phraseology and format and avoid nonessential words and phrases. Abbreviations should only be included in free text messages when they form part of standard ICAO phraseology, for example, ETA.

5.4.3 Unsupported messages

5.4.3.1 Whilst ATSUs should provide CPDLC service using the complete message set provided in Appendix A, some ATSUs provide a CPDLC service using a limited message set. The operator should ensure that its flight crews are aware of any unsupported downlink message elements that are described in regional or State documentation.

5.4.3.2 If the flight crew sends a downlink message containing a message element that is not supported by the ATSU, they will typically receive the uplink message, MESSAGE NOT SUPPORTED

BY THIS ATS UNIT, rather than terminating the connection. If the flight crew receives this message, they should accept (ROGER) the message and use voice for the communication transaction.

5.4.4 CPDLC reports

5.4.4.1 The flight crew should ensure that they respond to CPDLC reports when appropriate.

Note.— ATSUs may send a CPDLC message that combines a REPORT instruction with a clearance. The flight crew may use automation, procedures, and/or a combination to remind them when to send the reports requested in the CPDLC message.

Example:

Controller	CLIMB TO AND MAINTAIN FL350. REPORT LEAVING FL330. REPORT LEVEL FL350.
Flight crew	WILCO

5.5 Automatic dependant surveillance – contract (ADS-C)

5.5.1 General

5.5.1.1 ADS-C allows the ATSU to receive position reports automatically from the aircraft to update the flight plan, check vertical and route conformance and provide emergency alerting.

5.5.1.2 In airspace where ADS-C services are available, the flight crew need not send position reports via voice or CPDLC, except as described in paragraph 5.6.3 or when required by AIPs or regional supplementary procedures.

5.5.1.3 When using ADS-C services, the flight crew should check to ensure ADS-C is enabled prior to initiating a logon with an ATSU.

Note.— The flight crew can switch ADS-C off, which will cancel any ADS-C connections with the aircraft. While ADS-C is disabled, the ground system will not be able to establish an ADS-C connection.

5.5.1.4 Normally, the flight crew should leave ADS-C enabled for the entire flight. However, in airspace where ADS-C services are available, if the flight crew switches ADS-C off for any reason, or they receive indication of ADS-C failure, the flight crew should advise ATC and follow alternative procedures for position reporting per paragraphs 5.6 and 5.8.4.4.

5.5.1.5 In airspace where ADS-C services are not available, the flight crew may switch ADS-C off to cancel inadvertent ADS-C connections. In such cases, the flight crew should ensure that ADS-C is enabled when re-entering airspace where ADS-C services are again available.

5.5.1.6 If ADS-C is disabled in an ADS-C environment, the ATSU may send the flight crew an inquiry per paragraph 5.8.4.5.

5.6 Position reporting

5.6.1 General

5.6.1.1 The flight crew should ensure that waypoints are sequenced correctly. If an aircraft passes abeam a waypoint by more than the aircraft FMS waypoint sequencing parameter while flying in heading selected mode, the flight crew should sequence the waypoint in the FMS by executing a track offset that is within FMS waypoint sequencing parameters or flying direct to the next relevant waypoint.

Note.— As shown in Figure 5-2, when an aircraft passes abeam a waypoint in excess of the defined sequencing parameter (refer to Appendix F, paragraph F.7) for specific aircraft types), the FMS will not sequence the active waypoint. If the flight crew does not sequence the waypoint, incorrect information will be contained in ADS-C reports, CPDLC position reports and FMC waypoint position reports – the next waypoint in these reports will actually be the waypoint that the aircraft has already passed.

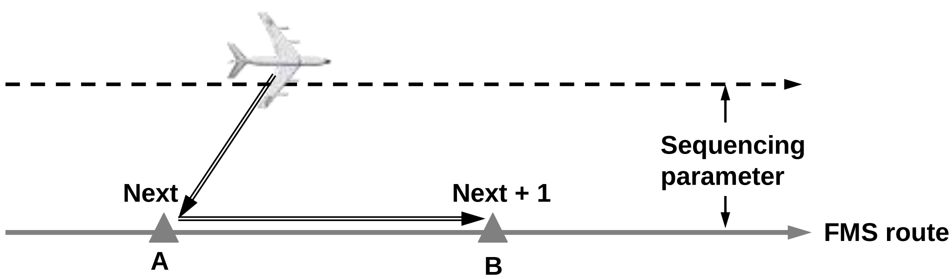


Figure 5-2. Waypoint sequencing anomaly

5.6.1.2 The flight crew should include in any CPDLC downlink message or FMC WPR, latitudes and longitudes encoded as waypoint names in the ICAO format. The flight crew should not use the ARINC 424 format.

Note 1.— ADS-C reports contain latitudes and longitudes rather than the identifier of the waypoint. Therefore, ARINC 424 waypoints do not affect ADS-C reporting.

Note 2.— ARINC 424 describes a 5-character latitude/longitude format for aircraft navigational database. (e.g. 10N40 describes a lat/long of 10N140W). This format is not an ICAO format and, therefore, the ATSU may reject any downlink message containing waypoint names in the ARINC 424 format.

5.6.2 Position reporting in a non-ADS-C environment

5.6.2.1 When ADS-C is not available, the flight crew should conduct position reporting by voice or CPDLC. When using CPDLC, the flight crew should send either automatically or manually POSITION REPORT [position report] whenever an ATC waypoint is sequenced, (or passed abeam when offset flight is in progress).

5.6.2.2 When using CPDLC for position reporting, the flight crew should ensure that the position and next position information applies only to compulsory reporting points unless requested otherwise by ATC. The ensuing significant point may be either the compulsory or non-compulsory reporting point after the next position (Refer AIREP form ICAO Doc 4444, Appendix 1).

5.6.2.3 When using CPDLC for position reporting, the flight crew should send position reports only at compulsory reporting points or on request.

5.6.3 Position reporting in an ADS-C environment

5.6.3.1 The flight crew should not insert non-ATC waypoints (e.g. mid-points) in cleared segments of the aircraft active flight plan.

Note.— If the flight crew inserts non-ATC waypoints into the aircraft active flight plan and activates the change, the aircraft system may trigger an ADS-C waypoint change event report at the non-ATC waypoint, or include information about the non-ATC waypoint in the predicted route group, as well as the intermediate and fixed projected intent groups. As a result, the ADS-C report will include information about the non-ATC waypoint, which is not expected by the ATC ground system.

5.6.3.2 When reporting by ADS-C only, the flight crew should not remove ATC waypoints even if they are not compulsory reporting points.

5.6.3.3 In an ADS-C environment, unless otherwise instructed, the flight crew should not provide voice or CPDLC position reports.

Note.— Some ATSPs require a single CPDLC position report, even when in an ADS-C environment, to provide the controlling ATSU confirmation that it is the current data authority and the only ATSU able to communicate with the aircraft via CPDLC (refer to Appendix E, paragraph E.2.2). If required by AIP or regional supplementary procedures, the flight crew will need to provide a position report when either of the following events occurs:

a) An initial CPDLC connection is established; or

b) The CPDLC connection transfer has been completed, i.e., at the associated FIR boundary entry position.

5.6.3.4 In an ADS-C environment, the flight crew should not provide revised waypoint estimates by CPDLC or voice, except under conditions in certain airspace as stipulated in Appendix E, paragraph E.2.6.

5.6.4 Position reporting using FMC WPR

5.6.4.1 The flight crew should verify the aircraft identification (ACID) is correct per filed flight plan.

5.6.4.2 When FMC waypoint position reports are manually initiated, the flight crew should send the report within 3 minutes of crossing each waypoint. If this cannot be achieved, the FMC WPR should not be triggered, but a voice report made instead.

5.6.4.3 The flight crew may assume that the estimate for the next waypoint, shown on the FMS at the time a waypoint is crossed, is the estimate transmitted to ATC in the FMC waypoint position report. If that estimate subsequently changes by more than 2 minutes, the flight crew should transmit a revised estimate via voice to the ATSU concerned as soon as possible.

5.6.4.4 The flight crew should avoid inserting non-ATC waypoints (e.g. mid-points) in route segments because as non-ATC waypoints may prevent the provision of proper ETA data in the FMS reports required for ATC purposes.

5.6.4.5 If the flight identification portion of the aircraft identification contains an alphabetic character (such as ABC132A or ABC324W, where 132A or 324W is the flight identification) the flight cannot participate in FMC WPR (see paragraph 3.4.1.4 for more information regarding this limitation). The flight crew should not use the initial contact procedures in Appendix E, paragraph E.2.1.1, but should revert to normal voice procedures.

5.7 Weather deviations and offsets

5.7.1 General

5.7.1.1 The flight crew may use CPDLC to request a weather deviation clearance or an offset clearance. The difference between a weather deviation and an offset are portrayed in Figure 5-3.

a) A weather deviation clearance authorizes the flight crew to deviate up to the specified distance at their discretion in the specified direction from the route in the flight plan.

b) An offset clearance authorizes the flight crew to operate at the specified distance in the specified direction from the route in the flight plan. A clearance is required to deviate from this offset route.

5.7.1.2 Flight crews should use the correct message element when requesting an off-route clearance.

Note.— The difference between a weather deviation and an offset affects how ATC separate aircraft.

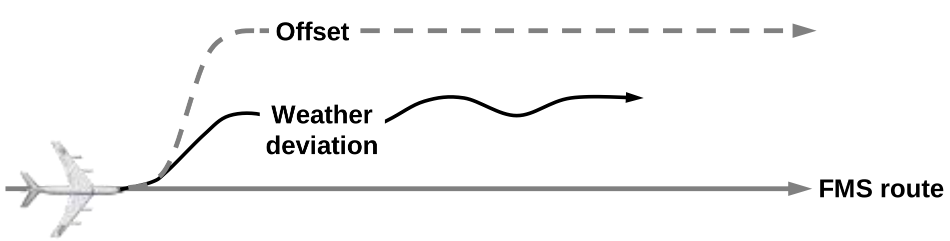


Figure 5-3. Offset and weather deviation

5.7.2 Weather deviation requests and offsets

5.7.2.1 When requesting a weather deviation or offset clearance, the flight crew should specify the distance off route with respect to the cleared route of the aircraft. If the flight crew has received a off-route clearance and then requests and receives a subsequent off-route clearance, the new clearance supersedes the previous clearance (i.e. only the most recent clearance is valid).

Example 1: As shown in Figure 5-4, the flight crew requests a weather deviation clearance to operate up to 20NM left of route. The controller issues the appropriate clearance.

Flight crew	REQUEST WEATHER DEVIATION UP TO 20NM LEFT OF ROUTE
Controller	CLEARED TO DEVIATE UP TO 20NM LEFT OF ROUTE REPORT BACK ON ROUTE
Flight crew	WILCO

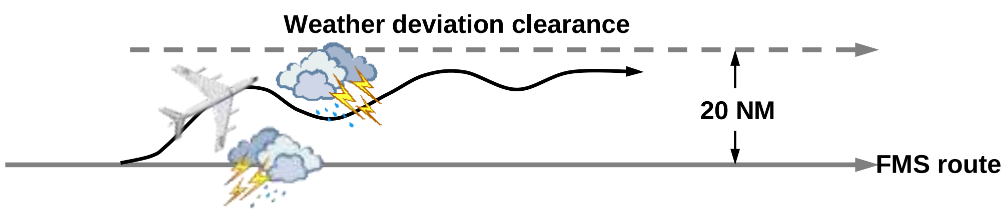


Figure 5-4. Weather deviation clearance up to 20 NM left of route

Example 2: As shown in Figure 5-5, the flight crew is operating on a weather deviation clearance up to 20 NM left of route and then requests another weather deviation clearance to operate up to a further 30NM left of route. They specify the deviation distance in the clearance request based on the cleared route rather in relation to the current weather deviation clearance. The controller issues the appropriate clearance.

Flight crew	REQUEST WEATHER DEVIATION UP TO 50NM LEFT OF ROUTE
Controller	CLEARED TO DEVIATE UP TO 50NM LEFT OF ROUTE REPORT BACK ON ROUTE
Flight crew	WILCO

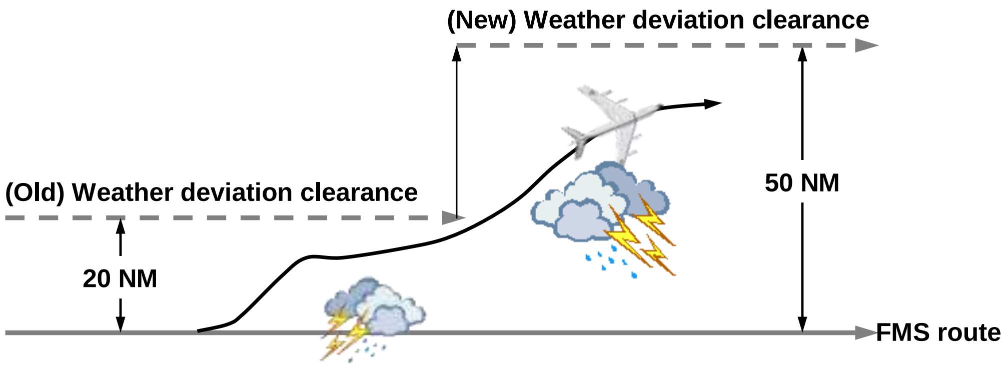


Figure 5-5. Subsequent weather deviation clearance up to 50 NM left of route

Example 3: As shown in Figure 5-6, the aircraft then requests a weather deviation clearance to operate 30NM right of route. The controller issues the appropriate clearance. The flight crew expeditiously navigates from one side of route to the other in accordance with the above clearance.

Note.— The ATSU applies the appropriate separation standards during the maneuvers.

Flight crew	REQUEST WEATHER DEVIATION UP TO 30NM RIGHT OF ROUTE
Controller	CLEARED TO DEVIATE UP TO 30NM RIGHT OF ROUTE REPORT BACK ON ROUTE
Flight crew	WILCO

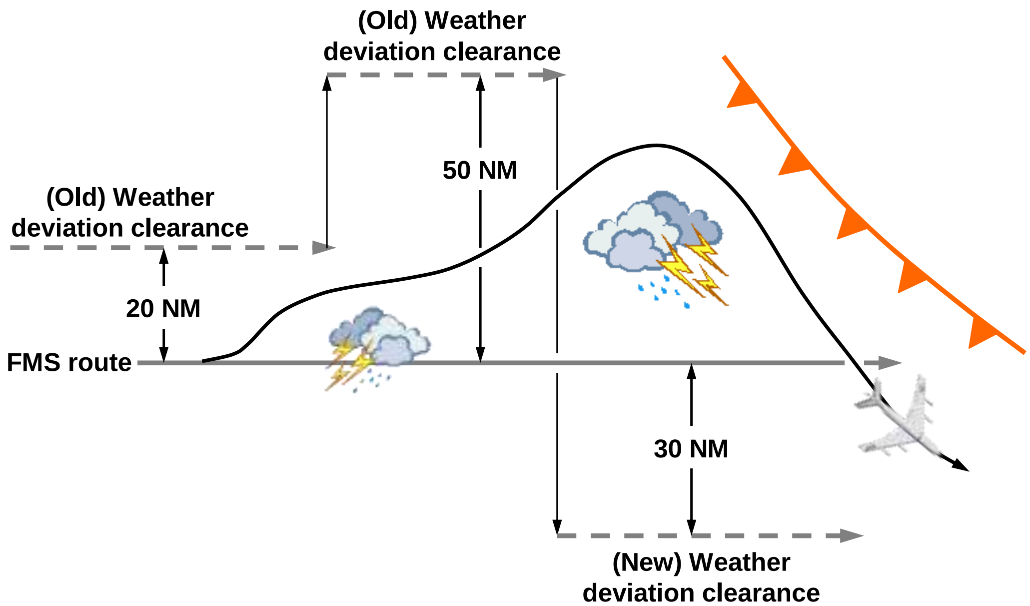


Figure 5-6. Subsequent weather deviation clearance up to 30 NM right of route

5.7.3 Deviations either side of route

5.7.3.1 There are a number of valid formats for the CPDLC [direction] variable. A number of aircraft types, however, can only request one direction (left or right) in weather deviation requests. When operating these aircraft types, the flight crew should request a deviation left and right of route using the following procedures:

a) Construct a weather deviation request for a deviation on one side of route using REQUEST WEATHER DEVIATION UP TO [specified distance] [direction] OF ROUTE; and

b) Append free text AND [specified distance] [direction] describing the distance to the other side of route.

Example: The flight crew requests a deviation left and right of route. The controller issues the appropriate clearance.

Flight crew	REQUEST WEATHER DEVIATION UP TO 20NM LEFT OF ROUTE. AND 20NM RIGHT
Controller	CLEARED TO DEVIATE UP TO 20NM EITHER SIDE OF ROUTE REPORT BACK ON ROUTE
Flight crew	WILCO

5.7.4 Reporting back on route

5.7.4.1 When the flight crew no longer needs the deviation clearance and is back on the cleared route, the flight crew should send the report BACK ON ROUTE.

a) If during the weather deviation, the flight crew receives a clearance to proceed direct to a waypoint – and the flight crew accepts (WILCO) this clearance – the aircraft is considered to be on a cleared route. Therefore, the flight crew should send the BACK ON ROUTE report after they execute the "direct to" clearance.

b) If the aircraft is off route on a weather deviation clearance and proceeding direct to a waypoint on the cleared route, the flight crew should not send the BACK ON ROUTE report until they have sequenced the waypoint on the cleared route.

Note.— If a BACK ON ROUTE report is received while the aircraft is still off-route, the incorrect information provided to ATC may affect the separation standards in use. Alternatively, the flight crew may consider requesting a clearance direct to the waypoint – on receipt of the uplink clearance, the procedure specified in item a) applies.

5.8 Emergency and non-routine procedures

5.8.1 Emergency procedures - general

5.8.1.1 In accordance with established procedures, the ATSU within whose airspace the aircraft is operating remains in control of the flight. If the flight crew takes action contrary to a clearance that the controller has already coordinated with another sector or ATSU and further coordination is not possible in the time available, then the flight crew performs this action under their emergency command authority.

5.8.1.2 The flight crew will use whatever means are appropriate, i.e. CPDLC and/or voice, to communicate during an emergency.

5.8.1.3 During an emergency, a controller would normally expect the flight crew to revert to voice communications. However, the flight crew may use CPDLC for emergency communications if it is either more expedient to do so or if they are unable to establish voice contact.

5.8.2 CPDLC and ADS-C emergency

5.8.2.1 The flight crew may use CPDLC to indicate an emergency situation or degraded operations to an ATSU by sending either a MAYDAY MAYDAY MAYDAY or PAN PAN PAN message.

5.8.2.2 The flight crew may be required to enter SOULS on BOARD during preflight preparation, prior to initiating a logon, or prior to sending the emergency message.

5.8.2.3 The flight crew should use the CPDLC emergency downlink message MAYDAY MAYDAY MAYDAY to automatically select the ADS-C function to emergency mode. The flight crew should only use ADS-C emergency mode when situations prohibit sending a CPDLC emergency message (e.g. in an ADS-C only environment).

5.8.2.4 If the flight crew inadvertently sends a CPDLC emergency downlink message or resolves the emergency situation, they should send CANCEL EMERGENCY, as soon as possible, to advise the controller and automatically set the ADS-C emergency mode to off. After sending CANCEL EMERGENCY, the flight crew should confirm the status of the flight and their intentions via either voice or CPDLC.

5.8.2.5 To check for inadvertent activation of the ADS-C emergency mode using CPDLC, the controller may send the following CPDLC free text uplink or use similar phraseology using voice communication.

Controller	CONFIRM ADS-C EMERGENCY

The flight crew should then check the status of the aircraft's ADS-C emergency mode and if the emergency mode has been activated inadvertently, the flight crew should select ADS-C emergency mode to off and advise the controller either by voice or by the following CPDLC messages.

Flight crew	ROGER, then (free text) ADS-C RESET

5.8.3 Voice communications

5.8.3.1 When CPDLC fails and the flight crew reverts to voice communications, they should consider all open messages not delivered and re-commence any dialogues involving those messages by voice.

5.8.3.2 The flight crew should use the standard voice phraseology under certain conditions as indicated in Table 5-4.

5.8.3.3 Except as provided in this paragraph 4.7.4, voice communication procedures related to data link operations are not standardized among the regions. Refer to Appendix E, paragraph E.2 for voice communication procedures for a specific region.

Table 5-4. Voice phraseology related to CPDLC

Condition	**Voice phraseology**
To advise ATC that the CPDLC connection is being terminated manually and logon is being initiated with the next ATSU.	CPDLC CONNECTION WITH [current ATSU] TERMINATED. LOGGING ON TO [subsequent ATSU] *Note.— The flight crew may use the ICAO four-character codes or plain language at his/her discretion.*
To advise ATC that the transmission is being made due to a CPDLC failure.	CPDLC FAILURE *Note.— This phraseology is included only with the first transmission made for this reason.*
To advise ATC that a delayed CPDLC uplink has been received.	DELAYED CPDLC MESSAGE RECEIVED *Note.— See paragraph 5.2.1.10 and Appendix F, paragraph F.11 for associated procedures.*

Condition	Voice phraseology
To advise ATC that a logon is being initiated following restoration of data link service.	LOGGING ON TO [facility designation]

5.8.4 Data link system failures

5.8.4.1 The flight crew should inform the ATSU for aircraft failure resulting in degraded performance below what is required, e.g. RCP 240, as well, e.g. Satcom failure and switch to HFDL.

5.8.4.2 When the flight crew has been notified that the data link service has shut down, they should terminate the CPDLC connection and use voice until informed by the ATSU that the data link system has resumed normal operations.

5.8.4.3 In the event of an aircraft data link system failure, the flight crew should inform the ATSU of the situation using the following voice phraseology:

Flight crew	DATA LINK FAILED. SELECTING ATC COMM OFF. CONTINUING ON VOICE
Controller	ROGER. CONTINUE ON VOICE

The flight crew should continue to use voice until the functionality of the aircraft system can be re-established.

5.8.4.4 If only the ADS-C service is terminated, then during that time period, the flight crew should conduct position reporting (via CPDLC, if available, or via voice).

5.8.4.5 If the ATSU cannot establish ADS-C contracts with an aircraft, or if ADS-C reporting from an aircraft ceases, the flight crew may have inadvertently switched ADS-C off. If CPDLC is still available and the flight crew receives the free text message CONFIRM ADS-C ARMED, they should check to ensure that ADS-C is not switched off and respond to the controller as follows:

Controller	CONFIRM ADS-C ARMED
Flight crew	ROGER

5.8.5 Using CPDLC to relay messages

5.8.5.1 When an ATSU and an aircraft cannot communicate, the controller may use CPDLC or voice to relay messages. When using CPDLC and depending on circumstances, the controller may first confirm that the CPDLC-capable aircraft is in contact with the subject aircraft, and obtain concurrence from the flight crew that they will act as an intermediary. After sending ROGER, the flight crew should only use free text to respond to the controller’s uplink free text message.

Example:

Controller	Format: RELAY TO [call sign] [unit name] [text of message to be relayed] RELAY TO UNITED345 OAKLAND CLEARS UNITED345 CLIMB TO AND MAINTAIN FL340
Flight crew	ROGER
Flight crew	Format: RELAY FROM [call sign] [response parameters] RELAY FROM UNITED345 CLIMBING FL340

5.8.5.2 The flight crew should reject any uplink CPDLC message intended for relay to another aircraft that is not free text to avoid confusion.

Chapter 6. Advanced data link operations

6.1 Reroute procedures

6.1.1 General

6.1.1.1 When rerouting an aircraft, the flight crew, AOC and each ATSU should follow standardized procedures using appropriate CPDLC message elements.

6.1.1.2 The availability of new weather forecasts on long haul routes may provide the potential for economic and/or safety benefits for operators by allowing them to propose revised routes for airborne aircraft.

6.1.1.3 The flight crew may initiate a reroute request. Each ATSU along the route may initiate an amended route clearance.

6.1.1.4 For flights that cross FIR boundaries between two automated ATSUs, the ATSUs can coordinate revised route information, reducing the requirement for AOC to transmit modification messages to all the ATSUs along the route.

6.1.2 Reroute procedures – AOC initiated (DARP)

6.1.2.1 The purpose of the dynamic airborne reroute procedure (DARP) is to allow aeronautical operational control (AOC) to initiate the process for an airborne aircraft to be issued an amended route clearance by the ATSU.

6.1.2.2 These procedures should only be used where the reroute will occur in FIRs where DARP services are available (Refer to Appendix E).

Note.— DARP service requires Air Traffic Services Interfacility Data Communications (AIDC) to permit the electronic exchange of revised route information.

6.1.2.3 To be eligible for DARP, the operator will need an operational CPDLC capability. Additionally, the flight crew should downlink the route request:

a) At least 60 minutes prior to the next FIR boundary to permit AIDC messaging to take place between the affected ATSUs. This time period may be reduced between ATSUs that support AIDC CDN messaging to coordinate the modification of route information; and

b) At least 20 minutes prior to the divergence waypoint to allow processing time by the ATSU and the flight crew.

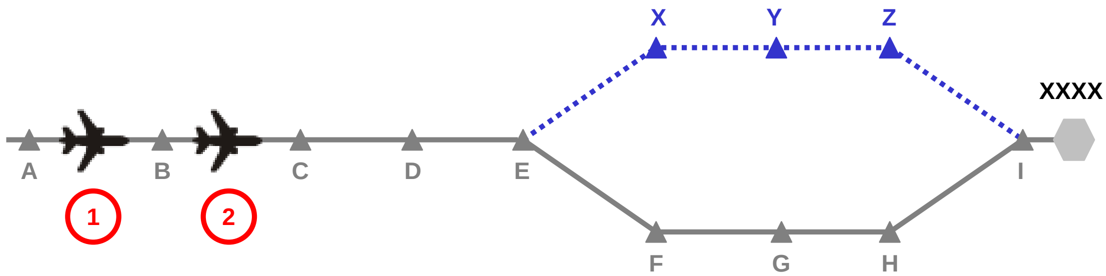
Note.— A downlink route request may be made to a new ATSU immediately after crossing the FIR boundary provided the above requirements are still met

6.1.2.4 Table 6-1 provides the procedures for an AOC initiated reroute and Figure 6-1 provides an overview of the DARP process.

Table 6-1. AOC initiated reroute procedures

Who	Procedures
AOC (Step 1)	a) The AOC should generate the amended route in compliance with standard UPR flight planning requirements (e.g. FIR boundary waypoints etc).
	b) The AOC ensures that the elements used to define the amended route comply with the requirements of ICAO Doc 4444. The elements that may be used to describe the amended route include: 1) Fix Names; *Note 1.— ARINC 424 fix names should not be used to define latitude and longitude.* 2) Airway Designators; *Note 2.— Where an airway designator is used it should be preceded and followed by a fix name or navaid designator that is defined on the airway described.* 3) Navaid Designators; and 4) Latitude and Longitude. *Note 3.— The ICAO requirement is that position should be defined in either whole degrees of latitude and longitude, e.g. 35S164E, or degrees and minutes for both latitude and longitude, e.g. 2513S15645E. A mixture of these formats should be avoided, e.g. 35S15725E.*
	c) The AOC uplinks the proposed route to the aircraft via ACARS.
Flight crew (Step 2)	a) Where applicable, delete any waypoints on the proposed route that have already been sequenced.
	b) Providing that the proposed route is acceptable to the flight crew, downlink the route request to the controlling ATSU using the CPDLC message element: **REQUEST CLEARANCE [route clearance]** or *REQUEST [route clearance]* where the first fix in the route clearance is the next waypoint ahead of the aircraft. *Note 4.— The route request may also contain additional information such as departure airport, destination airport, etc.* *Note 5.— Flight crew procedures should include guidance on downlinking CPDLC route clearance requests.*

Who	**Procedures**
ATSU (Step 3)	a) Where the requested clearance is available, uplink the amended route clearance to the aircraft. Example: UM 83 AT [position] CLEARED [route clearance] where [position] = [(fix1)] is the next waypoint ahead of the aircraft and [route clearance] = [(fix2) (fix3) …]. *Note 6.— The route clearance may also contain additional information such as departure airport, destination airport, etc.* *Note 7. — On occasions, other CPDLC message elements may be more appropriate than UM 83.*
	b) Where the requested clearance is not available, uplink UM 0 UNABLE and append the [reason]. Example: UM 0 UNABLE. UM 166 DUE TO TRAFFIC *Note 8.— ATSUs should not modify the intent of the route without advising the flight crew. This requirement does not apply to the removal of waypoints that have been sequenced prior to the clearance being uplinked or minor changes to the route.*
Flight crew (Step 4)	a) On receipt of a CPDLC route clearance from the ATSU, the flight crew should: 1) Load the uplink into the FMS and review the clearance. If the clearance is acceptable, respond with a DM 0 WILCO to confirm that the flight crew will comply with the clearance; or 2) Otherwise: i) Respond with DM 1 UNABLE; and ii) Continue in accordance with the current ATC clearance.
	b) Where the requested clearance is rejected by the ATSU, the flight crew should continue in accordance with the existing clearance.
	c) The flight crew should request new route data from AOC.



1	The AOC uplinks the proposed amended route "B C D E X Y Z I " to destination XXXX starting from the next point ahead of aircraft (B) and diverging from the current clearance at E. The flight crew reviews the proposed route and downlinks "REQUEST [B C D E X Y Z I]" to ATC.
2	ATC reviews the route request and uplinks the clearance "AT [C] CLEARED [D E X Y Z I]" to the aircraft using UM83. *Note.— In this example, by the time the clearance is uplinked, the aircraft has passed B and so this is not included in the clearance. Point C must also be removed from the [route clearance] parameter of UM 83 because point C is the [position] at which the reroute clearance begins.* The flight crew responds to the clearance with a WILCO.

Figure 6-1. The DARP process

6.2 Tailored arrival (TA)

6.2.1 General

6.2.1.1 The tailored arrival (TA) is a 4-dimentional (4-D) arrival procedure, based on an optimized ATC clearance, including, as necessary, vertical and/or speed restrictions, from the aircraft's current position, normally just prior to top of descent, to the designated destination runway. This optimized ATC clearance, or TA clearance, is issued via CPDLC data link message(s) to the aircraft and, upon flight crew selection, automatically loaded into the aircraft's FMS (i.e., 4-D trajectory guidance). The TA clearance generally consists of the lateral path, vertical and speed constraints, published approach procedure, and runway assignment.

6.2.1.2 This section provides guidelines and procedures for delivering and executing the TA clearance. These guidelines and procedures are intended for ATSPs that provide the TA service and participating operators.

Note. As ATSPs plan for providing the TA service throughout the world, ground system capability and geographical constraints may lead to some variations in local implementations. As experience is gained, these variations and other refinements will need to be coordinated in future amendments to the guidelines provided herein.

6.2.2 Provisions for the TA service.

6.2.2.1 The operator should establish operating and notification procedures for the flight crew and conduct training to be eligible to participate in tailored arrivals.

6.2.2.2 At each of the ATSUs involved, the ATSP should provide procedures to the controllers and conduct training for delivering and executing the TA clearance. If the flight crew from an eligible operator requests a TA clearance and the traffic situation permits, the controller should accommodate the request. All other standard operating procedures apply.

6.2.2.3 When the TA service is provided, the ATSP should:

a) Assign a TA designator to the TA clearance. The TA designator should:

1) Contain more than five letters so that it is not easily confused with a published or public procedure;

2) Relate to the geographical arrival area, e.g. PACIFIC 1; and

3) Be easy to pronounce when communicating on voice.

Note.— The flight crew and the controller use the TA designator throughout the procedure to unambiguously convey the route and vertical and speed constraints associated with the TA.

b) Define and notify operators of the TA request point as a time in minutes from the estimated top of descent (TOD) or from the airspace boundary where CPDLC service is terminated.

Note.— For example, the TA request point for the PACIFIC 1 TA at San Francisco airport is 45 minutes before the aircraft enters U.S. domestic airspace.

6.2.3 Clearance delivery and execution

6.2.3.1 Table 6-2 provides the procedures for delivering and executing a tailored arrival clearance.

Table 6-2. Tailored arrival clearance delivery and execution

Who	**Procedures**
Flight crew (Step 1)	At the TA request point, the flight crew should request a TA using the CPDLC standard free text message element: DM 67ad REQ TA [TA designator], where [TA designator] is optional. *Note 1.— When the ATSP and operators are evaluating a TA, the flight crew may include additional information such as an intended descent speed, using the format M[nn] for Mach or [nnn]KIAS for IAS. When this information is included, the controller and flight crew procedures should include message formats and intended use to avoid misunderstanding or confusion with the operational procedures.* Example 1: REQ TA PACIFIC 1. Example 2: REQ TA PACIFIC 1 M.83 Example 3: REQ TA 280KIAS
Controller (Step 2)	a) If the situation permits, the controller should uplink the TA clearance via CPDLC using: UM 169al [TA designator] UM 83 AT [position] CLEARED [route clearance] UM 19 MAINTAIN [level] Example: The controller uses the name PACIFIC 1 TA, which is unambiguous for the specific route and vertical and speed constraints. The route clearance includes lateral route, crossing restrictions, approach procedure, and runway assignment, and FL370 is the currently assigned flight level. PACIFIC 1 TA AT CINNY CLEARED [Route Clearance] MAINTAIN FL370.
	b) The controller may issue a vertical clearance after delivery of the tailored arrival clearance, without interfering with the TA clearance. In such cases, the controller should reissue the TA clearance to ensure no ambiguity.

Who	Procedures
Flight crew (Step 3)	a) The flight crew should load the TA clearance into the FMS and review it. If acceptable, the flight crew should activate the route in the FMS and downlink DM 0 WILCO. If unacceptable, the flight crew should downlink DM 1 UNABLE.
	b) The flight crew should select a descent speed schedule of 280kts (+/- 10kts) above 10,000ft. *Note 2.— This procedure provides additional descent profile predictability to the controllers, increasing the potential for the controllers to allow a full TA during congested periods when increased predictability is required due to other traffic. This function will eventually be replaced by ground automation which advises the optimum speed for the descent, based on the entire airspace situation at the expected time of the arrival.*
	c) If possible, the flight crew should request FMC waypoint wind and temperature data from AOC.
AOC (Step 4)	AOC should uplink cruise and descent winds to the arriving aircraft to optimize the FMS-calculated profile for the most predictable execution of that profile.
Controller (Step 5)	The controller should transfer control to the next sector and terminate CPDLC and ADS-C connections. *Note 3.— The transferring sector either manually or automatically advises the next sector that the aircraft is on a particular TA.*
Flight crew (Step 6)	The flight crew should initiate contact with the next sector on the voice communication channel with, [call sign] [TA designator] TAILORED ARRIVAL. [level].

Who	Procedures
Controller (Step 7)	a) The controller should advise [call sign] MAINTAIN [level]. *<u>Note 4</u>.— The controller has access to the uplinked lateral routing and currently assigned level/altitude on the flight strip through ATC interfacility coordination.*
	b) If the controller needs to add speed control, e.g. to increase the potential for issuing a TA clearance, the controller should advise the flight crew as soon as possible to expect a restriction. Example: [call sign] EXPECT TO DESCEND AT 260 KTS
	c) When appropriate, the controller should issue a descent clearance along the cleared route, using [TA designator] TAILORED ARRIVAL. [dest/area] ALTIMETER/QNH [nnnn] and, as necessary, include a speed or vertical restriction. Example 1: The controller does not issue a speed or vertical restriction. [call sign] DESCEND VIA PACIFIC 1 TAILORED ARRIVAL. KSFO ALTIMETER 29.92. Example 2: The controller issues a speed restriction. [call sign] DESCEND VIA PACIFIC 1 TAILORED ARRIVAL. DO NOT EXCEED 260KTS. KSFO ALTIMETER 29.92. Example 3: The controller issues a vertical restriction. [call sign] DESCEND VIA THE CATALINA 1 TAILORED ARRIVAL BUT AFTER SLI. MAINTAIN [level/altitude].
	d) The controller should transfer control to the next controller.
Flight crew (Step 8)	The flight crew should initiate contact with the next controller using: [call sign] PASSING FLIGHT LEVEL [FLnnn]/ALTITUDE [nn,nnn feet] ON THE [TA designator] TAILORED ARRIVAL. [ATIS code]. *<u>Note 5</u>.— Subsequent exchanges on different frequencies with the same ATSU do not require the flight crew to state the passing level/altitude.*

Who	Procedures
Controller (Step 9)	If continuation of the TA profile is acceptable to the approach controller, the controller should clear the aircraft for the approach by stating: a) [call sign] AFTER [fix name] CLEARED [approach name]; or b) [call sign] DESCEND VIA [TA designator] TAILORED ARRIVAL. CROSS [fixname] AT OR ABOVE [level/altitude]. CLEARED [approach name]; or c) DESCEND VIA THE [TA designator] TAILORED ARRIVAL. EXPECT [runway or procedure name]. Example 1: [call sign] AFTER MENLO CLEARED ILS RW28L APPROACH. Example 2: [call sign] DESCEND VIA THE FLORIDA 8 (or 9) TAILORED ARRIVAL, CROSS PABOY AT OR ABOVE 3000FT. CLEARED LOCALIZER DME RUNWAY 8L APPROACH. Example 3: [call sign] DESCEND VIA THE FLORIDA 9 TAILORED ARRIVAL. EXPECT RUNWAY 09.
Flight crew (Step 10)	If all conditions are acceptable, the flight crew should execute the cleared FMS-directed profile and apply standard approach and landing procedures.
Controller (Step 11)	a) At any time, the controller may issue alternative level/altitude, routing, or vectors and discontinue the TA to best suit traffic conditions. When the controller discontinues the TA, the controller should provide instructions including an assigned level/altitude to the flight crew. *Note 6.— The controller must include an assigned level/altitude because the flight crew does not know the minimum vectoring level/altitude nor do they know the level/altitude of other traffic.*
	b) The controller may clear the aircraft back onto the TA by stating: [call sign] CLEARED DIRECT [Waypoint on TA]. RESUME THE [TA designator] TAILORED ARRIVAL.

Chapter 7. State aircraft data link operations

7.1 General

7.1.1 The data link and voice communication requirements for CNS/ATM are being defined by international, regional, and national civil aviation authorities and are based on use of commercial communication systems. In the oceanic and remote regions, data link has seen increased use and will eventually replace voice as the primary means of communication. The military has unique requirements insofar as using CPDLC. These requirements were never considered when the CPDLC message set was being developed.

7.1.2 Many air and maritime air forces have the capability to conduct air-to-air refueling (AAR) operations. Although detailed procedures are dependent on aircraft type, mode of employment and national requirements, there is sufficient commonality for standard procedures to be developed to enhance operational interoperability. Many of these air and maritime air forces are making the transition to aeronautical data links and the use of controller pilot data link communications (CPDLC) and automatic dependent surveillance - contract (ADS-C).

7.1.3 The procedures outlined below describe the communications to be utilized by military aircraft in the attempt to promote harmonization in CPDLC and ADS-C procedures. These procedures have been developed utilizing a combination of existing CPDLC message elements and standardized free text. Standardized free text messages have been created to support these military operations in the attempt to avoid the general use of free text messages and for overall standardization. To the maximum extent possible, data link capable aircraft should adhere to procedural guidelines provided in Chapter 5 and Chapter 6.

7.1.4 The aim of this chapter is to provide a reference document covering military procedures to be used in an aeronautical data link environment. This chapter will provide guidance for the flight crew and the air traffic service provider (ATSP) to promote harmonized military AAR operations in an aeronautical data link environment and lead to a better understanding of AAR procedures and terminology.

7.2 Military assumes responsibility for separation of aircraft (MARSA)

7.2.1 Prior to commencing AAR or maneuvers with receiver aircraft, the tanker will notify ATC that the military assumes responsibility for separation of aircraft (MARSA). The tanker will use the term, MARSA, to notify ATC that the tanker and receiver aircraft are accepting the responsibility for their actions within the AAR track and the tanker is the lead of the formation. ATC controls all other traffic to preclude conflicts between civil and military traffic involved in the AAR while at the same time still controlling the tanker and receiver. The actual refueling commences at the air refueling control point (ARCP) and continues as the aircraft proceed down the refueling track. Normally, the refueling is completed prior to the aircraft reaching the air refueling exit point (AREX) point. At AREX, both aircraft need to receive ATC clearances to continue on their filed routing.

Table 7-1. MARSA initiation and termination procedures

Who	**Procedures**
Flight crew (Tanker) (Step 1)	a) The tanker can initiate MARSA after it receives clearance for the block level/altitude and, optionally, reports passing the ARCP. The tanker informs the controller that the flight crew is accepting MARSA procedures with the receiver. DM 67z ACCEPT MARSA WITH [call sign(s) of receiver aircraft] where [receiver aircraft call sign(s)] exactly matches the filed flight plan(s) for the receiver aircraft.
	b) The tanker performs MARSA with receiver aircraft.
Flight crew (Tanker and Receiver) (Step 2)	To terminate MARSA, each aircraft should first notify the controller of their assigned level/altitude. DM 37 **MAINTAINING [level]** *or LEVEL [altitude]*
Controller (to Tanker) (Step 3)	Then, when the controller receives notification that each aircraft is at its assigned level/altitude, the controller sends a free text message to terminate MARSA between the tanker and the receiver aircraft. UM 169aq MARSA TERMINATED WITH [call sign(s) of receiver aircraft] MARSA is terminated when the tanker receives notification.

7.3 Air-to-air refueling (AAR)

7.3.1 Air-to-air refueling is normally accomplished between 10,000 and 28,000 feet depending on receiver type, requiring both aircraft to descent for refueling.

7.3.2 Refueling tracks are numbered and depicted on charts in continental airspace and a few are depicted in oceanic and remote airspace. Oceanic refueling may also be conducted on non-designated tracks with an altitude reservation (ALTRV). In both cases, the refueling procedure is part of the filed flight plan. The flight plan always includes time, requested block level/altitude, air refueling control point (ARCP), air refueling initial point (ARIP), air refueling exit point (AREX) and intermediate refueling track points. If the procedure is depicted, its designation (ARxxx) is sufficient to define the track. In the oceanic environment, a refueling pattern may be part of an existing ALTRV.

7.3.3 During the refueling phase all aircraft operate within the block level/altitude and fly the route along the refueling track in the flight plan. An ADS contract may be set with any aircraft but it is only necessary with the lead tanker and needs to correspond with a filed flight plan. Additionally, any other CPDLC report (i.e. UM 130 REPORT PASSING [position], etc.) may be requested of the tanker in order to track the progress of the flight. The aircraft may or may not remain in a single formation in the block level/altitude for the remainder of the flight. There are no special CPDLC messages developed during this phase.

7.3.4 A typical air-refueling pattern is illustrated in Figure 7-1. The light green track represents the tanker's intended route to the ARCP. The light blue track is the receiver's intended route. Both aircraft file separate flight plans showing the specific aerial refueling locations. The dark blue track is the tanker's orbit and rendezvous flight paths with the dark green track depicting the AAR track. Three or more points can define the AAR track. The ARIP is the point where the receiver enters the AAR track. The ARCP is the reference point for the holding pattern where the tanker awaits the receiver. The AAR track is between the ARCP and the AREX.

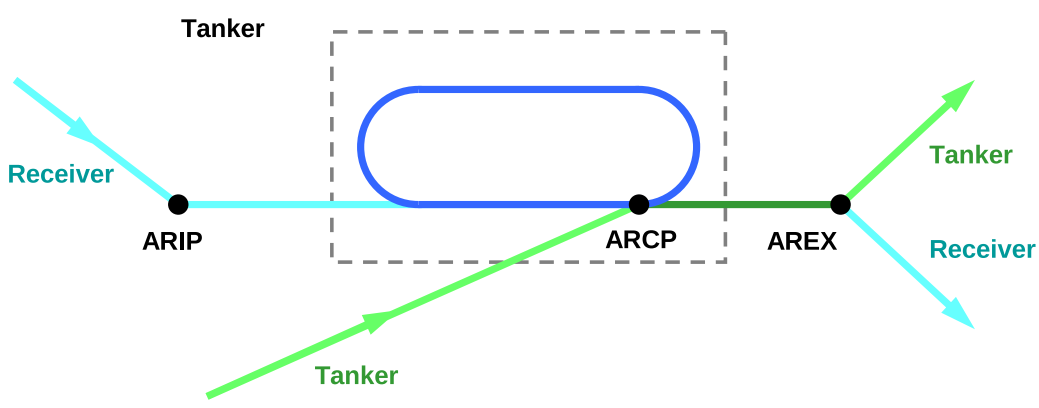


Figure 7-1. Air refueling pattern

Table 7-2. Air refueling data link procedures

Who	Procedures
Flight crew (Tanker) (Step 1)	At approximately 10 minutes from the ARCP, the tanker requests a clearance to delay at the ARCP until the rendezvous with the receiver and request a block level/altitude for air refueling. DM 25 REQUEST CLEARANCE DM 67w TO DELAY FOR AIR REFUEL AT [position] UNTIL [time] DM 7 REQUEST BLOCK [level] TO [level] Where: [position] is the ARCP as filed in the tanker's flight plan. [time] is the time the tanker expects to pass the ARCP and commence refueling along the refueling track. It is also the end of the delay time.

Who	Procedures
Controller (to Tanker) (Step 2)	a) The controller clears the tanker to delay at the ARCP, as requested. UM 169ar CLEARED TO DELAY FOR AIR REFUEL AT [position] UNTIL [time] *Note.— This message may need to be appended with a "free text" message in the event the controller needs to specify a specific area of operations or if the area to delay is different than the filed flight plan.*
	b) If block level/altitude is available, the controller issues one of the following instructions: UM 31 CLIMB TO AND MAINTAIN BLOCK [level] TO [level]; or UM 32 DESCEND TO AND MAINTAIN BLOCK [level] TO [level]; or UM 30 MAINTAIN BLOCK [level] TO [level]. Optionally, the controller may append the following: UM 180 REPORT REACHING BLOCK [level] TO [level]; and/or UM 130 REPORT PASSING [position]
	c) If the block level/altitude clearance is not available, the controller issues the following: UM 0 UNABLE UM 166 DUE TO TRAFFIC Optionally, the controller may append the following: UM 19 MAINTAIN [level], then any one of the following UM 9 or UM 10 EXPECT DESCENT AT [position/time]; or UM 7 or UM 8 EXPECT CLIMB AT [position/time]. Optionally, the controller may request a report. UM 130 REPORT PASSING [position].
Flight crew (Tanker) (Step 3)	The tanker responds to the controller instructions in accordance with the guidance provided in paragraph 2.2.4.4. DM 0 WILCO; DM 1 UNABLE; DM 3 ROGER; or DM 2 STANDBY.

Who	Procedures
Flight crew (Tanker) (Step 4)	If ATC has instructed the aircraft to report passing the ARCP, then when the tanker crosses the ARCP, the flight crew notifies the controller that it has crossed the ARCP and has entered the air-refueling orbit. DM 31 PASSING [position]
Controller (to Tanker) (Step 5)	If block level/altitude was NOT previously available, when traffic permits, the controller issues the block level/altitude clearance for the tanker. UM 31 CLIMB TO AND MAINTAIN BLOCK [level] TO [level]; or UM 32 DESCEND TO AND MAINTAIN BLOCK [level] TO [level]; or UM 30 MAINTAIN BLOCK [level] TO [level]. Optionally, the controller may append the following: UM 180 REPORT REACHING BLOCK [level] TO [level].
Flight crew (Tanker) (Step 6)	The tanker responds to the controller instructions in accordance with the guidance provided in paragraph 2.2.4.4. DM 0 WILCO; DM 1 UNABLE; DM 3 ROGER; or DM 2 STANDBY.
Flight crew (Tanker) (Step 7)	When the receiver approaches the ARIP, the tanker informs the controller that the flight crew is accepting MARSA procedures with the receiver. DM 67z ACCEPT MARSA WITH [call sign(s) of receiver aircraft] where [call sign(s) of receiver aircraft] exactly matches the filed flight plan(s) for the receiver aircraft.
Flight crew (Receiver(s)) (Step 8)	Prior to entering the ARIP – ARCP track, each receiver aircraft requests a level/altitude change to conduct refueling. DM 7 REQUEST BLOCK [level] TO [level]

Who	Procedures
Controller (to Receiver(s)) (Step 9)	a) If the controller has received the MARSA message from the tanker, the controller clears the receiver(s) to operate in the block level/altitude required for refueling. *Note.— If the controller did not receive the MARSA message from the tanker, the controller would UNABLE any requests from the receiver(s) until MARSA could be confirmed.* UM 31 CLIMB TO AND MAINTAIN BLOCK [level] TO [level]; or UM 32 DESCEND TO AND MAINTAIN BLOCK [level] TO [level]; or UM 30 MAINTAIN BLOCK [level] TO [level]; and UM 169as CLEARED TO CONDUCT REFUELING. Optionally, the controller may append the following: UM 180 REPORT REACHING BLOCK [level] TO [level].
Controller (to Tanker)	b) The controller clears the tanker for refueling. UM 169 CLEARED TO CONDUCT REFUELING.
Flight crew (Tanker and Receiver) (Step 10)	The tanker and receiver respond to the controller instructions in accordance with the guidance provided in paragraph 2.2.4.4. DM 0 WILCO; DM 1 UNABLE; DM 3 ROGER; or DM 2 STANDBY.
Flight crew (Tanker and Receiver) (Step 11)	When the tanker is commencing the rendezvous with the receiver, each aircraft sends the following: DM 11 AT [position] REQUEST CLIMB TO [level]; or DM 12 AT [position] REQUEST DESCENT TO [level]; Where: [position] is the EXIT point; and [level] is the requested level for each aircraft after refueling is complete.
Flight crew (Tanker) (Step 12)	When approaching the end of refueling, the tanker notifies the controller when to expect the end of refueling. DM 67x EXPECT END OF REFUEL AT [time/position].

Who	Procedures
Controller (to Tanker and Receiver) (Step 13)	The controller issues instructions to assign different flight levels/altitudes to each of the aircraft upon completion of refueling. UM 164 WHEN READY; and UM 19 MAINTAIN [level]; and UM 129 **REPORT MAINTAINING [level]** *or REPORT LEVEL [altitude]* *Note.— Climb or descent clearances may be issued as appropriate.*
Flight crew (Tanker and Receiver) (Step 14)	a) The tanker and receiver respond to the controller instructions in accordance with the guidance provided in paragraph 2.2.4.4. DM 0 WILCO; DM 1 UNABLE; DM 3 ROGER; or DM 2 STANDBY.
	b) When the aircraft is maintaining the assigned level, each aircraft notifies the controller. DM 37 **MAINTAINING [level]** *or LEVEL [altitude]*
Controller (to Tanker) (Step 15)	When the controller receives notification that each aircraft is at its assigned level/altitude, the controller sends a free text message to terminate MARSA between the tanker and the receiver aircraft. UM 169aq MARSA TERMINATED WITH [call sign(s) of receiver aircraft]

7.4 Formation flight data link procedures

7.4.1 Formation flying in a standard formation is usually one in which a proximity of no more than 1 mile laterally or longitudinally and within 100 feet vertically from the flight leader is maintained by each aircraft. Non-standard formations are those operating under conditions other than standard formation dimensions that the flight leader has requested and air traffic control (ATC) has approved, or when operating within an authorized ALTRV.

7.4.2 For each flight plan, the lead FANS 1/A aircraft will initiate an AFN logon at the correct time (refer to paragraph 5.2.2). Once in formation, only the lead aircraft will make position reports in accordance paragraph 5.6. Use CPDLC standard messages for level/altitude requests, routing requests (if different from what was filed), and speed or ETA requests with ATC to effect any en-route changes.

7.4.3 In the event a formation wants to break-up the formation or depart an ALTRV the aircraft desiring to break off of the formation will coordinate their departure a minimum of ten (10) minutes prior to separation with appropriate requests, and the following data link procedures will be used. Air traffic control will need separate flight plans for each flight in the event that the formation splits.

Table 7-3. Single aircraft or formation joining an ALTRV data link procedures

Who	Procedures
Flight crew	When a single aircraft or formation is joining an ALTRV, the flight crew notifies the controller of its intention to join the formation. DM 67y JOINING ALTRV [ALTRV designator] AT [time/position] Example: JOINING ALTRV CW413 AT HEMLO or JOINING ALTRV CW413 AT 1530Z

Table 7-4. Formation break-up or departure from ALTRV data link procedures

Who	Procedures
Controller	ATC responds to the request. UM 74 PROCEED DIRECT TO [position]; or UM 76 AT [time] PROCEED DIRECT TO [position];or UM 77 AT [position] PROCEED DIRECT TO [position]; or UM 79 CLEARED TO [position] VIA [route clearance]; or UM 80 CLEARED [route clearance]; or UM 83 AT [position] CLEARED [route clearance]
Flight crew	The flight crew responds to the controller instructions in accordance with the guidance provided in paragraph 2.2.4.4. DM 0 WILCO; DM 1 UNABLE; DM 3 ROGER; or DM 2 STANDBY.
Flight crew or Controller	The flight crew may further request desired level/altitude and the controller would respond with the appropriate instructions.

7.5 ADS-C reports

7.5.1 If suitably equipped, State aircraft should ensure ADS-C is armed because ADS contracts may be established by ATC. ATC will establish ADS contracts with the lead aircraft as identified in the filed flight plan.

Appendix A CPDLC message elements and standardized free text messages

This appendix contains the CPDLC message elements and standardized and preformatted free text messages for the FANS 1/A, ATN B1, and ATN B1-FANS 1/A data link systems described in paragraph 2.1.1. The CPDLC message elements are based on ICAO Doc 4444, 15th Edition.

- Section A.1 provides a CPDLC message element response requirements key;
- Section A.2 provides the CPDLC uplink message elements and intended uses;
- Section A.3 provides the CPDLC downlink message elements; and
- Section A.4 provides CPDLC standardized free text messages.

The following guidelines apply:

a) Normal text is taken from ICAO Doc 4444, e.g. message response key or message intent/use, and represents the global baseline. *Italic text* supplements the ICAO Doc 4444 guideline either as a *Note* or specific to *FANS 1/A*, *ATN B1*, or *ATN B1-FANS 1/A* data link system.

b) In cases where there is a choice for the message element or the response attribute, the first choice that appears in the row for that message element is shown in **bold text** and indicates the preferred choice, per ICAO Doc 4444, and should be used for new implementations. The second choice is shown in *italic text* and indicates legacy implementations, e.g. FANS 1/A, that are considered acceptable.

c) The following variables are considered operationally interchangeable in this document respecting range and resolution variations as defined in interoperability standards:

ICAO Doc 4444 variable	**Equivalent FANS 1/A variable**
[level]	[altitude] *(See Note)*
[specified distance] [direction]	[distance offset] [direction]
[departure clearance]	[predeparture clearance]
[unit name]	[icao unit name]
[code]	[beacon code]
[facility designation]	[icao facility designation]
[persons on board]	[remaining souls]

Note.— ICAO Doc 4444 notes that message elements that contain the [level] variable can be specified as either a single level or a vertical range, i.e., block level. **FANS 1/A** *only considers the [level] variable as a single level and uses message elements that are intended exclusively for specifying a vertical range, e.g. UM 30, UM 31, UM 32, UM 180, DM 7, DM 76, DM 77, etc.* **ATN B1** *uses the [level] variable to specify a vertical range and does not use the message elements intended exclusively for specifying a vertical range, except in cases where an ATN B1 ground system provides data link service to FANS 1/A aircraft.*

d) The "Data link system(s)" column indicates which system supports the message element. The cell is shaded green if they are valid messages in the ICAO Doc 4444 message set and red if they are reserved. ***N/A*** in this column indicates that none of the data link systems support the message element.

1) If a data link system supports a message element that is reserved in ICAO Doc 4444, then the cell will be red and the data link system will be highlighted in green. In these cases, the ATSPs and operators should establish procedures or automation to avoid the use of these message elements.

2) In some cases, a data link system supports a message element that is also a valid message element in ICAO Doc 4444, but its use should be avoided due to potential misinterpretation. In these cases, a note has been added to the "Message intent/use" column, and the ATSPs and operators should establish procedures or automation to avoid the use of these message elements.

Note.— The FOREWORD suggests that this guidance material may contain material that may eventually become Standards and Recommended Practices (SARPs), or PANS provisions. In particular, ICAO should strongly consider appropriate changes where experience has shown that valid message elements should be avoided, as indicated in this appendix.

A.1 CPDLC message element response requirements key

Response column	**Description**
	For uplink message
W/U	Response required. Yes Valid responses. WILCO, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR *Note.— WILCO, UNABLE, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY and ERROR will close the uplink message.* *FANS 1/A.— WILCO, UNABLE, STANDBY, ERROR, NOT CURRENT DATA AUTHORITY.*
A/N	Response required. Yes Valid responses. AFFIRM, NEGATIVE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR *Note.— AFFIRM, NEGATIVE, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY and ERROR will close the uplink message.* *FANS 1/A.— AFFIRM, NEGATIVE, STANDBY, ERROR, NOT CURRENT DATA AUTHORITY.*

Response column	**Description**
R	Response required. Yes Valid responses. ROGER, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR *Note.— ROGER, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY and ERROR will close the uplink message.* *FANS 1/A.— ROGER, STANDBY, ERROR, NOT CURRENT DATA AUTHORITY. FANS 1/A aircraft do not have the capability to send UNABLE in response to an uplink message containing message elements with an "R" response attribute. For these aircraft, the flight crew may use alternative means to UNABLE the message. These alternative means will need to be taken into consideration to ensure proper technical and operational closure of the communication transaction.*
Y	Response required. Yes Valid responses: Any CPDLC downlink message, LOGICAL ACKNOWLEDGEMENT (only if required)
N	Response required. No, unless logical acknowledgement required. Valid Responses (only if LOGICAL ACKNOWLEDGEMENT is required). LOGICAL ACKNOWLEDGEMENT, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, ERROR *FANS 1/A.— Defined "Response not required," but not used. Under some circumstances, an ERROR message will also close an uplink message.*
NE	[Not defined in ICAO Doc 4444] *FANS 1/A.— The WILCO, UNABLE, AFFIRM, NEGATIVE, ROGER, and STANDBY responses are not enabled (NE) for flight crew selection. An uplink message with a response attribute NE is considered to be closed even though a response may be required operationally. Under some circumstances, a downlink error message may be linked to an uplink message with a NE attribute.*
	For downlink messages
Y	Response required. Yes Valid responses. Any CPDLC uplink message, LOGICAL ACKNOWLEDGEMENT (only if required).
N	Response required. No, unless logical acknowledgement required. Valid responses (only if LOGICAL ACKNOWLEDGEMENT is required). LOGICAL ACKNOWLEDGEMENT, SERVICE UNAVAILABLE, FLIGHT PLAN NOT HELD, ERROR *FANS 1/A.— Aircraft do not have the capability to receive technical responses to downlink message elements with an "N" response attribute (other than LACK or ERROR for ATN B1 aircraft). In some cases, the response attribute is different between FANS 1/A aircraft and ICAO Doc 4444. As an example, most emergency messages have an "N" response attribute for FANS 1/A whereas ICAO Doc 4444 defines a "Y" response attribute for them. As a consequence, for FANS 1/A aircraft, the ATC will need to use alternative means to acknowledge to the flight crew that an emergency message has been received.*

A.2 CPDLC uplink message elements

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
	Responses/Acknowledgements (uplink)			
UM 0	Indicates that ATC cannot comply with the request.	UNABLE	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 1	Indicates that ATC has received the message and will respond. *Note.— The flight crew is informed that the request is being assessed and there will be a short-term delay (e.g. as appropriate, given the situation, but not to exceed 10 minutes). The exchange is not closed and the request will be responded to when conditions allow.*	STANDBY	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 2	Indicates that ATC has received the request but it has been deferred until later. *Note.— The flight crew is informed that the request is being assessed and a long-term delay can be expected. The exchange is not closed and the request will be responded to when conditions allow.*	REQUEST DEFERRED	**N** *Or* *NE*	FANS 1/A
UM 3	Indicates that ATC has received and understood the message.	ROGER	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 4	Yes.	AFFIRM	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 5	No	NEGATIVE	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 235	Notification of receipt of unlawful interference message.	ROGER 7500	N	N/A (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 211	Indicates that the ATC has received the request and has passed it to the next control authority. *FANS 1/A-ATN.— Uses FANS 1/A free text.*	REQUEST FORWARDED	N	ATN B1
UM 218	Indicates to the pilot that the request has already been received on the ground.	REQUEST ALREADY RECEIVED	N	N/A
UM 237	Indicates that the request cannot be responded to by the current unit and that it should be requested from the next unit. *FANS 1/A-ATN.— Uses FANS 1/A free text.*	REQUEST AGAIN WITH NEXT UNIT	N	ATN B1
	Vertical Clearances (uplink)			
UM 6	Notification that a level change instruction should be expected. *Note.— Avoid use of this message element due to potential misinterpretation.*	EXPECT [level]	R	FANS 1/A
UM 7	Notification that an instruction should be expected for the aircraft to commence climb at the specified time. *Note.— The controller should only use this message to respond to a flight crew request, e.g. WHEN CAN WE EXPECT …*	EXPECT CLIMB AT [time]	R	FANS 1/A
UM 8	Notification that an instruction should be expected for the aircraft to commence climb at the specified position. *Note.— The controller should only use this message to respond to a flight crew request, e.g. WHEN CAN WE EXPECT …*	EXPECT CLIMB AT [position]	R	FANS 1/A
UM 9	Notification that an instruction should be expected for the aircraft to commence descent at the specified time. *Note.— The controller should only use this message to respond to a flight crew request, e.g. WHEN CAN WE EXPECT …*	EXPECT DESCENT AT [time]	R	FANS 1/A
UM 10	Notification that an instruction should be expected for the aircraft to commence descent at the specified position. *Note.— The controller should only use this message to respond to a flight crew request, e.g. WHEN CAN WE EXPECT …*	EXPECT DESCENT AT [position]	R	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 11	Notification that an instruction should be expected for the aircraft to commence cruise climb at the specified time. *Note.— The controller should only use this message to respond to a flight crew request, e.g. WHEN CAN WE EXPECT …*	EXPECT CRUISE CLIMB AT [time]	R	FANS 1/A
UM 12	Notification that an instruction should be expected for the aircraft to commence cruise climb at the specified position. *Note.— The controller should only use this message to respond to a flight crew request, e.g. WHEN CAN WE EXPECT …*	EXPECT CRUISE CLIMB AT [position]	R	FANS 1/A
UM 13	(Reserved) *Note.— Avoid use of this message element, AT [time] EXPECT CLIMB TO [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 14	(Reserved) *Note.— Avoid use of this message element, AT [position] EXPECT CLIMB TO [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 15	(Reserved) *Note.— Avoid use of this message element, AT [time] EXPECT DESCENT TO [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 16	(Reserved) *Note.— Avoid use of this message element, AT [position] EXPECT DESCENT TO [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 17	(Reserved) *Note.— Avoid use of this message element, AT [time] EXPECT CRUISE CLIMB TO [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 18	(Reserved) *Note.— Avoid use of this message element, AT [position] EXPECT CRUISE CLIMB TO [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 19	Instruction to maintain the specified level.	MAINTAIN [level]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 20	Instruction that a climb to a specified level is to commence and once reached the specified level is to be maintained.	**CLIMB TO [level]** Or *CLIMB TO AND MAINTAIN [altitude]*	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 21	Instruction that at the specified time a climb to the specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that NOT BEFORE the specified time, a climb to the specified level is to commence and once reached the specified level is to be maintained.* *Note 2.— Precede this message element with UM 19 MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [time] CLIMB TO [level]** Or *AT [time] CLIMB TO AND MAINTAIN [altitude]*	W/U	FANS 1/A
UM 22	Instruction that at the specified position a climb to the specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that AFTER PASSING the specified position, a climb to the specified level is to commence and once reached the specified level is to be maintained.* *Note 2.— Precede this message element with UM 19 MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [position] CLIMB TO [level]** Or *AT [position] CLIMB TO AND MAINTAIN [altitude]*	W/U	FANS 1/A
UM 185	(Reserved)	N/A	W/U	N/A
UM 23	Instruction that a descent to a specified level is to commence and once reached the specified level is to be maintained.	**DESCEND TO [level]** Or *DESCEND TO AND MAINTAIN [altitude]*	W/U	FANS 1/A ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 24	Instruction that at a specified time a descent to a specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that NOT BEFORE the specified time, a descent to the specified level is to commence, and once reached, the specified level is to be maintained.* *Note 2.— Precede this message element with UM 19 MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [time] DESCEND TO [level]** Or *AT [time] DESCEND TO AND MAINTAIN [altitude]*	W/U	FANS 1/A
UM 25	Instruction that at the specified position a descent to the specified level is to commence and once reached the specified level is to be maintained. *Note 1.— Instruction that AFTER PASSING the specified position, a descent to the specified level is to commence and once reached the specified level is to be maintained.* *Note 2.— Precede this message element with UM 19 MAINTAIN [level], to prevent the premature execution of the instruction.*	**AT [position] DESCEND TO [level]** Or *AT [position] DESCEND TO AND MAINTAIN [altitude]*	W/U	FANS 1/A
UM 186	(Reserved)	N/A	W/U	N/A
UM 26	Instruction that a climb is to commence at a rate such that the specified level is reached at or before the specified time. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note. — Instruction that a climb is to commence at a rate such that the specified level is reached NOT LATER THAN the specified time.*	CLIMB TO REACH [level] BY [time]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 27	Instruction that a climb is to commence at a rate such that the specified level is reached at or before the specified position. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note.— Instruction that a climb is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.*	CLIMB TO REACH [level] BY [position]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 28	Instruction that a descent is to commence at a rate such that the specified level is reached at or before the specified time. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note.— Instruction that a descent is to commence at a rate such that the specified level is reached NOT LATER THAN the specified time.*	DESCEND TO REACH [level] BY [time]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 29	Instruction that a descent is to commence at a rate such that the specified level is reached at or before the specified position. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *Note.— Instruction that a descent is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.*	DESCEND TO REACH [level] BY [position]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 192	Instruction that a change of level is to continue, but at a rate such that the specified level is reached at or before the specified time.	REACH [level] BY [time]	W/U	N/A
UM 209	Instruction that a change of level is to continue, but at a rate such that the specified level is reached at or before the specified position.	REACH [level] BY [position]	W/U	N/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 30	Instruction that a level within the defined vertical range specified is to be maintained. *FANS 1/A - ATN B1.— FANS 1/A aircraft only. ATN B1 aircraft accepts UM 19 MAINTAIN [level], where [level] is a vertical range.*	MAINTAIN BLOCK [level] TO [level]	W/U	FANS 1/A FANS 1/A-ATN
UM 31	Instruction that a climb to a level within the vertical range defined is to commence. *FANS 1/A - ATN B1.— FANS 1/A aircraft only. ATN B1 aircraft accepts UM 20 CLIMB TO [level], where [level] is a vertical range.*	CLIMB TO AND MAINTAIN BLOCK [level] TO [level]	W/U	FANS 1/A FANS 1/A-ATN
UM 32	Instruction that a descent to a level within the vertical range defined is to commence. *FANS 1/A - ATN B1.— FANS 1/A aircraft only. ATN B1 aircraft accepts UM 23 DESCEND TO [level], where [level] is a vertical range.*	DESCEND TO AND MAINTAIN BLOCK [level] TO [level]	W/U	FANS 1/A FANS 1/A-ATN
UM 34	Instruction that a cruise climb to the specified level is to commence and continue and, once reached the specified level is to be maintained. *Note.— Avoid use of this message element due to potential misinterpretation.*	CRUISE CLIMB TO [level]	W/U	FANS 1/A
UM 35	Instruction to be used in conjunction with an associated level instruction indicating that a cruise climb can commence once above the specified level. *Note.— Avoid use of this message element due to potential misinterpretation.*	**WHEN ABOVE (level) COMMENCE CRUISE CLIMB** Or *CRUISE CLIMB ABOVE [level]*	W/U	FANS 1/A
UM 219	Instruction to stop the climb at the specified level and, once reached, this level is to be maintained. The specified level will be below the previously assigned level.	STOP CLIMB AT [level]	W/U	N/A (Urgent)
UM 220	Instruction to stop the descent at the specified level and, once reached, this level is to be maintained. The specified level will be above the previously assigned level.	STOP DESCENT AT [level]	W/U	N/A (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 36	Instruction that the climb to the specified level should be made at the aircraft's best rate.	EXPEDITE CLIMB TO [level]	W/U	FANS 1/A
UM 37	Instruction that the descent to the specified level should be made at the aircraft's best rate.	EXPEDITE DESCENT TO[level]	W/U	FANS 1/A
UM 38	Urgent instruction to immediately climb to the specified level and, once reached, the specified level is to be maintained.	IMMEDIATELY CLIMB TO [level]	W/U	FANS 1/A (Distress)
UM 39	Urgent instruction to immediately descend to the specified level and, once reached, the specified level is to be maintained.	IMMEDIATELY DESCEND TO [level]	W/U	FANS 1/A (Distress)
UM 40	(Reserved) *<u>Note</u>.— Avoid use of this message element, IMMEDIATELY STOP CLIMB AT [altitude], as it is reserved in ICAO Doc 4444.*	(Not defined)	**Y** *Or* *W/U*	FANS 1/A
UM 41	(Reserved) *<u>Note</u>.— Avoid use of this message element, IMMEDIATELY STOP DESCENT AT [altitude], as it is reserved in ICAO Doc 4444.*	(Not defined)	**Y** *Or* *W/U*	FANS 1/A
UM 171	Instruction to climb at not less than the specified rate.	CLIMB AT [vertical rate] MINIMUM	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 172	Instruction to climb at not above the specified rate.	CLIMB AT [vertical rate] MAXIMUM	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 173	Instruction to descend at not less than the specified rate.	DESCEND AT [vertical rate] MINIMUM	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 174	Instruction to descend at not above the specified rate.	DESCEND AT [vertical rate] MAXIMUM	W/U	FANS 1/A ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 33	(Reserved) *<u>Note</u>.— Avoid use of this message element, CRUISE [altitude], as it is reserved in ICAO Doc 4444.*	(Not defined)	**Y** *Or* *W/U*	FANS 1/A
	Crossing Constraints (uplink)			
UM 42	(Reserved) *<u>Note</u>.— Avoid use of this message element, EXPECT TO CROSS [position] AT [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 43	(Reserved) *<u>Note</u>.— Avoid use of this message element, EXPECT TO CROSS [position] AT OR ABOVE [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 44	(Reserved) *<u>Note</u>.— Avoid use of this message element, EXPECT TO CROSS [position] AT OR BELOW [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 45	(Reserved) *<u>Note</u>.— Avoid use of this message element, EXPECT TO CROSS [position] AT AND MAINTAIN [altitude], as it is reserved in ICAO Doc 4444.*	N/A	R	FANS 1/A
UM 46	Instruction that the specified position is to be crossed at the specified level. This may require the aircraft to modify its climb or descent profile.	CROSS [position] AT [level]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 47	Instruction that the specified position is to be crossed at or above the specified level.	CROSS [position] AT OR ABOVE [level]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 48	Instruction that the specified position is to be crossed at or below the specified level.	CROSS [position] AT OR BELOW [level]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 49	Instruction that the specified position is to be crossed at the specified level and that level is to be maintained when reached.	CROSS [position] AT AND MAINTAIN [level]	W/U	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 50	Instruction that the specified position is to be crossed at a level between the specified levels.	CROSS [position] BETWEEN [level] AND [level]	W/U	FANS 1/A
UM 51	Instruction that the specified position is to be crossed at the specified time.	CROSS [position] AT [time]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 52	Instruction that the specified position is to be crossed at or before the specified time.	CROSS [position] AT OR BEFORE [time]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 53	Instruction that the specified position is to be crossed at or after the specified time.	CROSS [position] AT OR AFTER [time]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 54	Instruction that the specified position is to be crossed at a time between the specified times.	CROSS [position] BETWEEN [time] AND [time]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 55	Instruction that the specified position is to be crossed at the specified speed and the specified speed is to be maintained until further advised.	CROSS [position] AT [speed]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 56	Instruction that the specified position is to be crossed at a speed equal to or less than the specified speed and the specified speed or less is to be maintained until further advised.	CROSS [position] AT OR LESS THAN [speed]	W/U	FANS 1/A
UM 57	Instruction that the specified position is to be crossed at a speed equal to or greater than the specified speed and the specified speed or greater is to be maintained until further advised.	CROSS [position] AT OR GREATER THAN [speed]	W/U	FANS 1/A
UM 58	Instruction that the specified position is to be crossed at the specified time and the specified level.	CROSS [position] AT [time] AT [level]	W/U	FANS 1/A
UM 59	Instruction that the specified position is to be crossed at or before the specified time and at the specified level.	CROSS [position] AT OR BEFORE [time] AT [level]	W/U	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 60	Instruction that the specified position is to be crossed at or after the specified time and at the specified level.	CROSS [position] AT OR AFTER [time] AT [level]	W/U	FANS 1/A
UM 61	Instruction that the specified position is to be crossed at the specified level and speed, and the level and speed are to be maintained.	CROSS [position] AT AND MAINTAIN [level] AT [speed]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 62	Instruction that at the specified time the specified position is to be crossed at the specified level and the level is to be maintained.	AT [time] CROSS [position] AT AND MAINTAIN [level]	W/U	FANS 1/A
UM 63	Instruction that at the specified time the specified position is to be crossed at the specified level and speed, and the level and speed are to be maintained.	AT [time] CROSS [position] AT AND MAINTAIN [level] AT [speed]	W/U	FANS 1/A
	Lateral Offsets (uplink)			
UM 64	Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction.	OFFSET [specified distance] [direction] OF ROUTE	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 65	Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction and commencing at the specified position.	AT [position] OFFSET [specified distance] [direction] OF ROUTE	W/U	FANS 1/A
UM 66	Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction and commencing at the specified time.	AT [time] OFFSET [specified distance] [direction] OF ROUTE	W/U	FANS 1/A
UM 67	Instruction that the cleared flight route is to be rejoined.	PROCEED BACK ON ROUTE	W/U	FANS 1/A
UM 68	Instruction that the cleared flight route is to be rejoined at or before the specified position.	REJOIN ROUTE BY [position]	W/U	FANS 1/A
UM 69	Instruction that the cleared flight route is to be rejoined at or before the specified time.	REJOIN ROUTE BY [time]	W/U	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 70	Notification that a clearance may be issued to enable the aircraft to rejoin the cleared route at or before the specified position.	EXPECT BACK ON ROUTE BY [position]	R	FANS 1/A
UM 71	Notification that a clearance may be issued to enable the aircraft to rejoin the cleared route at or before the specified time.	EXPECT BACK ON ROUTE BY [time]	R	FANS 1/A
UM 72	Instruction to resume own navigation following a period of tracking or heading clearances. May be used in conjunction with an instruction on how or where to rejoin the cleared route.	RESUME OWN NAVIGATION	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
	Route Modifications (uplink)			
UM 73	Instruction to be followed from departure until the specified clearance limit.	[departure clearance]	W/U	FANS 1/A
UM 74	Instruction to proceed directly from its present position to the specified position.	PROCEED DIRECT TO [position]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 75	Instruction to proceed, when able, directly to the specified position.	WHEN ABLE PROCEED DIRECT TO [position]	W/U	FANS 1/A
UM 76	Instruction to proceed, at the specified time, directly to the specified position.	AT [time] PROCEED DIRECT TO [position]	W/U	FANS 1/A
UM 77	Instruction to proceed, at the specified position, directly to the next specified position.	AT [position] PROCEED DIRECT TO [position]	W/U	FANS 1/A
UM 78	Instruction to proceed, upon reaching the specified level, directly to the specified position.	AT [level] PROCEED DIRECT TO [position]	W/U	FANS 1/A
UM 79	Instruction to proceed to the specified position via the specified route.	CLEARED TO [position] VIA [route clearance]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 80	Instruction to proceed via the specified route.	CLEARED [route clearance]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 81	Instruction to proceed in accordance with the specified procedure.	CLEARED [procedure name]	W/U	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 236	Instruction to leave controlled airspace.	LEAVE CONTROLLED AIRSPACE	W/U	N/A
UM 82	Approval to deviate up to the specified distance from the cleared route in the specified direction.	CLEARED TO DEVIATE UP TO [specified distance] [direction] OF ROUTE	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 83	Instruction to proceed from the specified position via the specified route.	AT [position] CLEARED [route clearance]	W/U	FANS 1/A
UM 84	Instruction to proceed from the specified position via the specified procedure.	AT [position] CLEARED [procedure name]	W/U	FANS 1/A
UM 85	Notification that a clearance to fly on the specified route may be issued. *Note.— Avoid use of this message element due to potential misinterpretation.*	EXPECT [route clearance]	R	FANS 1/A
UM 86	Notification that a clearance to fly on the specified route from the specified position may be issued. *Note.— Avoid use of this message element due to potential misinterpretation.*	AT [position] EXPECT [route clearance]	R	FANS 1/A
UM 87	Notification that a clearance to fly directly to the specified position may be issued. *Note.— Avoid use of this message element due to potential misinterpretation.*	EXPECT DIRECT TO [position]	R	FANS 1/A
UM 88	Notification that a clearance to fly directly from the first specified position to the next specified position may be issued. *Note.— Avoid use of this message element due to potential misinterpretation.*	AT [position] EXPECT DIRECT TO [position]	R	FANS 1/A
UM 89	Notification that a clearance to fly directly to the specified position commencing at the specified time may be issued. *Note.— Avoid use of this message element due to potential misinterpretation.*	AT [time] EXPECT DIRECT TO [position]	R	FANS 1/A
UM 90	Notification that a clearance to fly directly to the specified position commencing when the specified level is reached may be issued. *Note.— Avoid use of this message element due to potential misinterpretation.*	AT [level] EXPECT DIRECT TO [position]	R	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 91	Instruction to enter a holding pattern with the specified characteristics at the specified position and level.	**HOLD AT [position] MAINTAIN [level] INBOUND TRACK [degrees] [direction] TURNS [leg type]** Or *HOLD AT [position] MAINTAIN [altitude] INBOUND TRACK [degrees][direction] TURN LEG TIME [leg type]*	W/U	FANS 1/A
UM 92	Instruction to enter a holding pattern with the published characteristics at the specified position and level.	HOLD AT [position] AS PUBLISHED MAINTAIN [level]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 93	Notification that an onwards clearance may be issued at the specified time.	EXPECT FURTHER CLEARANCE AT [time]	R	FANS 1/A
UM 94	Instruction to turn left or right as specified on to the specified heading.	TURN [direction] HEADING [degrees]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 95	Instruction to turn left or right as specified on to the specified track.	TURN [direction] GROUND TRACK [degrees]	W/U	FANS 1/A
UM 215	Instruction to turn a specified number of degrees left or right.	TURN [direction] [degrees] DEGREES	W/U	ATN B1 FANS 1/A-ATN
UM 190	Instruction to fly on the specified heading.	FLY HEADING [degrees]	W/U	ATN B1 FANS 1/A-ATN
UM 96	Instruction to continue to fly on the current heading.	**CONTINUE PRESENT HEADING** Or *FLY PRESENT HEADING*	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 97	Instruction to fly on the specified heading from the specified position.	AT [position] FLY HEADING [degrees]	W/U	FANS 1/A
UM 221	Instruction to stop turn at the specified heading prior to reaching the previously assigned heading.	STOP TURN HEADING [degrees]	W/U	N/A (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 98	Instruction to turn immediately left or right as specified on to the specified heading.	IMMEDIATELY TURN [direction] HEADING [degrees]	W/U	FANS 1/A (Distress)
UM 99	Notification that a clearance may be issued for the aircraft to fly the specified procedure.	EXPECT [procedure name]	R	FANS 1/A
	Speed Changes (uplink)			
UM 100	Notification that a speed instruction may be issued to be effective at the specified time.	AT [time] EXPECT [speed]	R	FANS 1/A
UM 101	Notification that a speed instruction may be issued to be effective at the specified position.	AT [position] EXPECT [speed]	R	FANS 1/A
UM 102	Notification that a speed instruction may be issued to be effective at the specified level. *<u>Note</u>.— Avoid use of this message element due to potential misinterpretation.*	AT [level] EXPECT [speed]	R	FANS 1/A
UM 103	Notification that a speed range instruction may be issued to be effective at the specified time. *<u>Note</u>.— Avoid use of this message element due to potential misinterpretation.*	AT [time] EXPECT [speed] TO [speed]	R	FANS 1/A
UM 104	Notification that a speed range instruction may be issued to be effective at the specified position. *<u>Note</u>.— Avoid use of this message element due to potential misinterpretation.*	AT [position] EXPECT [speed] TO [speed]	R	FANS 1/A
UM 105	Notification that a speed range instruction may be issued to be effective at the specified level. *<u>Note</u>.— Avoid use of this message element due to potential misinterpretation.*	AT [level] EXPECT [speed] TO [speed]	R	FANS 1/A
UM 106	Instruction that the specified speed is to be maintained.	MAINTAIN [speed]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 188	Instruction that after passing the specified position the specified speed is to be maintained.	AFTER PASSING [position] MAINTAIN [speed]	W/U	N/A
UM 107	Instruction that the present speed is to be maintained.	MAINTAIN PRESENT SPEED	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 108	Instruction that the specified speed or a greater speed is to be maintained.	MAINTAIN [speed] OR GREATER	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 109	Instruction that the specified speed or a lesser speed is to be maintained.	MAINTAIN [speed] OR LESS	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 110	Instruction that a speed within the specified range is to be maintained.	MAINTAIN [speed] TO [speed]	W/U	FANS 1/A
UM 111	Instruction that the present speed is to be increased to the specified speed and maintained until further advised.	INCREASE SPEED TO [speed]	W/U	FANS 1/A
UM 112	Instruction that the present speed is to be increased to the specified speed or greater, and maintained at or above the specified speed until further advised.	INCREASE SPEED TO [speed] OR GREATER	W/U	FANS 1/A
UM 113	Instruction that the present speed is to be reduced to the specified speed and maintained until further advised.	REDUCE SPEED TO [speed]	W/U	FANS 1/A
UM 114	Instruction that the present speed is to be reduced to the specified speed or less and maintained at or below the specified speed until further advised.	REDUCE SPEED TO [speed] OR LESS	W/U	FANS 1/A
UM 115	Instruction that the specified speed is not to be exceeded.	DO NOT EXCEED [speed]	W/U	FANS 1/A
UM 116	Instruction that the aircraft's normal speed be resumed. The previously issued speed restriction(s) are cancelled.	RESUME NORMAL SPEED	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 189	Instruction that the present speed is to be changed to the specified speed.	ADJUST SPEED TO [speed]	W/U	N/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 222	Notification that the aircraft may keep its preferred speed without restriction. *FANS 1/A-ATN.— Uses UM 169z free text for FANS 1/A aircraft.*	NO SPEED RESTRICTION	R	ATN B1 FANS 1/A-ATN
UM 223	Instruction to reduce present speed to the minimum safe approach speed.	REDUCE TO MINIMUM APPROACH SPEED	W/U	N/A
	Contact/Monitor/Surveillance Requests (uplink)			
UM 117	Instruction that the ATS unit with the specified ATS unit name is to be contacted on the specified frequency.	CONTACT [unit name] [frequency]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 118	Instruction that at the specified position the ATS unit with the specified ATS unit name is to be contacted on the specified frequency.	AT [position] CONTACT [unit name] [frequency]	W/U	FANS 1/A
UM 119	Instruction that at the specified time the ATS unit with the specified ATS unit name is to be contacted on the specified frequency.	AT [time] CONTACT [unit name] [frequency]	W/U	FANS 1/A
UM 238	Notification that the secondary frequency is as specified. *FANS 1/A.— Uses UM 169o free text for FANS 1/A aircraft.*	SECONDARY FREQUENCY [frequency]	R	N/A
UM 120	Instruction that the ATS unit with the specified ATS unit name is to be monitored on the specified frequency. *Note.— The flight crew is not required to check in.*	MONITOR [unit name] [frequency]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 121	Instruction that at the specified position the ATS unit with the specified ATS unit name is to be monitored on the specified frequency. *Note.— The flight crew is not required to check in.*	AT [position] MONITOR [unit name] [frequency]	W/U	FANS 1/A
UM 122	Instruction that at the specified time the ATS unit with the specified ATS unit name is to be monitored on the specified frequency. *Note.— The flight crew is not required to check in.*	AT [time] MONITOR [unit name] [frequency]	W/U	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 123	Instruction that the specified code (SSR code) is to be selected.	SQUAWK [code]	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 124	Instruction that the SSR transponder responses are to be disabled.	STOP SQUAWK	W/U	FANS 1/A
UM 239	Instruction that the ADS-B transmissions are to be terminated.	STOP ADS-B TRANSMISSION	W/U	N/A
UM 125	Instruction that the SSR transponder responses should include level information.	**SQUAWK MODE CHARLIE** Or *SQUAWK ALTITUDE*	W/U	FANS 1/A
UM 240	Instruction that the ADS-B transmissions should include level information.	TRANSMIT ADS-B ALTITUDE	W/U	N/A
UM 126	Instruction that the SSR transponder responses should no longer include level information.	**STOP SQUAWK MODE CHARLIE** Or *STOP ALTITUDE SQUAWK*	W/U	FANS 1/A
UM 241	Instruction that the ADS-B transmissions should no longer include level information.	STOP ADS-B ALTITUDE TRANSMISSION	W/U	N/A
UM 179	Instruction that the 'ident' function on the SSR transponder is to be actuated.	SQUAWK IDENT	W/U	FANS 1/A ATN B1 FANS 1/A-ATN
UM 242	Instruction that the "ident" function of the ADS-B emitter is to be activated. *FANS 1/A.— Uses UM 169ai free text for FANS 1/A aircraft. The free text message is considered acceptable as the intended use does not change the volume of protected airspace (i.e., not a clearance).*	TRANSMIT ADS-B IDENT	**W/U** *Or* *R (free text)*	FANS 1/A
UM 243	Instruction to report when the aircraft is clear of adverse meteorological conditions, and a clearance to regain cleared flight route can be accepted.	REPORT CLEAR OF WEATHER	W/U	N/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
	Report/Confirmation Requests (uplink)			
UM 127	Instruction to report when the aircraft is back on the cleared route.	REPORT BACK ON ROUTE	**W/U** *Or* *R*	FANS 1/A
UM 128	Instruction to report when the aircraft has vacated the specified level that has either been maintained or passed through on climb or descent. *Note.— Either a level that has been maintained, or a level passed through on climb or descent.*	REPORT LEAVING [level]	**W/U** *Or* *R*	FANS 1/A
UM 129	Instruction to report when the aircraft is in level flight at the specified level. *Note.— This message element is only to be used with single altitude clearances.*	**REPORT MAINTAINING [level]** Or *REPORT LEVEL [altitude]*	**W/U** *Or* *R*	FANS 1/A
UM 175	(Reserved) *Note.— Avoid use of this message element, REPORT REACHING [level], as it is reserved in ICAO Doc 4444.*	N/A	**W/U** *Or* *R*	FANS 1/A
UM 200	Instruction used in conjunction with a level clearance to report maintaining the level assigned.	REPORT MAINTAINING	W/U	N/A
UM 180	Instruction to report when the aircraft is within the specified vertical range.	REPORT REACHING BLOCK [level] TO [level]	**W/U** *Or* *R*	FANS 1/A
UM 130	Instruction to report when the aircraft has passed the specified position.	REPORT PASSING [position]	**W/U** *Or* *R*	FANS 1/A
UM 181	Instruction to report the present distance to or from the specified position.	REPORT DISTANCE [to/from] [position]	**Y** *Or* *NE*	FANS 1/A
UM 184	Instruction to report at the specified time the distance to or from the specified position.	AT TIME [time] REPORT DISTANCE [to/from] [position]	Y	N/A
UM 228	Instruction to report the estimated time of arrival at the specified position. *FANS 1/A.— Uses UM 169d free text for FANS 1/A aircraft.*	REPORT ETA [position]	Y DM104	FANS 1/A [free text]

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 131	Instruction to report the amount of fuel remaining and the number of persons on board.	**REPORT REMAINING FUEL AND PERSONS ON BOARD** Or *REPORT REMAINING FUEL AND SOULS ON BOARD*	**Y** *Or* *NE*	FANS 1/A (Urgent)
UM 132	Instruction to report the present position.	**REPORT POSITION** Or *CONFIRM POSITION*	**Y** *Or* *NE*	FANS 1/A
UM 133	Instruction to report the present level.	**REPORT PRESENT LEVEL** Or *CONFIRM ALTITUDE*	**Y** *Or* *NE* *DM32*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 134	Instruction to report the requested speed. *Note.— Instruction to report the present speed.* *FANS 1/A.— Uses UM 169b free text for FANS 1/A aircraft when the controller is requesting the flight crew to report the present ground speed.*	**REPORT [speed type] [speed type] [speed type] SPEED** Or *CONFIRM SPEED*	**Y** *Or* *NE* *Or* *R* *DM113*	FANS 1/A
UM 135	Instruction to confirm the currently assigned level.	**CONFIRM ASSIGNED LEVEL** Or *CONFIRM ASSIGNED ALTITUDE*	**Y** *Or* *NE* *DM38* *DM77 (TBC)*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 136	Instruction to confirm the currently assigned speed.	CONFIRM ASSIGNED SPEED	**Y** *Or* *NE*	FANS 1/A
UM 137	Instruction to confirm the currently assigned route.	CONFIRM ASSIGNED ROUTE	**Y** *Or* *NE*	FANS 1/A
UM 138	Instruction to confirm the previously reported time over the last reported waypoint.	CONFIRM TIME OVER REPORTED WAYPOINT	**Y** *Or* *NE*	FANS 1/A

Ref #	**Message Intent/Use**	**Message Element**	**Resp.**	**Data link system(s)**
UM 139	Instruction to confirm the identity of the previously reported waypoint.	CONFIRM REPORTED WAYPOINT	**Y** *Or* *NE*	FANS 1/A
UM 140	Instruction to confirm the identity of the next waypoint.	CONFIRM NEXT WAYPOINT	**Y** *Or* *NE*	FANS 1/A
UM 141	Instruction to confirm the previously reported estimated time at the next waypoint.	CONFIRM NEXT WAYPOINT ETA	**Y** *Or* *NE*	FANS 1/A
UM 142	Instruction to confirm the identity of the next but one waypoint.	CONFIRM ENSUING WAYPOINT	**Y** *Or* *NE*	FANS 1/A
UM 143	The request was not understood. It should be clarified and resubmitted.	CONFIRM REQUEST	**Y** *Or* *NE*	FANS 1/A
UM 144	Instruction to report the selected (SSR) code.	CONFIRM SQUAWK	**Y** *Or* *NE*	FANS 1/A
UM 145	Instruction to report the present heading.	**REPORT HEADING** Or *CONFIRM HEADING*	**Y** *Or* *NE*	FANS 1/A
UM 146	Instruction to report the present ground track.	**REPORT GROUND TRACK** Or *CONFIRM GROUND TRACK*	**Y** *Or* *NE*	FANS 1/A
UM 182	Instruction to report the identification code of the last ATIS received.	CONFIRM ATIS CODE	**Y** *Or* *NE*	FANS 1/A
UM 147	Instruction to make a position report. *Note.— To be used if the controller does not receive a scheduled position report.*	REQUEST POSITION REPORT	**Y** *Or* *NE*	FANS 1/A
UM 216	Instruction to file a flight plan.	REQUEST FLIGHT PLAN	Y	N/A
UM 217	Instruction to report that the aircraft has landed.	REPORT ARRIVAL	Y	N/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 229	Instruction to report the preferred alternate aerodrome for landing.	REPORT ALTERNATE AERODROME	Y	N/A
UM 231	Instruction to indicate the pilot's preferred level. *FANS 1/A and FANS 1/A-ATN.— uses UM 169c free text for FANS 1/A aircraft.*	STATE PREFERRED LEVEL	Y *DM106*	Ocean SPR FANS 1/A [free text] ATN B1 FANS 1/A-ATN
UM 232	Instruction to indicate the pilot's preferred time and/or position to commence descent to the aerodrome of intended arrival. *FANS 1/A and FANS 1/A-ATN.— Uses UM 169aa free text for FANS 1/A aircraft.*	STATE TOP OF DESCENT	Y *DM109*	FANS 1/A [free text] ATN B1 FANS 1/A-ATN
	Negotiation Requests (uplink)			
UM 148	Request for the earliest time or position at which the specified level can be accepted.	WHEN CAN YOU ACCEPT [level]	**Y** *Or* *NE* *DM81* *DM82*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 149	Instruction to report whether or not the specified level can be accepted at the specified position.	CAN YOU ACCEPT [level] AT [position]	A/N	FANS 1/A
UM 150	Instruction to report whether or not the specified level can be accepted at the specified time.	CAN YOU ACCEPT [level] AT [time]	A/N	FANS 1/A
UM 151	Instruction to report the earliest time or position when the specified speed can be accepted.	WHEN CAN YOU ACCEPT [speed]	**Y** *Or* *NE* *DM83* *DM84*	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 152	Instruction to report the earliest time or position when the specified offset track can be accepted.	WHEN CAN YOU ACCEPT [specified distance] [direction] OFFSET	**Y** *Or* *NE* *DM85* *DM86*	FANS 1/A
	Air Traffic Advisories (uplink)			
UM 153	ATS advisory that the altimeter setting should be the specified setting.	ALTIMETER [altimeter]	R	FANS 1/A
UM 213	ATS advisory that the specified altimeter setting relates to the specified facility. *FANS 1/A-ATN.— Uses UM 169y free text for FANS 1/A aircraft.*	[facility designation] ALTIMETER [altimeter]	R	ATN B1 FANS 1/A-ATN
UM 154	ATS advisory that the radar service is terminated.	**RADAR SERVICE TERMINATED** Or *RADAR SERVICES TERMINATED*	R	FANS 1/A
UM 244	ATS advisory that the radar and/or ADS-B service is terminated. *FANS 1/A.— uses UM 169aj free text for FANS 1/A aircraft.*	IDENTIFICATION TERMINATED	R	FANS 1/A [free text]
UM 191	ATS advisory that the aircraft is entering airspace in which no air traffic services are provided and all existing air traffic services are terminated.	ALL ATS TERMINATED	R	N/A
UM 155	ATS advisory that radar contact has been established at the specified position.	RADAR CONTACT [position]	R	FANS 1/A
UM 156	ATS advisory that radar contact has been lost.	RADAR CONTACT LOST	R	FANS 1/A
UM 210	ATS advisory that the aircraft has been identified on radar and/or ADS-B at the specified position.	IDENTIFIED [position]	R	N/A
UM 193	Notification that radar and/or ADS-B identification has been lost.	IDENTIFICATION LOST	R	N/A
UM 157	Instruction that a continuous transmission is detected on the specified frequency. Check the microphone button.	CHECK STUCK MICROPHONE [frequency]	**N** *Or* *R*	FANS 1/A ATN B1 FANS 1/A-ATN (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 158	ATS advisory that the ATIS information identified by the specified code is the current ATIS information.	ATIS [atis code]	R	FANS 1/A
UM 212	ATS advisory that the specified ATIS information at the specified airport is current.	[facility designation] ATIS [atis code] CURRENT	R	N/A
UM 214	ATS advisory that indicates the RVR value for the specified runway.	RVR RUNWAY [runway] [rvr]	R	N/A
UM 224	ATS advisory that no delay is expected.	NO DELAY EXPECTED	R	N/A
UM 225	ATS advisory that the expected delay has not been determined.	DELAY NOT DETERMINED	R	N/A
UM 226	ATS advisory that the aircraft may expect to be cleared to commence its approach procedure at the specified time.	EXPECTED APPROACH TIME [time]	R	N/A
	System Management Messages (uplink)			
UM 159	A system generated message notifying that the ground system has detected an error.	ERROR [error information]	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN (Urgent)
UM 160	Notification to the avionics that the specified data authority is the next data authority. If no data authority is specified, this indicates that any previously specified next data authority is no longer valid.	NEXT DATA AUTHORITY [facility designation]	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 161	Notification to the avionics that the data link connection with the current data authority is being terminated.	END SERVICE	**N** *Or* *NE*	FANS 1/A
UM 162	Notification that the ground system does not support this message. *FANS 1/A.— Uses UM 169u free text for FANS 1/A aircraft.*	**MESSAGE NOT SUPPORTED BY THIS ATS UNIT** Or *SERVICE UNAVAILABLE*	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 234	Notification that the ground system does not have a flight plan for that aircraft.	FLIGHT PLAN NOT HELD	N	N/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 163	Notification to the pilot of an ATSU identifier.	**[facility designation]** Or *[icao facility designation] [tP4+Table]*	**N** *Or* *NE*	FANS 1/A
UM 227	Confirmation to the aircraft system that the ground system has received the message to which the logical acknowledgement refers and found it acceptable for display to the responsible person. *FANS 1/A-ATN.— ATN B1 only. Not available for FANS 1/A.*	LOGICAL ACKNOWLEDGEMENT	N	ATN B1 FANS 1/A-ATN
UM 233	Notification to the pilot that messages sent requiring a logical acknowledgement will not be accepted by this ground system.	USE OF LOGICAL ACKNOWLEDGEMENT PROHIBITED	N	N/A
	Additional Messages (uplink)			
UM 164	The associated instruction may be complied with at any future time. *Note.— Intent same as UM 177 AT PILOTS DISCRETION.*	WHEN READY	**N** *Or* *NE*	FANS 1/A
UM 230	The associated instruction is to be complied with immediately.	IMMEDIATELY	N	N/A (Distress)
UM 165	Used to link two messages, indicating the proper order of execution of clearances/ instructions.	THEN	**N** *Or* *NE*	FANS 1/A ATN B1 FANS 1/A-ATN
UM 166	The associated instruction is issued due to traffic considerations.	**DUE TO [traffic type] TRAFFIC** Or *DUE TO TRAFFIC*	**N** *Or* *NE*	FANS 1/A
UM 167	The associated instruction is issued due to airspace restrictions.	DUE TO AIRSPACE RESTRICTION	**N** *Or* *NE*	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 168	The indicated communication should be ignored. *Note.— The previously sent uplink CPDLC message should be ignored. DISREGARD should not refer to a clearance or instruction. If DISREGARD is used, another element should be added to clarify which message is to be disregarded.*	DISREGARD	R	FANS 1/A
UM 176	Instruction that the pilot is responsible for maintaining separation from other traffic and is also responsible for maintaining visual meteorological conditions.	MAINTAIN OWN SEPARATION AND VMC	W/U	FANS 1/A
UM 177	Used in conjunction with a clearance/instruction to indicate that the pilot may execute when prepared to do so. *Note.— Intent same as UM 164 WHEN READY.*	AT PILOTS DISCRETION	N	FANS 1/A
UM 178	(Reserved) *Note.— Avoid use of this message element, TRACK DETAIL MESSAGE, as it is reserved in ICAO Doc 4444.*	(not defined)	**Y** *Or* *W/U*	FANS 1/A
	Free Text Normal-(uplink)			
UM 169	Normal urgency attribute, low alert attribute	[free text]	R	FANS 1/A FANS 1/A-ATN
	Free Text Distress (uplink)			
UM 170	Distress urgency attribute, high alert attribute	[free text]	R	FANS 1/A
	Free Text – Other			
UM 183	Normal urgency attribute, medium alert attribute *FANS 1/A-ATN.— ATN B1 only. Ground system uses UM 169 [free text] for FANS 1/A aircraft.*	[free text]	N	ATN B1 FANS 1/A-ATN
UM 187	low urgency, normal alert	[free text]	N	N/A
UM 194	normal urgency, low alert	[free text]	Y	N/A
UM 195	low urgency, low alert	[free text]	R	N/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
UM 196	normal urgency, medium alert	[free text]	W/U	ATN B1 FANS 1/A-ATN
UM 197	urgent urgency, medium alert	[free text]	W/U	N/A (Urgent)
UM 198	distress urgency, high alert	[free text]	W/U	N/A (Distress)
UM 199	normal urgency, low alert	[free text]	N	N/A
UM 201	Not used, low urgency, low alert	[free text]	N	N/A
UM 202	Not used, low urgency, low alert	[free text]	N	N/A
UM 203	normal urgency, medium alert	[free text]	R	N/A
UM 204	normal urgency, medium alert	[free text]	Y	N/A
UM 205	normal urgency, medium alert	[free text]	A/N	N/A
UM 206	low urgency, normal alert	[free text]	Y	N/A
UM 207	low urgency, low alert	[free text]	Y	N/A
UM 208	low urgency, low alert	[free text]	N	N/A

A.3 CPDLC downlink message elements

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
	Responses/Acknowledgements (downlink)			
DM 0	The instruction is understood and will be complied with.	WILCO	N	FANS 1/A ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 1	The instruction cannot be complied with.	UNABLE	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 2	Wait for a reply. *Note.— The controller is informed that the request is being assessed and there will be a short term delay (within 10 minutes). The exchange is not closed and the request will be responded to when conditions allow.*	STANDBY	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 3	Message received and understood. *Note.— ROGER is the only correct response to an uplink free text message. Under no circumstances will ROGER be used instead of AFFIRM.*	ROGER	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 4	Yes. *Note.— AFFIRM is an appropriate response to an uplinked negotiation request message (e.g. UM 150 CAN YOU ACCEPT [level] at [time]).*	AFFIRM	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 5	No. *Note.— NEGATIVE is an appropriate response to an uplinked negotiation request message (e.g. UM 150 CAN YOU ACCEPT [level] at [time]).*	NEGATIVE	N	FANS 1/A ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
	Vertical Requests (downlink)			
DM 6	Request to fly at the specified level.	REQUEST [level]	Y *UM0* *UM1* *UM19* *UM20* *UM23* *UM26* *UM27* *UM28* *UM29* *UM46* *UM47* *UM48* *UM159* + *UM183* *UM162* *UM211*	FANS 1/A ATN B1 FANS 1/A-ATN
DM 7	Request to fly at a level within the specified vertical range. *FANS 1/A-ATN.— FANS 1/A aircraft only. ATN B1 aircraft uses DM 6 REQUEST [level], where [level] is a vertical range.*	REQUEST BLOCK [level] TO [level]	Y	FANS 1/A FANS 1/A - ATN
DM 8	Request to cruise climb to the specified level. *Note.— Avoid use of this message element due to potential misinterpretation.*	REQUEST CRUISE CLIMB TO [level]	Y	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 9	Request to climb to the specified level.	REQUEST CLIMB TO [level]	Y *UM0* *UM1* *UM19* *UM20* *UM23* *UM26* *UM27* *UM28* *UM29* *UM46* *UM47* *UM48* *UM159* + *UM183* *UM162* *UM211*	FANS 1/A ATN B1 FANS 1/A-ATN
DM 10	Request to descend to the specified level.	REQUEST DESCENT TO [level]	Y *UM0* *UM19* *UM20* *UM23* *UM26* *UM27* *UM28* *UM29* *UM46* *UM47* *UM48* *UM159* + *UM183* *UM162* *UM211*	FANS 1/A ATN B1 FANS 1/A-ATN
DM 11	Request that at the specified position a climb to the specified level be approved.	AT [position] REQUEST CLIMB TO [level]	Y	FANS 1/A
DM 12	Request that at the specified position a descent to the specified level be approved.	AT [position] REQUEST DESCENT TO [level]	Y	FANS 1/A
DM 13	Request that at the specified time a climb to the specified level be approved.	AT [time] REQUEST CLIMB TO [level]	Y	FANS 1/A
DM 14	Request that at the specified time a descent to the specified level be approved.	AT [time] REQUEST DESCENT TO [level]	Y	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 69	Request that a descent be approved on a see-and-avoid basis. *Note.— Avoid use of this message element due to potential misinterpretation.*	REQUEST VMC DESCENT	Y	FANS 1/A
	Lateral Off-Set Requests (downlink)			
DM 15	Request that a parallel track, offset from the cleared track by the specified distance in the specified direction, be approved.	REQUEST OFFSET [specified distance] [direction] OF ROUTE	Y	FANS 1/A
DM 16	Request that a parallel track, offset from the cleared track by the specified distance in the specified direction, be approved from the specified position.	AT [position] REQUEST OFFSET [specified distance] [direction] OF ROUTE	Y	FANS 1/A
DM 17	Request that a parallel track, offset from the cleared track by the specified distance in the specified direction, be approved from the specified time.	AT [time] REQUEST OFFSET [specified distance] [direction] OF ROUTE	Y	FANS 1/A
	Speed Requests (downlink)			
DM 18	Request to fly at the specified speed.	REQUEST [speed]	Y *UM0* *UM1* *UM162* *UM211* *UM55* *UM61* *UM106* *UM107* *UM108* *UM109* *UM116* *UM222* *UM159* + *UM183*	FANS 1/A ATN B1 FANS 1/A-ATN
DM 19	Request to fly within the specified speed range.	REQUEST [speed] TO [speed]	Y	FANS 1/A
	Voice Contact Requests (downlink)			
DM 20	Request for voice contact.	REQUEST VOICE CONTACT	Y	FANS 1/A
DM 21	Request for voice contact on the specified frequency.	REQUEST VOICE CONTACT [frequency]	Y	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
	Route Modification Requests (downlink)			
DM 22	Request to track from the present position direct to the specified position.	REQUEST DIRECT TO [position]	Y *UM0* *UM162* *UM211* *UM74* *UM96* *UM190* *UM159* + *UM183*	FANS 1/A ATN B1 FANS 1/A-ATN
DM 23	Request for the specified procedure clearance.	REQUEST [procedure name]	Y	FANS 1/A
DM 24	Request for a route clearance.	**REQUEST CLEARANCE [route clearance]** Or *REQUEST [route clearance]*	Y	FANS 1/A
DM 25	Request for a clearance. *Note.— Either pre-departure or route.*	**REQUEST [clearance type] CLEARANCE** Or *REQUEST CLEARANCE*	Y	FANS 1/A
DM 26	Request for a weather deviation to the specified position via the specified route.	REQUEST WEATHER DEVIATION TO [position] VIA [route clearance]	Y	FANS 1/A
DM 27	Request for a weather deviation up to the specified distance off track in the specified direction.	REQUEST WEATHER DEVIATION UP TO [specified distance] [direction] OF ROUTE	Y *UM0* *UM162* *UM211* *UM64* *UM74* *UM82* *UM96* *UM190* *UM159* + *UM183*	FANS 1/A ATN B1 FANS 1/A-ATN
DM 70	Request a clearance to adopt the specified heading.	REQUEST HEADING [degrees]	Y	FANS 1/A
DM 71	Request a clearance to adopt the specified ground track.	REQUEST GROUND TRACK [degrees]	Y	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
	Reports (downlink)			
DM 28	Notification of leaving the specified level.	LEAVING [level]	N	FANS 1/A
DM 29	Notification of climbing to the specified level.	CLIMBING TO [level]	N	FANS 1/A
DM 30	Notification of descending to the specified level.	DESCENDING TO [level]	N	FANS 1/A
DM 31	Notification of passing the specified position.	PASSING [position]	N	FANS 1/A
DM 78	Notification that at the specified time, the aircraft's position was as specified.	AT [time] [distance] [to/from] [position]	N	FANS 1/A
DM 32	Notification of the present level.	**PRESENT LEVEL [level]** Or *PRESENT ALTITUDE [altitude]*	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 33	Notification of the present position.	PRESENT POSITION [position]	N	FANS 1/A
DM 34	Notification of the present speed.	PRESENT SPEED [speed]	N	FANS 1/A
DM 113	Notification of the requested speed. *FANS 1/A.— Uses free text DM 67l GS [speed] for partial intent. The flight crew notifies the controller of present ground speed, in response to UM 169b, REPORT GROUND SPEED.*	[speed type] [speed type] [speed type] SPEED [speed]	N	FANS 1/A
DM 35	Notification of the present heading in degrees.	PRESENT HEADING [degrees]	N	FANS 1/A
DM 36	Notification of the present ground track in degrees.	PRESENT GROUND TRACK [degrees]	N	FANS 1/A
DM 37	Notification that the aircraft is maintaining the specified level.	**MAINTAINING [level]** Or *LEVEL [altitude]*	N	FANS 1/A
DM 72	(Reserved) *Note.— Avoid use of this message element, REACHING [level], as it is reserved in ICAO Doc 4444.*	N/A	N	FANS 1/A
DM 76	Notification that the aircraft has reached a level within the specified vertical range.	REACHING BLOCK [level] TO [level]	N	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 38	Read-back of the assigned level.	**ASSIGNED LEVEL [level]** Or *ASSIGNED ALTITUDE [altitude]*	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 77	Read-back of the assigned vertical range. *FANS 1/A-ATN.— FANS 1/A aircraft only. ATN B1 aircraft uses DM 38 ASSIGNED LEVEL [level], where [level] is a vertical range.*	ASSIGNED BLOCK [level] TO [level]	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 39	Read-back of the assigned speed.	ASSIGNED SPEED [speed]	N	FANS 1/A
DM 40	Read-back of the assigned route.	ASSIGNED ROUTE [route clearance]	N	FANS 1/A
DM 41	The aircraft has regained the cleared route.	BACK ON ROUTE	N	FANS 1/A
DM 114	Notification that the aircraft is clear of weather and is able to accept a clearance to regain cleared flight route.	CLEAR OF WEATHER	N	N/A
DM 42	The next waypoint is the specified position.	NEXT WAYPOINT [position]	N	FANS 1/A
DM 43	The ETA at the next waypoint is as specified.	NEXT WAYPOINT ETA [time]	N	FANS 1/A
DM 44	The next plus one waypoint is the specified position.	ENSUING WAYPOINT [position]	N	FANS 1/A
DM 45	Clarification of previously reported waypoint passage.	REPORTED WAYPOINT [position]	N	FANS 1/A
DM 46	Clarification of time over previously reported waypoint.	REPORTED WAYPOINT [time]	N	FANS 1/A
DM 47	The specified (SSR) code has been selected.	SQUAWKING [code]	N	FANS 1/A
DM 48	Position report. *Note.— Reports the current position of the aircraft when the flight crew presses the button to send this message. ATC expects position reports based on this downlink message.*	POSITION REPORT [position report]	N	FANS 1/A
DM 79	The code of the latest ATIS received is as specified.	ATIS [atis code]	N	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 89	The specified ATS unit is being monitored on the specified frequency. *FANS 1/A-ATN.— FANS 1/A aircraft uses DM 67aa free text. May require to be preformatted.*	MONITORING [unit name] [frequency]	N	ATN B1 FANS 1/A-ATN
DM 102	Used to report that an aircraft has landed.	LANDING REPORT	N	N/A
DM 104	Notification of estimated time of arrival at the specified position. *FANS 1/A.— Uses free text DM 67n. Response to free text UM 169d REPORT ETA [position]*	**ETA [position] [time]** Or *[position] [time]*	N	FANS 1/A [free text]
DM 105	Notification of the alternative aerodrome for landing.	ALTERNATE AERODROME [airport]	N	N/A
DM 106	Notification of the preferred level. *FANS 1/A.— Uses DM 67m. Response to free text UM 169c STATE PREFERRED LEVEL.* *FANS 1/A – ATN.— FANS 1/A aircraft response to UM 231 STATE PREFERRED LEVEL.*	**PREFERRED LEVEL [level]** Or *FL[altitude]*	N	FANS 1/A [free text] ATN B1 FANS 1/A-ATN
DM 109	Notification of the preferred time to commence descent for approach. *FANS 1/A.— Uses DM 67v. Response to free text UM 169aa STATE TOP OF DESCENT.* *FANS 1/A – ATN.— FANS 1/A aircraft response to UM 232 STATE TOP OF DESCENT.*	**TOP OF DESCENT [time]** Or *TOD [time]*	N	FANS 1/A [free text] ATN B1 FANS 1/A-ATN
DM 110	Notification of the preferred position to commence descent for approach.	TOP OF DESCENT [position]	N	N/A
DM 111	Notification of the preferred time and position to commence descent for approach.	TOP OF DESCENT [time] [position]	N	N/A
	Negotiation Requests (downlink)			
DM 49	Request for the earliest time at which a clearance to the specified speed can be expected.	WHEN CAN WE EXPECT [speed]	Y	FANS 1/A
DM 50	Request for the earliest time at which a clearance to a speed within the specified range can be expected.	WHEN CAN WE EXPECT [speed] TO [speed]	Y	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 51	Request for the earliest time at which a clearance to regain the planned route can be expected.	WHEN CAN WE EXPECT BACK ON ROUTE	Y	FANS 1/A
DM 52	Request for the earliest time at which a clearance to descend can be expected.	**WHEN CAN WE EXPECT LOWER LEVEL** Or *WHEN CAN WE EXPECT LOWER ALTITUDE*	Y	FANS 1/A
DM 53	Request for the earliest time at which a clearance to climb can be expected.	**WHEN CAN WE EXPECT HIGHER LEVEL** Or *WHEN CAN WE EXPECT HIGHER ALTITUDE*	Y	FANS 1/A
DM 54	Request for the earliest time at which a clearance to cruise climb to the specified level can be expected.	WHEN CAN WE EXPECT CRUISE CLIMB TO [level]	Y	FANS 1/A
DM 87	Request for the earliest time at which a clearance to climb to the specified level can be expected. *FANS 1/A.— Uses preformatted free text DM 67h*.	WHEN CAN WE EXPECT CLIMB TO [level]	Y	FANS 1/A
DM 88	Request for the earliest time at which a clearance to descend to the specified level can be expected. *FANS 1/A.— Uses preformatted free text DM 67i*.	WHEN CAN WE EXPECT DESCENT TO [level]	Y	FANS 1/A
	Emergency Messages (downlink)			
DM 55	Urgency prefix.	PAN PAN PAN	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Urgent)
DM 56	Distress prefix.	MAYDAY MAYDAY MAYDAY	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Distress)
DM 112	Indicates specifically that the aircraft is being subjected to unlawful interference.	SQUAWKING 7500	N	N/A (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 57	Notification of fuel remaining and number of persons on board.	**[remaining fuel] OF FUEL REMAINING AND [persons on board] PERSONS ON BOARD** Or *[remaining fuel] OF FUEL REMAINING AND [remaining souls] SOULS ON BOARD*	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Urgent)
DM 58	Notification that the pilot wishes to cancel the emergency condition.	CANCEL EMERGENCY	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Urgent)
DM 59	Notification that the aircraft is diverting to the specified position via the specified route due to an urgent need.	DIVERTING TO [position] VIA [route clearance]	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Urgent)
DM 60	Notification that the aircraft is deviating the specified distance in the specified direction off the cleared route and maintaining a parallel track due to an urgent need.	OFFSETTING [specified distance] [direction] OF ROUTE	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Urgent)
DM 61	Notification that the aircraft is descending to the specified level due to an urgent need.	DESCENDING TO [level]	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Urgent)
DM 80	Notification that the aircraft is deviating up to the deviating distance from the cleared route in the specified direction due to an urgent need. *<u>FANS 1/A</u>.— Notification that the aircraft is operating on an offset (including SLOP). The urgency attribute for this message element is not defined.*	**DEVIATING UP TO [specified distance] [direction] OF ROUTE** Or *DEVIATING [distanceoffset] [direction] OF ROUTE*	**Y** *Or* *N*	FANS 1/A FANS 1/A-ATN (Urgent)
	System Management Messages (downlink)			
DM 62	A system-generated message that the avionics has detected an error.	ERROR [error information]	N	FANS 1/A ATN B1 FANS 1/A-ATN (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 63	A system-generated denial to any CPDLC application message sent from a ground facility that is not the current data authority.	NOT CURRENT DATA AUTHORITY	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 99	A system-generated message to inform a ground facility that it is now the current data authority.	CURRENT DATA AUTHORITY	N	ATN B1 FANS 1/A-ATN (Urgent)
DM 64	Notification to the ground system that the specified ATSU is the current data authority. *FANS 1/A – ATN.— FANS 1/A aircraft uses this message.*	[facility designation]	N	FANS 1/A FANS 1/A-ATN
DM 107	A system-generated message sent to a ground system that tries to connect to an aircraft when a current data authority has not designated the ground system as the NDA. *FANS 1/A – ATN.— ATN B1 aircraft uses this message.*	NOT AUTHORIZED NEXT DATA AUTHORITY	N	ATN B1
DM 73	A system-generated message indicating the software version number. *FANS 1/A – ATN.— FANS 1/A aircraft uses this message.*	[version number]	N	FANS 1/A FANS 1/A-ATN
DM 100	Confirmation to the ground system that the aircraft system has received the message to which the logical acknowledgement refers and found it acceptable for display to the responsible person. *FANS 1/A – ATN.— ATN B1 ground systems uses alternate means, such as MAS message assurance received from FANS 1/A aircraft, to mimic LOGICAL ACKNOWLEDGEMENT.*	LOGICAL ACKNOWLEDGEMENT	N	ATN B1
	Additional Messages (downlink)			
DM 65	Used to explain reasons for pilot's message.	DUE TO WEATHER	N	FANS 1/A ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 66	Used to explain reasons for pilot's message.	DUE TO AIRCRAFT PERFORMANCE	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 74	States a desire by the pilot to provide his/her own separation and remain in VMC.	**REQUEST TO MAINTAIN OWN SEPARATION AND VMC** Or *MAINTAIN OWN SEPARATION AND VMC*	**Y** *Or* *N*	FANS 1/A
DM 75	Used in conjunction with another message to indicate that the pilot wishes to execute request when the pilot is prepared to do so.	AT PILOTS DISCRETION	N	FANS 1/A
DM 101	Allows the pilot to indicate a desire for termination of CPDLC application with the current data authority.	REQUEST END OF SERVICE	Y	N/A
DM 103	Allows the pilot to indicate that he/she has cancelled IFR flight plan.	CANCELLING IFR	Y	N/A
DM 108	Notification that de-icing action has been completed.	DE-ICING COMPLETE	N	N/A
	Free Text – Normal (downlink)			
DM 67	Normal urgency, low alert *FANS 1/A – ATN.— FANS 1/A aircraft only. ATN B1 uses DM 98.*	[free text]	N	FANS 1/A ATN B1 FANS 1/A-ATN
	Free Text - Distress (downlink)			
DM 68	Distress urgency, high alert *Note.— Selecting any of the emergency message elements will result in this message element being enabled for the flight crew to include in the emergency message at their discretion.*	[free text]	Y	FANS 1/A
DM 90	normal urgency, medium alert	[free text]	N	N/A
DM 91	normal urgency, low alert	[free text]	Y	N/A
DM 92	low urgency, low alert	[free text]	Y	N/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 93	urgent urgency, high alert	[free text]	N	N/A (Urgent)
DM 94	distress urgency, high alert	[free text]	N	N/A (Distress)
DM 95	urgent urgency, medium alert	[free text]	N	N/A (Urgent)
DM 96	urgent urgency, low alert	[free text]	N	N/A (Urgent)
DM 97	low urgency, low alert	[free text]	N	N/A
DM 98	normal urgency, normal alert *FANS 1/A – ATN.— ATN B1 aircraft only. FANS 1/A uses DM 67.*	[free text]	N	ATN B1 FANS 1/A-ATN
	Negotiation Responses (downlink)			
DM 81	We can accept the specified level at the specified time. *FANS 1/A.— Uses preformatted free text DM 67b.*	WE CAN ACCEPT [level] AT [time]	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 115	We can accept the specified level at the specified position.	WE CAN ACCEPT [level] AT [position]	N	N/A
DM 82	We cannot accept the specified level. *FANS 1/A.— Uses preformatted free text DM 67e.*	WE CANNOT ACCEPT [level]	N	FANS 1/A ATN B1 FANS 1/A-ATN
DM 83	We can accept the specified speed at the specified time. *FANS 1/A.— Uses preformatted free text DM 67c.*	WE CAN ACCEPT [speed] AT [time]	N	FANS 1/A
DM 116	We can accept the specified speed at the specified position.	WE CAN ACCEPT [speed] AT [position]	N	N/A
DM 84	We cannot accept the specified speed. *FANS 1/A.— Uses preformatted free text DM 67f.*	WE CANNOT ACCEPT [speed]	N	FANS 1/A
DM 85	We can accept a parallel track offset the specified distance in the specified direction at the specified time. *FANS 1/A.— Uses preformatted free text DM 67d.*	WE CAN ACCEPT [specified distance] [direction] AT [time]	N	FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	Data link system(s)
DM 117	We can accept a parallel track offset the specified distance in the specified direction at the specified position.	WE CAN ACCEPT [specified distance] [direction] AT [position]	N	N/A
DM 86	We cannot accept a parallel track offset the specified distance in the specified direction. *FANS 1/A.— Uses preformatted free text DM 67g.*	WE CANNOT ACCEPT [specified distance] [direction]	N	FANS 1/A

A.4 CPDLC standardized free text messages

A.4.1 CPDLC uplink standardized free text messages

When a free text uplink message has been received, the flight crew should respond with ROGER before responding to the message.

Ref #	Message Intent/Use	Message Element	Resp.
	Standardized Free Text Responses/Acknowledgements (uplink)		
UM 169q	Acknowledgement of receipt of a CPDLC downlink MAYDAY message. *Note.— No equivalent to ICAO Doc 4444.*	ROGER MAYDAY	R
UM 169r	Acknowledgement of receipt of a CPDLC downlinked PAN message. *Note.— No equivalent to ICAO Doc 4444.*	ROGER PAN	R
UM 169ak	Notification that an ADS-C emergency report has been received from the aircraft. *Note.— No equivalent to ICAO Doc 4444.*	CONFIRM ADS-C EMERGENCY	R
UM 169s	Notification that the CPDLC downlink request was: 1) part of the approved message set; and 2) received by the controller. The aircraft will receive any further communication about the request via voice contact with the specified unit. [unit_description] is the name of the radio facility with which the response will be communicated. *Note.— No equivalent to ICAO Doc 4444.*	REQUEST RECEIVED RESPONSE WILL BE VIA [unit_description]	R

Ref #	Message Intent/Use	Message Element	Resp.
UM 169x	Indication that the request has been received and has been forwarded on to the next ATSU. *Note.— Same intent as ICAO Doc 4444 UM 211.*	REQUEST FORWARDED	R
UM 169ab	Indicates that the request cannot be responded to by the current unit and that it should be requested from the next unit. *Note.— Same intent as ICAO Doc 4444 UM 237.*	REQUEST AGAIN WITH NEXT UNIT	R
	Standardized Free Text **Route Modifications (uplink)**		
UM 169al	Notification of an unambiguous tailored arrival name associated with a specific route and constraints. Used in combination with UM 83 AT [position] CLEARED [route clearance] and UM 19 MAINTAIN [level]. *Note.— No equivalent in ICAO Doc 4444.*	[TA designator]	R
	Standardized Free Text **Speed Changes (uplink)**		
UM 169p	Notification that a previously issued speed can be expected to be maintained until the specified position or time. *Note.— No equivalent to ICAO Doc 4444.*	EXPECT TO MAINTAIN [speed] UNTIL [time / position]	R
UM 169z	Notification that the aircraft may keep its preferred speed without restriction. *Note.— Same intent as ICAO Doc 4444 UM 222.*	NO SPEED RESTRICTION	R
	Standardized Free Text **Contact/Monitor/Surveillance Requests (uplink)**		
UM 169ai	Instruction that the "ident" function of the ADS-B emitter is to be activated. *Note.— Same intent as ICAO Doc 4444 UM 242.*	TRANSMIT ADS-B IDENT	R
	Standardized Free Text **Report/Confirmation Requests (uplink)**		
UM 169b	Instruction to report the ground speed of the aircraft. *Note.— Intent similar partially to ICAO Doc 4444 UM 134.*	REPORT GROUND SPEED	R, then DM 67l

Ref #	Message Intent/Use	Message Element	Resp.
UM 169c	Instruction to advise the preferred flight level for the flight. *Note.— Same intent as ICAO Doc 4444 UM 231*	STATE PREFERRED LEVEL	R, then DM 67m
UM 169d	Instruction to report the estimated time of arrival at the specified position. *Note.— Same intent as ICAO Doc 4444 UM 228.*	REPORT ETA [position]	R, then DM 67n
UM 169e	Instruction to notify when the specified traffic has been observed by visual contact to have passed. *Note.— No equivalent to ICAO Doc 4444.*	REPORT SIGHTING AND PASSING OPPOSITE DIRECTION [traffic description] ETP [time]	R, then DM 67o DM 67p
UM 169aa	Instruction to indicate the preferred time to commence descent to the aerodrome of intended arrival. *Note.— Same intent as ICAO Doc 4444 UM 232 for time only.*	STATE TOP OF DESCENT	R, then DM 67v
	Standardized Free text **Air Traffic Advisories (uplink)**		
UM 169k	Notification that a SELCAL check on the specified HF frequency should be expected. *Note.— No equivalent to ICAO Doc 4444.*	EXPECT SELCAL CHECK HF [frequency]	R
UM 169l	Notification that the CPDLC transfer process will not be completed at the FIR boundary and will be delayed until the specified time. If the CPDLC transfer is not completed by the specified time, the flight crew should manually disconnect and logon to the next center. *Note.— No equivalent to ICAO Doc 4444.*	EXPECT CPDLC TRANSFER AT [time]	R
UM 169aj	ATS advisory that the radar and/or ADS-B service is terminated. *Note.— Same intent as ICAO Doc 4444 UM 244.*	IDENTIFICATION TERMINATED	R
UM 169m	Notification that a CPDLC connection is not required by the next FIR (e.g. due to short transition time of the next FIR) and CPDLC connection will be transferred to the subsequent FIR. *Note.— No equivalent to ICAO Doc 4444.*	EXPECT NEXT CENTER [facility designation]. CONTACT WITH [facility designation] NOT REQUIRED	R

Ref #	Message Intent/Use	Message Element	Resp.
UM 169n	Notification of traffic significant to the flight. *Note.— No equivalent to ICAO Doc 4444.*	TRAFFIC IS [traffic description]	R, then, (optionally) DM 67q
UM 169o	Notification of the secondary frequency for the area. *Note.— Same intent as ICAO Doc 4444 UM 238.*	SECONDARY FREQUENCY [frequency]	R
UM 169ag	ATS advisory that normal voice communication is not available. *Note.— No equivalent to ICAO Doc 4444.*	TRY SATCOM VOICE OR RELAY THROUGH ANOTHER AIRCRAFT	R
UM 169y	ATS advisory that the specified altimeter setting relates to the specified facility. *Note.— Same intent as ICAO Doc 4444 UM 213.*	[facility designation] ALTIMETER [altimeter]	R
	Standardized Free Text System Management Messages (uplink)		
UM 169j	Instruction to check the status of CPDLC messages and to respond to unanswered uplink messages. *Note.— No equivalent to ICAO Doc 4444.*	CHECK AND RESPOND TO OPEN CPDLC MESSAGES	R
UM 169w	Instruction to set the latency timer to the specified value. *Note.— No equivalent to ICAO Doc 4444.*	SET MAX UPLINK DELAY VALUE TO [delayed message parameter] SECONDS	R
UM 169u	Notification that an element contained in a CPDLC downlink message was not part of the approved CPDLC message set. *Note.— Equivalent to ICAO Doc 4444 UM 162.*	MESSAGE NOT SUPPORTED BY THIS ATS UNIT	R
UM 169ah	Notification that an element contained in a CPDLC downlink message was not part of the approved message set. The message should be communicated by voice, i.e., radiotelephone (RTF). *Note.— No equivalent to ICAO Doc 4444.*	MESSAGE NOT SUPPORTED BY THIS ATS UNIT, CONTACT RTF	R
UM 169am	Instruction to turn the CPDLC application off and to logon to the specified ATSU.	SELECT ATC COMM OFF THEN LOGON TO [facility designation]	R
UM 169an	Instruction for the flight crew to check that the ADS-C function is armed.	CONFIRM ADS-C ARMED	R
UM 169ao	Instruction to transmit CPDLC position reports due to the failure of ADS-C.	ADS-C SHUT DOWN. REVERT TO CPDLC POSITION REPORTS	R

Ref #	Message Intent/Use	Message Element	Resp.
UM 169at	Instruction to transmit voice position reports due to the failure of ADS-C.	ADS-C SHUT DOWN REVERT TO VOICE POSITION REPORTS	R
UM 169ap	Instruction for intermediary CPDLC-capable aircraft to relay message to aircraft not in communication with ATC.	RELAY TO [call sign] [unit name] [text of message to be relayed]	R, then DM67new
	Standardized Free Text Military (uplink)		
UM 169aq	Notification that MARSA procedures with the specified aircraft have been terminated.	MARSA TERMINATED WITH [call sign(s) of receiver aircraft]	R
UM 169ar		CLEARED TO DELAY FOR AIR REFUEL AT [position] UNTIL [time]	R
UM 169as		CLEARED TO CONDUCT REFUELING	R

A.4.2 CPDLC downlink standardized free text messages

Ref #	Message Intent/Use	Message Element	Resp.
	Standardized Free Text Route Modification Requests (downlink)		
DM 67ad	Request for a tailored arrival. *Note.— No equivalent in ICAO Doc 4444.*	REQ TA [TA designator]	N
	Standardized Free Text Reports (downlink)		
DM 67k	Notification of a revised estimate for the specified position. *Note.— Intent similar to DM 43.*	REVISED ETA [position] [time]	N
DM 67l	Notification of the ground speed. *Note.— Intent partial to ICAO Doc 4444 DM 113.*	GS [speed]	N
DM 67m	Notification of the preferred level. *Note.— Same intent as ICAO Doc 4444 DM 106.*	FL[altitude]	N
DM 67n	Notification of estimated time of arrival at the specified position. *Note.— Same intent as ICAO Doc 4444 DM 104.*	[position] [time]	N

Ref #	Message Intent/Use	Message Element	Resp.
DM 67o	Notification that the flight crew has visually sighted and passed the specified traffic. *Note.— No equivalent in ICAO Doc 4444.*	[traffic identification] SIGHTED AND PASSED	N
DM 67p	Notification that the flight crew did NOT visually sight the specified traffic. *Note.— No equivalent in ICAO Doc 4444.*	[traffic identification] NOT SIGHTED	N
DM 67q	Notification that the previously described traffic has been sighted. *Note.— No equivalent in ICAO Doc 4444.*	TRAFFIC SIGHTED	N
DM 67v	Notification of the preferred time to commence descent for an approach. *Note.— Same intent as ICAO Doc 4444 DM 109.*	TOD [time]	N
DM 67aa	The specified ATSU is being monitored on the specified frequency. *Urgent urgency attribute.* *Note 1.— Airborne automation (i.e., preformatted message rather than the flight crew typing the text) may be necessary for message composition and to ensure accuracy of the message content. Consequently, not all aircraft will be equipped with such automation.* *Note 2.— Same intent as ICAO Doc 4444 DM 89.*	MONITORING [unit name] [frequency]	N
	Standardized Free Text **System Management Messages (downlink)**		
DM 67u	Notification that the delivery time of an uplink message exceeded the maximum permitted by the latency timer. The uplink message should be re-sent or communicated by other means. *Note.— No equivalent in ICAO Doc 4444.*	UPLINK DELAYED IN NETWORK AND REJECTED - RESEND OR CONTACT BY VOICE	N
DM 67ab	Notification that the ADS-C emergency mode was inadvertent and has been set to OFF. *Note.— No equivalent in ICAO Doc 4444.*	ADS-C RESET	N
DM 67ae	Notification from the intermediary CPDLC-capable aircraft that the aircraft not in communication received the instructions.	RELAY FROM [call sign] [response parameters]	N
	Standardized Free Text **Additional messages (downlink)**		
DM 67ac	Used with DM 27, indicating a request for a weather deviation on both sides of route.	AND [specified distance] [direction]	N

Ref #	Message Intent/Use	Message Element	Resp.
	Standardized Free Text Negotiation Responses (downlink)		
DM 67b	We can accept the specified level at the specified time. *Note.— Intent equivalent to ICAO Doc 4444 DM 81.*	WE CAN ACCEPT [altitude] AT [time]	N
DM 67c	We can accept the specified speed at the specified time. *Note.— Intent equivalent to ICAO Doc 4444 DM 83.*	WE CAN ACCEPT [speed] AT [time]	N
DM 67d	We can accept a parallel track offset the specified distance in the specified direction at the specified time. *Note.— Intent equivalent to ICAO Doc 4444 DM 85.*	WE CAN ACCEPT [specified distance] [direction] AT [time]	N
DM 67e	We cannot accept the specified level. *Note.— Intent equivalent to ICAO Doc 4444 DM 82.*	WE CANNOT ACCEPT [altitude]	N
DM 67f	We cannot accept the specified speed. *Note.— Intent equivalent to ICAO Doc 4444 DM 84.*	WE CANNOT ACCEPT [speed]	N
DM 67g	We cannot accept a parallel track offset the specified distance in the specified direction. *Note.— Intent equivalent to ICAO Doc 4444 DM 86.*	WE CANNOT ACCEPT [specified distance] [direction]	N
DM 67h	Request for the earliest time at which a clearance to climb to the specified level can be expected. *Note.— Intent equivalent to ICAO Doc 4444 DM 87.*	WHEN CAN WE EXPECT CLIMB TO [altitude]	N
DM 67i	Request for the earliest time at which a clearance to descend to the specified level can be expected. *Note.— Intent equivalent to ICAO Doc 4444 DM 88.*	WHEN CAN WE EXPECT DESCENT TO [altitude]	N

Ref #	Message Intent/Use	Message Element	Resp.
	Standardized Free Text **Military (downlink)**		
DM 67w	Request for a delay at the specified position until a specified time to rendezvous with the receiver aircraft. *Note 1.— [position] is the ARCP as filed in the tanker's flight plan. [time] is the time the tanker expects to pass the ARCP and commence refueling along the refueling track. It is also the end of the delay time.* *Note 2.— No equivalent in ICAO Doc 4444.*	TO DELAY FOR AIR REFUEL AT [position] UNTIL [time]	N
DM 67x	Notification that refueling will end at the specified time or position. *Note.— No equivalent in ICAO Doc 4444.*	EXPECT END OF REFUEL AT [time/position]	N
DM 67y	Notification that the aircraft will be joining the specified ALTRV at the specified position or time. *Note.— No equivalent in ICAO Doc 4444.*	JOINING ALTRV [ALTRV designator] AT [time/position]	N
DM 67z	Notification that the tanker will accept MARSA with the specified (receiver) aircraft. *Note.— No equivalent in ICAO Doc 4444.*	ACCEPT MARSA WITH [call sign(s) of receiver aircraft]	N

Appendix B RCP specifications

This appendix includes specifications for RCP 240 and RCP 400. These specifications support:

a) Safety oversight of air traffic service provisions and operations;

b) Agreements/contractual arrangements that air traffic service providers and aircraft operators make with their respective CSPs;

c) Operational authorizations, flight crew training and qualification;

d) Design approval of aircraft data link systems; and

e) Operational-monitoring, analysis, and exchange of operational data among regions and states.

The RCP specifications are derived mainly from a safety assessment. However, in cases where it has been determined to be beneficial, the RCP specification may include criteria to support operational efficiency and orderly flow of air traffic. In these cases, the RCP specification indicates the distinction between safety and efficiency.

The specifications provide a means of compliance, in general. Additional guidance related to service provision, aircraft approval and operational authorizations can be found in Chapter 3. Guidance and requirements on post-implementation monitoring can be found at Appendix D.

The RCP specifications include allocations for data communications. The /D designator is used to indicate the RCP allocations associated with the CPDLC application.

B.1 Terms and acronyms

Note.— The terms applied to the RCP specifications are taken from ICAO Doc 9869, First Edition, Manual on Required Communication Performance, dated 2008. Additional terms are provided, as appropriate, to clarify meaning and measurement points for the RCP allocations.

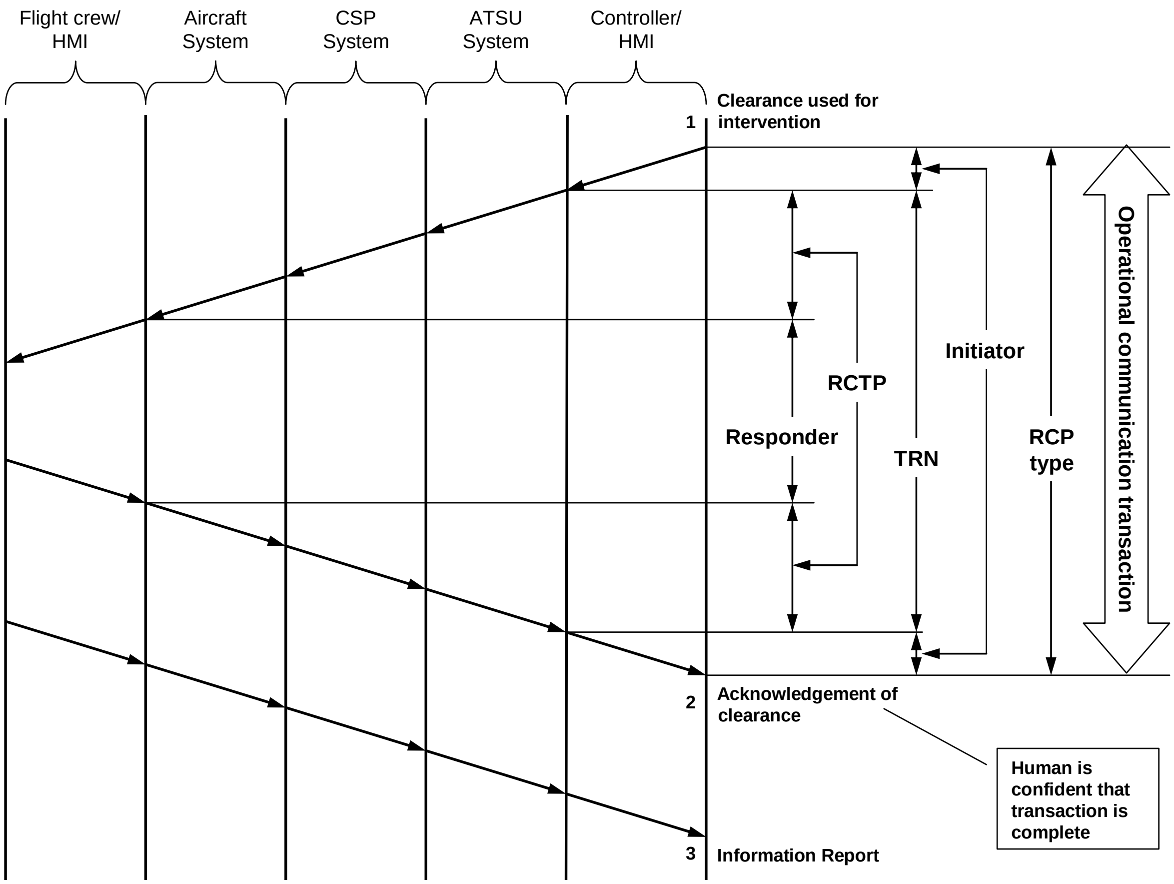
RCP specification	
Term	**Description**
Operational communication transaction	The process a human uses to initiate the transmission of an instruction, clearance, flight information, and/or request, and is completed when that human is confident that the transaction is complete.
RCP type	A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.
RCP expiration time (ET)	The maximum time for the completion of the operational communication transaction after which the initiator is required to revert to an alternative procedure.
RCP nominal time (TT 95%)	The maximum nominal time within which 95% of operational communication transactions is required to be completed.

RCP specification	
Term	**Description**
RCP continuity (C)	The required probability that an operational communication transaction can be completed within the communication transaction time, either ET or TT 95%, given that the service was available at the start of the transaction.
RCP availability (A)	The required probability that an operational communication transaction can be initiated when needed.
RCP integrity (I)	The required probability that an operational communication transaction is completed with no undetected errors. Note.— *Whilst RCP integrity is defined in terms of the "goodness" of the communication capability, it is specified in terms of the likelihood of occurrence of malfunction on a per flight hour basis, e.g. 10^{-5}, consistent with RNAV/RNP specifications.*

/D transaction time	
Term	**Description**
Monitored operational performance (TRN)	The portion of the transaction time (used for intervention) that does not include the times for message composition or recognition of the operational response.
Required communication technical performance (RCTP)	The portion of the (intervention) transaction time that does not include the human times for message composition, operational response, and recognition of the operational response.
Responder performance criteria	The operational portion of the transaction time to prepare the operational response, and includes the recognition of the instruction, and message composition, e.g. flight crew/HMI for intervention transactions.
$RCTP_{ATSU}$	The summed critical transit times for an ATC intervention message and a response message, allocated to the ATSU system.
$RCTP_{CSP}$	The summed critical transit times for an ATC intervention message and a response message, allocated to the CSP system.
$RCTP_{AIR}$	The summed critical transit times for an ATC intervention message and a response message, allocated to the aircraft system.

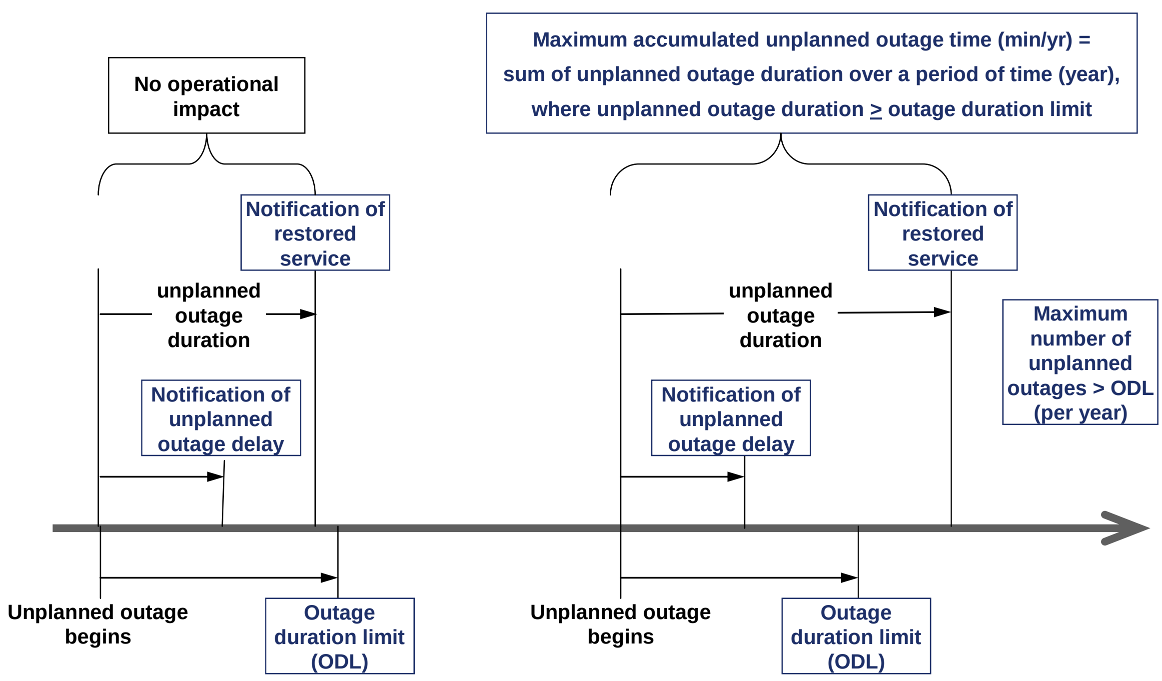
Continuity	
Term	**Description**
C for TRN	The proportion of intervention messages and responses that can be delivered within the specified TRN for intervention.
C for RCTP	The proportion of intervention messages and responses that can be delivered within the specified RCTP for intervention.

Continuity	
Term	**Description**
C for $RCTP_{ATSU}$	The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{ATSU}$ for Intervention.
C for $RCTP_{CSP}$	The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{CSP}$ for Intervention.
C for $RCTP_{AIR}$	The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{AIR}$ for Intervention.



Availability	
Term	**Description**
Service availability (A_{CSP})	The required probability that the communication service is available to all users in a specific airspace when desired..

Availability	
Term	**Description**
Unplanned outage duration limit (minutes)	Time after the unplanned outage begins at which there is an operational impact. Measured from when an unplanned outage begins to when the ATSU receives notification that the service has been restored.
Maximum number of unplanned outages	Measured separately for each relevant operational airspace or Flight Information Region (FIR) over any 12-month period.
Maximum accumulated unplanned outage time (min/yr)	Measured by accumulating ***only*** the duration times for unplanned outages greater than the unplanned outage duration limit during any 12-month period. The accumulation is performed separately for each relevant operational airspace or FIR.
Unplanned outage notification delay (min)	Notification to the ATSU of an unplanned outage. Measured from when the unplanned outage begins to when the ATSU receives notification.
Aircraft system availability (A_{AIR})	The required probability of available capability on an aircraft with an average flight of 6 hours. *Note.— The actual aircraft system availability is computed assuming that the service is available in the relevant airspace.*



B.2 RCP 240 specification

<table>
<tr><th colspan="4">RCP Specification</th></tr>
<tr><td colspan="2">RCP type</td><td colspan="2">RCP 240</td></tr>
<tr><td colspan="4">Airspace specific considerations</td></tr>
<tr><td>Interoperability</td><td colspan="3">Specify interoperability criteria, e.g. FANS 1/A</td></tr>
<tr><td>ATS Function</td><td colspan="3">Specify ATS function(s), e.g. applicable separation standard</td></tr>
<tr><td>Application</td><td colspan="3">Specify controller-pilot ATC communication intervention capability, e.g. CPDLC application per ICAO Doc 4444, and RTCA DO-306/EUROCAE ED-122, Annex A</td></tr>
<tr><td colspan="4">RCP parameter values</td></tr>
<tr><td>Transaction time (sec)</td><td>Continuity (C)</td><td>Availability (A)</td><td>Integrity (I)</td></tr>
<tr><td>ET = 240</td><td>C(ET) = 0.999</td><td rowspan="2">0.999
0.9999 (efficiency)</td><td rowspan="2">Malfunction = 10^{-5} per flight hour</td></tr>
<tr><td>TT 95% = 210</td><td>C(TT 95%) = 0.95</td></tr>
<tr><td colspan="4">RCP monitoring and alerting criteria</td></tr>
<tr><td>Ref</td><td colspan="3">Criteria</td></tr>
<tr><td>MA-1</td><td colspan="3">The system shall be capable of detecting failures and configuration changes that would cause the communication service to no longer meet the RCP type for the intended function.</td></tr>
<tr><td>MA-2</td><td colspan="3">When the communication service can no longer meet the RCP type for the intended function, the flight crew and/or the controller shall take appropriate action.</td></tr>
<tr><td colspan="4">Notes</td></tr>
<tr><td colspan="4"><u>Note 1</u>.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122.
<u>Note 2</u>.— The values for transaction times are to be applied to transactions that are representative of communication capability for the controller to intervene with a specific operator, aircraft type, and aircraft identification.
<u>Note 3</u>.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RCP type, this would be considered a change in system configuration.
<u>Note 4</u>.— DO 306/ED 122 specifies an availability value based on safety assessment of the operational effects of the loss of the service. The availability value herein is more stringent, based on an additional need to maintain orderly and efficient operations.</td></tr>
</table>

B.2.1 RCP 240/D allocations

The RCP 240/D allocations are applicable to the CPDLC application.

B.2.1.1 Air traffic service provider (ATSP)

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: ATSP**
Transaction Time Parameter	**ET (sec) C = 99.9%**	**TT (sec) C = 95%**	**Compliance Means**
Transaction Time Value	240	210	Analysis, CSP contract/service agreement. See also paragraph B.2.1.2.
RCP Time Allocations			
Initiator	30	30	Analysis, simulations, safety and human factors assessments
TRN	210	180	Monitored, CSP contract/service agreement. See also paragraph B.2.1.2.
TRN Time Allocations			
Responder	60	60	Initially, by analysis, simulations, safety human factors assessments Post-implementation, monitored, estimated
RCTP	150	120	Monitored, estimated, CSP contract/service agreement. See also paragraph B.2.1.2.
RCTP Time Allocation			
$RCTP_{ATSU}$	15	10	Pre-implementation demonstration

RCP availability criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: ATSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	0.9999	0.999	Contract/service agreement terms. *Note.— For guidelines to aid in the development of the contract/service agreement with the CSP, see paragraph B.2.1.2, RCP 240/D allocation to CSP for RCP availability criteria.*

RCP integrity criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Malfunction = 10^{-5} per flight hour	Analysis, safety requirements, development assurance level commensurate with integrity level, (compliance shown prior to operational implementation). See also RCP related safety requirement SR-26 for the ATSP. CSP contract/service agreement. See also RCP integrity criteria for CSP, paragraph B.2.1.2.

RCP monitoring and alerting criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Ref:	**Criteria**	**Compliance means**
MA-1a	The ground system shall be capable of detecting ground system failures and configuration changes that would cause the communication service to no longer meet the requirements for the intended function. *Note.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RCP type, this would be considered a change in system configuration.*	System design, implementation. CSP contract/service agreement. See also paragraph B.2.1.2, RCP availability criteria.
MA-1b	When the communication service no longer meets the requirements for the intended function, the ground system shall provide indication to the controller.	System design, implementation. CSP contract/service agreement. See also paragraph B.2.1.2, RCP availability criteria.
MA-2	When the controller receives an indication that the communication service no longer meets the requirements for the intended function (e.g. reduced longitudinal separation), the controller shall take action to resolve the situation, (e.g. apply an alternative form of separation).	System design, procedures, implementation

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Ref	**Related RCP Parameter**	**Safety requirement**
SR-1a (ATSP)	A	The ATSU shall display the indication provided by the aircraft system when a data link service request initiated by the ground system or the controller is rejected at the application layer.

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Ref	**Related RCP Parameter**	**Safety requirement**
SR-1b (ATSP)	A	The ATSU shall provide to the aircraft system an indication when it rejects a data link service request initiated by the flight crew at the application layer.
SR-2 (ATSP)	A, C	The ATSU shall indicate to the controller a detected loss of data link service.
SR-3 (ATSP)	A	Data link service shall be established in sufficient time to be available for operational use.
SR-4 (ATSP)	A, C	ATSU shall be notified of planned outage of data link service sufficiently ahead of time.
SR-5 (ATSP)	A, C	The ATSU shall indicate to the controller when a message can not be successfully transmitted.
SR-6 (ATSP)	C, I	The ATSU end system shall provide unambiguous and unique identification of the origin and destination with each message it transmits.
SR-7 (ATSP)	C, I	The ATSU shall indicate in each response to which messages it refers.
SR-8 (ATSP)	I	The ATSU shall send the route clearance information with the route clearance via data link.
SR-9 (ATSP)	C, I	The ATSU end system shall time stamp to within one second UTC each message when it is released for onward transmission.
SR-11 (ATSP)	C, I	Any processing performed by ATSU (data entry/ encoding/ transmitting/ decoding/ displaying) shall not affect the intent of the message.
SR-12 (ATSP)	C, I	The ATSU end system shall reject messages not addressed to itself.
SR-13 (ATSP)	C, I	The ATSU shall transmit messages to the designated aircraft system.
SR-14 (ATSP)	A, C, I	The ATSU system shall indicate to the controller when a required response for a message sent by the ATSU is not received within the required time (ET_{TRN}).
SR-15 (ATSP)	C, I	When the ATSU receives a message whose time stamp exceeds ET_{TRN}, the ATSU shall provide appropriate indication.
SR-16 (ATSP)	C, I	The ATSU shall prevent the release of clearance without controller action.
SR-17 (ATSP)	C, I	The ATSU shall prohibit operational processing by controller of corrupted messages.

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Ref	**Related RCP Parameter**	**Safety requirement**
SR-18 (ATSP)	C, I	The ATSU shall be able to determine the message initiator.
SR-19 (ATSP)	C, I	The ATSU shall prohibit to the controller operational processing of messages not addressed to the ATSU.
SR-20 (ATSP)	C, I	ATSU shall only establish and maintain data link services when the aircraft identifiers in data link initiation correlates with the ATSU's corresponding aircraft identifiers in the current flight plan.
SR-21 (ATSP)	C, I	The aircraft identifiers used for data link initiation correlation by the ATSU shall be unique and unambiguous (e.g. the Aircraft Identification and either the Registration Marking or the Aircraft Address).
SR-23 (ATSP)	C, I	An ATSU system shall not permit data link services when there are non compatible version numbers.
SR-24 (ATSP)	C, I	The ATSU shall respond to messages in their entirety.
SR-25 (ATSP)	I	The ATSU end system shall be capable of detecting errors that would result in mis-delivery introduced by the communication service.
SR-26 (ATSP)	I	The ATSU end system shall be capable of detecting errors that would result in corruption introduced by the communication service.

B.2.1.2 Communication service provider (CSP)

Note.— The RCP allocations for the CSP are intended to aid the ATSP and the aircraft operator in the development of contracts and service agreements.

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: CSP**
Transaction Time Parameter	**ET (sec) C = 99.9%**	**TT (sec) C = 95%**	**Compliance means**
RCTP Time Allocation			
$RCTP_{CSP}$	120	100	Contract/service agreement terms. Pre-implementation demonstration.

RCP availability criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: CSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	0.9999	0.999	Contract/service agreement terms
Unplanned outage duration limit (min)	10	10	Contract/service agreement terms
Maximum number of unplanned outages	4	48	Contract/service agreement terms
Maximum accumulated unplanned outage time (min/yr)	52	520	Contract/service agreement terms
Unplanned outage notification delay (min)	5	5	Contract/service agreement terms
Note.— DO 306/ED 122 specifies a requirement to indicate loss of the service. Unplanned outage notification delay is an additional time value associated with the requirement to indicate the loss to the ATS provider per the RCP related safety requirement SR-4 for the ATSP.			

RCP integrity criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: CSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Not specified	Contract/service agreement terms. Per RCP related safety requirements SR-26 for the ATSP and SR-26 for the aircraft system, the end system is required include provisions, consistent with the overall RCP integrity criteria, to mitigate the effects of errors introduced by the network. These provisions require the network to pass protected information (or data) to the end system without manipulating the protected information (or data) it passes. *Note.— In formulating contract terms with the CSP, the ATSP and/or operator may specify an integrity value and other related criteria, as appropriate, for the network, including subnetworks, that will ensure acceptable data integrity, consistent with the assumptions used to define the end system provisions, e.g. CRC or Fletcher's checksum.*

B.2.1.3 Aircraft system

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft system**
Transaction Time Parameter	**ET (sec) C = 99.9%**	**TT (sec) C = 95%**	**Compliance Means**
RCP Time Allocation			
Initiator	30	30	Human-machine interface capability, pre-implementation demonstration
TRN Time Allocation			
Responder	60	60	Human-machine interface capability, pre-implementation demonstration
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Pre-implementation demonstration

RCP availability criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft system**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR}	N/A	0.999	Analysis, architecture, design, pre-implementation demonstration

RCP integrity criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft system**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Malfunction = 10^{-5} per flight hour	Analysis, safety requirements, development assurance level, e.g. Level C software, commensurate with integrity level, pre-implementation demonstration. See also RCP related safety requirement SR-26 for the aircraft system.

RCP monitoring and alerting criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft system**
Ref:	**Criteria**	**Compliance means**
MA-1a	The aircraft system shall be capable of detecting aircraft system failures or loss of air/ground communication that would cause the aircraft communication capability to no longer meet the requirements for the intended function.	System design, implementation
MA-1b	When the aircraft communication capability no longer meets the requirements for the intended function, the aircraft system shall provide indication to the flight crew.	System design, implementation

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft system**
Ref	**Related RCP Parameter**	**Safety requirement**
SR-1a (Air)	A	The aircraft system shall provide to the ATSU an indication when it rejects a data link service request initiated by the ground system or the controller at the application layer.
SR-1b (Air)	A	The aircraft system shall display the indication provided by the ATSU when a data link service request initiated by the flight crew is rejected at the application layer.
SR-2 (Air)	A, C	The aircraft system shall indicate to the flight crew a detected loss of data link service.
SR-5 (Air)	A, C	The aircraft system shall indicate to the flight crew when a message can not be successfully transmitted.
SR-6 (Air)	C, I	The aircraft end system shall provide unambiguous and unique identification of the origin and destination with each message it transmits.
SR-7 (Air)	C, I	The aircraft system shall indicate in each response to which messages it refers.
SR-8 (Air)	I	The aircraft shall execute the route clearance per the route clearance received from the ATSU via data link.
SR-9 (Air)	C, I	The aircraft end system shall time stamp to within one second UTC each message when it is released for onward transmission.
SR-1 (Air)0	C, I	The aircraft end system shall include in each ADS-C report the time at position to within one second of the UTC time the aircraft was actually at the position provided in the report.
SR-11 (Air)	C, I	Any processing performed by aircraft system (data entry/ encoding/ transmitting/ decoding/ displaying) shall not affect the intent of the message

RCP related safety requirements		
Specification: RCP 240/D	Application: CPDLC	Component: Aircraft system
Ref	**Related RCP Parameter**	**Safety requirement**
SR-12 (Air)	C, I	The aircraft end system shall reject messages not addressed to itself.
SR-13 (Air)	C, I	The aircraft system shall transmit messages to the designated ATSU.
SR-15 (Air)	C, I	When the aircraft system receives a message whose time stamp exceeds ET_{TRN}, the aircraft system shall provide appropriate indication.
SR-16 (Air)	C, I	The aircraft end system shall prevent the release of responses to clearances without flight crew action.
SR-17 (Air)	C, I	The aircraft system shall prohibit operational processing by flight crew of corrupted messages.
SR-18 (Air)	C, I	The aircraft system shall be able to determine the message initiator.
SR-19 (Air)	C, I	The aircraft system shall prohibit to the flight crew operational processing of messages not addressed to the aircraft.
SR-21 (Air)	C, I	The aircraft identifiers sent by the aircraft system and used for data link initiation correlation shall be unique and unambiguous (e.g. the Aircraft Identification and either the Registration Marking or the Aircraft Address).
SR-24 (Air)	C, I	The aircraft system shall respond to messages in their entirety or allow the flight crew to do it.
SR-25 (Air)	I	The aircraft end system shall be capable of detecting errors that would result in mis-delivery introduced by the communication service
SR-26 (Air)	I	The aircraft end system shall be capable of detecting errors that would result in corruption introduced by the communication service.
SR-27 (Air)	C, I	The aircraft and/or flight crew shall ensure the correct transfer into or out of the aircraft's FMS of route data received/sent via data link that will be used to define the aircraft active flight plan.

B.2.1.4 Aircraft operator

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft operator**
Transaction Time Parameter	**ET (sec) C = 99.9%**	**TT (sec) C = 95%**	**Compliance Means**
RCP Time Allocations			
Initiator	30	30	Procedures, flight crew training and qualification in accordance with safety requirements.
TRN Time Allocations			
Responder	60	60	Procedures, flight crew training and qualification in accordance with safety requirements.
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
$RCTP_{CSP}$	120	100	CSP contract/service agreement. See also paragraph B.2.1.2. Pre-implementation demonstration.

RCP availability criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft operator**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR}	N/A	0.999	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. owner requirements table or airline policy file.
Service availability (A_{CSP})	0.9999	0.999	Contract/service agreement terms. *Note.— For guidelines to aid in the development of the contract/service agreement with the CSP, see paragraph B.2.1.2, RCP 240/D allocation to CSP for RCP availability criteria.*

RCP integrity criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft operator**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Malfunction = 10^{-5} per flight hour	Aircraft type design approval, establish procedures, training, and qualification to meet safety requirements. CSP contract/service agreement. See also RCP integrity criteria for CSP, paragraph B.2.1.2.

RCP monitoring and alerting criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft operator**
Ref:	**Criteria**	**Compliance means**
MA-2	When the flight crew determines that the aircraft communication capability no longer meets the requirements for the intended function, the flight crew shall advise the ATC unit concerned.	Procedures, flight crew training and qualification

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft operator**
Ref	**Related RCP Parameter**	**Safety requirement**
SR-22 (Operator)	C, I	The flight crew shall perform the initiation data link procedure again with any change of the flight identifier.
SR-24 (Operator)	C, I	The flight crew shall respond to a message in its entirety when not responded by the aircraft system.
SR-27 (Operator)	C, I	The aircraft and/or flight crew shall ensure the correct transfer into or out of the aircraft's FMS of route data received/sent via data link that will be used to define the aircraft active flight plan.

B.3 RCP 400 specification

RCP Specification			
RCP type		**RCP 400**	
Airspace specific considerations			
Interoperability	Specify interoperability criteria, e.g. FANS 1/A		
ATS Function	Specify ATS function(s), e.g. applicable separation standard		
Application	Specify controller-pilot ATC communication intervention capability, e.g. CPDLC application per ICAO Doc 4444, and RTCA DO-306/EUROCAE ED-122, Annex A		
RCP parameter values			
Transaction time (sec)	**Continuity (C)**	**Availability (A)**	**Integrity (I)**
ET = 400	C(ET) = 0.999	0.999	Malfunction = 10^{-5} per flight hour
TT 95% = 350	C(TT 95%) = 0.95		
RCP monitoring and alerting criteria			
Ref:	**<u>Criteria</u>**		
MA-1	The system shall be capable of detecting failures and configuration changes that would cause the communication service to no longer meet the RCP type for the intended function.		
MA-2	When the communication service can no longer meet the RCP type for the intended function, the flight crew and/or the controller shall take appropriate action.		
Notes			
<u>Note 1</u>.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122. *<u>Note 2</u>.— The values for transaction times are to be applied to transactions that are representative of communication capability for the controller to intervene with a specific operator, aircraft type, and aircraft identification.* *<u>Note 3</u>.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RCP type, this would be considered a change in system configuration.*			

B.3.1 RCP 400/D allocations

The RCP 400/D allocations are applicable to the CPDLC application.

B.3.1.1 Air traffic service provider (ATSP)

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: ATSP**
Transaction Time Parameter	**ET (sec) C = 99.9%**	**TT (sec) C = 95%**	**Compliance Means**
Transaction Time Value	400	350	Analysis, CSP contract/service agreement. See also paragraph B.3.1.2.
RCP Time Allocations			
Initiator	30	30	Analysis, simulations, safety and human factors assessments
TRN	370	320	Monitored, CSP contract/service agreement. See also paragraph B.3.1.2.
TRN Time Allocations			
Responder	60	60	Initially, by analysis, simulations, safety human factors assessments Post-implementation, monitored, estimated
RCTP	310	260	Monitored, estimated, CSP contract/service agreement. See also paragraph B.3.1.2.
RCTP Time Allocation			
$RCTP_{ATSU}$	15	10	Pre-implementation demonstration

RCP availability criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: ATSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	N/A	0.999	Contract/service agreement terms. *Note.— For guidelines to aid in the development of the contract/service agreement with the CSP, see paragraph B.3.1.2, RCP 400/D allocation to CSP for RCP availability criteria.*

RCP integrity criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: ATSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— RCP integrity criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.1.*	

RCP monitoring and alerting criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: ATSP**
Ref:	**Criteria**	**Compliance means**
All	*Note.— RCP monitoring and alerting criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.1.*	

RCP related safety requirements		
Specification: RCP 400/D	**Application: CPDLC**	**Component: ATSP**
Ref	**Related RCP Parameter**	**Safety requirement**
All	A, C, I	*Note.— Safety requirements related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.1.*

B.3.1.2 Communication service provider (CSP)

Note.— The RCP allocations for the CSP are intended to aid the ATSP and the aircraft operator in the development of contracts and service agreements.

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: CSP**
Transaction Time Parameter	**ET (sec) C = 99.9%**	**TT (sec) C = 95%**	**Compliance means**
RCTP Time Allocation			
$RCTP_{CSP}$	280	240	Contract/service agreement terms

RCP availability criteria			
Specification: RCP 400/D	**Application: CPDLC**	**Component: CSP**	
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	N/A	0.999	Contract/service agreement terms
Unplanned outage duration limit (min)	N/A	20	Contract/service agreement terms
Maximum number of unplanned outages	N/A	24	Contract/service agreement terms
Maximum accumulated unplanned outage time (min/yr)	N/A	520	Contract/service agreement terms
Unplanned outage notification delay (min)	N/A	10	Contract/service agreement terms

RCP integrity criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: CSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— RCP integrity criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.2.*	

B.3.1.3 Aircraft system

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft system**
Transaction Time Parameter	**ET (sec) C = 99.9%**	**TT (sec) C = 95%**	**Compliance Means**
RCP Time Allocation			
Initiator	30	30	Human-machine interface capability, pre-implementation demonstration
TRN Time Allocation			
Responder	60	60	Human-machine interface capability, pre-implementation demonstration
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Pre-implementation demonstration

RCP availability criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft system**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR}	N/A	0.999	Analysis, architecture, design, pre-implementation demonstration

RCP integrity criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft system**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— RCP integrity criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.3.*	

RCP monitoring and alerting criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft system**
Ref:	**Criteria**	**Compliance means**
All	*Note.— RCP monitoring and alerting criteria related to RCP type 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.3.*	

RCP related safety requirements		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft system**
Ref	**Related RCP Parameter**	**Safety requirement**
All	A, C, I	*Note.— Safety requirements related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.3.*

B.3.1.4 Aircraft operator

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft operator**
Transaction Time Parameter	**ET (sec)** **C = 99.9%**	**TT (sec)** **C = 95%**	**Compliance Means**
RCP Time Allocations			
Initiator	30	30	Procedural capability, flight crew training and qualification in accordance with safety requirements.
TRN Time Allocations			
Responder	60	60	Procedural capability, flight crew training and qualification in accordance with safety requirements.
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
$RCTP_{CSP}$	280	240	CSP contract/service agreement. See also paragraph B.3.1.2.

RCP availability criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft operator**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR}	N/A	0.999	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
Service availability (A_{CSP})	N/A	0.999	Contract/service agreement terms. *Note.— For guidelines to aid in the development of the contract/service agreement with the CSP, see paragraph B.3.1.2, RCP 400/D allocation to CSP for RCP availability criteria.*

RCP integrity criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft operator**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— RCP integrity criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.4.*	

RCP monitoring and alerting criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft operator**
Ref:	**Criteria**	**Compliance means**
All	*Note.— RCP monitoring and alerting criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.4.*	

RCP related safety requirements		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft operator**
Ref	**Related RCP Parameter**	**Safety requirement**
All	C, I	*Note.— Safety requirements related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.4.*

Appendix C Surveillance performance specifications

This appendix includes specifications for surveillance performance. These specifications support:

a) Safety oversight of air traffic service provisions and operations;

b) Agreements/contractual arrangements that air traffic service providers and aircraft operators make with their respective CSPs;

c) Operational authorizations, flight crew training and qualification;

d) Design approval of aircraft data link systems; and

e) Operational-monitoring, analysis, and exchange of operational data among regions and states.

The surveillance performance specifications are derived mainly from a safety assessment. However, in cases where it has been determined to be beneficial, the surveillance performance specification may include criteria to support operational efficiency and orderly flow of air traffic. In these cases, the surveillance performance specification indicates the distinction between safety and efficiency.

The specifications provide a means of compliance, in general. Additional guidance related to service provision, aircraft approval and operational authorizations can be found in Chapter 3. Guidance and requirements on post-implementation monitoring can be found at Appendix D.

The surveillance performance specifications include allocations for data communications. The /D designator is used to indicate the surveillance performance allocations associated with the ADS-C or FMC WPR application.

C.1 Terms and acronyms

Note.— The terms applied to the surveillance performance specifications are taken from ICAO Doc 9869, First Edition, Manual on Required Communication Performance, dated 2008. Additional terms are provided, as appropriate, to clarify meaning and measurement points for the RCP allocations.

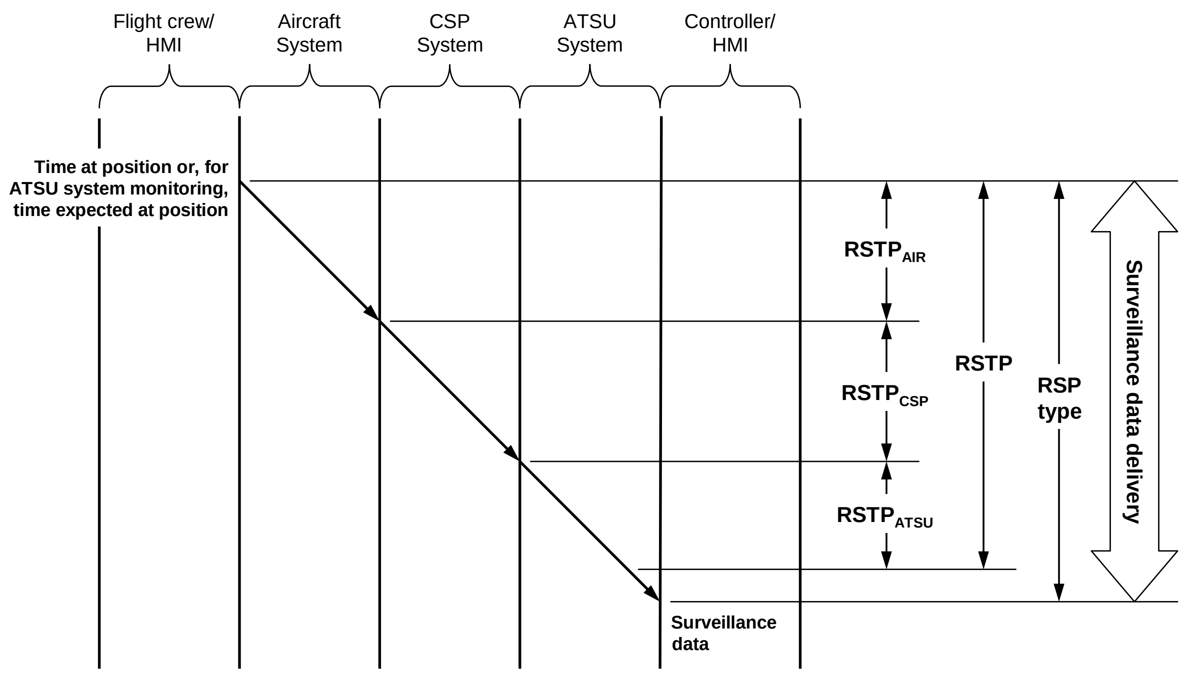
Surveillance performance specification and related terms	
Term	**Description**
ATS surveillance service	A term used to indicate a service provided directly by means of an ATS surveillance system. (ICAO)
ADS-C service	A term used to indicate an ATS service that provides surveillance information by means of the ADS-C application. *Note.— ICAO Doc 4444 does not include ADS-C in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the ADS-C application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.*

Surveillance performance specification and related terms	
Term	**Description**
FMC WPR service	A term used to indicate an ATS service that provides surveillance information by means of the FMC WPR application. Note.— *ICAO Doc 4444 does not include FMC WPR in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the FMC WPR application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.*
ATS surveillance system	A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft. Note.— *A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.* (ICAO)
Automatic dependent surveillance — broadcast (ADS-B)	A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link. (ICAO)
Automatic dependent surveillance — contract (ADS-C)	A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports. Note.— *The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.* (ICAO)
Surveillance data	Data pertaining to the identification of aircraft and/or obstructions for route conformance monitoring and safe and efficient conduct of flight. Note.— *In this document, surveillance data applies to ADS-C reports, CPDLC position reports and FMC waypoint position reports.*
Surveillance performance	A statement of the performance requirements for operational surveillance in support of specific ATM functions.
Surveillance performance type	A label (e.g. type 180) that represents the values assigned to surveillance performance parameters for surveillance data transit time, continuity, availability and integrity.

Surveillance performance specification and related terms	
Term	**Description**
Surveillance data delivery	The process for obtaining surveillance data. Note.— *In this document, the delivery is defined for the following reports:* *a) ADS-C periodic report, from the start of the periodic interval to when the ATSU receives the report. The start of the periodic interval occurs when the periodic report is sent by the aircraft/flight crew;* *b) ADS-C event reports and FMC waypoint position reports, from the time the aircraft system detects that the event has occurred to when the ATSU receives the report; and* *c) CPDLC position report, from the time at which the aircraft reported its position and when the ATSU receives the report.*
Surveillance data transit time	The required time for surveillance data delivery.
Surveillance overdue delivery time (OT)	The maximum time for the successful delivery of surveillance data after which the initiator is required to revert to an alternative procedure.
Surveillance nominal delivery time (DT 95%)	The maximum nominal time within which 95% of surveillance data is required to be successfully delivered.
Surveillance continuity (C)	The required probability that surveillance data can be delivered within the surveillance delivery time parameter, either OT or DT 95%, given that the service was available at the start of delivery.
Surveillance availability (A)	The required probability that surveillance data can be provided when needed.
Surveillance integrity (I)	The required probability that the surveillance data is delivered with no undetected error. Note.— *Surveillance integrity includes such factors as the accuracy of time, correlating the time at aircraft position, reporting interval, data latency, extrapolation and/or estimation of the data.*

Surveillance data transit time criteria	
Term	**Description**
$RSTP_{ATSU}$	The overdue (OD) or nominal (DT) transit time for surveillance data from the CSP interface to the ATSU's flight data processing system.
$RSTP_{AIR}$	The overdue (OD) or nominal (DT) transit time for surveillance data from the aircraft's avionics to the antenna.
$RSTP_{CSP}$	The overdue (OD) or nominal (DT) transit time for surveillance data allocated to the CSP.

Surveillance continuity criteria	
Term	**Description**
C for $RSTP_{ATSU}$	The proportion of surveillance messages that can be delivered within the specified $RSTP_{ATSU}$.
C for $RSTP_{AIR}$	The proportion of surveillance messages that can be delivered within the specified $RSTP_{AIR}$.
C for $RSTP_{CSP}$	The proportion of surveillance messages that can be delivered within the specified $RSTP_{CSP}$.



Note.— The terms and acronyms used to specify the criteria for surveillance availability are the same as the terms and acronyms used to specify the criteria for RCP availability. See Appendix B, paragraph B.1.

C.2 Surveillance performance type 180 specification

Surveillance Performance Specification	
Surveillance performance type	**180**
Airspace specific considerations	
Interoperability	Specify interoperability criteria, e.g. FANS 1/A
ATS Function	Specify ATS function(s), e.g. applicable separation standard
Application	Specify the required surveillance capability. FMC WPR or, for ADS-C, specify the types of contracts required to support the ATS function, e.g. periodic contract at [nn] min, waypoint change event contract, lateral deviation event contract at [n] NM, etc.

Surveillance parameter values

Transit time (sec)	Continuity (C)		Availability (A)	Integrity (I)	
OT = 180	C(OT) = 0.999		0.999 0.9999 (efficiency) *See* *Note 3*.	**Navigation FOM**	*See* *Note 4*.
DT 95% = 90	C(DT 95%) = 0.95			**Time at position accuracy**	+/- 1 sec (UTC)
				Data integrity	Malfunction = 10^{-5} per flight hour

Surveillance monitoring and alerting criteria

Ref	Criteria
MA-1	The system shall be capable of detecting failures and configuration changes that would cause the ADS-C or FMC WPR service to no longer meet the surveillance parameter values for the intended function.
MA-2	When the ADS-C or FMC WPR service can no longer meet the surveillance parameter values for the intended function, the flight crew and/or the controller shall take appropriate action.

Notes

Note 1.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122.

Note 2.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the surveillance parameter values, this would be considered a change in system configuration.

Note 3.— DO 306/ED 122 specifies an availability value based on safety assessment of the operational effects of the loss of the service. The availability value herein is more stringent, based on an additional need to maintain orderly and efficient operations.

Note 4.— The navigation figure of merit (FOM) is specified based on the navigation criteria associated with this spec. For example, if RNP 4 is prescribed, then for ADS-C surveillance service, the FOM level would need to be 4 or higher. In all cases, when the navigation capability no longer meets the criteria specified for the operation, the flight crew is responsible for reporting the non-compliance to ATC in accordance with ICAO procedures.

C.2.1 Surveillance performance type 180/D allocations

The surveillance performance type 180/D allocations can be applied to the ADS-C or FMC WPR applications.

C.2.1.1 Air traffic service provider (ATSP)

Surveillance data transit time and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: ATSP**
Data Latency Parameter	**OT (sec)** **C = 99.9%**	**DT 95%(sec)** **C = 95%**	**Compliance Means**
Delivery Time Value	180	90	Analysis, CSP contract/service agreement. See also paragraph C.2.1.2.
RSTP Time Allocation			
$RSTP_{ATSU}$	5	3	Pre-implementation demonstration

Surveillance availability criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: ATSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	0.9999	0.999	Contract/service agreement terms. *Note.— For guidelines to aid in the development of the contract/service agreement with the CSP, see paragraph C.2.1.2, surveillance performance type 180/D allocation to CSP for surveillance availability criteria.*

Surveillance integrity criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Malfunction = 10^{-5} per flight hour	Analysis, safety requirements, development assurance level commensurate with integrity level, (compliance shown prior to operational implementation). See also related safety requirement SR-26 for the ATSP. CSP contract/service agreement. See also surveillance integrity criteria for CSP, paragraph C.2.1.2.

Surveillance monitoring and alerting criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**
Ref:	**Criteria**	**Compliance means**
MA-1a	The ground system shall be capable of detecting ground system failures and configuration changes that would cause the ADS-C or FMC WPR service to no longer meet the requirements for the intended function. _Note_.— *If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the surveillance performance type, this would be considered a change in system configuration.*	System design, implementation. CSP contract/service agreement. See also paragraph C.2.1.2, surveillance availability criteria.
MA-1b	When the ADS-C or FMC WPR service no longer meets the requirements for the intended function, the ground system shall provide indication to the controller.	System design, implementation. CSP contract/service agreement. See also paragraph C.2.1.2, surveillance availability criteria.
MA-2	When the controller receives an indication that the ADS-C or FMC WPR service no longer meets the requirements for the intended function (e.g. reduced longitudinal separation), the controller shall take action to resolve the situation, (e.g. apply an alternative form of separation).	System design, procedures, implementation

Surveillance related safety requirements		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**
Ref	**Related Surveillance Parameter**	**Safety requirement**
All	A, C, I	*Note.— Safety requirements related to surveillance performance type 180/D are the same as those related to RCP 240/D, unless otherwise modified in this table. See Appendix B, paragraph B.2.1.1.*

C.2.1.2 Communication service provider (CSP)

Note.— The surveillance performance allocations for the CSP are intended to aid the ATSP and the aircraft operator in the development of contracts and service agreements.

Surveillance data transit time and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Data Latency Parameter	**OT (sec) C = 99.9%**	**DT 95% (sec) C = 95%**	**Compliance means**
RSTP Time Allocation			
$RSTP_{CSP}$	170	84	Contract/service agreement terms. Pre-implementation demonstration

Surveillance availability criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	0.9999	0.999	Contract/service agreement terms
Unplanned outage duration limit (min)	10	10	Contract/service agreement terms
Maximum number of unplanned outages	4	48	Contract/service agreement terms
Maximum accumulated unplanned outage time (min/yr)	52	520	Contract/service agreement terms
Unplanned outage notification delay (min)	5	5	Contract/service agreement terms
Note.— The surveillance availability criteria for type 180/D are the same as the for RCP 240/D. See Appendix B, paragraph B.2.1.2.			

Surveillance integrity criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: CSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Not specified	Contract/service agreement terms. Per surveillance related safety requirements SR-26 for the ATSP and SR-26 for the aircraft system, the end system is required include provisions, consistent with the overall data integrity criteria, to mitigate the effects of errors introduced by the network. These provisions require the network to pass protected information (or data) to the end system without manipulating the protected information (or data) it passes. *Note.— In formulating contract terms with the CSP, the ATSP and/or operator may specify an integrity value and other related criteria, as appropriate, for the network, including subnetworks, that will ensure acceptable data integrity, consistent with the assumptions used to define the end system provisions, e.g. CRC or Fletcher's checksum.*

C.2.1.3 Aircraft system

Surveillance data transit time and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft system**
Data Latency Parameter	**OT (sec)** **C = 99.9%**	**DT 95%(sec)** **C = 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	5	3	Pre-implementation demonstration

Surveillance availability criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft system**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Analysis, architecture, design, pre-implementation demonstration
Note.— The surveillance availability criteria for type 180/D are the same as the criteria for RCP 240/D. See Appendix B, paragraph B.2.1.3.			

Surveillance integrity criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft system**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Malfunction = 10^{-5} per flight hour	Analysis, safety requirements, development assurance level, e.g. Level C software, commensurate with integrity level, pre-implementation demonstration. See also related safety requirement SR-26 for the aircraft system.

Surveillance monitoring and alerting criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft system**
Ref:	**Criteria**	**Compliance means**
MA-1a	The aircraft system shall be capable of detecting aircraft system failures or loss of air/ground communication that would cause the aircraft surveillance capability to no longer meet the requirements for the intended function.	System design, implementation
MA-1b	When the aircraft surveillance capability no longer meets the requirements for the intended function, the aircraft system shall provide indication to the flight crew.	System design, implementation

Surveillance related safety requirements		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft system**
Ref	**Related Surveillance Parameter**	**Safety requirement**
All	A, C, I	*Note.— Safety requirements related to surveillance performance type 180/D are the same as those related to RCP 240/D, unless otherwise modified in this table. See Appendix B, paragraph B.2.1.3.*

C.2.1.4 Aircraft operator

Surveillance data transit time and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft operator**
Data Latency Parameter	**OT (sec) C = 99.9%**	**DT 95% (sec) C = 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	5	3	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
$RSTP_{CSP}$	170	84	CSP contract/service agreement. See also paragraph C.2.1.2. Pre-implementation demonstration.

Surveillance availability criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft operator**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. owner requirements table or airline policy file.
Service availability (A_{CSP})	0.9999	0.999	Contract/service agreement terms. Note.— For guidelines to aid in the development of the contract/service agreement with the CSP, see paragraph C.2.1.2, surveillance performance type 180/D allocation to CSP for surveillance availability criteria.

Surveillance integrity criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft operator**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	Malfunction = 10^{-5}	Aircraft type design approval, establish procedures, training, and qualification to meet safety requirements. CSP contract/service agreement. See also surveillance integrity criteria for CSP, paragraph C.2.1.2.

Surveillance monitoring and alerting criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft operator**
Ref:	**Criteria**	**Compliance means**
MA-2	When the flight crew determines that the aircraft surveillance capability no longer meets the requirements for the intended function, the flight crew shall advise the ATC unit concerned.	Procedures, flight crew training and qualification

Surveillance related safety requirements		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft operator**
Ref	**Related Surveillance Parameter**	**Safety requirement**
All	C, I	*Note.— Safety requirements related to surveillance type 180/D are the same as those related to RCP 240/D. See Appendix B, paragraph B.2.1.4.*

C.3 Surveillance performance type 400 specification

Surveillance Performance Specification					
Surveillance performance type	**400**				
Airspace specific considerations					
Interoperability	Specify interoperability criteria, e.g. FANS 1/A				
ATS Function	Specify ATS function(s), e.g. applicable separation standard				
Application	Specify the required surveillance capability. FMC WPR or, for ADS-C, specify the types of contracts required to support the ATS function, e.g. periodic contract at [nn] min, waypoint change event contract, lateral deviation event contract at [n] NM, etc.				
Surveillance parameter values					
Transit time (sec)	**Continuity (C)**	**Availability (A)**	**Integrity (I)**		
OT = 400	C(OT) = 0.999	0.999	**Navigation FOM**	*See Note 3.*	
DT 95% = 300	C(DT 95%) = 0.95		**Time at position accuracy**	+/- 1 sec (UTC)	
			Data integrity	Malfunction = 10^{-5} per flight hour	
Surveillance monitoring and alerting criteria					
Ref	**Criteria**				
MA-1	The system shall be capable of detecting failures and configuration changes that would cause the ADS-C or FMC WPR service to no longer meet the surveillance parameter values for the intended function.				
MA-2	When the ADS-C or FMC WPR service can no longer meet the surveillance parameter values for the intended function, the flight crew and/or the controller shall take appropriate action.				
Notes					
Note 1.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122. *Note 2.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the surveillance parameter values, this would be considered a change in system configuration.* *Note 3.— The navigation figure of merit (FOM) is specified based on the navigation criteria associated with this spec. For example, if RNP 10 is prescribed, then for ADS-C surveillance service, the FOM level would need to be 3 or higher. In all cases, when the navigation capability no longer meets the criteria specified for the operation, the flight crew is responsible for reporting the non-compliance to ATC in accordance with ICAO procedures.*					

C.3.1 Surveillance performance type 400/D allocations

The surveillance performance type 400/D allocations can be applied to the ADS-C or FMC WPR applications.

C.3.1.1 Air traffic service provider (ATSP)

Surveillance data transit time and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: ATSP**
Data Latency Parameter	**OT (sec) C = 99.9%**	**DT 95% (sec) C = 95%**	**Compliance Means**
Delivery Time Value	400	300	Analysis, CSP contract/service agreement. See also paragraph C.3.1.2.
RSTP Time Allocation			
$RSTP_{ATSU}$	30	15	Pre-implementation demonstration

Surveillance availability criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: ATSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	N/A	0.999	Contract/service agreement terms. *Note.— For guidelines to aid in the development of the contract/service agreement with the CSP, see paragraph C.3.1.2, surveillance performance type 180/D allocation to CSP for surveillance availability criteria.*

Note.— The surveillance integrity criteria, monitoring and alerting criteria, and related safety requirements for type 400/D are the same as the criteria provided for type 180/D. See paragraph C.2.1.1.

C.3.1.2 Communication service provider (CSP)

Note.— The surveillance performance allocations for the CSP are intended to aid the ATSP and the aircraft operator in the development of contracts and service agreements.

Surveillance data transit time and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Data Latency Parameter	**OT (sec)** **C = 99.9%**	**DT 95% (sec)** **C = 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{CSP}$	340	270	Contract/service agreement terms. Pre-implementation demonstration

Surveillance availability criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP})	N/A	0.999	Contract/service agreement terms
Unplanned outage duration limit (min)	N/A	20	Contract/service agreement terms
Maximum number of unplanned outages	N/A	24	Contract/service agreement terms
Maximum accumulated unplanned outage time (min/yr)	N/A	520	Contract/service agreement terms
Unplanned outage notification delay (min)	N/A	10	Contract/service agreement terms
Note.— The surveillance availability criteria for type 400/D are the same as the for RCP 400/D. See Appendix B, paragraph B.3.1.2.			

Surveillance integrity criteria		
Specification: Type 400/D	**Application: ADS-C, FMC WPR**	**Component: CSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— Surveillance integrity criteria related to Type 400/D are the same as those related to Type 180/D. See paragraph C.2.1.2.*	

C.3.1.3 Aircraft system

Surveillance data transit time and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft system**
Data Latency Parameter	**OT (sec)** **C = 99.9%**	**DT 95% (sec)** **C = 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	30	15	Pre-implementation demonstration

Note.— The surveillance availability, integrity and monitoring and alerting criteria, and related safety requirements for type 400/D are the same as the criteria and related safety requirements provided for type 180/D. See paragraph C.2.1.3.

C.3.1.4 Aircraft operator

Surveillance data transit time and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft operator**
Data Latency Parameter	**OT (sec)** **C = 99.9%**	**DT 95% (sec)** **C = 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	30	15	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
$RSTP_{CSP}$	340	270	CSP contract/service agreement. See also paragraph C.3.1.2. Pre-implementation demonstration.

Note.— The surveillance availability, integrity and monitoring and alerting criteria, and related safety requirements for type 400/D are the same as the criteria and related safety requirements provided for type 180/D. See paragraph C.2.1.4.

Appendix D Post-implementation monitoring and corrective action

The ICAO Global Plan calls for the implementation of a performance based system and ICAO Annex 11 requires that data link system performance is monitored to verify that an acceptable level of safety continues to be met. Annex 11 at paragraph 2.2.7.5 states:

> "Any significant safety-related change to the ATC system, including the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. When appropriate, the responsible authority shall ensure that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met."

Oversight of the compliance to the Annex 11 requirements is a matter for the States. However, States participate in planning and implementation regional groups (PIRGs), and most use a regional monitoring agency to facilitate monitoring activities within their respective region. The individual states/ATSPs will need to provide the data and information and analysis that will portray regional performance measures. The ATSPs, operators, CSPs, airframe manufacturers, and equipment suppliers all need to participate in reporting and resolving problems associated among the ATSPs and with aircraft.

While individual ATSP will develop the FANS 1/A data collection mechanisms, monitoring tools, and internal reporting requirements best suiting their own environment, all ATSP shall collect and maintain a database of FANS 1/A performance data using the data formats specified in this appendix. These databases will provide the means to aggregate CPDLC RCP transaction time and ADS-C surveillance transit time on a regional and global basis.

Monitoring of FANS 1/A data communications in terms of RCP and surveillance performance is an important part of the performance based system described in the ICAO global plan. To successfully achieve this performance monitoring on a global scale will require the use of a common data set. It is only through this common data set that RCP and surveillance performance data can be aggregated from an ATSP level through to a regional monitoring agency level and then to global level. This aggregation of performance data is in accordance with the guidelines provided in ICAO Doc 9883 Manual on Global Performance of the Air Navigation System.

This appendix contains the following guidance material:

a) ATSP data collection and analysis - This section defines a common data reporting format. Guidance material is included on how to obtain the required data points from the FANS 1/A ACARS messages and on the calculation of actual communication performance (ACP), actual communication technical performance (ACTP), pilot operational response time (PORT), surveillance transit time, and how they are calculated. Examples of the type of analysis that can be carried out at an ATSP level are also included. Issues regarding data filtering are discussed including guidance on how to manage this.

b) Problem reporting and resolution – This section provides guidance on the problem identification and resolution process

c) Regional performance monitoring – This section provides guidance on the monitoring of ADS-C transit time and CPDLC actual communication performance at a regional level.

D.1 ATSP data collection and analysis

Data link performance requirements for the application of reduced separation standards, as defined in ICAO Doc 4444, are contained in the RTCA DO-306/EUROCAE ED 122 Oceanic SPR standard. These requirements are specified in terms of required communications performance (RCP) and surveillance performance.

D.1.1 ATSP data collection for CPDLC application

This section provides guidance on data collection and performance measurement for the CPDLC application

D.1.1.1 Measuring CPDLC communication performance

CPDLC analysis is based on the calculation of actual communication performance (ACP) used to monitor RCP time allocation for communication transaction (TRN), actual communications technical performance (ACTP) used to monitor required communication technical performance (RCTP) time allocation, and pilot operational response time (PORT) used to monitor the responder performance criteria of the transaction.

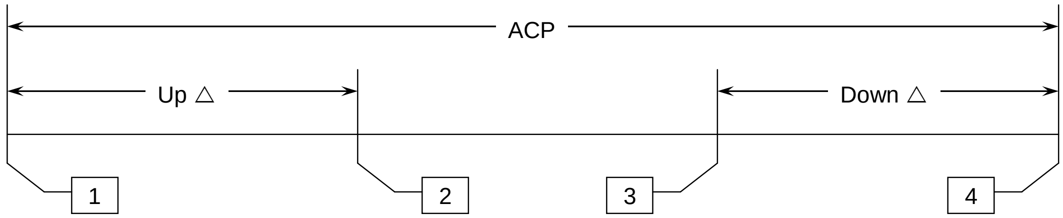
The analysis uses the measurement of transit and response times to those CPDLC uplinks that receive a single DM 0 WILCO response. Responses not measured are where an uplink receives DM 1 UNABLE, DM 2 STANDBY, DM 3 ROGER, DM 4 AFFIRM, DM 5 NEGATIVE responses. A DM 0 WILCO response following a DM 2 STANDBY is also not measured. The rationale behind this is that the critical communications requirement is provided by intervention messages when applying reduced separation standards. Incorporating other message types such as free text queries, information requests not requiring a DM 0 WILCO response, messages with DM 1 UNABLE responses, or DM 2 STANDBY responses followed by DM 0 WILCO, will skew the observed data because of the longer response times from the flight deck.

All messages with a W/U response attribute are assessed. These include communications transfer messages in addition to the typical intervention messages such as climb clearances. Data analysis has shown no significant difference in crew response between these message types and the addition of the communication transfer messages provides ATSP with a significantly greater number of data points for analysis.

To calculate ACP, the difference between the times that the uplink message is originated at the air traffic service provider (ATSP) to the time that the corresponding response downlink is received at the ATSP is used.

To calculate ACTP, the difference between the downlink's aircraft time stamp and the received time is added to half the round trip time determined by the difference between the uplink time when the message is sent from the ATSP and the receipt of the MAS response for the uplink at the ATSP ((uplink transmission time – MAS receipt)/2 + downlink time).

PORT is calculated by the difference between ACP and ACTP. Figure D- 1 illustrates these measurements.



1. Uplink Sent. This is the date/time that the CPDLC clearance was sent to the aircraft.
2. MAS Received. This is the date/time that the MAS for the CPDLC clearance was received.
3. WILCO Sent. This is the date/time that the WILCO reply is transmitted.
4. WILCO Received. This is the date/time that the WILCO reply for the CPDLC clearance was received.

The measurements (in seconds) are calculated as follows:

$$\text{ACP} = (\text{WILCO\_Received}) - (\text{Uplink\_Sent}) \rightarrow \textbf{TRN}$$

$$\text{ACTP} \cong \left(\left(\frac{\text{Up}\Delta}{2} \right) + \text{Down}\Delta \right) \rightarrow \textbf{RCTP}$$

$$\text{PORT} \cong \text{ACP} - \text{ACTP} \rightarrow \textbf{Responder}$$

Figure D- 1. CPDLC transaction calculations

The values for ACTP and PORT are only approximations. Uplink transit times are estimated by taking half the time for the MAS response round trip. This assumption is flawed in a small percentage of cases because we know it is possible for the MAS to be received at the ATSP after the operational response is received; or for the timestamp on the operational response to be earlier than the MAS receipt time. This will happen if the CSP does not hear the network ACK from the aircraft (which is sent on uplink receipt) and resends the uplink later. The CSP receives the network ACK to this second uplink and sends the MAS to the ATSP. In the meantime, the aircraft has already responded with the operational response. ATSP will see this issue reflected in their data with crew response times with negative or extremely small values. There is no requirement to filter these small or negative response times from the measured data and all negative values are counted as 0 for graphical presentation. The time sequence diagram below in Figure D- 2 illustrates the issue.

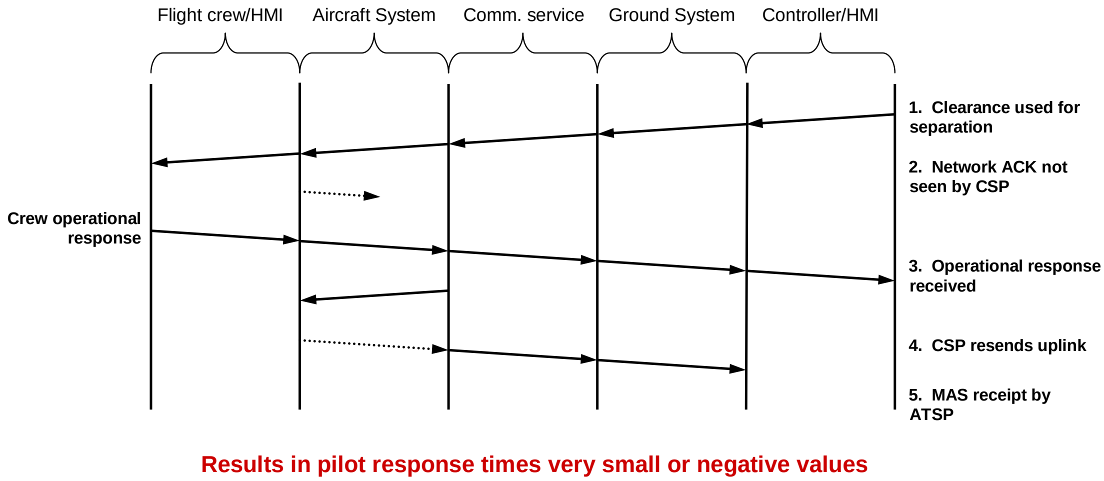


Figure D- 2 Issue with estimating uplink transit time as half MAS roundtrip

D.1.1.2 Recording the data points for each CPDLC transaction

The following data points in Table D-1 are recommended as the minimum set that should be extracted from ATSP data link system recordings to enable RCP analysis and provide sufficient information for problem analysis. This does not preclude individual ATSP from extracting additional data points for their own analysis requirements and some possibilities are listed below. To obtain these data points ATSP should note that they will require additional database information to enable the aircraft type and operator to be obtained by correlation to the aircraft registration extracted from the data link recordings. All of the other data points are extracted from either the ACARS header or the CPDLC application message.

Table D-1 CPDLC data collection points

Ref	Label	Description and/or remarks
1	ATSP	The four letter ICAO designator of the FIR, e.g. NZZO.
2	Aircraft registration	The aircraft registration in ICAO Doc 4444 Format (no hyphens, packing dots, etc.), e.g. N104UA. *Note.— Extracted from ACARS header or application message.*
3	Aircraft type designator	The ICAO aircraft type designator, e.g. B744. *Note.— Extracted from ATSP database using aircraft registration as key.*
4	Operator designator	The ICAO designator for the aircraft operating agency, e.g. UAL. *Note.— Extracted from ATSP database using aircraft registration as key.*
5	Date	In YYYYMMDD format, e.g. 20081114. *Note.— Extracted from ATSP system data recording time stamp, synchronized to within 1 second of Universal Time Coordinated (UTC).*

Ref	Label	Description and/or remarks
6	MAS RGS	Designator of the RGS that MAS downlink was received from, e.g. POR1. *Note.— This is a 3 or 4 letter designator extracted from the ACARS header DT line.*
7	OPS RGS	Designator of the RGS that the operational response was received from, e.g. AKL1. *Note.— This is a 3 or 4 letter designator extracted from the ACARS header DT line.*
8	Uplink time	The timestamp on the uplink CPDLC message sent by the ATSP in HH:MM:SS format, e.g. 03:43:25. *Note.— Extracted from ATSP system data recording time stamp, synchronized to within 1 second of UTC.*
9	MAS receipt time	The ATSP timestamp on receipt of the MAS in HH:MM:SS format, e.g. 03:43:55. *Note.— Extracted from ATSP system data recording time stamp, synchronized to within 1 second of UTC.*
10	MAS round trip time	In seconds (#9-#8), e.g. 10.
11	Aircraft FMS time stamp	In the operational response messages in HH:MM:SS, e.g. 03:44:15. *Note.— Extracted from the ATCmessageHeader timestamp in the decoded operational response message. See RTCA DO-258AEUROCAE ED-100A section 4.6.3.3.*
12	ATSP timestamp on the receipt of the operational response	In HH:MM:SS, e.g. 03:44:45. *Note.— Extracted from ATSP system data recording time stamp, synchronized to within 1 second of UTC.*
13	Operational message round trip time	From sending uplink (#8) to receipt of operational response (#12) in seconds, e.g. 80.
14	Downlink response transit time	In seconds (#12-#11), e.g. 30.
15	Uplink message elements	All uplink message element identifier preceded by U encapsulated between quotation marks with a space between each element, e.g. “U118 U80” *Note.— Extracted from the decoded operational uplink that initiated the transaction.*
16	Downlink message elements	All downlink message elements encapsulated between quotation marks with a space between each element if required, e.g. “D0” *Note.— Extracted from the decoded operational downlink.*
17	ACTP	Actual communication technical performance in seconds, e.g. 35. *Note.— Truncated to whole seconds.*

Ref	Label	Description and/or remarks
18	ACP	Actual communications performance in seconds measured as the difference between time uplink sent (#8) to operational response received (#12), e.g. 80.
19	PORT	Pilot Operational Response Time = ACP (#18) - ACTP(#17), e.g. 45. *Note.— Implementers should allow for negative values where the operational response is received before the MAS as per Figure D- 2 above. When graphing PORT negative values should be counted as 0.*

ATSP may find that the following additional data may be useful for performance analysis:

a) The aircraft call sign extracted from either the Flight Plan, e.g. ANZ123, or the AFN logon for the flight, e.g. NZ123, or the FI line in the ACARS header, e.g. NZ0123;

b) Direction of flight calculated by the flight data processor and displayed as a three figure group representing degrees true, e.g. 275; and

c) The estimated position in latitude and longitude of the aircraft when a CPDLC downlink is sent. Calculated by the flight data processor. For consistency the following formats are recommended: For latitude use "+" for North or "-" for South followed by a decimal number of degrees, e.g. -33.456732. For longitude use "+" for East or "-" for West followed by a decimal number of degrees, e.g. +173.276554.

D.1.1.3 Data record for each CPDLC transaction

If required for regional monitoring agency analysis CPDLC transaction data as described above may be sent to the regional/State monitoring agency at as a comma delimited text file. The format for each record will at minimum contain the 20 data points specified in table D-1. Using the example in the previous paragraph the data record for the transaction described above in comma delimited format is:

NZZO,N104UA,B744,UAL,20081114,POR1,AKL1,03:43:25,03:43:55,10,03:44:15,03:44:45,80,30,"U118 U80","D0",35,80,45

Guidance on the type of analysis carried out at an ATSP or regional level is provided later in paragraphs D.1.3 and D.2.1.

D.1.2 ATSP data collection for ADS-C application

This section provides guidance on data collection and performance measurement for the ADS-C application.

D.1.2.1 Measuring ADS-C surveillance performance

The analysis of ADS-C performance is based on the measurement of the transit times of the ADS-C periodic and event reports between the aircraft and the ATSP ground system. This is measured as the difference between the time extracted from the decoded ADS-C basic group timestamp when the message originated from the FMS and the time the message is received at the ATSP.

D.1.2.2 Recording the ADS-C data points for each ADS-C downlink.

The following data points in Table D-2 are recommended as the minimum set that should be extracted from ATSP data link system recordings to enable an analysis of ADS-C performance and provide sufficient information for problem analysis. This does not preclude individual ATSP from extracting additional data points for their own analysis and some possibilities are listed below. To obtain all of these data points ATSP should note that they will require additional database information to enable the Aircraft Type and Airline to be obtained by correlation to the aircraft registration extracted from the data link recordings. All of the other data points are extracted from either the ACARS header or the ADS-C application message.

Table D-2 ADS-C data collection points

Ref	Label	Description and/or remarks
1	ATSP	The four letter ICAO designator for the FIR of the reporting ATSP, e.g. NZZO.
2	Aircraft Registration	The aircraft registration in ICAO Doc 4444 Format (no hyphens, packing dots, etc.), e.g. N104UA. *Note.— Extracted from ACARS header or application message.*
3	Aircraft Type Designator	The ICAO aircraft type designator, e.g. B744. *Note.— Extracted from ATSP database using aircraft registration as key.*
4	Operator Designator	The IATA designator for the aircraft operating agency, e.g. UAL. *Note.— Extracted from ATSP database using aircraft registration as key.*
5	Date	In YYYYMMDD format, e.g. 20081114. *Note.— Extracted from ATSP system data recording time stamp, synchronized to within 1 second of UTC.*
6	RGS	Designator of the RGS that ADS-C downlink was received from, e.g. POR1. *Note.— This is a 3 or 4 letter designator extracted from the ACARS header DT line.*
7	Report Type	The type of ADS-C report extracted from the ADS-C basic group report tag where tag value 7=PER, 9=EMG, 10=LDE, 18=VRE, 19=ARE, 20=WCE. As some aircraft concatenate more than one report in the same downlink extract the ADS-C report tag from each ADS-C basic group and identify them in the REP_TYPE column by using the first letter of the report type as an identifier e.g. for a concatenated report containing two ADS-C basic groups for a periodic report and a waypoint event report the field will contain PW. Where a downlink does not contain a ADS-C basic group the REP_TYPE field will be left blank.
8	Latitude	The current latitude decoded from the ADS-C basic group. The format is "+" for North or "-" for South followed by a decimal number of degrees, e.g. -33.456732.
9	Longitude	The current longitude decoded from the ADS-C basic group. The format is "+" for East or "-" for West followed by a decimal number of degrees, e.g. +173.276554.

Ref	Label	Description and/or remarks
10	Aircraft Time	The time the ADS-C message was sent from the aircraft in HH:MM:SS, e.g. 03:44:15. *Note.— Decoded from the ADS-C basic group timestamp extracted as seconds since the most recent hour. See RTCA DO-258A/EUROCAE ED-100A, section 4.5.1.4.*
11	Received Time	The ATSP timestamp on the receipt of the ADS-C message in HH:MM:SS, e.g. 03:44:45. *Note.— Extracted from ATSP system data recording time stamp, synchronized to within 1 second of UTC.*
12	Transit Time	The transit time of the ADS-C downlink in seconds calculated as the difference between #10 Aircraft Time and #11 Received Time, e.g. 30.

ATSP may find that the following additional data may be useful for performance analysis:

a) The aircraft call sign extracted from either the Flight Plan, e.g. ANZ123 or the AFN log on for the flight e.g. NZ123 or the FI line in the ACARS header, e.g. NZ0123

b) Direction of flight calculated by the ATSP flight data processor and displayed as a three figure group representing degrees true, e.g. 275.

c) ADS-C predicted position latitude and longitude and time when available. (Note: time decoded from the ADS-C predicted group where timestamp is extracted as seconds since the most recent hour. (See RTCA DO-258A section 4.5.1.4)) For consistency the following formats are recommended: For latitude use "+" for North or "-" for South followed by a decimal number of degrees, e.g. -33.456732. For longitude use "+" for East or "-" for West followed by a decimal number of degrees, e.g. +173.276554.

D.1.2.3 Data record for each ADS-C downlink

If required for regional/State monitoring agency analysis ADS-C transaction data as described above may be sent to the regional regional/State monitoring agency as a comma delimited text file. The format for each record will at minimum contain the 12 data points specified in table D-2. Using the example in the previous paragraph the data record for the transaction described above in comma delimited format is:

NZZO,N104UA,B744,UAL,20081114,POR1,PER,-33.456732,+173.276554,03:44:15,03:44:45,30

Guidance on the type of analysis carried out at an ATSP or regional level is provided later in paragraphs D.1.3 and D.2.1.

D.1.3 ATSP data analysis

To enable adequate system performance monitoring ATSP should at minimum perform a monthly analysis of CPDLC RCP and ADS-C performance data. This monitoring will verify system performance and also enable continuous performance improvement by detecting where specific aircraft or fleets are not meeting the performance standards.

While this analysis could be carried out by a regional monitoring agency, it is thought the analysis will be more efficient if done by the ATSP. It is the ATSP that will usually have the operational expertise and local area knowledge that is important when identifying problems from any data analysis. At least one region has had considerable success by using some of the regional ATSP to complete a monthly data analysis and reporting the identified problems to the regional monitoring agency for resolution.

A regional monitoring agency is best suited to manage problems reported from the ATSP analysis, and to develop actual regional performance figures from information supplied by the ATSP. Analysis by the individual ATSP will also avoid the regional monitoring agency having to manage a large quantum of data that the ATSP already holds.

D.1.3.1 Graphical analysis

It is recommended that ATSP perform a graphical analysis of the performance data gathered. This graphical analysis is useful for depicting in a readily assimilated fashion actual performance, and has proved extremely useful when identifying performance problems.

Monitoring can be completed at a number of levels and similar levels can be used for both CPDLC and ADS-C performance monitoring. The following structure is recommended:

a) Monitoring Communication Media Performance. An analysis of:

   1) Data from all aircraft via all Remote Ground Station (RGS) types.

   2) Data from all aircraft via SATCOM RGS

   3) Data from all aircraft via VHF RGS

   4) Data from all aircraft via HF RGS

   5) Data from all aircraft via HF and SATCOM RGS

Note.— The monitoring of combined HF and SATCOM data is to allow verification that the performance obtained from those aircraft using HFDL for downlinks only when SATCOM is not available does not degrade performance by an unacceptable level.

b) Monitoring Airline Fleet Performance. An analysis of:

   1) The observed performance of each type of aircraft operated by an operator:

      i) Via SATCOM

      ii) Via SATCOM + HF

      iii) Via HF

      iv) Via VHF

      v) Via All RGS

   2) Comparative analysis of the observed performance from the same type of aircraft from different operators.

Note.— When measuring CPDLC performance for a specific media type(s) then only those transactions where both the RGS for the MAS and the RGS of the operational response are from that media type would be measured. Mixed media transactions such as where the MAS is received via a VHF RGS and the operational response is via a SATCOM RGS would be excluded from a SATCOM analysis. Mixed media transactions would be counted in the SATCOM + HF, and All RGS analysis above.

D.1.3.2 Data filtering

It is important that consistent data filtering is employed to ensure that all ATSP measure against the same baseline. Raw data obtained from the ATSP recordings will include delayed transactions measured during periods of system outage and these should not be used when assessing CPDLC transaction time or surveillance data transit time. The data may also include duplicated messages which will also skew the measurements if not removed. This data should be filtered from the raw data before any performance assessment is made.

D.1.3.2.1 System Outages

The raw data should be checked for any delayed transactions observed during system outages. These delays are easily identified during outages that have been notified by the CSP, but the data should be carefully reviewed for outages that have not been notified. Delays observed from multiple aircraft where the downlinks completing the transactions are received at similar times indicate a system outage. CPDLC transactions and surveillance data delivery measurements during these outage periods should be removed. A typical outage not notified by any DSP is illustrated in Table D- 3 showing ADS-C downlink delays from 3 aircraft between 1120 and 1213.

Table D- 3. ADS-C outages not notified

Aircraft registration	Aircraft time	ATSP system time	Downlink time (Seconds)
ZK-SUI	11:55:38	12:12:52	1034
ZK-SUI	11:44:42	12:12:19	1657
ZK-SUJ	11:41:54	12:12:01	1807
ZK-SUJ	11:26:18	12:09:42	2604
ZK-SUI	11:23:21	12:08:32	2711
ZK-SUJ	11:20:34	12:07:39	2825
ZK-OKG	11:53:52	12:12:51	1139

D.1.3.2.2 Duplicated ADS-C reports

Numerous instances of duplicate ADS-C reports are observed in FANS-1/A data records. A particular report is often duplicated with the second and sometimes third record duplicated at some later time as illustrated in Table D- 4. These duplicate records will skew ADS-C surveillance data delivery measurements and should be removed.

Table D- 4. ADS-C duplicate reports

LAT_LON	Aircraft time	ATSP system time	Downlink time (Seconds)
350225S1694139E	22:29:45	22:31:04	79
350225S1694139E	22:29:45	22:34:56	311
350225S1694139E	22:29:45	22:40:05	620

D.1.3.3 CPDLC RCP analysis

Monitoring of CPDLC RCP involves an assessment of ACP, ACTP, and PORT by a graphical analysis of data using the structure outline in paragraph D.1.3.1.

D.1.3.3.1 Monitoring communications media performance

Graphs illustrating ACP and ACTP are used to assess CPDLC transaction performance through the various communications media. Since PORT is independent of media this would normally only be assessed over one media. The graphs depict measured performance against the RCP requirements at the 95% and 99.9% level and would be completed for the RCP types in use, e.g. RCP240, RCP400. An analysis is completed for:

a) Data from all aircraft via all remote ground station (RGS) types.

b) Data from all aircraft via SATCOM RGS

c) Data from all aircraft via VHF RGS

d) Data from all aircraft via HF RGS

e) Data from all aircraft via HF and SATCOM RGS

A typical graph illustrating ACTP performance constructed using a spreadsheet application is illustrated in Figure D- 3. Similar graphs are used to assess ACTP and ACP for other communications media.

Figure D- 3 graphs ACTP against the 95% 120” and 99.9% 150” requirements for RCP240 using the 16511 CPDLC transactions recorded during the period January-May 2009 in the NZZO FIR.

Data transactions used for the measurement of SATCOM, VHF, and HF ACTP and ACP are where both the MAS and operational response are received via the media being assessed. The exception to this is the assessment of combined HF and SATCOM performance where any transaction involving HF or SATCOM is used.

Similar graphs are used to assess ACTP and ACP for other communications media.

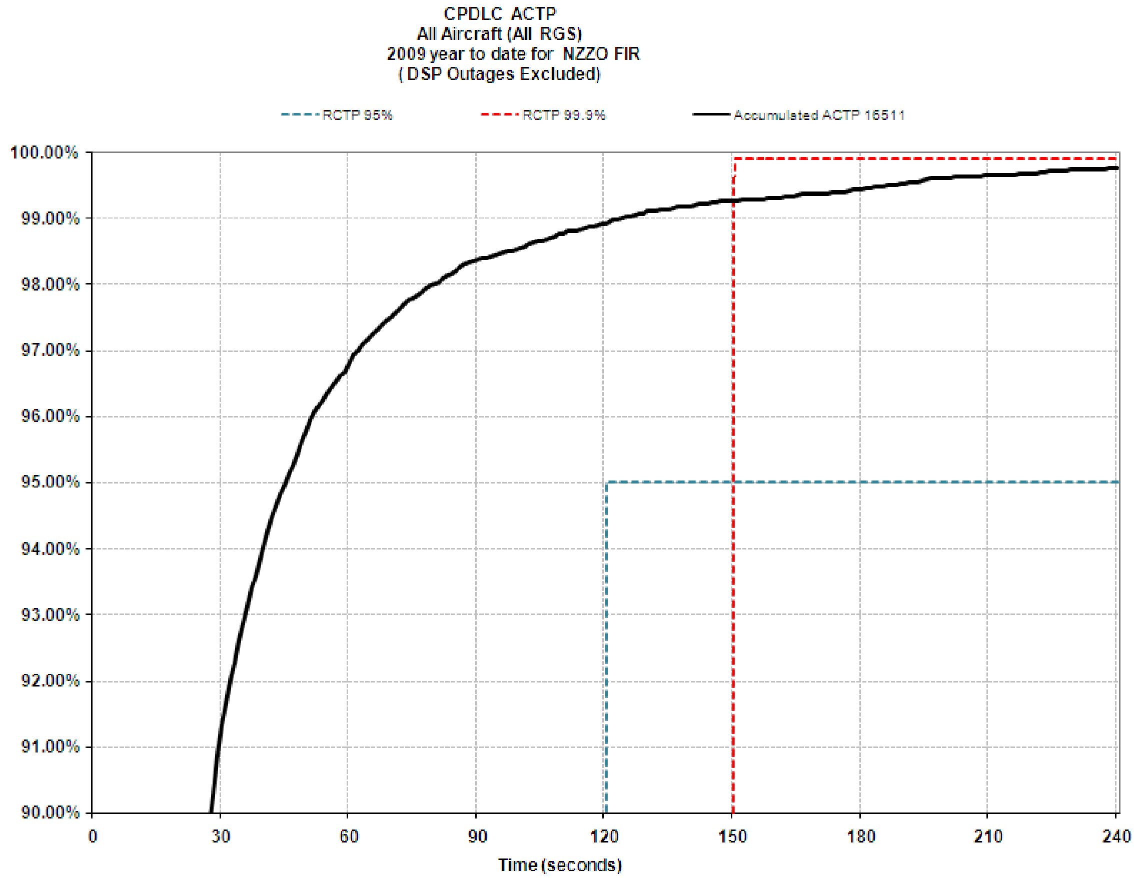


Figure D- 3. CPDLC ACTP performance

D.1.3.3.2 Monitoring Airline Fleet Performance

Graphs illustrating ACP, ACTP, and PORT can be used to monitor the performance of each aircraft type in an operator's fleet. These should be maintained on a monthly basis and can be used to observe the performance of each type when using different media such as: via SATCOM; via SATCOM + HF; via HF; via VHF; and via all RGS. The January to May 2009 SATCOM ACP analysis of the B744 fleet for an operator in the NZZO FIR is illustrated in Figure D- 4.

Figure D- 4 graphs CPDLC ACP against the 95% 180" and 99.9% 210" requirements for RCP240 using the 1888 SATCOM CPDLC transactions recorded for the fleet during the period January-May 2009. Considerable performance variation may be seen month to month and significant degradation in any month may be the result of poor performance from an individual aircraft or may be the result of routes changing month to month with varying weather patterns. These may be investigated further using an analysis of individual tails in a fleet as discussed in paragraph D.1.3.5.

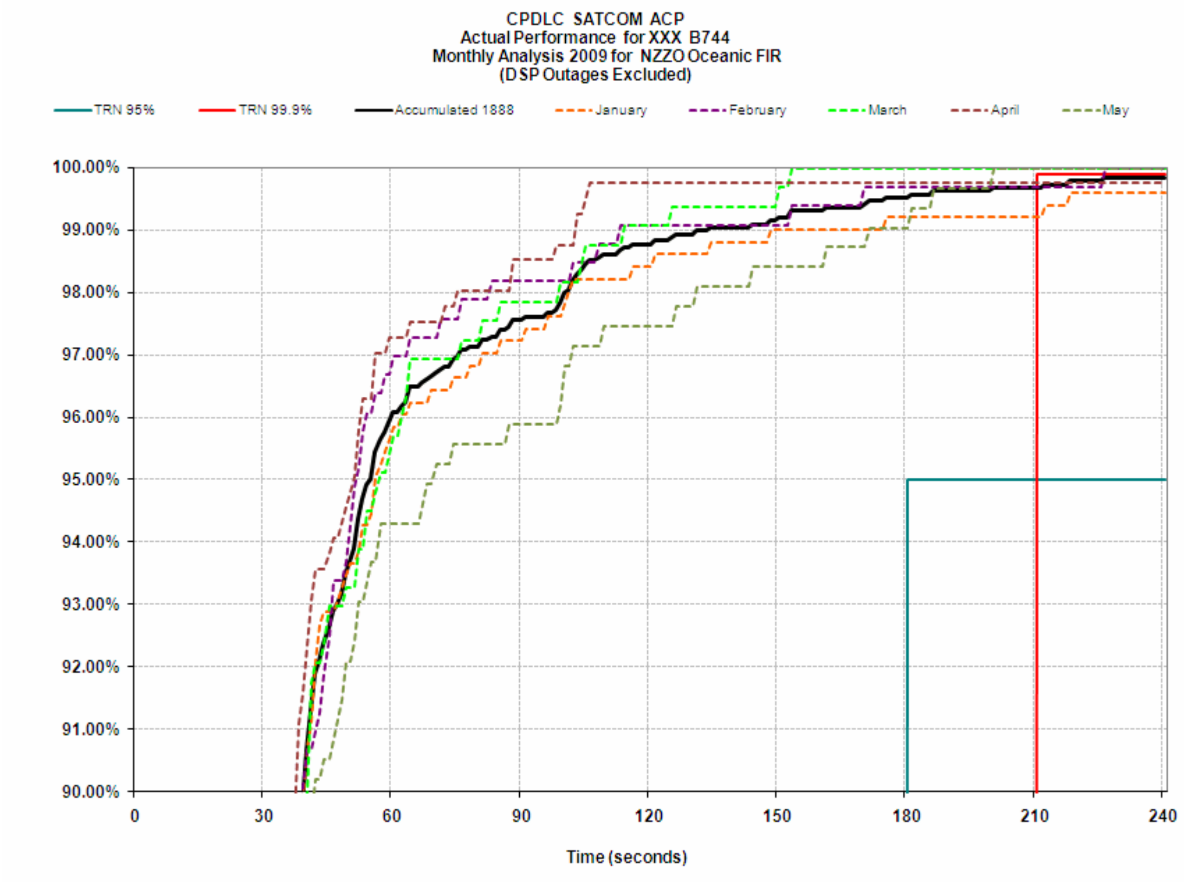


Figure D- 4. CPDLC ACP Airline XXX B744

A comparative analysis of the performance of different fleets operating in an FIR particularly of fleets of the same type is useful. Under performing fleets can be identified for further analysis and a picture of typical performance from all fleets operating in a FIR can be built up. These can be compared with the same fleets operating in other regional FIR.

Figure D-7 below graphs SATCOM ACTP for a number of fleets operating in NZZO FIR for the period January – May 2009. Significant variations in observed performance such as with operator NNN B744 when compared with operator XXX and operator GGG B744 can be flagged for further analysis as discussed in paragraph D.1.3.5.

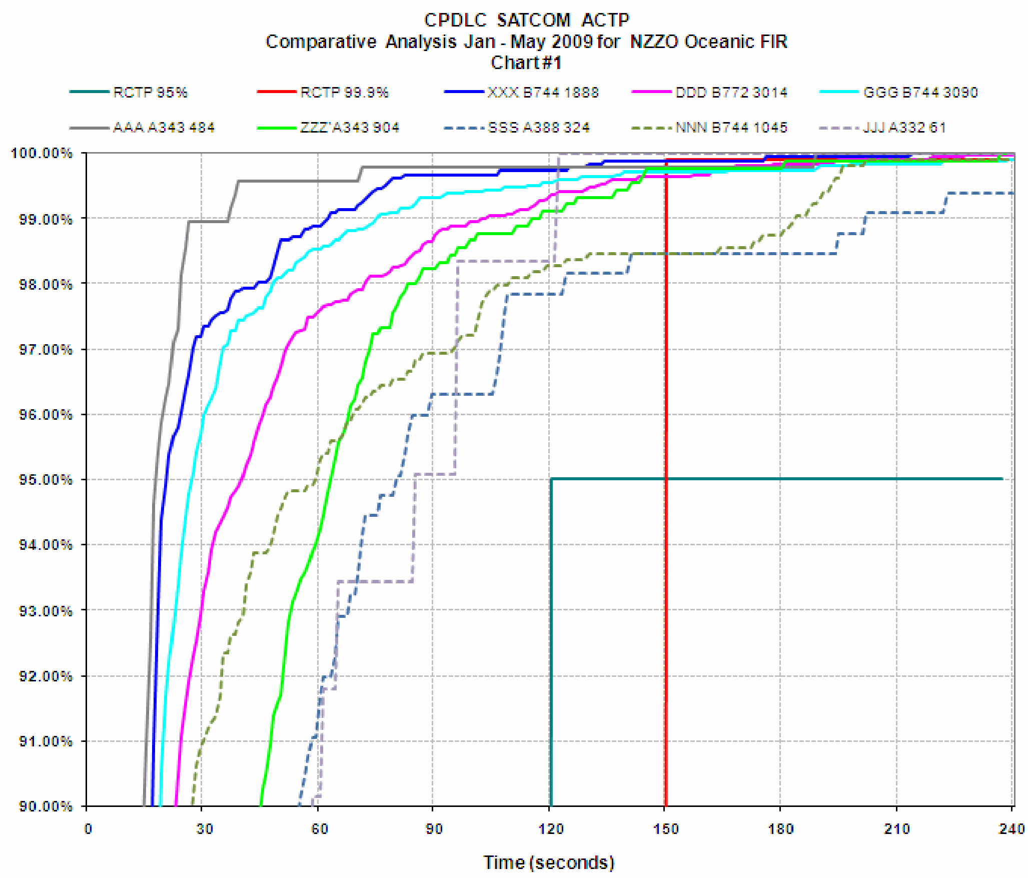


Figure D- 5. CPDLC ACTP comparative operator type performance

D.1.3.4 ADS-C surveillance data transit time analysis

Monitoring of ADS-C surveillance data transit time involves an assessment of observed delay from a graphical analysis of data using the structure outlined in paragraph D.1.3.1.

D.1.3.4.1 Monitoring communications media performance

Graphs illustrating ADS-C surveillance data transit time are used to assess performance through the various communications media. The graphs depict measured performance against the surveillance requirements at the 95% and 99.9% level. An analysis is completed for:

a) Data from all aircraft via all remote ground station (RGS) types.

b) Data from all aircraft via SATCOM RGS

c) Data from all aircraft via VHF RGS

d) Data from all aircraft via HF RGS

e) Data from all aircraft via combined HF and SATCOM RGS

A typical graph illustrating ADS-C surveillance data transit time observed from all RGS and constructed using a spreadsheet application is illustrated in Figure D- 6. Similar graphs are used to assess delay through individual communications media.

Figure D- 6 graphs ADS-C surveillance data transit time against the 95% 90-second and 99.9% 180-second requirements for the surveillance specification provided in Appendix C, paragraph C.2 using the 90235 ADS-C transactions recorded during the period January-May 2009 in the NZZO FIR. For clarity while the graph depicts accumulated performance it also depicts the high and low months observed in the year to date.

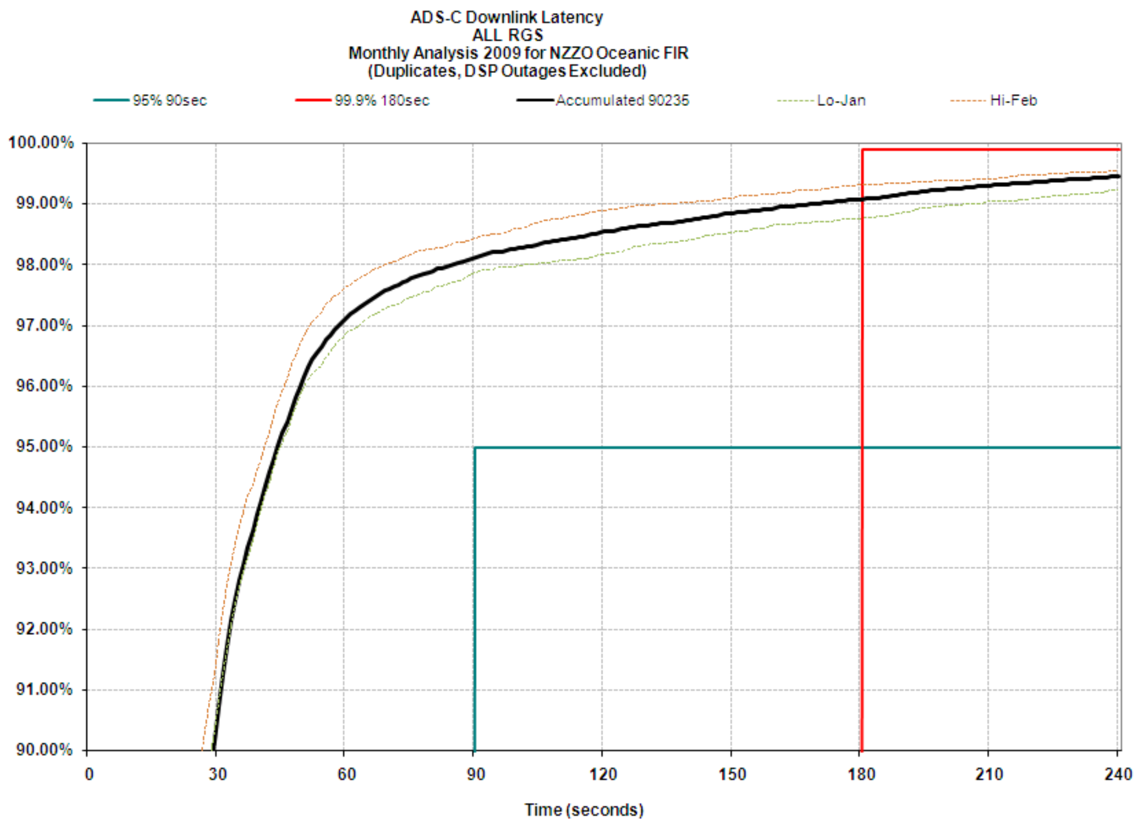


Figure D- 6. ADS-C surveillance data transit time via all RGS NZZO FIR Jan – May 2009

D.1.3.4.2 Monitoring operator fleet performance

Graphs illustrating ADS-C surveillance data transit time can be used to monitor the performance of each aircraft type in an operator's fleet. These should be maintained on a monthly basis and can be used to observe the performance of each type when using different media such as: via SATCOM; via SATCOM + HF; via HF; via VHF; and via all RGS. The January to May 2009 SATCOM delay analysis of the A343 fleet for an operator in the NZZO FIR is illustrated in Figure D- 7.

Figure D- 7 graphs ADS-C surveillance data transit time against the 95% 90-second and 99.9% 180-second requirements for surveillance performance type 180D using the 3195 ADS-C downlinks recorded for the fleet during the period January-May 2009. Considerable performance variation may be seen month to month on some fleets and significant degradation in any month may be the result of poor performance from an individual aircraft or may be the result of routes changing month to month with varying weather patterns. These may be investigated further using an analysis of individual tails in a fleet as discussed in D1.3.5 below. The fleet illustrated shows little variation between the months and for clarity only the high and low months are depicted.

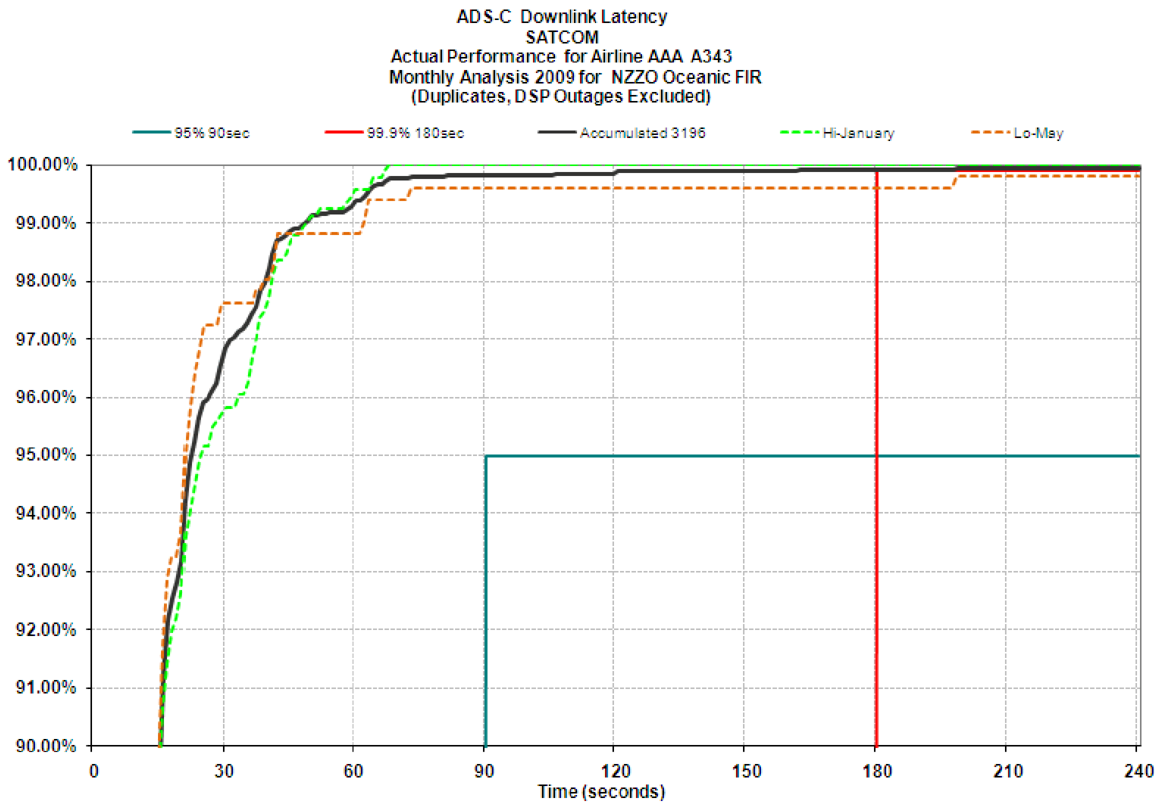


Figure D- 7. ADS-C surveillance data transit time via all RGS NZZO FIR Jan – May 2009

A comparative analysis of the performance of different fleets operating in an FIR particularly of fleets of the same type is useful. Under performing fleets can be identified for further analysis and a picture of typical performance from all fleets operating in a FIR can be built up. These can be compared with the same fleets operating in other regional FIR.

Figure D- 8 below graphs SATCOM transit times for a number of fleets operating in NZZO FIR for the period January – May 2009. Significant variations in observed performance can be flagged for further analysis as discussed in paragraph D.1.3.5.

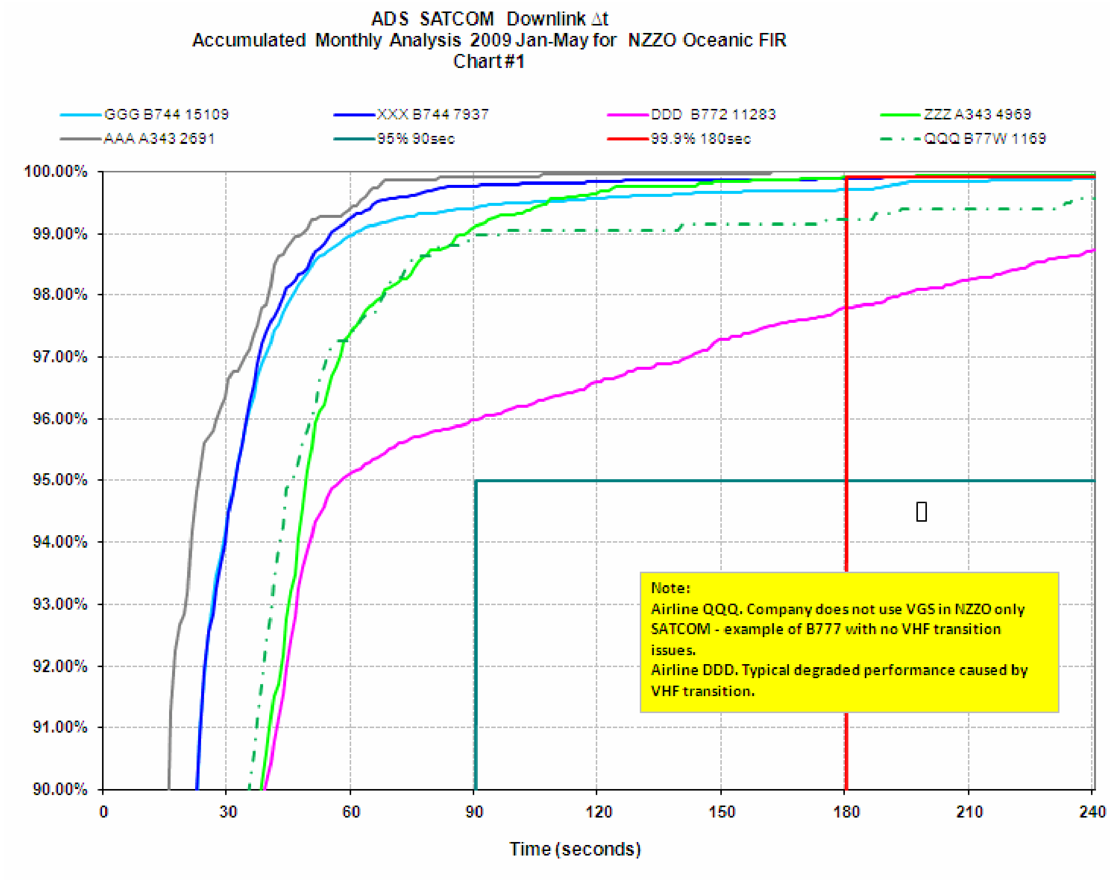


Figure D- 8. Comparative SATCOM ADS-C surveillance data transit time for different operators

D.1.3.5 Identifying poor performers

The reasons behind degraded performance are many and varied. Considerable analysis may be required before the reasons behind poor performing fleets are identified and it is difficult to provide guidance for all situations. Some analysis techniques that have been used by some ATSP with some success to identify reasons behind poor performance are provided in the following paragraphs.

On a number of occasions poor performance has been attributed to a specific aircraft in a fleet. Usually these poor-performing aircraft can be identified by the visual inspection of monthly data ordered in terms of transit time, or more accurately by graphing the monthly data for a fleet by aircraft registration.

Techniques such as graphing the positions of all delayed messages on a geographical display have identified areas for further investigation.

There are low speed (600 bps and 1200 bps) and high speed (10500 bps) data rates defined for the P, R, and T SATCOM channels. Some aircraft are capable of low speed SATCOM only. Other aircraft are capable of both high speed and low speed. However, not all aircraft that are capable of high speed operation have enabled the use of high speed SATCOM and, instead operate in low speed only. It is recommended an operator using low speed SATCOM channels change to the high speed channels where possible. Low or high speed channel use is selectable by an individual operator in the aircraft operational requirements table (ORT).

Significant performance benefits accrue with the use of the high speed channels as illustrated in the figure D-10 below.

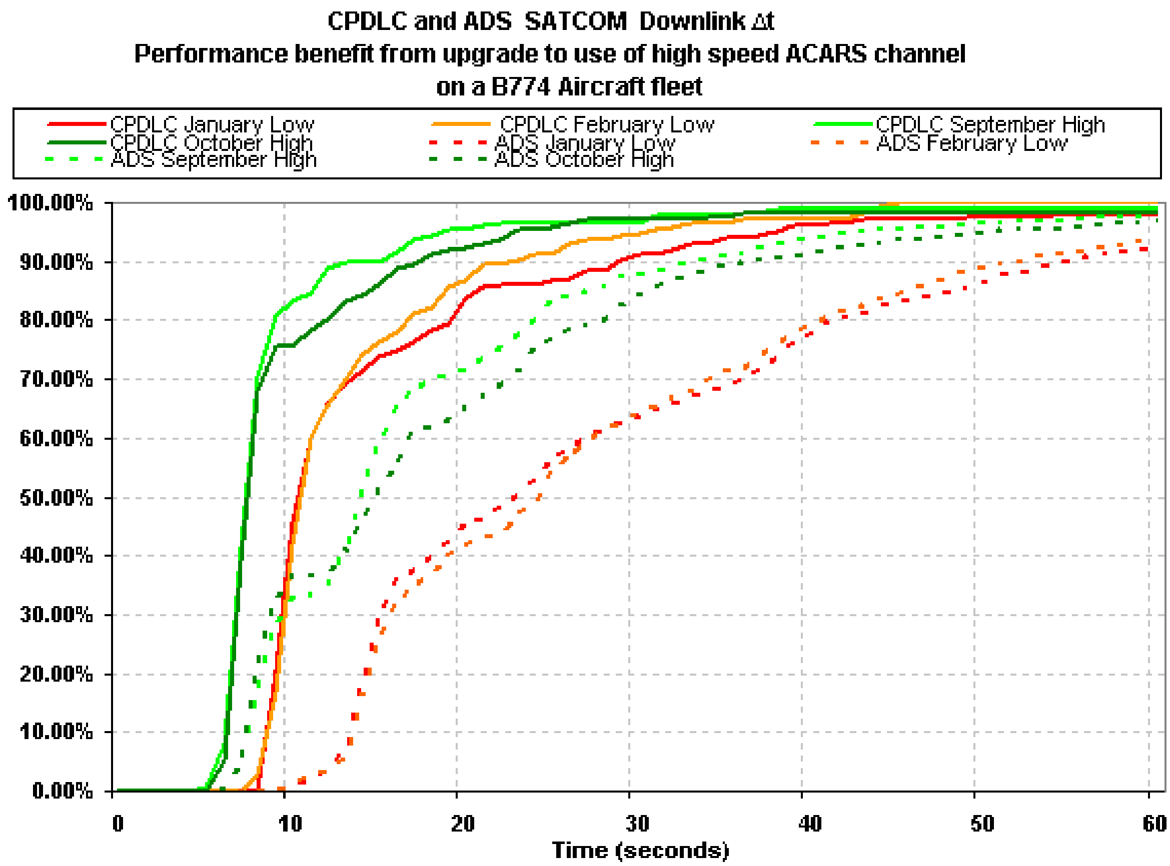


Figure D- 9. Effect of ACARS channel speed on ADS-C surveillance data transit time

An ATSP can assess ACARS channel speed use by evaluating the monthly downlink times for ADS-C reports via SATCOM. For users of high speed channels ATSP will consistently see a small percentage of reports in the 6-8 second time bands. Low speed channels users usually have very few reports less than 10 seconds.

ATSP should identify those operators using the low speed channels and stakeholders should work with those operators to achieve an upgrade to the high speed channels.

D.2 Problem reporting and resolution

D.2.1 General

The working principles in this guidance material result from the combined experience of the North Atlantic, Asia-Pacific, South American, African-Indian Ocean, and European Regions. Many regions have formed a regional monitoring agency to manage the problem reporting and resolution process.

The problem identification and resolution process, as it applies to an individual problem, consists of a data collection phase, followed by problem analysis and coordination with affected parties to secure a resolution, and recommendation of interim procedures to mitigate the problem in some instances. This is shown in the Figure D- 10.

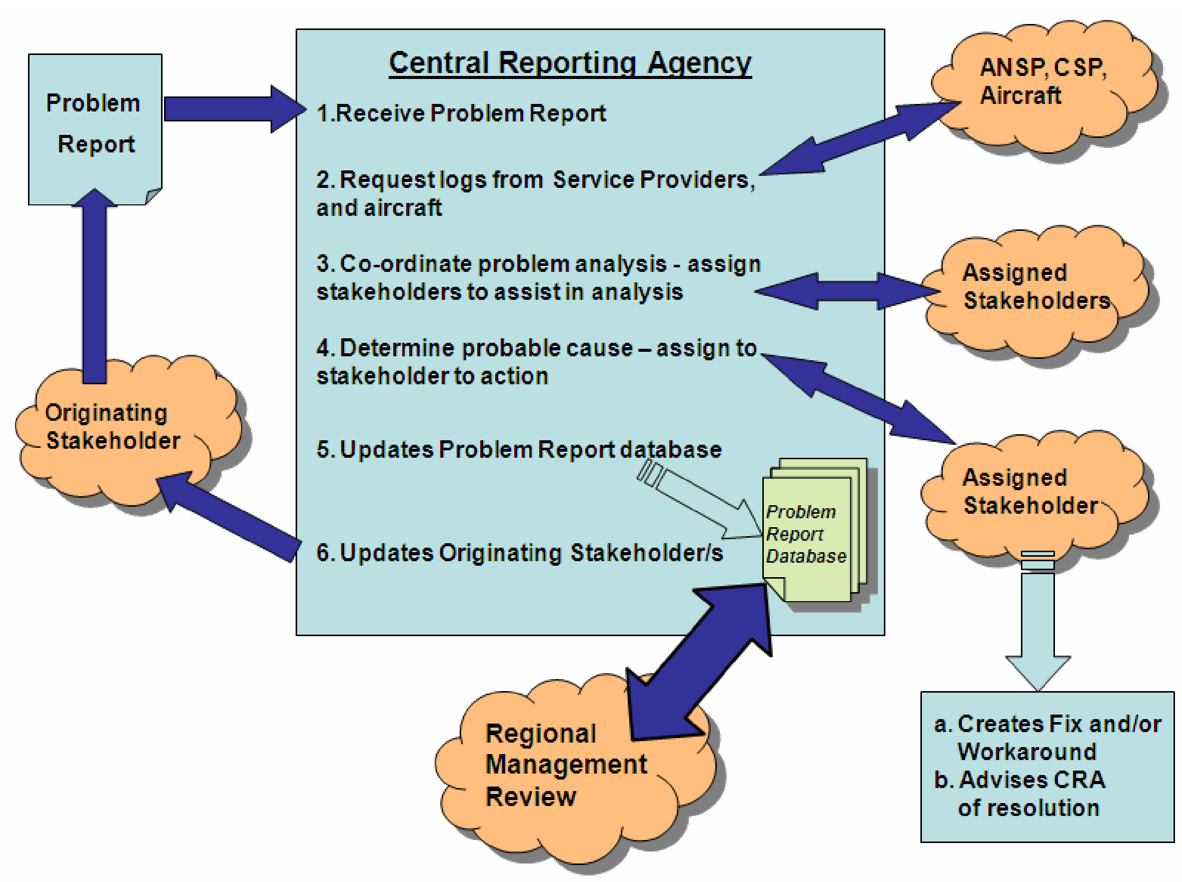


Figure D- 10. Problem reporting and resolution process

D.2.2 Problem report form

The problem identification task begins with receipt of a report from a stakeholder, usually an operator, ATS provider or CSP. Standard reporting forms should be developed and regions should investigate the use of a website to receive and store problem reports. An example of an online problem reporting form is shown in Figure D- 11. The fields used in the form are as follows:

a) Originator's Reference Number: Originators problem report reference, e.g. ANZ_2009-23;

b) Title: A short title which conveys the main issue of the reported problem, e.g. CPDLC transfer failure;

c) Date UTC: Date in YYYYMMDD format, e.g. 20090705;

d) Time UTC: Time in HHMM, e.g. 2345;

e) Aircraft registration: ICAO flight plan aircraft registration, e.g. ZKADR;

f) Aircraft identification: ICAO flight plan call sign if applicable, e.g. NZA456;

g) Flight Sector: If applicable the departure and destination airfield of the flight, e.g. NZAA-RJBB;

h) Organization: Name of the originators organization, e.g. Airways NZ;

i) Active Center: Controlling Centre at time of occurrence if applicable, e.g. NZZO;

j) Next Center: Next controlling centre at time of occurrence if applicable, e.g. NFFF;

k) Position: Position of occurrence, e.g. 3022S16345E;

l) Problem Description: Detailed description of problem;

m) Attach File: Area of web page where originator and assigned stakeholders can attach data files or other detailed information such as geographic overlays; and

n) Additional Data: Area set aside for feedback from stakeholders assigned by the regional/State monitoring agency. This will includes the results of the investigation and the agreed action plan.

Note.— A number of regional monitoring agencies are developing websites to manage the problem reporting process. Website addresses and the regional monitoring agency to which they are applicable are listed in Appendix E, paragraph E.1, Table E- 3.

FANS 1/A Problem Report Form

Form Details			
		Originators Reference Number	
Title			
Date UTC		Time UTC	
Registration		Flight Number	
Flight Sector			
Originator		Aircraft Type	
Organisation			
Active Center		Next Center	
Postion			
Problem Description (box will expand as you type)			
Attach File	Browse... (click browse - do not type in this field)		
	Browse... (click browse - do not type in this field)		
	Browse... (click browse - do not type in this field)		
	Browse... (click browse - do not type in this field)		
	Browse... (click browse - do not type in this field)		
Additional Data			

Submit PR

Figure D- 11, Example on-line problem reporting form

D.2.3 Problem assessment

D.2.3.1 Data collection

D.2.3.1.1 The data collection phase consists of obtaining message logs from the appropriate parties (which will depend on which ATSPs and CSPs were being used and operator service contracts). Today, this usually means obtaining logs for the appropriate period of time from the CSPs involved. Usually, a log for a few hours before and after the event that was reported will suffice, but once the analysis has begun, it is sometimes necessary to request additional data, (perhaps for several days prior to the event if the problem appears to be an on-going one).

D.2.3.1.2 Additionally, some aircraft-specific recordings may be available that may assist in the data analysis task. These are not always requested initially as doing so would be an unacceptable imposition on the operators, but may occur when the nature of the problem has been clarified enough to indicate the line of investigation that needs to be pursued. These additional records include:

a) Aircraft maintenance system logs.

b) Built-In Test Equipment data dumps for some aircraft systems.

c) SATCOM activity logs.

d) Logs and printouts from the flight crew and recordings/logs from the ATS provider(s) involved in the problem may also be necessary. It is important that the organization collecting data for the analysis task requests all this data in a timely manner, as much of it is subject to limited retention.

D.2.3.2 Data analysis

D.2.3.2.1 Once the data has been collected, the analysis can begin. For this, it is necessary to be able to decode all the messages involved, and a tool that can decode every ATS data link message type used in the region is essential. These messages include:

a) AFN (ARINC 622), ADS-C and CPDLC (RTCA DO-258/EUROCAE ED-100) in a region operating FANS-1/A.

b) Context Management, ADS-C and CPDLC applications (ICAO Doc 9705 and RTCA DO-280/ED-110) in a region using ATN.

c) FIS or ARINC 623 messages used in the region.

D.2.3.2.2 The analysis of the decoded messages requires a thorough understanding of the complete message traffic, including:

a) Media management messages.

b) Relationship of ground-ground and air-ground traffic.

c) Message envelope schemes used by the particular data link technology (ACARS, ATN, etc).

D.2.3.2.3 The analyst must also have a good understanding of how the aircraft systems operate and interact to provide the ATS data link functions, as many of the reported problems are aircraft system problems.

D.2.3.2.4 This information will enable the analyst to determine a probable cause by working back from the area where the problem was noticed to where it began. In some cases, this may entail manual decoding of parts of messages based on the appropriate standard to identify particular encoding errors. It may also require lab testing using the airborne equipment (and sometimes the ground networks) to reliably assign the problem to a particular cause.

D.2.3.2.5 Once the problem has been identified, then the task of coordination with affected parties begins. The stakeholder who is assigned responsibility for fixing the problem must be contacted and a corrective action plan agreed. The stakeholder who initiated the problem report shall be provided with regular updates on the progress and resolution of the problem

D.2.3.2.6 This information (the problem description, the results of the analysis and the plan for corrective action) is then entered into a database covering data link problems, both in a complete form to allow continued analysis and monitoring of the corrective action and in a de-identified form for the information of other stakeholders. These de-identified summaries are reported at the appropriate regional management forum and made available to other regional central reporting/monitoring agencies on request.

D.2.4 Mitigating procedures – problem resolution

The regional monitoring agency's responsibility does not end with determining the cause of the problem and identifying a fix. As part of that activity, and because a considerable period may elapse while software updates are applied to all aircraft in a fleet, procedural methods to mitigate the problem may have to be developed while the solution is being coordinated. The regional monitoring agency should identify the need for such procedures and develop recommendations for implementation by the ATSPs, CSPs and operators involved.

D.3 Regional performance monitoring

This section provides guidance on periodic reporting by individual ATSP of observed system performance in their FIR that will enable regional performance metrics to be developed for the availability, CPDLC transaction time and ADS-C surveillance data transit time requirements specified in Appendix B and Appendix C.

These regional performance metrics should be made available to all interested stakeholders. The use of regional websites to enhance the distribution of these metrics should be considered. An example of such a website can be viewed at http://www.ispacg-cra.com/.

D.3.1 Periodic reporting

It is recommended that regions implement monthly performance reporting to obtain system performance metrics. These reports will provide data on observed availability, CPDLC transaction time and ADS-C surveillance data transit time as described herein.

D.3.1.1 Reporting on availability

ATSP should report on CSP notified system outages and on detected outages that have not been notified as described in paragraph D.1.3.2.1.

For each outage the following information should be reported:

a) Time of CSP outage notification: In YYYYMMDDHHMM format or "Not Notified" if no CSP notification received.

b) CSP Name: Name of CSP providing outage notification if applicable.

c) Type of outage: Report media affected SATCOM, VHF, HF, ALL.

d) Outage start time: In YYYYMMDDHHMM format

e) Outage end time: In YYYYMMDDHHMM format

f) Duration of Outage: In minutes.

As per Appendix B only outages greater than 10 minutes are reported. An example form is shown in Figure D- 12.

D.3.1.2 Reporting on CPDLC actual communications performance

ATSP should report observed ACP and ACTP for RCP240 and RCP400 for different media paths using all transactions involving a WILCO response as described in paragraph D.1.3. The media paths to report are:

a) From all aircraft via all remote ground station (RGS) types.

b) From all aircraft where both uplink and downlink are via SATCOM RGS

c) From all aircraft where both uplink and downlink are via VHF RGS

d) From all aircraft where both uplink and downlink are via HF RGS

e) From all aircraft where either uplink and downlink are via HF or SATCOM RGS

A tabular reporting format can be used to capture the observed performance at the 95% and 99.9% RCP240/400 times.

As PORT is independent of media path, this need only be reported for all RGS types. An example form is shown in Figure D- 12.

D.3.1.3 Reporting on ADS-C surveillance data transit time

ATSP should report observed ADS-C surveillance data transit time for surveillance performance type 180 and type 400 for different media paths using all downlinks as described in paragraph D.1.3. The media paths to report are:

a) From all aircraft via all Remote Ground Station (RGS) types.

b) From all aircraft where both uplink and downlink are via SATCOM RGS

c) From all aircraft where both uplink and downlink are via VHF RGS

d) From all aircraft where both uplink and downlink are via HF RGS

e) From all aircraft where either uplink and downlink are via HF or SATCOM RGS

A tabular reporting format can be used to capture the observed performance at the 95% and 99.9% surveillance performance types 180 and 400 times. An example form is shown in Figure D- 12.

Monthly Report of Datalink Performance by < ANSP Name> for < FIR Name > for <month> <year>

Section 1: Availability

CSP Notification	CSP Name	Outage Type	Start	End	Duration (Mins)
200907150005	ARINC	SATCOM	200907150001	200907150020	19
Not Notified	N/A	SATCOM	200907212233	200907212255	22
200907281515	SITA	VHF	200907281510	200907281525	15

Section 2: CPDLC

ALL RGS			SATCOM		
ACTP RCP240	120sec	98.20%	ACTP RCP240	120sec	
	150sec	100%		150sec	
ACP RCP240	180sec	98%	ACP RCP240	180sec	
	210sec	99.70%		210sec	
PORT	60sec	98%			
ACTP RCP400	260sec		ACTP RCP400	260sec	
	310sec			310sec	
ACP RCP400	320sec		ACP RCP400	320sec	
	370sec			370sec	
VHF			**HF**		
ACTP RCP240	120sec		ACTP RCP240	120sec	
	150sec			150sec	
ACP RCP240	180sec		ACP RCP240	180sec	
	210sec			210sec	
ACTP RCP400	260sec		ACTP RCP400	260sec	
	310sec			310sec	
ACP RCP400	320sec		ACP RCP400	320sec	
	370sec			370sec	
SATCOM + HF					
ACTP RCP240	120sec				
	150sec				
ACP RCP240	180sec				
	210sec				
ACTP RCP400	260sec				
	310sec				
ACP RCP400	320sec				
	370sec				

Section 3: ADS-C

ALL RGS			SATCOM		
ASP RSP180	90sec	98.80%	ASP RSP180	90sec	
	180sec	100%		180sec	
ASP RSP400	300sec		ASP RSP400	300sec	
	400sec			400sec	
VHF			**HF**		
ASP RSP180	90sec		ASP RSP180	90sec	
	180sec			180sec	
ASP RSP400	300sec		ASP RSP400	300sec	
	400sec			400sec	
SATCOM + HF					
ASP RSP180	90sec				
	180sec				
ASP RSP400	300sec				
	400sec				

Figure D- 12. Example ATSP monthly report

D.3.1.4 Reporting data to enable graphical reports

In addition to the tabular performance reporting described above regions should consider presenting performance data using graphical means. Performance graphs illustrating regional communications and surveillance performance for the different media paths can be readily obtained by aggregating spreadsheet data from individual ATSP as illustrated in Figure D- 13. This figure illustrates part of an ATSP report of actual performance for ACTP, ACP, and PORT against the RCP240 requirements for a particular media type where the number of messages received within a time is recorded at one second intervals. This type of data can be included in an ATSP monthly report to enable regional aggregation of agreed performance information to allow it to be presented in graphical form. Regions could present all or some of the data reported in tabular form per paragraphs D.3.1.2 and D.3.1.3 above in graphical form if desired. This method of reporting would also assist global aggregation.

ACTP#	ACTP%	ACP#	ACP%	CREW#	CREW%	t"
0	0.00%	0	0.00%	149	0.89%	0
0	0.00%	0	0.00%	176	1.05%	1
0	0.00%	0	0.00%	210	1.26%	2
0	0.00%	0	0.00%	322	1.93%	3
0	0.00%	0	0.00%	673	4.03%	4
0	0.00%	0	0.00%	1444	8.64%	5
1	0.01%	0	0.00%	2330	13.94%	6
29	0.17%	0	0.00%	3133	18.74%	7
988	5.91%	0	0.00%	3946	23.60%	8
3939	23.56%	0	0.00%	4731	28.30%	9
6726	40.23%	0	0.00%	5667	33.90%	10
8519	50.96%	0	0.00%	6763	40.45%	11
9566	57.22%	3	0.02%	7811	46.72%	12
10585	63.31%	13	0.08%	8794	52.60%	13
11356	67.93%	33	0.20%	9594	57.39%	14
11910	71.24%	67	0.40%	10355	61.94%	15
12401	74.18%	136	0.81%	10964	65.58%	16
12962	77.53%	232	1.39%	11483	68.69%	17
13530	80.93%	609	3.64%	11899	71.17%	18
13938	83.37%	1949	11.66%	12267	73.38%	19
14247	85.22%	3280	19.62%	12595	75.34%	20
14415	86.22%	4326	25.88%	12867	76.96%	21
14586	87.25%	5362	32.07%	13145	78.63%	22
14724	88.07%	6308	37.73%	13387	80.08%	23
14839	88.76%	7057	42.21%	13588	81.28%	24
14943	89.38%	7766	46.45%	13764	82.33%	25
15029	89.90%	8388	50.17%	13930	83.32%	26
15128	90.49%	8977	53.70%	14098	84.33%	27
15220	91.04%	9494	56.79%	14249	85.23%	28
15323	91.66%	9968	59.62%	14425	86.28%	29
15402	92.13%	10373	62.05%	14562	87.10%	30
15448	92.40%	10763	64.38%	14696	87.91%	31
15501	92.72%	11102	66.41%	14826	88.68%	32
15543	92.97%	11433	68.39%	14938	89.35%	33
15599	93.31%	11720	70.10%	15049	90.02%	34
15640	93.55%	11985	71.69%	15160	90.68%	35
15683	93.81%	12235	73.18%	15258	91.27%	36
15720	94.03%	12477	74.63%	15338	91.75%	37
15747	94.19%	12703	75.98%	15405	92.15%	38
15790	94.45%	12908	77.21%	15476	92.57%	39
15813	94.59%	13111	78.42%	15533	92.91%	40
15851	94.81%	13289	79.49%	15603	93.33%	41

16660	99.65%	16540	98.94%	16655	99.62%	200
16660	99.65%	16543	98.95%	16656	99.63%	201
16662	99.67%	16547	98.98%	16656	99.63%	202
16662	99.67%	16549	98.99%	16656	99.63%	203
16662	99.67%	16549	98.99%	16656	99.63%	204
16662	99.67%	16550	99.00%	16657	99.64%	205
16662	99.67%	16553	99.01%	16657	99.64%	206
16662	99.67%	16556	99.03%	16657	99.64%	207
16662	99.67%	16561	99.06%	16657	99.64%	208
16664	99.68%	16563	99.07%	16659	99.65%	209
16664	99.68%	16564	99.08%	16662	99.67%	210
16664	99.68%	16565	99.08%	16662	99.67%	211
16664	99.68%	16566	99.09%	16662	99.67%	212
16666	99.69%	16567	99.10%	16663	99.67%	213
16667	99.69%	16571	99.12%	16663	99.67%	214
16667	99.69%	16572	99.13%	16665	99.68%	215
16667	99.69%	16574	99.14%	16665	99.68%	216
16667	99.69%	16575	99.14%	16665	99.68%	217
16667	99.69%	16576	99.15%	16666	99.69%	218
16669	99.71%	16577	99.16%	16666	99.69%	219
16669	99.71%	16579	99.17%	16666	99.69%	220
16669	99.71%	16580	99.17%	16666	99.69%	221
16672	99.72%	16581	99.18%	16666	99.69%	222
16673	99.73%	16583	99.19%	16666	99.69%	223
16674	99.74%	16586	99.21%	16666	99.69%	224
16675	99.74%	16586	99.21%	16667	99.69%	225
16675	99.74%	16589	99.23%	16667	99.69%	226
16675	99.74%	16589	99.23%	16667	99.69%	227
16676	99.75%	16593	99.25%	16668	99.70%	228
16677	99.75%	16594	99.26%	16668	99.70%	229
16677	99.75%	16596	99.27%	16668	99.70%	230
16677	99.75%	16597	99.28%	16668	99.70%	231
16677	99.75%	16598	99.28%	16668	99.70%	232
16677	99.75%	16601	99.30%	16668	99.70%	233
16677	99.75%	16604	99.32%	16668	99.70%	234
16678	99.76%	16604	99.32%	16668	99.70%	235
16678	99.76%	16605	99.32%	16668	99.70%	236
16679	99.77%	16606	99.33%	16668	99.70%	237
16679	99.77%	16607	99.34%	16668	99.70%	238
16680	99.77%	16609	99.35%	16668	99.70%	239
16681	99.78%	16609	99.35%	16668	99.70%	240
37	0.22%	109	0.65%	50	0.30%	>240
16718	100.00%	16718	100.00%	16718	100.00%	Total

Figure D- 13. Example ATSP monthly report that will enable graphical analysis

Appendix E Regional/State-specific information

E.1 Regional and/or State information

Table E- 1 lists the flight information regions (FIRs) where data link service is provided and indicates AFN address, ATSU ACARS Address, coordinating group, CPDLC Contact or Monitor message requirements and position reporting requirements. For CPDLC, ADS-C and FMC WPR columns, O=operational, T=trial, and N=not available.

Table E- 1. Data link services by FIR

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	Remarks
Accra							
Algeria (Alger)	O	O	N	DAAA			
Amsterdam (Maastricht) (FL 245+)	O	N	N	EDYY		E LINK 2000+	Limited CPDLC, See paragraph 2.1 and Appendix A, reference ATN B1.
Anchorage and Anchorage Arctic (north of N63 and east of W165)	O	N	N	PAZA	ANCXFXA	IPACG FIT	CPDLC voice transfer: CONTACT PAZA CENTER [frequency] Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Anchorage Oceanic (south of N63 and west of W165)	O	O	N	PAZN	ANCATYA	IPACG FIT	CPDLC voice transfer: CONTACT PAZA CENTER [frequency] Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Antananarivo (Madagascar)	O	O	N	FMMM			
Atlantico (Brazil)	O	O	N	SBAO			

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	Remarks
Auckland Oceanic	O	O	O	NZZO	AKLCDYA	ISPACG FIT	CPDLC voice transfer: MONITOR NZZO CENTER [frequency] Confirm CPDLC CDA: One CPDLC position report at FIR boundary,. See paragraph E.2.2.
Bahrain							
Bangkok	O	O	O	VTBB	BKKGWXA	FIT BOB FIT SEA	Confirm CPDLC CDA: CPDLC UM 160 (NDA). See paragraph E.2.2.
Bodø	N	O	O	ENOB		NAT CNSG	
Brisbane	O	O	T	YBBB	BNECAYA	ISPACG FIT	CPDLC voice transfer: MONITOR BRISBANE CENTER [frequency] Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Bruxelles (Maastricht) (FL 245+)	O	N	N	EDYY		E LINK 2000+	Limited CPDLC, See paragraph 2.1 and Appendix A, reference ATN B1.
Canarias	O	O	N	GCCC			
Capetown	O	O	N	FACT			
Casablanca							
Chengdu (China)	O	O	N	ZUUU	CTUGWYA		
Chennai (India)	O	O	N	VOMF	MAACAYA	FIT BOB	
Colombo	T	T	N	VCCC			Position reporting: CPDLC position report at each waypoint. *Note.— Currently trialing ADS-C and CPDLC. Primary communication via voice. Full HF reporting still required.*
Dakar Oceanic (Senegal)	O	O	N	GOOO			

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	Remarks
Delhi (India)	N	O	N	VIDF			
Edmonton (Canada)	N	O	N	CZEG			
Emirates							
Fukuoka	O	O	N	RJJJ	FUKJJYA	IPACG FIT	CPDLC voice transfer: CONTACT TOKYO CENTER [frequency] Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Gander	O	O	O	CZQX	YQXE2YA	NAT CNSG	Report revised ETA: Next waypoint ETA error 3 minutes or more, use free text DM 67k REVISED ETA [position] [time]. See paragraph E.2.6.
Honiara	O	O	N	YBBB	BNECAYA		
Hannover (Maastricht) (FL 245+)	O	N	N	EDYY		E LINK 2000+	Limited CPDLC, See paragraph 2.1 and Appendix A, reference ATN B1.
Johannesburg Oceanic	O	O	N	FAJO	JNBCAYA		Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Kolkata (India)	O	O	N	VECF			
Kunming (China)	O	O	N	ZPPP	KMGGWYA		
Kuwait							
Lanzhou (China)	O	O	N	ZLLL	LHWGWYA		
Lisboa							
Luanda							
Magadan (Russia)	O	O	N	GDXB			
Mauritius	O	O	N	FIMM			Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.

Flight Information Region (FIR)	**CPDLC**	**ADS-C**	**FMC WPR**	**AFN address**	**ATSU ACARS Address**	**Coord Group**	**Remarks**
Melbourne	O	O	N	YMMM	MELCAYA	ISPACG FIT	CPDLC voice transfer: MONITOR MELBOURNE CENTER [frequency] Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Mumbai (India)	O	O	N	VABF	BOMCAYA		
Nadi	O	O	N	NFFF	NANCDYA	ISPACG FIT	CPDLC voice transfer: MONITOR NFFF CENTER [frequency] Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Naimey (Niger)	O	O	N	DRRR			
Nauru	O	O	N	YBBB	BNECAYA		MONITOR BRISBANE CENTER [frequency]
New York	O	O	N	KZWY	NYCODYA	NAT CNSG	DO NOT use CPDLC for position reporting. Use ADS-C or voice only. SELCAL check via HF are required for all FANS connected aircraft prior to entering the CTA/FIR. DO NOT send a CPDLC position report to confirm CDA prior to, or upon crossing the FIR.

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	Remarks
Oakland	O	O	N	KZAK	OAKODYA	IPACG FIT ISPACG FIT	CPDLC voice transfer: CONTACT KSFO CENTER [frequency] *Note.— KSFO (San Francisco Radio) will provide all primary and secondary HF frequencies, and HF transfer points along the route of flight.* Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Reykjavik	O	O	O	BIRD	REKCAYA	NAT CNSG	Confirm CPDLC CDA: Free text uplink. See paragraph E.2.2. Report revised ETA: Next waypoint ETA error 3 minutes or more, use free text DM 67k REVISED ETA [position] [time]. See paragraph E.2.6.
Santa Maria	O	O	O	LPPO	SMACAYA	NAT CNSG	Confirm CPDLC CDA: CPDLC UM 160 (NDA). See paragraph E.2.2. Report revised ETA: Next waypoint ETA error 3 minutes or more, use free text DM 67k REVISED ETA [position] [time]. See paragraph E.2.6.
Seychelles	O	O	N	FSSS			
Shanwick	O	O	O	EGGX	PIKCPYA	NAT CNSG	Report revised ETA: Next waypoint ETA error 3 minutes or more, use free text DM 67k REVISED ETA [position] [time]. See paragraph E.2.6.
Singapore	O	O	O	WSJC	SINCDYA	FIT SEA	Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.

Flight Information Region (FIR)	**CPDLC**	**ADS-C**	**FMC WPR**	**AFN address**	**ATSU ACARS Address**	**Coord Group**	**Remarks**
Tahiti	O	O	N	NTTT	PPTCDYA	ISPACG FIT	CPDLC voice transfer: CONTACT NTTT CENTER [frequency] *Note.— A SELCAL check is required.* Confirm CPDLC CDA: One CPDLC position report at FIR boundary. See paragraph E.2.2.
Tunis							
Ujung Pandang (Makassar) (Indonesia)	T	T	N	WAAF	UPGCAYA		Position reporting: CPDLC position report at each waypoint. *Note.— Currently trialing ADS-C and CPDLC.*
Ulan Bator (Mongolia)	O	O	N	ZMUA			
Urumqi (China)	O	O	N	ZWWW			
Yangon (Myanmar)	O	O	N	VYYF			

Table E- 2 provides contact information.

Table E- 2. Contact information

Coordinating group or regional monitoring agency	**Contact information**
North Atlantic Communications, Navigation and Surveillance Group (NAT CNSG) FANS Central Monitoring Agency	Tim Murphy Team Leader, Engineering Operations Support Phone +44 1292 692 772 Fax +44 1292 692 640 Email: tim.murphy@nats.co.uk
NAT CNSG ICAO	Elkhan Nahmadov Phone +33 1 4641 8529 Fax +33 1 4641 8500 Email icaoeurnat@paris.icao.int
NAT CNSG Operations	Robert Simpson Operational System Requirements Phone +1(709) 651 5215 Fax +1(709) 651 5235 Email simpsonr@navcanada.ca
NAT CNSG Engineering	Tim Murphy Team Leader, Engineering Operations Support Phone +44 1292 692 772 Fax +44 1292 692 640 Email: tim.murphy@nats.co.uk
NAT CNSG Operators using ARINC as their CSP contact	Pete Grogan Phone (410) 266-2344 Fax Email PGROGAN@arinc.com
NAT CNSG Operators using SITA as their CSP contact	Kathleen Kearns Manager, AIRCOM ATC Business, North America Phone: (703) 491-0661 Fax: (703) 491-0662 e-Mail: Kathleen.Kearns@sita.aero
NAT CNSG Document Management - NAT GM	Iain C. Brown Room G.06 ScOACC Atlantic House Sherwood Road Prestwick Ayrshire KA9 2NR United Kingdom Email Iain.Brown@nats.co.uk

Coordinating group or regional monitoring agency	Contact information
Informal Pacific ATC Coordinating Group (IPACG) Central Reporting Agency (CRA) USA	Reed B. Sladen, IPACG/FIT Co-chair Program Operations Field Manager Oakland Air Route Traffic Control Centers Federal Aviation Administration (FAA) Tel: +1 510 745 3328 Fax: +1 510 745 3826 Email: reed.b.sladen@faa.gov
IPACG (CRASA) USA	Gordon Sandell Avionic Engineering The Boeing Company P.O. Box 3707, MC 02-98 Seattle, WA 98124-2207 – USA Fax: +1 425 707 5052 Tel: +1 425 342 4906 EM: gordon.r.sandell@boeing.com
IPACG CRA Japan	Takahiro Morishima, IPACG/FIT Co-chair Special Assistant to the Director, ATS Systems Planning Division, ATS Department, Japan Civil Aviation Bureau (JCAB) Ministry of Land, Infrastructure, Transport and Tourism Tel: +81 3 5253 8739 Fax: +81 3 5253 1663 Email: morishima-t2zg@mlit.go.jp
IPACG (CRASA) Japan	Masahisa Hayashi JCAB CRASA K-1 Building, 3rd floor, 1-6-6 Haneda Airport, Ota-ku, Tokyo 144-0041 – JAPAN Fax: +81-3-3747-1231 Tel: +81-3-3747-1231 EM: CRASA@cra-japan.org
Informal South Pacific ATC Coordinating Group (ISPACG)	Paul Radford Manager Oceanic Systems Airways New Zealand Tel: +64 9 256 8078 Fax: +64 9 275 3106 Email: paul.radford@airways.co.nz

Coordinating group or regional monitoring agency	**Contact information**
ISPACG Central Reporting Agency (CRA) and CRASA	Brad D. Cornell 787 Flight Crew Operations The Boeing Company P.O. Box 3707, MS 02-JH SEATTLE, WA 98124-2207 – USA Fax: 425 294-1076 EM: bradley.d.cornell@boeing.com SITA: FMCBOCR Tel: 425-294-6520
ISPACG Central Reporting Agency (CRA) and CRASA	Suzie NESS FMS The Boeing Company P.O. Box 3707, MS 02-RP SEATTLE, WA 98124-2207 – USA Fax: 425 342-6078 EM: suzie.ness@boeing.com SITA: FMCBOCR Tel: 425-342-6803
Informal Indian Ocean Coordinating Group (IIOCG)	Doug Scott Upper Airspace Services Manager Airservices Australia Tel: +61 7 3866 3366 Fax: +61 7 3866 3257 Email: doug.scott@airservicesaustralia.com
Bay of Bengal (BOB)	Brad D. Cornell Air Traffic Management Services The Boeing Company Tel: +1 425 266 8206 Email: bradley.d.cornell@boeing.com
South Atlantic Air Traffic Services (SAT) Central Reporting Agency (CRA)	Johnny Smit, SAT/FIT Focal Point Tel: +27 11 928 6526 Fax: +27 11 395 1045 Email: johnnys@atns.co.za
Arab Civil Aviation Commission (ACAC)	Akhil Sharma, ACAC/FIT Chair Director, Aircom Service Development SITA Tel: +44 0208 756 8339 Fax: +44 0208 756 8001
Southeast Asia ATS Coordination Group (SEACG)	

Coordinating group or regional monitoring agency	Contact information
EUROCONTROL LINK 2000+	Maastricht UAC Gustaaf Janssens Programme Manager Phone +31 43 366 1252 Email gustaaf.janssens@eurcontrol.int EUROCONTROL Martin Adnams LINK2000+ Programme Manager Phone +32 2 729 3328 Email martin.adnams@eurocontrol.int

Table E- 3. Regional monitoring agency websites available for problem reporting

Regional monitoring agency	Website URL
Informal South Pacific ATC Coordinating Group (ISPACG) and ISPACG Central Reporting Agency (CRA) and CRASA	http://www.ispacg-cra.com/

E.2 Regional and/or State differences

E.2.1 Voice communication procedures – North Atlantic Region

E.2.1.1 Flight crew – contact with aeradio

E.2.1.1.1 The integrity of the ATC service remains wholly dependent on establishing and maintaining HF or VHF voice communications with each ATSU along the route of flight. The procedures in this section are applicable only in NAT airspace and pertain only to ATS data link operations.

E.2.1.1.2 Prior to entering each NAT oceanic CTA, the flight crew should contact the appropriate aeradio station.

E.2.1.1.3 Table E- 4 provides the data link terms the flight crew should use to identify the flight. The flight crew should continue to use the data link term until either the SELCAL check has been completed or the frequency assignment has been received.

Table E- 4. Terms to identify data link capability

Term	Data link status of aircraft
"A-D-S"	Participating in ADS-C only.
"F-M-C"	Participating in FMC WPR
"C-P-D-L-C"	Participating in CPDLC and ADS-C

E.2.1.1.4 If the flight will exit the CTA into oceanic and remote airspace, on initial contact with the CTA the flight crew should:

a) not include a position report;

b) use the appropriate data link term after the aircraft call sign (see paragraph E.2.1.1.3);

c) state the name of the next CTA/FIR to be entered; and

d) request the SELCAL check.

Example 1 (initial contact from an eastbound ADS-C-only flight about to enter the Gander CTA):

GANDER RADIO, AIRLINE 123 A-D-S, SHANWICK NEXT, REQUEST SELCAL CHECK CDAB.

Example 2 (initial contact from a westbound FMC WPR flight about to enter the Santa Maria CTA):

SANTA MARIA RADIO, AIRLINE 123 F-M-C, NEW YORK NEXT, REQUEST SELCAL CHECK AFMP.

Example 3 (initial contact from an eastbound CPDLC flight about to enter the New York Data Link service area):

NEW YORK ARINC, AIRLINE 123 C-P-D-L-C, GANDER NEXT, REQUEST SELCAL CHECK CKFM.

E.2.1.1.5 If the flight will exit the CTA into continental (domestic) airspace, on initial contact with the CTA, the flight crew should:

a) not include a position report;

b) use the appropriate data link term after the aircraft call sign (see paragraph E.2.1.1.3);

c) state the track letter if operating on the organized track system;

d) state the last two fixes in the cleared route of flight if operating outside the organized track system; and

e) request the SELCAL check.

Example 1 (initial contact from an eastbound ADS-C-only flight about to enter the Shanwick CTA):

SHANWICK RADIO, AIRLINE 123 A-D-S, TRACK ZULU, REQUEST SELCAL CHECK CDAB.

Example 2 (initial contact from a westbound CPDLC flight about to enter the Gander CTA):

GANDER RADIO, AIRLINE 123 C-P-D-L-C, SCROD VALIE, REQUEST SELCAL CHECK DMCS.

Example 3 (initial contact from an eastbound FMC WPR flight about to enter the Shanwick CTA):

SHANWICK RADIO, AIRLINE 123 F-M-C, TRACK ZULU, REQUEST SELCAL CHECK CDAB.

E.2.1.1.6 Depending on which data link services are offered in the CTA and the operational status of those services, the aeradio operator will provide appropriate information and instructions to the flight crew (see paragraph E.2.1.2 for information regarding associated aeradio procedures).

E.2.1.1.7 In the event an onboard systems failure prevents CPDLC, ADS-C or FMC WPR or if any of these services is terminated:

a) if the failure/termination occurs prior to initial contact with the aeradio station, do not use the phrase "A-D-S", "C-P-D-L-C" or "F-M-C" after the aircraft call sign;

b) resume normal voice communications, including providing all subsequent position reports via voice;

c) do not inform aeradio that the service has been terminated; and

d) inform Company Operations Department in accordance with established problem reporting procedures.

E.2.1.1.8 For ADS-C & FMC WPR flights, the flight crew should not submit position reports via voice to reduce frequency congestion, unless otherwise advised by aeradio operator.

E.2.1.1.9 ADS-C flights are exempt from all routine voice meteorological reporting, however the flight crew should use voice to report unusual meteorological conditions such as severe turbulence to the aeradio station.

E.2.1.1.10 The flight crew should not ask aeradio questions regarding the status of the ADS-C connections or whether an ADS-C or an FMC WPR has been received. Should the ATSU fail to receive an expected position report, the controller will follow guidelines in paragraph 4.4.1.7 for late or missing ADS-C reports or request a voice report for a late or missing FMC waypoint position report.

E.2.1.1.11 When leaving CPDLC, ADS-C-only, or FMC WPR environment, the flight crew should comply with all communication requirements applicable to the airspace being entered.

E.2.1.1.12 If the flight crew does not receive its domestic frequency assignment by 10 minutes prior to the flight's entry into continental (domestic) airspace, the flight crew should contact aeradio and request the frequency, stating the oceanic exit fix.

E.2.1.2 Aeradio - response to initial contact

E.2.1.2.1 Aeradio operators should:

a) respond to an aircraft that identifies itself by including a data link term after the aircraft call sign by restating the data link term after the aircraft call sign (see paragraph E.2.1.1.3 for the list of data link terms); and

b) complete the SELCAL check (see paragraph E.2.1.1.4 and paragraph E.2.1.1.5 for examples of the initial contact procedures to be used by the flight crew).

E.2.1.2.2 If a flight uses the term "A-D-S" after the aircraft call sign, the aeradio operator should issue:

a) communication instruction for the next CTA/FIR; or

b) communications instructions and the frequency to contact the appropriate ATSU approaching, or over, the exit point; or

c) instructions for the flight to contact the aeradio station serving the next CTA/FIR at a time or location prior to the next CTA/FIR boundary or exit point.

E.2.1.2.3 When the CTA/FIR does not offer FMC WPR services, if a flight uses the term "F-M-C" after the aircraft call sign, the aeradio operator should advise the flight crew to make position reports by HF voice.

E.2.1.2.4 When the CTA/FIR offers FMC WPR services, if a flight uses the term "F-M-C" after the aircraft call sign, the aeradio operator should issue:

a) communication instruction for the next CTA/FIR; or

b) communications instructions and the frequency to contact the appropriate ATSU approaching, or over, the exit point; or

c) instructions for the flight to contact the aeradio station serving the next CTA/FIR at a time or location prior to the next CTA/FIR boundary or exit point.

E.2.1.2.5 When the CTA/FIR does not offer CPDLC services, if a flight uses the term "C-P-D-L-C" after the aircraft call sign, the aeradio operator should:

a) Advise the flight that ""CPDLC SERVICE NOT AVAILABLE IN (name) CTA/FIR"; and

b) Issue:

1) communication instruction for the next CTA/FIR; or

2) communications instructions and the frequency to contact the appropriate ATSU approaching, or over, the exit point; or

3) instructions for the flight to contact the aeradio station serving the next CTA/FIR at a time or location prior the next CTA/FIR boundary or exit point.

E.2.1.2.6 During CPDLC operations, if a flight uses the term "C-P-D-L-C" after the aircraft call sign, the aeradio operator should:

a) Advise the flight that "(type) FREQUENCIES WILL BE ASSIGNED VIA CPDLC"; and

b) Issue:

1) communication instructions for the next CTA/FIR; or

2) communication instructions and the frequency to contact the appropriate ATSU approaching, or over, the exit point; or

3) instructions for the flight to contact the aeradio station serving the next CTA/FIR at a time or location prior to the next CTA/FIR boundary or exit point.

E.2.1.3 Aeradio - delayed CPDLC messages

If the flight crew advises "DELAYED CPDLC MESSAGE RECEIVED", they are explaining that a CPDLC message was received late. Flight crew procedures require voice contact to verify the message status. Aeradio operators should include this notation when relaying the associated communication to ATC (see paragraph 5.2.1.10 and Appendix F, paragraph F.11 for flight crew procedures and paragraph 4.2.7 for further information regarding delayed CPDLC uplinks).

E.2.2 Confirm CPDLC current data authority

With the FANS-1/A application, an ATSP receiving a CDPLC transfer does not have confirmation they are current data authority (CDA) until a downlink is received from the aircraft. The ATSPs are unable to reach global agreement on whether this confirmation is needed, and those that require confirmation are unable to reach agreement on a common procedure to achieve this.

An ATSP that requires confirmation relies on upstream automation to transfer CPDLC connections reliably enough to give adequate safety margins and has considered the disadvantages and cost of available mitigations, the rate of occurrence of transfer failures, and the availability of HF as fallback in arriving at this conclusion.

The ATSPs that require confirmation of current authority have different means of meeting this requirement. These different means include:

a) Receiving ATSP sends an automated free-text uplink UM169 when the aircraft crosses the boundary. The aircraft response will be DM3 ROGER if the transfer was successful, otherwise the error response DM 63 NOT CURRENT DATA AUTHORITY.

b) Receiving ATSP sends UM 160 NEXT DATA AUTHORITY[facility designation] as the aircraft crosses the FIR boundary. The aircraft response will be DM 63 NOT CURRENT DATA AUTHORITY if the CPDLC transfer has not occurred.

c) Aircraft sends DM 48 POSITION REPORT either crossing the FIR boundary or when the Active Center indication on the flight deck changes to the receiving center. If the active center does not change as expected the DM48 will be sent to the transferring ATSP which will indicate that the transfer has failed.

Some regions are implementing AIDC messages that will provide the receiving ATSP with the notification that the communications transfer has completed successfully. When these messages are implemented confirmation of data authority as described above will be redundant.

Table E- 1 lists ATSP requirements for confirmation of CDA.

E.2.3 Unsupported CPDLC downlink message elements – region specific

Table E- 5 provides the CPDLC downlink message elements that are supported by a data link system but are not supported within a specific region. If the appropriate ATSU receives any of the message elements listed in this table, they will send UM 169u MESSAGE NOT SUPPORTED BY THIS ATS UNIT.

Note.— See Appendix A for CPDLC message elements that are supported by a data link system but their use should be avoided due to potential misinterpretation and should not be supported globally.

Table E- 5 Unsupported CPDLC downlink message elements – region specific

Region or State	Data link system	Unsupported downlink message elements
NAT	FANS 1/A	DM 49 WHEN CAN WE EXPECT [speed] DM 50 WHEN CAN WE EXPECT [speed] TO [speed] DM 51 WHEN CAN WE EXPECT BACK ON ROUTE DM 52 WHEN CAN WE EXPECT LOWER ALTITUDE DM 53 WHEN CAN WE EXPECT HIGHER ALTITUDE DM 54 WHEN CAN WE EXPECT CRUISE CLIMB TO [altitude] DM 67h WHEN CAN WE EXPECT CLIMB TO [altitude] DM 67i WHEN CAN WE EXPECT DESCENT TO [altitude] *Note.— The downlink messages are not supported because of potential misinterpretation of appropriate uplink responses in the event of a total communication failure. In addition to highlighted messages in Appendix A, the following uplink messages are not used in the NAT:* *UM 70 EXPECT BACK ON ROUTE BY [position]* *UM 71 EXPECT BACK ON ROUTE BY [time]* *UM 99 EXPECT [procedure name]* *UM 100 AT [time] EXPECT [speed]* *UM 101 AT [position] EXPECT [speed]*

E.2.4 Uplink message elements unsuited for NAT operations

The following uplink message elements are unsuited for NAT operations and NAT ATSPs should avoid their use.

UM 171 CLIMB AT [vertical rate] MINIMUM

UM 172 CLIMB AT [vertical rate] MAXIMUM

UM 173 DESCEND AT [vertical rate] MINIMUM

UM 174 DESCEND AT [vertical rate] MAXIMUM

UM 115 DO NOT EXCEED [speed]

UM 116 RESUME NORMAL SPEED

UM 146 REPORT GROUND TRACK

UM 182 CONFIRM ATIS CODE

E.2.5 Flight plan requirements for EUR airspace where CPDLC is available

In accordance with the EUR Regional SUPPs, for flights conducted wholly or partly in the EUR airspace where CPDLC is available (per regional supplementary procedures), and not equipped with CPDLC capabilities but which have been granted an exemption, the indicator RMK/CPDLCX shall be included in Item 18 of the flight plan.

E.2.6 Reporting requirements in NAT airspace where ADS-C is available

In the NAT Region, if the estimated time for the next position last provided to air traffic control is found to be in error by three minutes or more, the flight crew should provide a revised estimated time.

The flight crew may assume that the estimate for the next waypoint, shown on the FMS at the time a waypoint is crossed, is the estimate transmitted to ATC.

The flight crew should provide the revised estimate to the controlling ATS unit as soon as possible via voice or CPDLC using free text DM 67k REVISED ETA [position] [time]

E.2.7 Exchange of turbulence information in Fukuoka FIR

In the Fukuoka FIR, the flight crew should report moderate or severe turbulence information. Turbulence information is provided for aircraft which fly around location of observation within height difference of ±2,000ft from altitude of observation and will pass within two hours from time of observation.

The flight crew may use CPDLC for reporting and receiving moderate or severe turbulence information. For aircraft which does not have a CPDLC connection, the exchange of turbulence information is implemented by voice. The turbulence information provided to flight crews, whether by CPDLC or voice, will be the same.

E.2.7.1 Report of turbulence information by CPDLC

When reporting turbulence information via CPDLC, aircraft should downlink in the following form by free text message.

DM 67 [MOD or SEV] TURB [location of observation] [altitude of observation] [time of observation]Z

Note 1.— Aircraft should report location of observation in the following form. When observing turbulence continuously, aircraft is able to report location of observation in the following form; "[beginning location of observation] [end location of observation]".

a) FIX, e.g. "NIPPI"

b) Distance and radial from FIX, e.g. "20NM SW NIPPI"

c) Latitude and longitude, e.g. "4020N14532E"

d) When observing turbulence continuously, e.g. "RIPKI GARRY"

Note 2.— When observing turbulence while cruising, aircraft is able to report by omitting altitude of observation. When observing turbulence continuously while climbing or descending, aircraft should report altitude of observation in the following form; "[lower limit altitude of observation] [upper limit altitude of observation]", e.g. "FL330 FL350".

Note 3.— When reporting turbulence information within 5 minutes after observing, aircraft is able to report by omitting time of observation.

Examples of downlink messages:

"SEV TURB 35N160E FL330 0924Z"

"MOD TURB 20NM N ASEDA 35NM S ASEDA FL350 1152Z"

"MOD TURB NIPPI 2114Z"

"SEV TURB 3530N15451E FL370 FL390 0304Z"

"SEV TURB POXED FL320"

"MOD TURB CELIN"

E.2.7.2 Provision of turbulence information by CPDLC

When providing via CPDLC, turbulence information is uplinked in the following form by free text message:

UM 169 [MOD or SEV] TURB [location of observation] [altitude of observation] [time of observation]Z [type of aircraft]

The downlink response DM 3 ROGER should be used to acknowledge receipt of turbulence information issued.

Examples of uplink messages:

"MOD TURB NIPPI F360 0130Z B772"

"SEV TURB FM 37N160E TO 37N158E F320 0418Z A332"

"MOD TURB 20NM N ASEDA F330F350 1152Z B744"

Appendix F Operator/aircraft specific information

F.1 Data link avionics updates

Airbus A320
FANS A+ (CSB4) FANS A+ Data link Recording (CSB7)
Airbus A330, A340
FANS A (CLR3) FANS A+ (CLR4) FANS A+ Data link Recording (CLR7)
Airbus A380
FANS A+ Data link Recording (CLA3)
Boeing B747-400, 717, MD-90, MD-10, MD-11
FANS 1
Boeing B737, B747-8, B757, B767, B777, B787
FANS 1+

F.2 Verifying aircraft registration

Airbus A380
On the A380 aircraft, the flight crew cannot change the aircraft registration in the FN_CON message. The aircraft registration is provided by the aircraft system.
Airbus A320, A330, A340
These aircraft do not have an ***essential*** data source for this datum, which means that the maintenance / flight crew needs to verify that the aircraft registration used for data link comm. is correct.
Boeing B787
On the B787 aircraft, the flight crew cannot change the aircraft registration in the FN_CON message. The aircraft registration is provided by the aircraft system.
Boeing B737, B747-400, B747-8, B777, B757, B767, B717, MD90, MD10, MD11
These aircraft do not have an ***essential*** data source for this datum, which means that the flight crew needs to verify that the aircraft registration is correct.

F.3 CPDLC connection management

Remarks
If the aircraft is establishing or in the process of establishing a connection with a previously designated next data authority, and a message with a new UM 160 NEXT DATA AUTHORITY [icao facility designation] message element is received, the aircraft sends DISCONNECT REQUEST (DR1) for this connection with the next data authority.
Airbus
If the facility designation in the new UM 160 NEXT DATA AUTHORITY is the same as the facility designation that the aircraft already retains, the aircraft discards the new UM 160 NEXT DATA AUTHORITY and the connections will not be affected.
Boeing
In the above case the connection will be terminated. The only CPDLC CR1 message processed normally by FANS 1 is the first CPDLC CR1 following an AFN logon (i.e., an AFN logon initiated when no CPDLC connection exists).

F.4 Flight crew display – response and acknowledgement

Airbus A320, A330, A340, A380
In response to an uplink message that requires a closure response (DM 0 WILCO, ROGER, AFFIRM, UNABLE, NEGATIVE), the flight crew is presented with prompts corresponding to the closure responses required by DO-258A/ED-100A for the specific uplink message. EG prompts presented upon receipt of an uplink clearance are DM 0 WILCO, UNABLE, and DM 2 STANDBY.
Boeing
In response to an uplink message that requires a response element (DM 0 WILCO, ROGER, AFFIRM, UNABLE or NEGATIVE), the flight crew is presented with two prompts (Accept and Reject). If the correct response to the uplink message is affirmative (DM 0 WILCO, ROGER, or AFFIRM), then the flight crew will select the Accept prompt. If the correct response to the uplink message is negative (UNABLE or NEGATIVE), then the flight crew will select the Reject prompt. When the flight crew selects either the Accept or the Reject prompt, the FANS 1 automatically transmits the correct response (DM 0 WILCO, ROGER, AFFIRM, UNABLE, or NEGATIVE) for the corresponding message. On the FANS 1 equipped aircraft, the flight crew cannot add any other element to a positive response.

F.5 FMS processing of waypoints

Airbus A320, A330, A340, A380
The FMS cannot distinguish between ATC mandatory waypoints and waypoints inserted by the flight crew. However, the flight crew can over-write any system-determined default data contained in reports and confirm messages.

Boeing B747-400
The FMCs on the B747-400 aircraft does not distinguish between ATC mandatory waypoints and FMC sequenced waypoints for position reports. Additionally, the FANS 1 of the B747-400 aircraft does not permit the flight crew to overwrite the FMC-determined default "reported waypoint" position in downlink DM 45 - REPORTED WAYPOINT. However, the FANS 1 of the B747-400 aircraft does allow the flight crew to overwrite the FMC-determined default time (in particular, in response to uplink UM 138 -CONFIRM TIME OVER REPORTED WAYPOINT). Non-use of uplink UM 139 for B747-400 aircraft The uplink message UM 139 - Confirm reported waypoint should not be sent to B747-400 aircraft.
Boeing B737, B777, B757, B767, B717, MD90, MD10, MD11
The FMCs on these Boeing aircraft do not distinguish between ATC mandatory waypoints and FMC sequenced waypoints for position reports. However, the FANS 1 of these aircraft will allow the flight crew to overwrite the FMC-determined default "reported waypoint" position and time (Downlink element DM 45).
Boeing B787
The B787 FANS 1 can be selected to distinguish between ATC mandatory waypoints and non-mandatory waypoints for reporting the NEXT and NEXT+1 waypoints. However, the reported waypoint in a position report will always be the last sequenced waypoint, regardless of whether it is an ATC mandatory one. The FANS 1 will allow the flight crew to overwrite the FMC-determined default "reported waypoint" position and time (Downlink element DM 45).

F.6 Multiple request messages

Airbus A380
There is no network acknowledgement timer on A380 aircraft for the establishment of a connection. Once CPDLC is established, there is an ACK_DSP timer which is set as 3 min 30.
Airbus A320, A330, A340
There is no network acknowledgement timer on these Airbus aircraft for the establishment of a connection. Once CPDLC is established, there is an ACK_DSP timer which is set as follows: FANS A (CLR3) = 2 min FANS A+ (CLR4) = 3 min 30s FANS A+ DR (CLR7) = 6 min.

Boeing B747-400
If the network acknowledgement to a downlink message is not received by the B747-400 aircraft's ACARS Management Unit within a time period set in the Navigation Database or Operational Program Configuration (OPC) file, the FANS 1 closes the message and an alert is triggered to the flight crew. This alert may prompt the flight crew to re-send the message. Once back "IN COMM" the ACARS Management Unit will transmit any "queued" messages. The timer value is set to 5 minutes. If a second message is identical to the first, but with a different message identification number, and both messages have been received and responded to by the controller, the aircraft system will only recognize the message identification number of the second message. The aircraft system considers the first message to have been unsuccessful. In reply to the controller's response to the first message, the aircraft system will send an INVALID REFERENCE NUMBER ERROR. The controller's response to the second message will be processed normally. In this case, if the controller ignores the first message, the connections to both ATS systems will not be lost when an End Service message is received on board the aircraft.
Boeing B737, B747-8, B757, B767, B717, MD90, MD10, MD11
When the network acknowledgement timer expires, it just "unlocks" the request pages, so that the flight crew will be able to send another one. The time at which the network acknowledgement timer expires can be set in the Operational Program Configuration (OPC) file in the FMS. Currently, the value is set to 5 minutes.
Boeing B777, B787
This network acknowledgement timer does not apply to these aircraft.

F.7 Waypoint sequencing

Airbus A320, A330, A340, A380
Waypoint sequencing will only occur when the aircraft is within 7 NM of the aircraft active flight plan track (as modified by any parallel offset that may have been entered). Therefore ADS-C waypoint change event report and armed UM 130 REPORT PASSING message will not be transmitted automatically when the aircraft is outside these limits.
Boeing B737, B747-400, B747-8, B757, B767, B777, B787, MD90
Waypoint sequencing will only occur when the aircraft is within 21 NM of the aircraft active flight plan track (as modified by any parallel offset that may have been entered). Therefore ADS-C waypoint change event report and armed UM 130 REPORT PASSING message will not be transmitted automatically when the aircraft is outside these limits.
Boeing B717, MD10, MD11
Waypoint sequencing will only occur when the aircraft is within 7 NM of the aircraft active flight plan track (as modified by any parallel offset that may have been entered). Therefore ADS-C waypoint change event report and armed UM 130 REPORT PASSING message will not be transmitted automatically when the aircraft is outside these limits.

F.8 Open uplinks at time of transfer of communications

Boeing
If there are OPEN uplinks in the ATC LOG when the Current Data Authority initiates transfer of communication to the Next Data Authority, the FMC will allow transfer to the Next Data Authority (i.e. The avionics will not disconnect the next data authority). This allows a smooth transfer to the next Flight Information Region if there are open uplinks at the time of transfer.
Airbus A330, A340 FANS A
If there are OPEN uplinks when the Current Data Authority initiates transfer of communication to the Next Data Authority, the avionics will disconnect all CPDLC connection.
Airbus A320, A330, A340, A380 FANS A+
If there are OPEN uplinks when the Current Data Authority initiates transfer of communication to the Next Data Authority, the avionics will allow transfer to the Next Data Authority (i.e. the avionics will not disconnect the next data authority). This allows a smooth transfer to the next Flight Information Region if there are open uplinks at the time of transfer.

F.9 Variable constraints

Airbus A320, A330, A340 FANS A & FANS A+
These Airbus aircraft do not support a <space> within a [unit name] parameter.
Airbus A330, A340 FANS A+ DR, A380
These Airbus aircraft support a <space> within a [unit name] parameter.
Boeing
Boeing aircraft support a <space> within a [unit name] parameter.

F.10 ADS-C emergency report interval default

Airbus
If a periodic contract is active, the emergency reports will be transmitted at the existing periodic interval. Otherwise, the interval will default to 64 seconds.
Boeing
If a periodic contract is active, the emergency reports will be transmitted at the existing periodic interval. Otherwise, the interval will default to 304 seconds.

F.11 Message latency timer

Airbus
For Airbus aircraft entering a FIR, this function automatically sets the [delayed message parameter] to the default NONE value (i.e. there is no check of a delayed CPDLC message until the flight crew manually sets a new value). a) It is possible the flight crew may set a value for the [delayed message parameter], even if not instructed to do so. In this case, the aircraft system will reject uplink messages delayed by more than the value of the [delayed message parameter]. b) The flight crew will not see such messages. If such a message is rejected, the ATSU will receive the following downlink message: INVALID DATA UPLINK DELAYED IN NETWORK AND REJECTED RESEND OR CONTACT BY VOICE. This message will refer to the delayed CPDLC uplink message. c) If an ATSU is not using the message latency timer function and receives the above downlink, the following free text message may be sent: SET MAX UPLINK DELAY VALUE TO 999 SEC. This will minimize the possibility of subsequent uplink messages being rejected.
Boeing (all except B747-400)
For most Boeing aircraft entering a FIR, this function is automatically set to OFF with the following exceptions: a) Boeing aircraft whose CPDLC connection has been transferred will maintain the value of the [delayed message parameter], which was enabled during the previous CPDLC connection; b) Boeing 777 aircraft will maintain the value of the [delayed message parameter], which was enabled during any previous CPDLC connection, until the aircraft has landed at which time the value will be set to an operator-specified value in the aircraft's data base; and c) It is possible the flight crew may set a value for the [delayed message parameter], even if not instructed to do so.

F.12 Terminating ADS-C connections

Airbus
For Airbus aircraft: a) FANS A+ – the flight crew has the capability to turn off the ADS-C application, which will terminate all ADS-C connections, or terminate a specific ADS-C connection. b) FANS A – the flight crew has the capability to turn off the ADS-C application, which will terminate all ADS-C connections.
Boeing B787
The flight crew has the capability to turn off the ADS-C application, which will terminate all ADS-C connections, or terminate a specific ADS-C connection.

Boeing B737, B747-400, B747-8, B777, B757, B767, B717, MD90, MD10, MD11
For these Boeing aircraft, the flight crew has the capability to turn off the ADS-C application, which will terminate all ADS-C connections.

F.13 SATCOM channel format

Airbus
The Frequencysatchannel parameter is defined as being a NumericString type having the values {space, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9}.
Boeing
The Frequencysatchannel parameter is defined as being a NumericString type having the values {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}.

F.14 Transfer of ATSU

Airbus FANS-A
Whenever an FN_CAD is sent by an ATSU A which does not use CPDLC towards a new ATSU B which uses CPDLC, FANS A Airbus a/c will reject any attempt from ATSU B to make a CPDLC connection (and will trigger a DR1), until the flight crew performs a manual Logon with ATSU B.
Airbus FANS-A+
This limitation does not apply to Airbus FANS A+ aircraft.
Boeing
This limitation does not apply to Boeing aircraft.

F.15 Number of ADS-C connections

Airbus
Five ADS-C connections are available for ATS use.
Boeing B747-400
One of the ADS-C connections is reserved for operator use, and will only connect with the address specified in the aircraft's database. The other 4 connections may be used by ATSUs.
Boeing B737, B747-8, B777, B757, B767, B787, B717, MD90, MD10, MD11
Five connections are available for ATS use.

F.16 Lateral deviation events on offsets

Airbus
On all Airbus aircraft with FMS standards prior to Release 1A: When an offset is entered (or modified), the path from which lateral deviation is computed is immediately offset by the requisite distance. If a lateral deviation event contract is in place, and the deviation limit is less than the change in the offset, then an LDE report will be sent as soon as the offset is entered and executed. On all Airbus aircraft with FMS Release 1A: When an offset is entered or modified, the FMS computes a path to fly to reach the new offset. Lateral deviation is the distance the aircraft is from this path, so entry of an offset does not affect the aircraft's lateral deviation, and no LDE report will be issued as a result of an offset entry.
Boeing B747-400, B747-8, B777, B757, B767, B717, MD90, MD10, MD11
When an offset is entered (or modified), the path from which lateral deviation is computed is immediately offset by the requisite distance. If a lateral deviation event contract is in place, and the deviation limit is less than the change in the offset, then an LDE report will be sent as soon as the offset is entered and executed.
Boeing B737, B787
When an offset is entered or modified, the FMS computes a path to fly to reach the new offset. Lateral deviation is the distance the aircraft is from this path, so entry of an offset does not affect the aircraft's lateral deviation, and no LDE report will be issued as a result of an offset entry

F.17 Assigned block altitude

Airbus
Airbus aircraft can only respond to UM 135 CONFIRM ASSIGNED ALTITUDE with DM 38 ASSIGNED ALTITUDE [altitude], and not DM 77 ASSIGNED BLOCK [altitude] TO [altitude]. Assigned block levels will have to be reported with a free text message.
Boeing B777 AIMS-1
B777 aircraft with the AIMS-1 avionics (and those with AIMS-2 prior to Blockpoint v14) can only respond to UM 135 CONFIRM ASSIGNED ALTITUDE with DM 38 ASSIGNED ALTITUDE [altitude], and not DM 77 ASSIGNED BLOCK [altitude] TO [altitude]. Assigned block altitudes will have to be reported with a free text message.
Boeing B777 AIMS-2 and all other Boeing aircraft
Other Boeing aircraft (including B777 aircraft with AIMS-2 and Blockpoint v14 or later) can respond to UM 135 CONFIRM ASSIGNED ALTITUDE with either DM 38 ASSIGNED ALTITUDE [altitude], or DM 77 ASSIGNED BLOCK [altitude] TO [altitude].

APPENDIX E

PROPOSAL FOR AMENDMENT TO THE PROCEDURES FOR AIR NAVIGATION SERVICES – AIR TRAFFIC MANAGEMENT

(paragraph 4.1.35 refers)

*Editorial Note***:** Amendments are arranged to show deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

Chapter 8 ATS SURVEILLANCE SERVICES

8.6 GENERAL PROCEDURES

8.6.3 Transfer of identification

8.6.3.1 Transfer of identification from one controller to another should only be attempted when it is considered that the aircraft is within the accepting controller's surveillance coverage.

8.6.3.2 Transfer of identification shall be effected by one of the following methods:

a) designation of the position indication by automated means, provided that only one position indication is thereby indicated and there is no possible doubt of correct identification;

b) notification of the aircraft's discrete SSR code~~ or aircraft address~~;

Note~~ 1~~.— The use of a discrete SSR code requires a system of code assignment which ensures that each aircraft in a given portion of airspace is assigned a discrete code (see 8.5.2.2.7).

~~*Note 2.— Aircraft address would be expressed in the form of the alphanumerical code of six hexadecimal characters.*~~

c) notification via automated data exchange of the aircraft address transmitted by the aircraft systems;

Note.— Aircraft address would be expressed in the form of the alphanumerical code of six hexadecimal characters.

~~c~~d) notification that the ~~aircraft is SSR Mode S equipped with an~~ aircraft identification ~~feature~~ transmitted by a Mode S equipped aircraft has been verified, when SSR Mode S coverage is available;

~~d~~e) notification that the ~~aircraft is ADS-B equipped with an~~ aircraft identification ~~feature~~ transmitted by an ADS-B equipped aircraft has been verified, when compatible ADS-B coverage is available;

~~e~~f) direct designation (pointing with the finger) of the position indication, if the two situation displays are adjacent, or if a common "conference" type of situation display is used;

Note.— Attention must be given to any errors which might occur due to parallax effects.

~~f~~g) designation of the position indication by reference to, or in terms of bearing and distance from, a geographical position or navigational facility accurately indicated on both situation displays, together with the track of the observed position indication if the route of the aircraft is not known to both controllers;

Note.— Caution must be exercised before transferring identification using this method, particularly if other position indications are observed on similar headings and in close proximity to the aircraft under *control. Inherent radar deficiencies, such as inaccuracies in bearing and distance of the radar position indications displayed on individual situation displays and parallax errors, may cause the indicated position of an aircraft in relation to the known point to differ between the two situation displays. The appropriate ATS authority may, therefore, prescribe additional conditions for the application of this method, e.g.:*

i) a maximum distance from the common reference point used by the two controllers; and

ii) a maximum distance between the position indication as observed by the accepting controller and the one stated by the transferring controller.

~~g~~h) where applicable, issuance of an instruction to the aircraft by the transferring controller to change SSR code and the observation of the change by the accepting controller; or

~~h~~i) issuance of an instruction to the aircraft by the transferring controller to squawk/transmit IDENT and observation of this response by the accepting controller.

Note.— Use of procedures ~~g~~h) and ~~h~~i) requires prior coordination between the controllers, since the indications to be observed by the accepting controller are of short duration.

APPENDIX F

(paragraph 4.1.37 refers – Emergency Descent Procedures)

Draft Proposal for Amendment to EUR SUPPs

9.1.2.3 When deemed necessary, air traffic control will broadcast an emergency message, or cause such message to be broadcast, to other aircraft concerned to warn them of the emergency descent. The broadcast emergency message shall contain specific instructions of actions to be taken by the aircraft addressed in the broadcast or, alternatively, instructions to continue in accordance with the current clearance and stand by on the appropriate channels for further clearances and instructions.

Draft Proposal for Amendment to the PANS-ATM

15.1.4.2 ~~It is expected that~~ Controlled aircraft receiving such a broadcast ~~will clear the specified areas~~ are expected to continue the flight in accordance with the current clearance or instruction, except when otherwise instructed in the broadcast message, and stand by on the appropriate radio frequency for further clearances from the air traffic control unit. It is expected that uncontrolled aircraft receiving such broadcast will clear the specified areas and stand by on the appropriate radio frequency for further information.

SUPPORTING MATERIAL

Global ICAO provisions with regards to pilot and ATS recommended actions in the case of emergency descent specify that, in the event of an emergency broadcast message from ATS (PANS-ATM paragraph 15.1.4.1 and paragraph 12.3.2.5, b) refer), it is expected that aircraft concerned will clear the specified areas and stand by on appropriate radio channels for further clearances from ATS (PANS-ATM paragraph 15.1.4.2 refers).

At the European level, reviews of potential operational scenarios unfolding from strict application of the global provision in the event of an emergency descent have identified a number of areas that would require further clarification. They are linked to:

a) the need to remove any uncertainty with regards to the actions aircraft are required to take in their attempt to “clear the specified areas” (as per PANS ATM paragraph 15.1.4.2: “It is expected that aircraft receiving such a broadcast will clear the specified areas and stand by on the appropriate radio frequency for further clearances from the air traffic control unit”); and;

b) the need to consider potential ACAS TAs/RAs, triggered by the descending aircraft, in the proper operational context.

According to PANS ATM paragraph 15.1.4, air traffic control shall take all possible action to safeguard the aircraft concerned when an emergency descent through other traffic is conducted. When so required, air traffic control shall immediately broadcast an emergency message with the format and content described below:

> "ATTENTION ALL AIRCRAFT IN THE VICINITY OF [or AT](significant point or location) EMERGENCY DESCENT IN PROGRESS FROM (level) (followed as necessary by specific instructions, clearances, traffic information, etc.)"

In the European environment it is considered desirable to make this emergency broadcast in order to ensure full awareness of the situation. The pilot community have expressed the need for awareness of such emergency descents executed in their proximity, particularly in light of potential ACAS TAs or RAs that might be generated. Therefore, the likelihood of broadcasting a message pertaining to an emergency descent should be carefully considered.

This scenario, where aircraft receiving an emergency broadcast would leave the specified areas, has created concerns amongst several ATS authorities and ANSPs in the EUR Region to the extent that some of them have published procedures in their national AIPs indicating clearly that an aircraft receiving an emergency broadcast shall not leave the specified area, but continue according to their latest clearance unless threatened by an immediate danger, and to stand by on the appropriate channels for specific clearances and instructions.

In addition, such concerns are also shared by the pilot community inasmuch as PANS ATM paragraph 15.1.4.2 does not provide any additional direction as to how aircraft are to achieve the aim to "leave the specified areas". To this extent an IFALPA Policy Statement was adopted in 2001. A considerable part of the IFALPA Policy Statement pertaining to recommended actions to be taken by an aircraft performing an emergency descent was introduced in the EUR-SUPPs. A particularly relevant item was that the descending aircraft would initiate a turn to build a positive "G" during the descent. Given the fact that the aircraft in emergency descent would turn away from the assigned route or track, the need for the provisions in PANS ATM, 15.1.4.2 was again questioned.

It was considered that such concerns would best be addressed by providing clarity in what is expected from aircraft receiving an emergency broadcast, and that the content of the broadcast message provides sufficient elements to avoid ambiguity on the pilot side. This can be achieved by:

a) An amendment to ICAO Doc 7030, paragraph 9.1.2.3, to specify what shall be contained in a broadcast emergency message. In order to supplement the requirements of the PANS ATM with regards to what is expected from aircraft receiving an emergency broadcast, it is proposed that, for the ICAO EUR Region the emergency broadcast will contain clear instructions for pilots to follow, or in case the air traffic control intends to address individually the aircraft at a later stage, the emergency broadcast will reinforce the current clearances and explicitly ask the pilots to stand-by for further instructions.

b) An amendment to the PANS ATM paragraph 15.1.4.2 (hence of global application) by which controlled aircraft receiving a broadcast message are expected to continue in accordance with their current clearance/instruction unless otherwise instructed in the broadcast message. Moreover, all controlled aircraft addressed by an emergency broadcast are expected to stand by on the appropriate voice communication channels for appropriate instructions. It should be noted that, as regards the uncontrolled aircraft, these are expected to clear the specified area.

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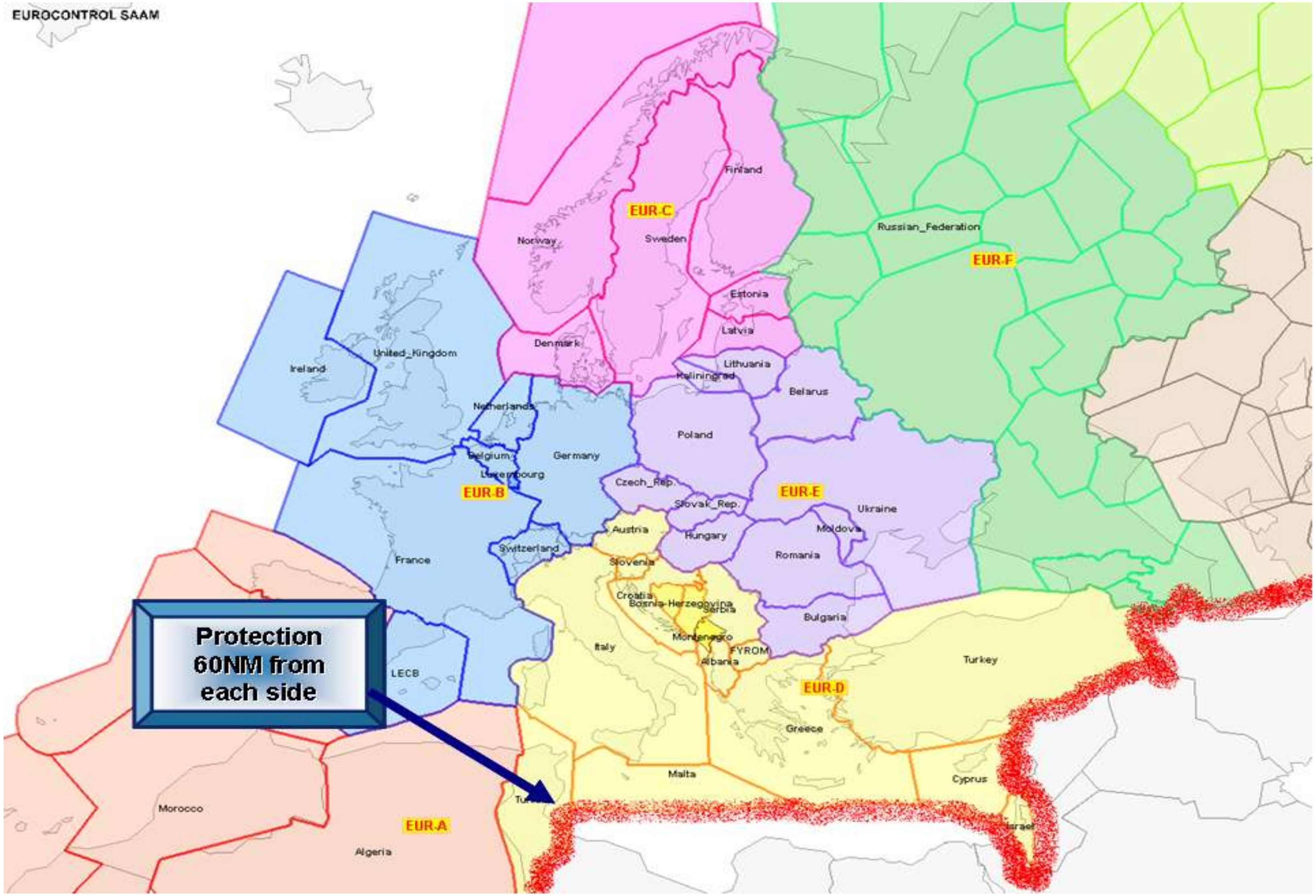
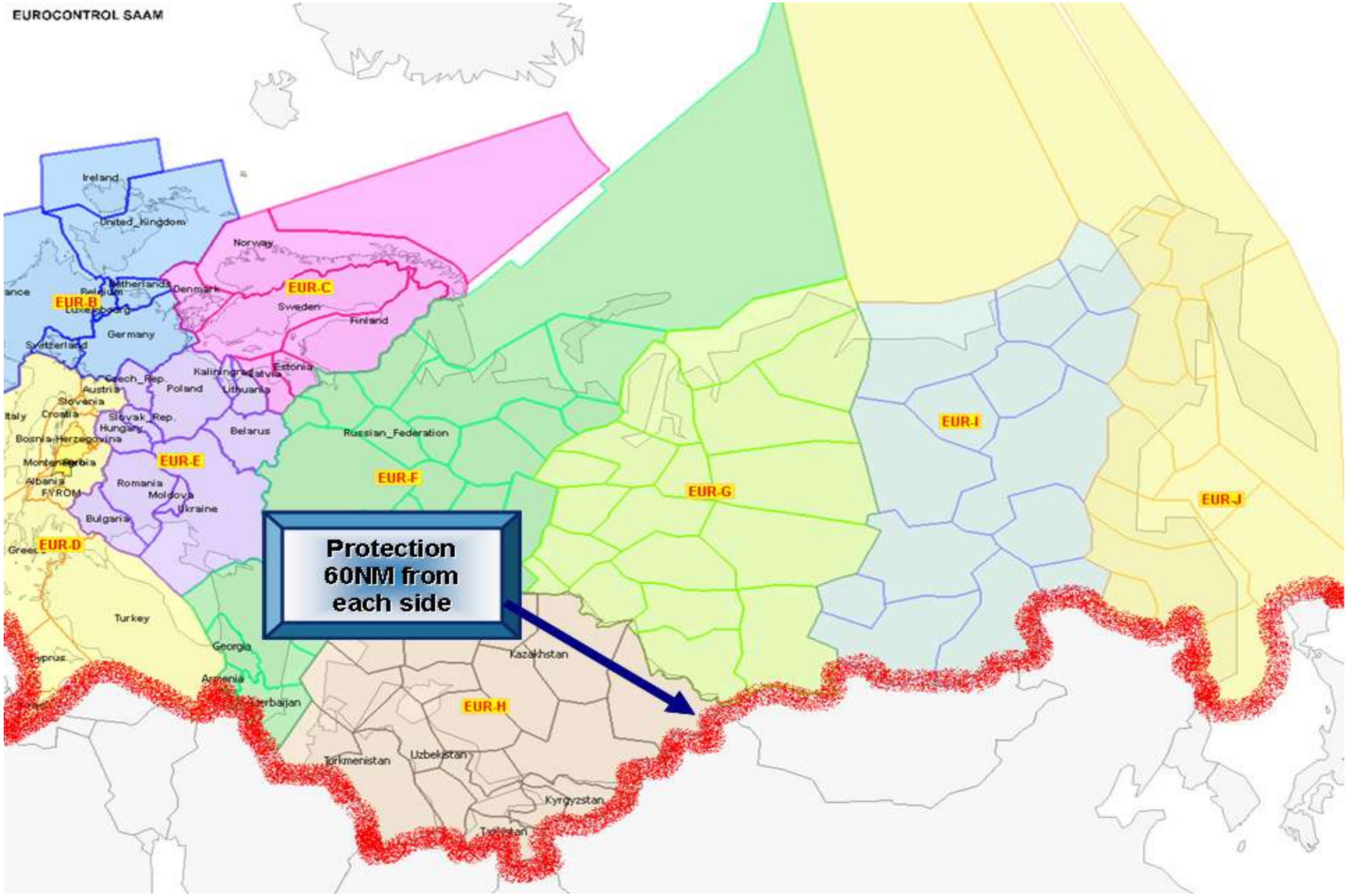
APPENDIX G - Agenda 4b – SSR CODE ALLOCATION AT THE INTERFACE BETWEEN TWO REGIONS

(paragraph 4.2.6 refers)

Interface Areas Between the ICAO EUR and other ICAO Regions




EUROCONTROL SAAM
EUR-B
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EUR-F
EUR-G
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EUR-I
EUR-J
Protection
60NM from
each side
Ireland
United_Kingdom
Norway
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Belarus
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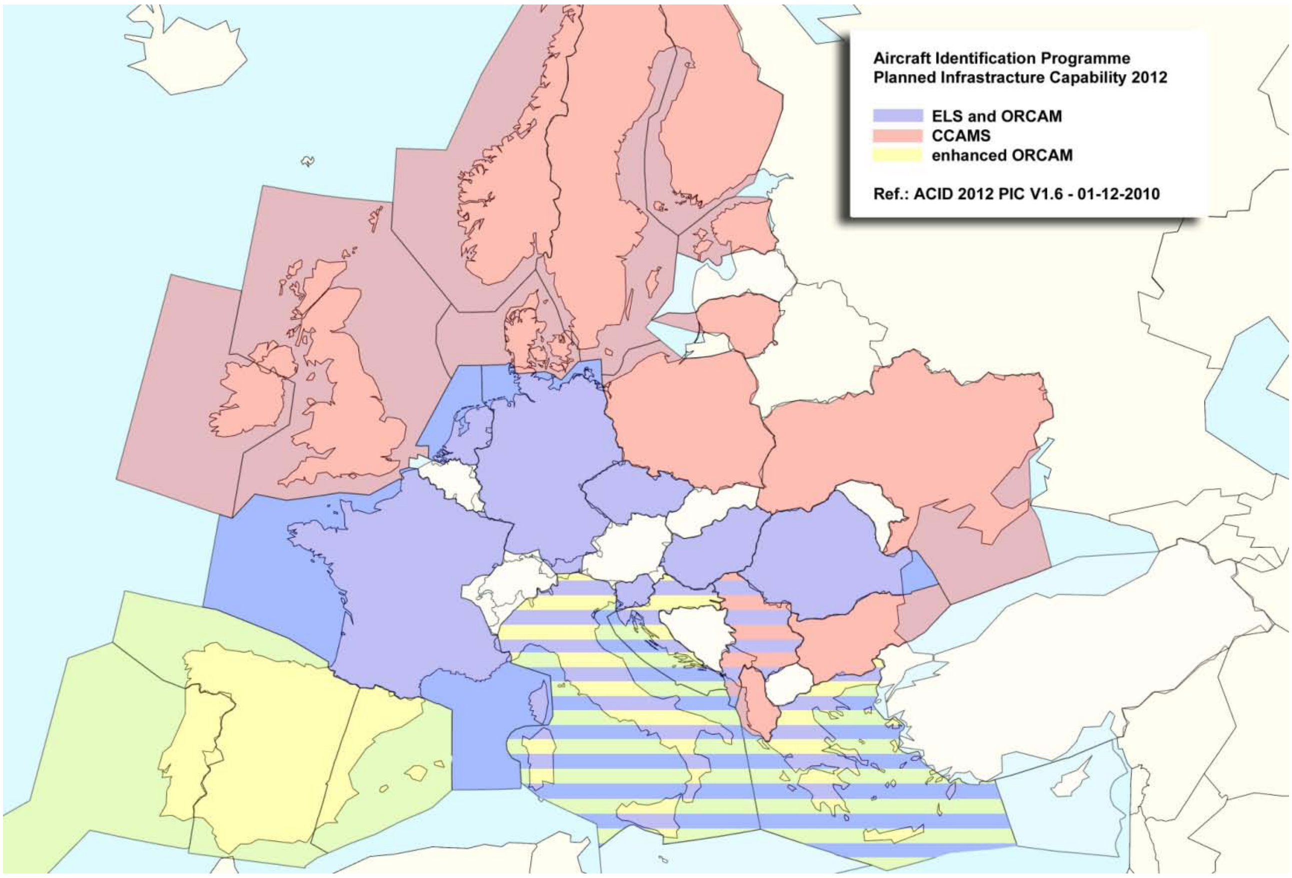
Moldova
Ukraine
Bulgaria
Turkey
Georgia
Armenia
Russian_Federation
Kazakhstan
Turkmenistan
Uzbekistan
Kyrgyzstan

APPENDIX H – Readiness Assessment

(paragraph 4.2.16 refers – Aircraft identification)

Information is not available for areas shown in white



APPENDIX I (paragraph 4.2.20 refers)

Companion Document to ICAO EUR DOC 017

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Identified Transition Key Issues for the introduction and application of non-visual aids to all-weather operations in the European Region of ICAO

– ~~Second~~ Third Edition –

~~2009~~2010

PREPARED BY THE EUROPEAN AND NORTH ATLANTIC OFFICE OF ICAO

~~JULY~~ SEPT ~~2009~~2010

The designations and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of ICAO concerning the legal status of any country, territory, city or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

1.1.1 TABLE OF CONTENTS

VERSION MANAGEMENT

Edition	***Comments***	***Date***
1.0	proposed for AWOG approval by correspondence	April 2005
1.1	Update based on AWOG PT Road comments received by correspondence	July 2009
2.0	AWOG#15 approval	Sept 2009
3.0	Proposed to AWOG#16	Sept 2010

ACRONYMS

AAIM	Aircraft Autonomous Integrity Monitoring
ACP	Aeronautical Communications Panel (ICAO)
ACP/WG-F	Working Group F of ACP
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
AIS/MAP	Aeronautical Information Services/Aeronautical Maps and Charts
AMCP	Former Aeronautical Mobile Communications Panel (ICAO)
AM(R)S	Aeronautical Mobile (Route) System
ANC	Air Navigation Commission (ICAO)
AOP	Aerodrome Operations
AOPG	Former Aerodrome Operations Group of the EANPG
APP	Approach
APV	Approach with vertical guidance
ARNS	Aeronautical Radio Navigation Service
A-SMGCS	Advanced SMGCS
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATS	Air Traffic Services
AWO	All-Weather Operations
AWOG	All-Weather Operations Group of the EANPG
AWOP	Former ICAO All-Weather Operations Panel
BDS	Baseline Development Standards
B-RNAV	Basic Area Navigation
BRA	Building Restricted Areas
CAT	Category (of precision approach)
CDMA	Code division multiple access
CNS/ATM	Communications, Navigation, Surveillance / Air Traffic Management
CN&TSG	Conventional Navaids and Testing Sub Group of ICAO NSP
CS AWO	EASA Certification Specifications for All Weather Operations
COG	EANPG Programme Coordinating Group
COM	Communications
CRM	Collision Risk Model
CVS	Combined Vision System
DFS	Deutsche Flugsicherung, (German Air Navigation Services)
DME	Distance Measuring Equipment
DME/P	Precision Distance Measuring Equipment
DO	Document (in RTCA references)
EAD	European Aeronautical Database
EASA	European Aeronautical Safety Agency
EANPG	European Air Navigation Planning Group
EC DGVII	Former European Commission Directorate General VII
ECAC	European Civil Aviation Conference
ED	EUROCAE Document
EGNOS	European Geostationary Navigation Overlay Service
ESA	European Space Agency
ESDP	EGNOS Signal and Data Provider
ESSP	European Satellite Services Provider
EU OPS	European Operational Specifications
EUR	ICAO European Region
EUROCAE	European Organisation for Civil Aviation Equipment
EUR RAN	European Regional Air Navigation
EVS	Enhanced Vision System
FAA	Federal Aviation Administration of the United States

FM	Frequency Modulation
FMG	Frequency Management Group of the EANPG
GAST	GBAS Approach Service Type
GAST-D	GAST level D supports GBAS CAT III operations based on GPS L1 only
GBAS	Ground Based Augmentation System
GJU	Galileo Joint Undertaking
GLONASS	Global Orbiting Navigation Satellite System
GNSS	Global Navigation Satellite System
GNSSP	Former ICAO Global Navigation Satellite System Panel
GPS	US Global Positioning System
GSA	Galileo Supervisory Authority
HUD	Head-Up Display
IAR	Institutional Arrangements
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
IMTEG	Instrument Landing System/Microwave Landing System Transition Group
IOP	Initial Operational Phase
ITU	International Telecommunications Union
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements
JAR OPS	Joint Aviation Requirements – Operations
LTEP	ICAO Legal and Technical Experts Panel
LVP	Low Visibility Procedures
MASPS	Minimum Avionics System Performance Specification
MLS	Microwave Landing System
MMR	Multi-Mode Receiver
MOPS	Minimum Operational Performance Specification Standards
MRD	Mission Requirements Document
MTBO	Mean Time Between Outages
NATS	National Air Traffic Services (UK)
NOTAM	Notice To Airmen: A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations
NPA	Non-Precision Approach
NSP	Navigation Systems Panel (ICAO)
NSP/SSG	NSP Spectrum Subgroup
OCP	ICAO Obstacle Clearance Panel
OCR	Operational and Certification Requirements (EUROCONTROL Task Force)
OFZ	Obstacle Free Zone
OPS	Operations
ORR	Operational Readiness Review
PANS-ATM	Procedures for Air Navigation Services, Air Traffic Management
PANS-OPS	Procedures for Air Navigation Services, Design of Instrument Procedures and their Operations
PAR	Precision Approach Radar
PT/BRA	AWOG Project Team on the Building Restriction Areas
PT/LVP	AWOG Project Team on the Low Visibility Procedures
PT/Road	AWOG Project Team on the Road Map
R&D	Research and Development
RAIM	Receiver Autonomous Integrity Monitoring
RCM	Operational Requirements, Criteria and Method of application
RNAV	Area Navigation
RNP	Required Navigation Performance
ROT	Runway Occupancy Time
RTCA	Radio Technical Commission for Aeronautical Telecommunication Committee
SARPs	Standards and Recommended Practices
SBAS	Satellite Based Augmentation System

SESAR	Single European Sky ATM Research Programme
SIS	Signal-in-Space
SMGCS	Surface Movement Guidance and Control Systems
SOIRSG	ICAO Study Group on Simultaneous Operations on parallel and Near Parallel Instrument Runways
SUPPs	Supplementary Procedures
SVS	Synthetic Vision System
TBD	To be determined
TKI	Transition Key Issue
TMA	Terminal Control Area
TRNSG	ICAO Study Group for Testing of Radio Navigation Aids
TSO	Technical Standard Order (FAA)
US	United States of America
VAP	ICAO Visual Aids Panel
VHF	Very High Frequency
VOR	VHF Omni-directional Radio Range
WG	Working Group
WGS-84	World Geodetic System 1984
WRC	ITU World Radio Conference
XLS	Any Landing system (e.g; ILS, MLS, GLS…)

2. INTRODUCTION

1.1 Background

1.1.1 The Transition Key Issues (TKIs) were developed during the initiation of the AWOG. IMTEG, the predecessor of the AWOG had identified in an early stage which issues - technical, institutional and operational - needed to be solved before a successful transition from ILS to new navigation aids for approach and landing could be made. This information was forwarded to the EANPG during the preparation of the EUR RAN Meeting of 1994. The EANPG endorsed this information and forwarded this to the AWOG.

1.1.2 Based on the ICAO Global Strategy adopted by the 11th Air Navigation Conference in September 2003, the purpose of the Transition Methodology described in ICAO Doc 017 is to enable a smooth introduction and application of non-visual aids to AWO in the EUR Region. The identification of critical obstacles to this process is essential to achieve this objective. Therefore, the AWOG developed an extensive list of TKIs for the transition phase. The list is detailed in Section 2. This information is essential for provider States and users when planning AWO based on current or new technologies. From this list of TKIs, the obstacles for planning are identified as the critical planning issues.

1.1.3 The information provided hereafter is not static but dynamic. The status of the TKIs changes when new information becomes available or technology evolves. Therefore, the list of TKIs and its corresponding tasks will be reviewed by AWOG on a regular basis.

1.2 Scope

1.2.1 In order to provide a complete overview of the activities necessary to guarantee the availability of AWO to the highest level of service (including safety aspects) in Europe, the possible obstacles on the introduction of new or the maintainability of existing non-visual aids have been identified. Therefore, TKIs have been defined in Section 2 for the following subjects with the accompanying objectives according to the global strategy:

a) **ILS,** the planning aims to maintain ILS to the highest level of service as long as economically beneficial and operationally acceptable;

b) **MLS,** the planning aims to enable introduction for precision approach operations where operationally required and economically beneficial;

c) **GNSS,** the planning aims to enable introduction for non-precision and precision approach operations where operationally required and economically beneficial;

d) **Auxiliary,** to identify TKIs on operational issues and the potential use of alternative navigation aids.

1.3 Format of the Transition Key Issues (TKIs)

1.3.1 For each TKI, background and rationale are provided in order to explain the relation to other developments. A clear and unambiguous statement of the objective of each TKI is provided. Also an action programme has been developed, assigning different tasks which must be completed in order to solve the overall TKI, which means removing the obstacle. The definition of the different tasks includes the identification of the responsible bodies and appropriate target dates for completion. These target dates are estimates based on publicly available information. Some of the responsible bodies have confirmed the tasks assigned to them including the associated target date. The results of completed tasks will be referred to.

1.3.2 Therefore, each TKI is structured in the following format:

title;

background and rationale (describing the current and expected situation, its magnitude and impact);

objective;

milestones and tasks (with an associated action programme);

comments; and

reference documents.

1.4 Identification of the relation between the different tasks

1.4.1 It is essential for planning a transition for non-visual aids supporting AWO at an aerodrome to identify the issues to be resolved before a certain navigation system may be approved for a specific type of operation, e.g. the use of GNSS for CAT I operations. Therefore, each TKI is clearly defined. Different tasks to be performed are identified and these tasks are related in order to identify possible dependencies. The identification of different relations between the tasks is important. Several tasks can be performed sequentially (see Figure 1-4), e.g. Tasks B & C, however certain tasks may be performed in parallel, e.g. Tasks A & B to meet the objective. When tasks are sequential, this means that e.g. Task C cannot be performed without the result of Task B; for parallel tasks in the example the final objective is met when both Task A and Task C have been taken into account.

1.4.2 Possible delays in the execution of a task may impact the estimated time of meeting a specific objective. Therefore it is important that the target dates are confirmed by the responsible bodies to enable the development of a detailed planning of the tasks showing the expected timelines and the end date for meeting the objectives.

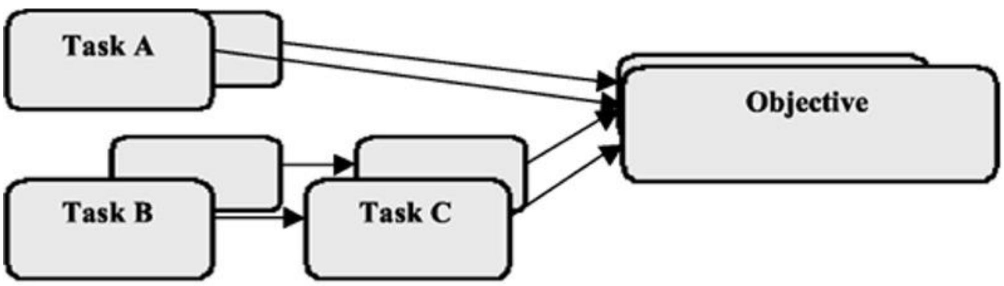


Figure 1-4: Example of relations.

1.5 Maintenance of the Transition Key Issues (TKIs) Companion Document

1.5.1 The TKIs are a living part of the Transition Methodology for AWO in the EUR Region (ICAO Doc 017). Due to their dynamic nature, the TKIs will be continuously reviewed in co-ordination with the appropriate working groups and bodies. In this context, some TKIs may be deleted when superseded, while new ones may be added when appropriate. As a consequence this document needs to be updated on a regular basis by the AWOG.

3. 2. TRANSITION KEY ISSUES – MLS

2.1 Ground equipment

2.1.1 *MLS frequency protection*

Background and Rationale: The MLS frequency band 5030 – 5150 MHz is currently allocated to the Aeronautical Radio Navigation Service (ARNS) and thus protected for use by aviation. However at the WRC 2007 an allocation to the AM(R)S in the band 5 091-5 150 MHz (MLS extension band), limited to airport surface operations was agreed. This is a shared allocation with the aeronautical radio navigation service (MLS), fixed satellite service (FSS), aeronautical mobile telemetry (AMT) and an Aeronautical Security (AS) application intended for the provision of radiocommunication used in response to unlawful interruption of aircraft operations. The ARNS (MLS) and the new AM(R)S allocation have the same status and a precedence over other uses...

Objective: To ensure that sufficient frequencies will be maintained for MLS applications.

Milestones and Tasks:	Responsibility	Target Dates:
a) review/confirm plans for the implementation of MLS;	States	as necessary
b) ensure protection and allocation of MLS bands to ARNS [1]	States	before 2011
c) re-plan the MLS/DME channel requirements, including ILS/MLS/DME triple pairing requirements	FMG / ACP/WG-F	completed [2]

Comments: Simulations to assess MLS/DME and ILS/MLS/DME channel requirements, including triple pairing constraints, were performed by FMG in the past, but were based on old information contained in the COM-3 tables.
For the WRC 2011 there is an attempt to allocate communications for UAS in the band 5 GHz. Therefore protection of MLS deployment needs to be supported.

Reference documents:

[1] ICAO Position for WRC2007

[2] FMG meeting Autumn 2007

2.1.2 *Potential sources of interference likely to affect the MLS*

Background and Rationale: Although the MLS signal quality is less threatened by multipath and other interference mechanisms (e.g.: radio interference, signal reflections, military radiation) than ILS, the quality of the signal cannot be guaranteed in all conditions. Especially during advanced procedures, the signal of both MLS and Distance Measuring Equipment (DME) may suffer from multipath interference. Guidance material should be developed for the proper identification of threats to the signal quality.

Objective: Operational Requirements, Criteria and Method of application (RCM) available to detect and predict interference threats to MLS and DME signals and apply this information.

Milestones and Tasks:	Responsibility	Target Dates:
a) identify the potential of interference mechanisms for straight-in MLS operations.	PT/BRA	completed [1]
b) develop harmonised provisions for BRA to protect for MLS straight-in operations	PT/BRA	completed [1]
c) identify the potential of interference mechanisms for advanced MLS operations	PT/BRA	As Necessary

Comments: ICAO has adopted propagation models. Although there is no plan to develop MLS curved approaches there is still some provision in ANNEX 10 Attachment G 14.3 on MLS curved path procedures.

Reference documents:

[1] ICAO EUR DOC015 – European Guidance Material on Managing the Building Restricted Areas

2.1.3 *Certification of MLS Ground Stations*

Background and Rationale: Before a new landing aid is approved for operations, the navigation-ground stations need to be certified by the appropriate authorities. This process must be carried out for both CAT I and for CAT II/III operations.

Objective: Certification of MLS Ground stations for the full range of AWO.

Milestones and Tasks:	Responsibility	Target Dates:
a) MOPS for MLS ground stations	EUROCAE	completed [1], [2]
b) certification of MLS ground stations for CAT I	States	completed
c) certification of MLS ground stations for CAT II/III	States	completed [3];[4] -

Comments: Certification of the ground stations is a normal part of the implementation process. The certification is a site specific issue that still needs to be carried out each time. “completed” means here that at least one aerodrome in Europe has accomplished this task.. Certification of MLS ground stations for CAT III was achieved at London Heathrow in March 2009.

For States where the EU SES interoperability regulation applies, Eurocontrol has developed guidelines [5] to guide Air Navigation Service Providers and manufacturers in ~~on~~ the demonstration of their compliance with the SES interoperability regulation.

Reference documents:

[1] EUROCAE ED-53A- MOPS for MLS Ground Stations

[2] ICAO Annex 10, Volume 1 - Radio-navigation Aids, MLS MTBO requirements

[3] ICAO EUR Doc 012: European Guidance Material on Continuity of Service Evaluation In Support of the Certification of ILS & MLS Ground Systems

[4] ICAO EUR Doc 016: European Guidance Material on Integrity Demonstration In Support of the Certification of ILS & MLS Systems

[5] EUROCONTROL–GUID-137: EUROCONTROL Guidelines on conformity assessment for the interoperability Regulation of the Single European Sky

2.2 Airborne equipment

2.2.1 *Airborne certification process for MLS operations*

Background and Rationale: The demand for CAT III operations is growing in Europe. However, the continuation of ILS based CAT III operations can not be guaranteed at some locations. Furthermore, at some aerodromes, GNSS based CAT III operations are not foreseen to be available in the appropriate time frame, which leaves MLS as the only option for the safe continuation of CAT III operations. Due to the necessity of interoperability between Regions and States, the Global Strategy identified the ultimate need for a multi-modal airborne landing capability. Therefore the availability of the MMR needs to be ensured.

If required, activities to support the implementation of advanced operations could be undertaken after the certification for straight-in operations is completed.

Objective: To develop both MLS CAT III receivers and the appropriate certification criteria for MLS operations as well as to ensure the availability of the MMR with MLS-capability.

Milestones and Tasks:	Responsibility	Target Dates:
a) MOPS for the MLS receiver	EUROCAE	completed [1,4,5]
b) development of certification requirements for the MLS installations (incl. MMR)	JAA	completed [2]
c) certification for MLS/ MMR equipment	avionics manufacturers, States	Completed [1,4,5,6]
d) develop operational certification requirements for MLS operations	JAA	completed [3]
e) operational approval of the aircraft for CAT I/II/III MLS autoland operations	aircraft manufacturers, operators, States	completed
f) develop certification requirements for MLS installations to support advanced approach operations, when required;	EASA / States	as necessary
g) certification of the MLS installation (incl. MMR) to support advanced operations, when required.	aircraft manufacturers, operators, States	as necessary
h) operational approval of the aircraft for CAT I/II/III advanced operations, when required	aircraft manufacturers, operators, States	as necessary

Comments: Certification MLS/MMR airborne equipment achieved October 2007 for straight in approaches. Operational approval for CAT III MLS autoland operations achieved March 2009. There is currently no plan to develop MLS curved approaches but there remains provisions in ANNX10 for such operations.

Reference documents:

[1] EUROCAE ED-36B MOPS for MLS stand-alone airborne receiving equipment

[2] CS AWO - Certification Specifications for All Weather Operations –subpart 1 and AMC to subpart 1

[3] EU OPS (Council **Regulation** (EEC) No. 3922/91 Annex III)

[4] EUROCAE ED-74 MOPS for Combined ILS and MLS Airborne Receiving Equipment

[5] EUROCAE ED-88 MOPS for MMR including ILS, MLS and GPS used for supplemental means of navigation

[6] EASA list of ETSO authorisations 2nd June 2009

2.3 ATS Procedures

2.3.1 *Definition of ATS procedures for MLS straight-in operations*

Background and Rationale: New technology prevents the use of new ATS procedures due to the changed criteria for the operations. Enhanced capacity and new ATS techniques must be based on ICAO SARPs and PANS. Potential new criteria for longitudinal spacing with MLS and adequate separation need to be developed. Objective: To provide users, providers and regulators a set of ATS procedures for the conduct of MLS operations.

Objective: To provide users, providers and regulators a set of ATS procedures for the conduct of MLS operations.

Milestones and Tasks:	Responsibility	Target Dates:
a) define MLS sensitive and critical areas for straight-in operations;	AWOP	completed [2]
b) elaborate EUR SUPPs (Doc. 7030) for development of MLS-based ATS procedures for straight-in ILS look-alike operations	States	TBD
c) develop ATS procedures for MLS CAT I straight-in operations	States	as necessary [1]
d) develop ATS procedures for MLS CAT II/III straight-in operations	States	as necessary [3]

Comments: The basis for the short term MLS operations are ILS look-alike procedures. It is assumed that just a few airports will install MLS. These airports shall play a leading part in the development of operational procedures. Initiatives with respect to this issue are already foreseen. The results shall be forwarded to the AWOG for further initiatives with respect to the development of SARPs. MLS CAT I and MLS CAT II/III operations are being undertaken at London Heathrow and this experience has been used in the development of the guidance material for MLS procedures [3].

Reference documents:

[1] ICAO PANS-ATM Doc. 4444

[2] ICAO Annex 10, Volume 1 - Radio-navigation Aids

[3] ICAO EUR Doc 013 - European Guidance Material on Aerodrome Operations under Limited Visibility Conditions

2.3.2 *Evaluation of the extent to which traffic flow / longitudinal spacing / runway capacity can be improved by MLS*

Background and Rationale: The introduction of MLS could have an impact on the longitudinal spacing standards between aircraft in the approach phase of flight as, amongst others, the MLS signal will not be interfered by aircraft which are leaving the runway. To obtain the full benefit of MLS, for instance the Obstacle Free Zone (OFZ), graded area and landing clearance delivery point must be assessed. This could have a positive impact on the maximum runway capacity and the total traffic flow

Objective: Evaluation of the impact of the introduction of MLS on the longitudinal spacing, the runway capacity and the traffic flow in general, whilst maintaining an acceptable level of safety..

Milestones and Tasks:	Responsibility	Target Dates:
a) determination of the effect of the introduction of MLS on the minimum longitudinal spacing	PT/LVP	completed [1]
b) identify the need for early inclusion of Regional Provisions in Doc 7030	States	as necessary
c) inclusion of ICAO provisions for implementing improved capacity in Procedures for Air Navigation Services, Air Traffic Management (PANS- ATM) Doc 4444	ICAO ANC	TBD
d) reassessment of OFZ due to current fleet capability	EUROCONTROL	completed [2]
e) safety assessment of optimised low visibility operations	EUROCONTROL	~~2009~~ 2010 [2]

Comments: The maximum capacity gain when replacing ILS with MLS requires new procedures such as the trigger line concept described in ICAO EUR Doc 013. It has to be proven however that while maximising the capacity in low visibility conditions the level of safety remains acceptable notably compared to current operations

The initial concept introduced in Doc 013 has recently been revisited in light of the findings of specific collision risk study. This study has demonstrated that there exists a safe landing clearance distance that lies within the OFZ for aircraft vacating the runway. Based on this new element the initial concept has been simplified and the safety assessment redrafted. The EUROCONTROL Safety Regulation Committee will issue a position paper by Oct 2010 on the safety assessment of the revised concept.

Reference documents:

[1] Assessment of the impact of MLS implementation on CAT II/III runway's capacity in low visibility conditions, European Commission Directorate General VII (EC DGVII), Transport Research/Air Transport, ISBN-92-827-5837-0, Luxembourg, 1996.

[2] Preliminary Safety Case for Optimised operations under Low Visibility conditions - Draft

4. 3. TRANSITION KEY ISSUES – GNSS

3.1 General issues

3.1.1 *Institutional arrangements for provision of GNSS*

Background and Rationale: The introduction of satellite based technologies provoked a new way of thinking about division of the responsibilities between users, providers and regulators. The responsibilities need to be addressed and agreement must be reached with all parties concerned, before operations, based on the use of satellite technology can be implemented.

Objective: To reach agreement on responsibilities of States and other parties concerned. To guarantee the safe and expeditious flow of traffic based on satellite technology to ensure the long term provision of GNSS services.

Milestones and Tasks:	Responsibility	Target Dates:
a) development of a GNSS Legal Framework to elaborate States' and operators responsibilities	ICAO Legal Committee	ongoing
b) reach agreement over institutional arrangements for the full range of GNSS operations	States	as necessary
c) develop an EGNOS operation approval mechanism	EC/States	~~on going~~completed

Comments: Some attempts have been made by EUROCONTROL in the Institutional Arrangement (IAR) Task Force and the ICAO Legal and Technical Experts Panel (LTEP).

The successor of the IAR Task Force, since January 1998, is the GNSS Legal Task Force which is chaired by the Head of Legal Service, EUROCONTROL. Its mandate is to co-ordinate the European contribution to ICAO on the global GNSS legal framework and to develop proposals for a European legal framework on GNSS. With regard to ICAO the Task Force is currently participating as a member of the ICAO Study Group on legal issues. With regard to Galileo/EGNOS, the Task Force has prepared several submissions to the EC on the proposed legal and institutional framework and attended the EC Task Force meeting to put forward aviation's position.

At the ICAO General Assembly (28 Sept – 8 Oct'04) an important breakthrough has been achieved regarding the legal aspects of GNSS. Through a co-ordinated effort by European States and EUROCONTROL, the need for a GNSS Legal Framework has now been formally recognised and maintained with the highest priority on the legal programme of the ICAO Legal Committee. The Assembly directed the Secretary General to monitor and where appropriate, assist in the development of contractual frameworks on the basis, inter alia, of the structure and model proposed by EUROCONTROL and the ECAC States. This contractual framework is considered an initial step towards an International convention on GNSS. The European proposal for a CNS/ATM Contractual Framework has been drawn up to set out conditions for implementation and operation. The regulatory aspects will cover legal liability aspects of the use of GNSS, including GPS and Galileo, which is an important pre-requisite for the evolution towards a more GNSS based Air Navigation System and safety related matters.

~~The GNSS Legal Task Force is assessing how to apply the contractual framework to EGNOS in view of the service provision phase in the short term.~~ Agreements between the ESSP and each ANSPs that intend to use SBAS signal operationally is on going.

Reference documents:

[1] ICAO Doc 9750 - Global Air Navigation Plan for CNS/ATM Systems (includes LTEP Recommendations)

[2] EUROCONTROL IAR Reports

[3] ICAO General Assembly (28 Sept – 8 Oct 2004) Resolution A35-3

3.1.2 *Implementation of Galileo*

Background and Rationale: Currently the European Union, in co-operation with ESA, is developing a European satellite navigation system (Galileo) independent from GPS. Galileo will improve availability and continuity of service of current satellite based navigation system by providing a European civil satellite system inter-operable with the US GPS and the Russian GLONASS. Apart from the improved performance this may also solve some specific institutional issues related with using GPS for operations in Europe. There are still many issues to be solved such as the Galileo definition (service definition, the standardisation and architecture definition), for which the Galileo Mission Requirements Document (MRD) is the basis. An important issue is the integration of EGNOS in Galileo.

Objective: Development of Galileo to improve overall GNSS performance and robustness.

Milestones and Tasks:	Responsibility	Target Dates:
a)Galileo definition [MRD]	EU/ESA	completed [1]
b)Galileo frequency allocation	EU / ITU	completed [2]
c)Galileo development and in-orbit validation	EU / ESA	2011~~0~~
d)Galileo ~~full~~ Initial Operational Capabilities (18 satellites) deployment	EU / ESA	~~2013~~2014
e)Galileo operational Full Operational Capability (30 satellites)	EU / ESA	~~2013~~TBD
f)Galileo operational validation	States, Eurocontrol	~~2015~~2018 (based on IOC)

Comments: The additional constellation provides the necessary availability for GNSS precision approaches. At the ITU World Radio Conference in 2000 (WRC-2000) radio frequencies have been allocated to Galileo.

The Galileo Mission Requirements Document (MRD) contains the functional and performance requirements of the Galileo satellite navigation system.

During 2009 ESA and EC are negotiating with industry the Galileo FOC procurement in parallel with a Galileo mission consolidation. ~~It is expected that by early 2010, more consolidated information on the Galileo performances and dates will be available.~~

Reference documents:

[1] Galileo Mission Requirements Document [MRD], EU/ESA version 6, 2005

[2] ITU World Radio Conference Report (WRC-2000)

3.1.3 *Data Quality*

Background and Rationale: Operations based on GNSS will rely on a database of waypoints identifying the flight path to be followed. All necessary position fixes to support GNSS operations must be available in the WGS-84 standard reference frame. Relevant ICAO SARPs require States to publish charts with inter-alia the locations of navigation aids and ground facilities based on WGS-84 co-ordinates. In the ECAC area, EUROCONTROL coordinates the implementation of WGS-84.

Additionally data integrity requirements remain a key issue.

Objective: States to publish waypoint information in the WGS-84 co-ordinate system.

Milestones and Tasks:	Responsibility	Target Dates:
a) implementation of horizontal component of WGS84	States	completed [1], [3]
b) implementation of vertical component of WGS84	States, EUROCONTROL	TBD [1], [2], [3]
c) verification of complete and proper implementation of WGS-84	EUROCONTROL/ States	ongoing
d) Data Quality EC mandate	EC	~~2013~~Completed [4]
e)Identify Terrain and Obstacle data requirements for annex 15 amendment	ICAO	~~2012~~2015
f)FAS data block support tool to implementation	States/ EUROCONTROL	As Necessary

Comments: The implementation of the WGS-84 is formally completed since 1 January 1998. However from the implementation and some database checks it appears to be necessary to verify the complete and proper implementation of the WGS-84. Moreover some specific issues remain with respect to the definition of future parking positions and taxiway in relation to SMGCS.

A survey of all ECAC AIP's by EUROCONTROL, shows that not all States comply to WGS-84 yet.

Annex 10 provides the FAS data block description; for APV approaches Annex 4 provides FAS data block charting requirements. There remains the need to harmonise the APV FAS data block production process and maintenance.

Data Quality regulation [4] will be in force by 2013

Reference documents:

[1] National AIP's.

[2] ICAO Annex 15 and Annex 4

[3] ICAO WGS-84 Manual Doc 9674

[4] COMMISSION REGULATION (EU) No 73/2010.

3.1.4 *Develop SARPs for GNSS based approach systems*

Background and Rationale: To ensure international interoperability and standardisation of GNSS based approach systems SARPs must be developed.

Objective: To produce SARPs for GNSS

Milestones and Tasks:	Responsibility	Target Dates:
a) develop SARPs for GPS L1	GNSSP	completed [1]
b) develop SARPs for GLONASS	GNSSP	completed [1]
c) develop SARPs for SBAS L1	GNSSP	completed [1]
d) develop SARPs for GBAS for CAT. I	GNSSP	completed [1]
e) develop SARPs for GBAS for CAT. II/III based on L1	NSP	See comments below 2010
f) applicability date of GNSS SARPs for all operations down to CAT I	ICAO ANC	completed [1]
g) Galileo standardisation (SARPS) – Open service	NSP	2010/Q4 2011[1]
h) Galileo standardisation (SARPS) – Safety of life service	NSP	2015
ih) standardization of GPS L5 signal (SARPS)	NSP	2010/11[2] [2]
ji) standardization of GLONASS L3 signalevolution (CDMA)	NSP	TBD2013
kj) standardization of SBAS L5 signal	NSP	TBD
lk) standardization of combined used of GNSS signals	NSP	TBD
me) develop SARPs for GBAS for CAT. II/III based on multi GNSS	NSP	2018
n) Advanced ABAS techniques based on multi constellations dual frequencies configurations	NSP	2013

Comments: After GNSSP/3 the standards for GNSS CAT I service have formally been validated and recommended for inclusion in ICAO Annex 10, Volume 1 - Radio-navigation Aids. Amendment 85 and 86 of the SARPS will contain few changes required following notably GBAS CAT I initial implementation feedback.

GBAS CAT II/III L1 SARPs validation relies on two validation phases: first a technical validation phase, which has now been completed, and second an operational validation phase. During the operational validation the agreed GAST D SARPs material will be frozen and treated as if it was actual SARPs material, but designated a Baseline Development Standards (BDS). The operational validation may require two years, or perhaps longer,

[1]This tentative date will be consolidated during NSP work plan update. These dates corresponds to SARPS preparation process. Official publication in Annex 10 will depend on constellation deployment schedule and related SARPS validation activities.
[2] As note 1

depending on issues uncovered during the validation. It will be deemed completed if at least one operational approval, comprising all components, has been granted. At the completion of the operational validation, the material will be reviewed and any change deemed necessary in light of the results of the operational validation will be made, then a SARPs amendment package will be prepared and its approval for implementation in Annex 10 recommended.

The key areas that will be scrutinised during the operational validation phase are: siting and autoland coverage, availability and function of the integrity monitors, notably the anomalous ionospheric errors mitigations.

To ensure operational evaluation a Letter to Selectedinterested States has been issued with some appropriate explanations from the ICAO Secretariat on the state of development and intended use of this BDS material [3]. Official language translations will also be available from ICAO.

NSP decided to develop GBAS SARPs for CAT II/III operations initially based on GPS/L1 only. Work is currently progressed in ICAO NSP CAT III Sub Group (CSG° , key issues in current discussion are the integrity concept and Time To alert as well as continuity.Additionally Aa conceptual framework document (technical concept) has been developed to help support the understanding of the new concept proposed that diverts from ILS look alike[4][3].

For the long term perspective a multi GNSS GBAS CAT II/III SARPS is envisioned.

The implementation of Galileo (TKI 3.1.9) or another stable core constellation is a determining factor to the availability of GBAS multi GNSS CAT II/III operations.

Reference documents:

[1] ICAO Annex 10, Volume 1 - Radio-navigation Aids

[2] RTCA DO 261 NAVSTAR GPS L5 Signal Specification

[3] GAST-D SARPS BDS document – Attachment G to the Report of the NSP meeting, Montreal, May 2010

[4] GAST-D Concept paper, NSP WP11 of the meeting of November 2009, Montreal, Note: This document explains the GAST-D principles, but has not been updated to the latest version of the GAST-D BDS. can we reference it as it has currently no official status??

3.1.5 *GPS GNSS to support NPA and APV*

Background and Rationale: Non-Precision Approach (NPA) requirements may be supported by ABAS [3] based on GPS, possibly including additional elements such as GLONASS or other aircraft sensors. If States wish to develop approvals for the introduction of NPA, the proposed navigation system elements must be identified.

According to ICAO decision (ICAO Assembly Resolution A36-23) APV approaches will progressively replace NPAs as APV provides a vertical profile to all runways improving safety and efficiency. Two types of APV approaches exist: APV Baro (to LNAV /VNAV minima) and APV SBAS (toi.e.: LPV minima).

The European implementation of SBAS is covered in the EGNOS programme. States need all relevant information on EGNOS based APV operations before they can decide upon the best option (compared to Baro-based APV operations) for a transition from NPA operations at aerodromes in the EUR Region. ~~An operational validation of EGNOS will need to take place after technical delivery of the SBAS system by the manufacturer.~~

Objective: Approval for GPS based NPA and APV approaches.

Milestones and Tasks:	Responsibility	Target Dates:
a) identify architectures to support GPS NPA operations	AWOG	completed
b) implement architecture to support GPS NPA operations	States / operators	completed [1]; [2]
c) safety case for GPS based NPA operations	States	continuous
d) GPS approved for non-precision operations	States	continuous
e) APV approaches based on GPS and barometric altitude	States	Continuous [2]
f) Generic safety argument in support of APV operations based on GPS and barometric altitude	EUROCONTROL	Oct 2010
g) identify GNSS architectures to support APV operations	States	completed [1]
h) EGNOS available (Signal in Space) *	EC	Sept~~Aug~~ 2010
i) EGNOS Operational Validation *	EC	completed
j) EGNOS observation period	ESSP/States	Aug to Nov 2010
k) generic safety argument in support of APV operations based on EGNOS	EUROCONTROL	2010
l) EGNOS approved to support APV operations *	EC	Nov 2010

(*): as part of the ESSP certification by the French NSA and with the support of the other European NSAs

Comments: JAA established the baseline requirements for the application of GPS for NPA operations [1]. In the near future EASA AMC 20-27 will be the basis for RNP APCH (i.e. GPS NPA) approval. It is up to the States to apply sufficient safety management in their decision of the application of GPS to support NPA operations.

Around 50 APV Baro VNAV procedures will be published by end 2010 in Europe.

EUROCONTROL started in 2005 the validation of the EGNOS signal and data against the requirements for aviation applications. Since April 1st 2009 the EGNOS System Service Provider (ESSP) established by the European Commission has been~~is~~ gradually ~~handing~~taking over operations and maintenance of EGNOS. The setting up of the ESSP and its certification according to the Single European Sky legislation, including EGNOS validation activities and related work by EUROCONTROL on EGNOS aviation applications such as EGNOS-based APV are expected to enable aviation use of EGNOS for safety critical applications by Nov 2010.

EGNOS will support enroute to NPA operations starting from Sept~~August~~ 2010.

Reference documents:

[1] AMC 20-5 AIRWORTHINESS APPROVAL AND OPERATIONAL CRITERIA FOR THE USE OF THE NAVSTAR GLOBAL POSITIONING SYSTEM (GPS)

[2] AMC 20-27 AIRWORTHINESS APPROVAL AND OPERATIONAL CRITERIA FOR RNP Approach (RNP APCH) operations including APV Baro VNAV operations

[3] ICAO Annex 10, Volume 1 - Radio-navigation Aids

[4] PBN-Manual Doc-9613

3.1.6*SBAS operations*

Background and Rationale: The European implementation of SBAS is covered in the EGNOS programme. States need all relevant information on EGNOS based APV operations before they can decide upon the best option (compared to Baro-based APV operations) for a transition from NPA operations at aerodromes in the EUR Region. An operational validation of EGNOS will need to take place after technical delivery of the SBAS system by the manufacturer.

Objective: To implement EGNOS for APV operations in the EUR Region and to approve its use.

Milestones and Tasks:	**Responsibility**	**Target Dates:**
identify GNSS architectures to support APV operations	States	completed [1]
b) EGNOS available (Signal in Space) *	EC	2010
GNOS Operational Validation *	EC	Q2/2010
generic safety argument in support of APV operations based on EGNOS	EUROCONTROL	2009
EGNOS approved to support APV operations *	EC	Q2/2010

(*): as part of the ESSP certification by the French NSA and with the support of the other European NSAs

Comments: Eurocontrol started in 2005 the validation of the EGNOS signal and data against the requirements for aviation applications. Since April 1st 2009 the EGNOS System Service Provider (ESSP) established by the European Commission is gradually handing over operations and maintenance of EGNOS. The setting up of the ESSP and its certification according to the Single European Sky legislation, including EGNOS validation activities and related work by Eurocontrol on EGNOS aviation applications such as EGNOS-based APV are expected to enable aviation use of EGNOS for safety critical applications by mid 2010.from

Reference documents:

[1] ICAO Annex 10, Volume 1 - Radio-navigation Aids

[25] Civil aviation requirements for EGNOS, OCR/DP/157, Eurocontrol Operational and Certification Requirements task force, October 15, 1999 (issue 3.0).

[6] ICAO State Letter – 23 July 2010 – Guidance material for the issuance of required navigation performance approach operational approval

[7] EASA AMC 20-28 is planned to be published in 2010. Draft AMC 20-28 is available under NPA 2009-04 since 23rd March 2009.

~~3.1.7~~3.1.6 *GBAS to support CAT I operations*

Background and Rationale: States need all relevant information on GBAS CAT I operations before they can decide upon the possible successor of ILS for AWO in the EUR Region.

The introduction of GBAS to support CAT I requires additional effort in terms of siting criteria and frequency planning. If States wish to develop approvals for the introduction of CAT I services, the proposed navigation system elements must be identified.

Objective: To decide upon the technical and operational options for the introduction of GBAS CAT I operations in the EUR Region and to approve its use.

Milestones and Tasks:	**Responsibility**	**Target Dates:**
a) identify GBAS architectures to support CAT I operations	GNSSP	completed [1]
b) assess the availability of frequencies for GBAS uplink facilities	GNSSP	completed [2]
c) develop siting criteria for locating GBAS ground stations for CAT I operations	ICAO	completed [3], [4] [5]
d) generic safety argument for GBAS based CAT I operations	EUROCONTROL	~~2009~~completed [8]
e) generic safety argument for GBAS based CAT I operations on parallel runways for independent operation	EUROCONTROL	ongoing
f) GBAS CAT I ground station certification	States	2010 [1],[3]; [7]
g) GBAS approved to support CAT I operations;	States	as necessary
h) GBAS approved to support CAT I operations on parallel runways	States	as necessary
i) GBAS eligible to support lower than CAT I operations	EASA	~~2009~~ 2011 [6]
j) ~~Update~~ Proposal for update of Doc 013 to include lower than Standard CAT I GBAS operations	ICAO AWOG	~~2010??~~TBD

Comments: Current ICAO EUR Doc 015 provides GBAS protection criteria for building application; Doc 015 does not currently address new GBAS installation but only provides the protections to be applied when building close to a GBAS Ground station. These criteria ~~were established on early GBAS installations and thus~~ are necessarily very conservative, as they are only designed to define the areas where a more detailed study needs to be elaborated and cannot be used to derive~~. This leads to significant~~ GBAS siting constraints. ~~and thus can prevent GBAS installation at a number of Airports..~~ Nevertheless ICAO EUR Doc 015 is the only ICAO document that provides GBAS protection criteria; as such it is currently used by regulators. Therefore there is a need to assess the GBAS protection criteria when installing a new ground station based on GBAS Standards and taking account of the ~~new~~actual antenna characteristics for the system installed. EUROCAE WG28 in ED-

114 and ICAO NSP in the GNSS Manual should be tasked to assessdescribe the required protection criteria.

Anomalous Iionospheric errorsic issue and their role in thepotentially integrity concept are still open issues that need further investigation due to the rarity of these phenomena. An Ad Hoc working group has been created in ICAO CSG to focus on this issue.

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Reference documents:

[1 ICAO Annex 10, Volume 1 - Radio-navigation Aids

[2] ICAO GNSSP WG-B, WP12 June 2000; and GNSSP WG-D, WP50 Sept 1997

[3] ED-114 - MOPS for a GBAS ground facility to support CAT I approach and landing

[4] ICAO EUR Doc 015 – European Guidance Material on Managing the Building Restricted Areas

[5] FAA LAA Ground Facility Siting criteria

[6] EASA IR OPS

[7] ICAO Doc 8071: Manual on testing of radio navigation aids

[8] EUROCONTROL Preliminary Safety Case for GBAS CAT I Final Approaches – version 1.1 Sept 2009.

3.1.83.1.7 *GBAS to support CAT II/III operations*

Background and Rationale: States need all relevant information on GBAS CAT II/III operations before they can decide upon the possible successor of ILS CAT II/III operations in the ICAO EUR Region. The CAT II/III requirements may be supported by a number of possible architectures including a combination of GNSS elements. The addition of the GPS L5a second frequency would greatly benefit the robustness of GNSS CAT II/III operations. If States wish to develop approvals for the introduction of CAT II/III services, the proposed navigation system elements must be identified.

Objective: To decide upon the technical and operational options for the introduction of GBAS CAT II/III operations in the EUR Region and to approve its use.

Milestones and Tasks:	**Responsibility**	**Target Dates:**
a) identify architectures and requirements to support GBAS CAT II/III operations	NSP	2010BDS completed
b) develop siting criteria for locating differential ground stations for CAT II/III operations	NSP/SSG	TBDOngoing
c) consider the necessity and develop harmonised building restriction areas for GBAS CAT II/III operations	AWOG/EUROCAE	201TBD0
d) full availability of GPS L5 signal	US	2018
de)safety case for GBAS L1 CAT II/III operations	EUROCONTROL States	2015

e~~f~~) Implement architecture for GBAS L1 CAT II/III operations	States	2015
f~~g~~) GBAS L1 approved as navigation aid for CAT II/III operations	States	2015
g~~h~~) Update GBAS CAT II/III safety case to include multi GNSS capability	EUROCONTROL States	2015
h~~i~~) Implement GBAS ground subsystem to support CAT II/III operations based on multi GNSS	States	2020
i~~j~~) GBAS multi GNSS approved as navigation aid for CAT II/III operations	States	2020
j~~k~~)Investigate GBAS L1 in support to other than standard CAT II operations	EASA	As necessary

Comments: New operations named Other than Standard CAT II have been introduced recently in EU OPS and have been proposed for inclusion in EASA IR OPS, but are not recognised so far by ICAO. These operations offer more flexibility for the operators especially at airports where full CAT I or CAT II lighting would not be available. However these new operations identify a number of ATM requirements that would need to be captured and documented in guidance material such as ICAO EUR Doc 013

The GBAS CAT II/III ~~SARPs~~ GAST-D Baseline Development Standard as frozen contains a number of areas that still need further validation during the operational validation. These include: aerodrome coverage operational and technical requirements, siting criteria and anomalous ionospheric errors.

Task j~~)~~ includes maintenance, testing, operational concept and procedures.

~~3.1.9~~3.1.8 *GNSS interference protection*

Background and Rationale: The potential interference mechanisms, both radio interference and atmospheric distortions for GNSS, need to be identified and assessed to maintain the safety in AWO. Multipath vulnerabilities are considered to be mitigated through the design of the GNSS augmentation service, in particular the GBAS ground facility. In respect to the use of GNSS as a future means of navigation for all phases of flight (including AWO) it is essential that the GNSS frequency band be adequately protected against interference.

Objective: To define aviation requirements for the protection of the GNSS frequencies and to get international acceptance of these maximum allowable interference levels.

Milestones and Tasks:	**Responsibility**	**Target Dates:**
a) identify potential radio frequency interference mechanisms for GNSS	GNSSP	Completed [1], [2], [3], [4]
b) develop protection levels against interference of the GNSS frequency band	GNSSP	completed [5], [6]
c) international acceptance of the developed protection levels against radio frequency interference	States/ITU	completed [7], [8]

d) define compatibility of DME – GNSS signals	States/ICAO/ ITU	completed [5]
e) assess interference to GNSS from ionospheric distortions	ICAO NSP	Completed [9]
f) complete interference criteria for GBAS allocation in the navigation band	FMG	On going

Comments: At the WRC 2000 international acceptance on the adequate protection of GNSS satellite signals have been reached through co-ordination with regional frequency management bodies, ICAO and States. One item left from the meeting that needs to be considered is the mutual interference between GNSS and DME in the DME band (GPS L5 and Galileo E5 signals). The compatibility requirements between DME and GNSS signals have been defined and were accepted at WRC 2003.

While not located in the GNSS frequency bands, the GBAS VHF Data Broadcast (VDB) forms an integral part of GBAS augmentation. ~~Currently, no~~With the increasing number of GBAS installations, allocations ~~are foreseen~~ in the lower part of the navigation band, e.g., 108 to 112 MHz have to be envisaged. ~~However, should VDB allocations be extended to this band~~This requires completion of the interference criteria, currently planned to be completed until 2012. ~~criteria to protect ILS from FM Broadcast interference (primarily intermodulation) may need to be revalidated for the GBAS VDB.~~

EC is currently investigating the development of~~supporting~~ regulations for pseudolites in the GNSS bands ~~development~~ which could significantly increase risk of interference notably on the GBAS operation~~signal notably~~. Concern has been expressed to EC. Monitoring of the future activities in this area~~course of action is~~ by states is required.

Reference documents:

[1] ICAO Doc 9849 – GNSS Manual

[2] RTCA DO235B – Assessment of Radio Frequency Interference Relevant to the GNSS L1 Frequency Band

[3] RTCA DO292 – Assessment of Radio Frequency Interference Relevant to the GNSS L5 / E5A Frequency Band

[4] Protection of GNSS operating in the band 1559 to 1610 MHz against unwanted emissions from Mobile Earth Stations operating in the band 1610 to 1626.5 MHz, ITU Attachment 9 to the Report of the First Meeting of the 8D-SRG (see Addendum 2 to Circular Letter 8/LCCE/40), ICAO, April 2 1997.

[5] ICAO Annex 10 Vol 1, Radio Navigation Aids

[6] ICAO GNSSP Report, 23rd April 1999, Montreal.

[7] EANPG conclusions 40/4, 40/56.

[8] ICAO Doc 9718 - Handbook of Radio frequency spectrum requirements for civil aviation, including statement of approved ICAO policies.

[9] ICAO Navigation Systems Panel: Ionospheric Effects on GNSS Aviation Operations, December 2006

[10] EUR Doc 011: Frequency Management Manual

~~3.1.10~~3.1.9 *Data collection activities to support operational approvals*

Background and Rationale: To support the introduction and certification of GNSS based operations, data on performance of satellite navigation needs to be collected to support operational approval of satellite navigation.

Objective: GNSS data collection to support GNSS system operational approvals (from En route to CAT III).

Milestones and Tasks:	Responsibility	Target Dates:
a) data collection on GNSS capability of onboard integrity monitoring (SAPPHIRE)	EUROCONTROL	Completed [1], [2], [3]
b) data collection on GNSS capability to support precision approach operations	EUROCONTROL States	ongoing
c) GBAS CAT I and EGNOS Validation tool development and qualification (PEGASUS)	EUROCONTROL States	completed [4]
d) GBAS CAT II/III Validation Tool development and qualification (PEGASUS)	EUROCONTROL States	2011~~0~~
e) EGNOS Data collection to support EGNOS approval	ESSP/EC/EUROCONTROL	~~2010~~completed
f) ~~EGNOS Data collection to support EGNOS approval (PEGASUS)~~Iono measurement campaign	EUROCONTROL	~~2010 completed~~Q4/2012
g) EGNOS Data Collection to support LPV 200	EUROCONTROL	Q4/2012
h) GPS L5 and Galileo first measurements	EUROCONTROL	Q4/2012

Reference documents:

[1] SAPPHIRE - First Results; EEC Report 330, 1998 (http://www.eurocontrol.int/eec/publications/eecreports/1998/330.htm)

[2] Investigation of Multipath Effects in the Vicinity of an Aircraft dependent on different Flight Profiles; EEC Report 357, 2000 (http://www.eurocontrol.int/eec/publications/eecreports/2000/357.htm)

[3] RAIM Study and SAPPHIRE RAIM Algorithms Validation; EEC Note 16, 2001 (http://www.eurocontrol.int/eec/publications/eecnotes/2001/16.htm)

[4] PEGASUS version 4.5.0.1

3.2 Airborne equipment

3.2.1 *Standardisation and certification of airborne equipment for GNSS-based NPA operations*

Background and Rationale: Standards for airborne GNSS equipment are an essential element to enable certification and interoperability. Due to the necessity of interoperability between Regions and States, the ICAO Global Strategy identified the ultimate need for a Multi Mode Airborne Capability with GNSS elements. The availability of this equipment and stand alone equipment and their certification onboard aircraft needs to be ensured to support GNSS based NPA operations.

Objective: Development of MOPS and Minimum Avionics System Performance Specification (MASPS) for GNSS Avionics Equipment using the MMR or stand alone equipment with GNSS NPA capability.

Milestones and Tasks:	Responsibility	Target Dates:
a) MOPS for GPS receiver for NPA	EUROCAE	completed [1]
b) MOPS for GPS element of MMR for NPA	EUROCAE	completed [1], [2]
c) MOPS for SBAS for NPA	RTCA / EUROCAE	completed [4] , [5]
d) certification of GPS receivers for NPA	JAA/ States	completed [3]
e) certification of EGNOS receivers for NPA	EASA/ States	completed [5]
f) certification of aircraft for GPS based NPA	EASA/ States	Completed
g) MOPS for Multi constellations Multi frequencies receiver	RTCA/EUROCAE	2018

Comments: It is assumed that the outcome of some tasks will possibly have an influence on other tasks (i.e. MOPS for CAT I versus CAT II/III). This means that all individual tasks are possibly related.

However to maintain a total overview of tasks, NPA, APV, CAT I and CAT II/III are split in individual tasks. For the application of GNSS based NPA operations critical question is whether or not a satellite or aircraft based augmentation system needs to be available to fulfil all the operational requirements.

Similar tasks will have to be repeated for receivers using GALILEO signals..

Task g) depends ~~however depends~~ on the operational validation of GPS L5 and Galileo E1/E5.

Reference documents:

[1] EUROCAE ED-72A MOPS for airborne GPS receiving equipment used for supplemental means of navigation.

[2] EUROCAE ED88 MOPS for MMR including ILS, MLS and GPS used for Supplemental Means of Navigation

[3] ETSO C129a

[4] RTCA DO-229D, MOPS for Global Positioning System/Wide Area Augmentation System Airborne Equipment

[5] ETSO C145/146

3.2.2 *Standardisation and certification of airborne equipment for APV Baro operations*

Background and Rationale: The implementation of APV Baro is now a solution to comply with ICAO 36th assembly resolution on PBN implementation. Therefore standardisation of airborne receiver requirements and subsequent certification should be undertaken.

Objective: Ensure certification of airborne equipments to support APV Baro operations

Milestones and Tasks:	Responsibility	Target Dates:
b) certification of airborne equipment for APV Baro	EASA	2009 [1]
g) certification of aircraft for APV Baro operations	EASA/ States	~~2010~~ on going[1]

Reference documents:

[1] EASA AMC 20-27 AIRWORTHINESS APPROVAL AND OPERATIONAL CRITERIA FOR RNP Approach (RNP APCH) operations including APV Baro VNAV operations

3.2.3 *Standardisation and certification of airborne equipment for APV SBAS operations*

Background and Rationale: The implementation of SBAS is ongoing. Therefore standardisation of airborne receiver requirements and subsequent certification should be undertaken. Moreover at the GNSSP/3 the APV has been introduced. For this reason, the MOPS have to be adapted to accommodate this change.

Objective: Ensure certification of SBAS operations and adapt industry standards to incorporate the APV operations.

Milestones and Tasks:	Responsibility	Target Dates:
a) adapt MOPS for SBAS to include APV and CAT I capability	RTCA	Completed [1] ,
b) certification of EGNOS receivers for APV	EASA	2010 [2]

Reference documents:

[1] RTCA DO-229D, MOPS for Global Positioning System/Wide Area Augmentation System Airborne Equipment

[2] *EASA AMC 20-28 is planned to be published in 2010. Draft AMC 20-28 is available under NPA 2009-04 since 23rd March 2009.*

3.2.4 *Standardisation and certification of integrated/combined airborne receivers for GBAS CAT I operations*

Background and Rationale: Standards for airborne GNSS equipment are an essential element to enable certification and interoperability. Due to the necessity of interoperability between Regions and States, the ICAO Global Strategy identified the ultimate need for a Multi Mode Airborne Capability with GNSS elements to cover all precision approach systems (ILS, MLS and GBAS).. The availability of this equipment and its certification onboard aircraft needs to be ensured to support GBAS CAT I operations.

Objective: Development of MOPS and MASPS for GNSS Avionics Equipment and certification of the MMR with GBAS CAT I capability.

Milestones and Tasks:	Responsibility	Target Dates:
a) MOPS for GBAS for CAT I	RTCA / EUROCAE	completed [1], [2], [3], [4],[5]

b) certification of GBAS receivers for CAT I	EASA / States	completed
~~c) Approval of straight-in GBAS CAT I operations~~	~~States~~	~~2010~~
~~d~~c) certification of GBAS CAT I system with autoland	EASA/States	2012/~~2012~~completed

Comments: It is assumed that the outcome of some tasks will possibly have an influence on other tasks (i.e. MOPS for CAT I versus CAT II/III). Some aircraft are already certified for GBAS CAT I autoland (e.g.: A380)

Reference documents:

[1] RTCA DO-245 – MASPS for Local Area Augmentation System (LAAS) (Note: now obsolete, but not yet replaced)

[2] EUROCAE ED-144 HIGH-LEVEL PERFORMANCE REQUIREMENTS FOR A GLOBAL NAVIGATION SATELLITE SYSTEM / GROUND BASED AUGMENTATION SYSTEM TO SUPPORT PRECISION APPROACH OPERATIONS, October 2007

[3] EUROCAE ED-88 Minimum Operational Performance Specification for Multi-Mode Airborne Receiver (MMR) including ILS, MLS and GPS used for Supplemental Means of Navigation; Note: ED-88A including GBAS CAT I is in final draft stage

[4] RTCA DO-253C[3] Minimum Operational Performance Standards for GPS Local Area Augmentation System Airborne Equipment

[5] ETSO-C161 Ground Based Augmentation System (GBAS) Positioning and Navigation Equipment

3.2.5 *Standardisation and certification of integrated/combined airborne receivers for GBAS CAT II/III operations*

Background and rationale: Standards for GBAS equipment are an essential element to enable certification and interoperability of CAT II/III operations. The availability of this equipment and its certification onboard aircraft needs to be ensured to support GNSS based CAT II/III operations.

Objective: Development of MOPS and MASPS for GNSS Avionics Equipment and certification of the MMR with GNSS CAT II/III capability.

Milestones and Tasks:	Responsibility	Target Dates:
a) MOPS for GBAS L1 system for CAT II/III	RTCA	completed[3]
b) Update of MMR MOPS (ED-88) to include GBAS L1element for CAT II/III	EUROCAE	~~2012~~TBD
c) certification of the MMR for GBAS L1 system for CAT II/III straight in operations	EASA/ States	2013
d) certification of the aircraft for GBAS L1 CAT II/III for straight-in operations	EASA/ States	2015

[3] B version is the one relevant for CAT I – use of C version is subject to restriction mentioned in its foreword.

e) MOPS for GBAS multi GNSS for CAT II/III	EUROCAE	TBD
f) Update of MMR MOPS (ED-88) to include multi-GNSS CAT II/III	EUROCAE	TBD
g) certification of GBAS multi GNSS for CAT II/III operations	EASA/ States	TBD
h) certification of the MMR for GBAS CAT II/III multi GNSS straight in operations	EASA/ States	TBD
i) certification of the aircraft for GBAS multi GNSS CAT II/III for straight-in operations	EASA/ States	TBD

Comments:

GBAS CAT II/III certification criteria are currently being developed by AWOHWG. It is expected that specific GBAS airworthiness criteria will be identified to cover the specificities of GBAS over ILS.

~~SARPs are essential to complete these tasks (TKI 2.2.1.4 refers). It is assumed that when SARPs are available, MASPS are not necessary (beyond the content of ED-144 or its update) for the development of the GNSS receiver. It is also assumed that the outcome of some tasks will possibly have an influence on other tasks (i.e. MOPS for CAT I versus CAT II/III).~~

GBAS multi GNSS CAT II/III operations development will depend strongly on multi frequency and multi constellation availability.

EUROCAE is not planning to develop GBAS L1 CAT II/III MASPS – beyond the contents of [2] - refer to [1] (obsolete) for LAAS MASPS if needed.

Reference documents:

[1] RTCA DO-245A – MASPS for Local Area Augmentation System (LAAS) (Note: now obsolete, but not yet replaced)

[2] EUROCAE ED-144 - High-Level Performance Requirements for a global Navigation Satellite System/Ground Based Augmentation System to support Precision Approach Operations

[3] RTCA DO 253C: LAAS MOPS

3.2.6 *Ensure waypoint database integrity*

Background and Rationale: Approach procedures making use of GNSS will require a database of waypoints to define the approach path. The integrity of onboard databases can only be assured to a certain level which may not be adequate for precision approach operations. The actual integrity of information provided by onboard databases must be quantified and other possibilities investigated such as up-linking waypoints from the ground. The latter leads to the requirement to assess the integrity of the ground based database.

Objective: Quantify the integrity of information carried in onboard databases and assess the performance of other methods of providing the waypoints to the aircraft.

Milestones and Tasks:	**Responsibility**	**Target Dates:**

a) publish the data integrity requirements in ICAO Annexes 4, 11, 14 and 15	ICAO	completed [1], [2]
b) determine the integrity of airborne database information	EUROCONTROL	ongoing
c) determine the integrity of the GBAS Ground database information	EUROCAE	completed [1], [2]
d) ensure the data integrity as specified in Annex 15	States, aerodromes, manufacturers, operators	continuous [1], [2]
f) implementation of European Aeronautical Database (EAD)	States, EUROCONTROL	2004 [1], [2]

Comments: The quantification of the data integrity is the responsibility of States, database providers, aircraft manufacturers and aircraft operators. Combined RTCA/EUROCAE WGs have tackled the issues and the resulting requirements for database integrity are published in RTCA DO-200A/EUROCAE ED-76 and DO-201A/ED-77. EUROCAE DO-201A specifies the integrity and accuracy requirements for each waypoint. DO-200A describes the quality assurance procedures required around the establishment and the updating process for the database. Nevertheless the database integrity will have to be certified against these integrity values and this task is not closed, specifically for precision approach operations.

Preliminary studies by EUROCONTROL demonstrated that the RNAV database integrity requirements are not met. A comprehensive assessment has started to compare different commercial databases, to verify national AIPs and compare AIPs with the databases.

The introduction of a European Aeronautical Database may prove an essential improvement in maintaining the integrity of aeronautical data. An EC mandate to extent the scope of the current Regulation to achieve aeronautical information of sufficient quality in the aeronautical data chain, from post-publication by the AIS to the end-user has been issued to Eurocontrol in March 2010 and is planned for 2012.

Reference documents:

[1] EUROCAE ED-76 / RTCA DO-200A Standards for Processing Aeronautical Data

[2] EUROCAE ED-77 / RTCA DO-201A Standards for Aeronautical Information

[3] ICAO Annex 4 – Aeronautical Charts

[4] ICAO Annex 11 – Air Traffic Services

[5] ICAO Annex 14 – Aerodromes

[6] ICAO Annex 15 – Aeronautical Information Services

3.3 ATS Procedures

3.3.1 *Develop Instrument Flight Procedures using GNSS*

Background and Rationale: Due to the foreseen pressure to continue ILS-based AWO and to introduce new technologies for AWO at the same time, the proper, safe introduction of new technology, based on known criteria, should be safeguarded. This is especially true for the most critical operations known in aviation, (i.e. CAT II/III operations). Criteria to design aircraft operations shall be developed and agreed.

Objective: Develop criteria to safeguard the continuation of safe AWO, based on new technologies, in CAT I, II and III conditions.

Milestones and Tasks:	Responsibility	Target Dates:
a) development of a specific CRM for GNSS operations	IFPP	as necessary
b) develop criteria for designing GNSS NPA procedures	OCP	completed
c) develop criteria for designing APV-I procedures	OCP	completed [1]
d) develop criteria for designing APV-II procedures	OCP	completed [1]
e) develop criteria for designing SBAS CAT I procedures	IFPP	2010
f) develop criteria for designing GBAS CAT I procedures	OCP	completed
g) develop criteria for designing GBAS CAT II/III procedures	IFPP	TBD
h) design GNSS NPA procedures	States	ongoing
i) design GNSS APV procedures (either APV SBAS or APV Baro)	States	as necessary
j) design GNSS CAT I procedures	States	as necessary
k) design GNSS CAT II/III procedures	States	as necessary

Comments: In the GNSS SARPs requirements will be stated on the signal-in-space performance. No guidance will be published in Annex 10 for the development of criteria for ATS procedures. Most probably, the ILS CRM can be the basis for approval of GNSS operations. However the ILS CRM might be more conservative than a GNSS CRM. Therefore continuation of the development of a specific GNSS CRM is recommended, due to the specific architecture and related safety requirements. For the purpose of GBAS CAT I criteria a"Correlation study" was performed in 2003 showing that no separate CRM was needed for GBAS CAT I. Such work needs to be reconducted for GBAS CAT II/III once prototype systems are available

Depending on the progress of the GBAS CAT II/III SARPS the corresponding criteria are currently considered for inclusion in IFPP future work programme.

Specific safety requirements for parallel approaches supported by GBAS are currently under investigation in IFPP.

-**Reference documents**:

[1] ICAO Doc 8168 - PANS-OPS

3.3.2 *Definition of ATS procedures for GNSS*

Background and Rationale: Introduction of new technology provokes a new way of operating in the ATS environment. R&D and trials should focus on the operational aspects, especially for issues such as SBAS/GBAS transition, range of Signal in Space (SIS) requirements for availability and continuity, ATC and flight crew training, GNSS information by Notice to Airmen (NOTAM), etc. This information should result in ICAO provisions for AWO based on these technologies.

Objective: To gain knowledge for the safe and efficient AWO based on GNSS technologies.

Milestones and Tasks:	Responsibility	Target Dates:
a) ICAO global provisions including ATS procedures supporting instrument approaches based on GNSS;	ICAO ANC	ongoing [1], [2]
b) identify the need for and if necessary propose EUR SUPPs (Doc.7030) for operations supported by GNSS	AWOG/States	as necessary
c) APV SBAS and APV Baro Operational Concepts	ICAO, Eurocontrol	~~ongoing~~completed [4]
d) GBAS CAT I Operational Concept	ICAO, Eurocontrol	Completed [3]
e) GBAS CAT II/III Operational Concept	ICAO, Eurocontrol	completed [3]

Comments: Global provisions in PANS ATM are under review, in particular with regard to NOTAM requirements (e.g.: predicted RAIM holes). Operational concepts have to be developed in order to assess the impacts of GNSS technology on the existing operations and new operations such as APV. On the basis that GNSS should be used globally, it is not recommended to provide specific developments of Doc 7030.

Reference documents:

[1] ICAO Doc. 8168 – PANS-OPS

[2] ICAO Doc. 4444 – PANS-ATM

[3] EUROCONTROL GBAS Concept of Operation

[4] EUROCONTROL APV-Baro safety assessment report Version 1.0 – 22/09/2009

3.3.3 *Revised requirements for visual aids related to the introduction of GNSS*

Background and Rationale: The provisions of visual aids (marking and lighting) on and around aerodromes are governed by ICAO SARPs (Annex 14). The growing number of operations, the implementation of Advanced Surface Movement Guidance and Control Systems (A-SMGCS) and the use of new technologies (GNSS) may call for new or revised provisions. Especially the minimum lighting requirements associated with the introduction of APV, needs to be considered by ICAO.

Before certain technology and possible corresponding procedures are implemented or decommissioned and in order to facilitate the installation of equipment and training of the users, sufficient lead time must be taken into account.

Objective: To identify the need for new or revised ICAO provisions on visual aids (marking and lighting) for AWO, and develop such material. To identify the minimum lead time for users, providers and regulators for implementation/decommissioning of visual aids.

Milestones and Tasks:	Responsibility	Target Dates:
a) identify the need for new or revised visual aids for AWO due to the introduction of GNSS	GNSSP/3	completed [1]
b) development and inclusion of new requirements on visual aids in Annex 14	ICAO Visual Aids Panel	TBD

Comment: As a consequence an impact assessment of any identified change in Airfield Ground Lighting requirement due to GNSS operations on A-SMGCS Level 2 Safety Nets should be conducted.

Reference documents:

[1] GNSSP/3 Report

[2] ICAO Annex 14 – Aerodromes

3.3.4 *Potential of advanced operations of GNSS*

Background and Rationale: With the introduction of GNSS many additional advanced operations arise which can not be provided by ILS (e.g. computed centre-line approaches, interception techniques, airborne capability levels, curved approaches, and use of data link). The purpose of this TKI is to identify these applications, the related benefits and the associated ATS and airborne procedures to allow the early use of such applications.

Objective: Determine the advanced applications of GNSS, their potential benefits and the associated ATS and airborne procedures.

Milestones and Tasks:	Responsibility	Target Dates:
a) determine the advanced applications of GNSS	ICAO ~~NSP~~IFPP	as necessary
b) assess the related benefits of advanced applications of GNSS	ICAO ~~NSP~~IFPP	as necessary
c) ICAO global provisions for GNSS advanced operations included in PANS-ATM (Doc. 4444)	ICAO ~~NSP~~IFPP	as necessary
d) identify the need for and if necessary EUR SUPPs (Doc. 7030) for GNSS advanced operations	AWOG	as necessary
e) revise the advanced minimum parallel runway separation standards for GNSS and include them in the PANS-ATM (Doc. 4444)	ICAO SOIRSG	TBD
f) develop criteria for RNP transition to XLS operations	SESAR	~~2011~~2012

Comments: See also TKI 3.3.2
Specific safety assessment to address GNSS continuity risk when supporting parallel operations is needed (ref to PANS OPS). An alternative would be to reassess the NTZ size taking full account of multiple simultaneous missed approaches.

5. 4. TRANSITION KEY ISSUES – AUXILIARY

4.1 Alternate navigation aids

4.1.1 *Impact of new technologies on AOP*

Background and Rationale: New technologies (other than MLS and GNSS e.g. Enhanced Visual Display (EVS), Head-Up Display (HUD)) could have a certain impact on AOP. These could have an effect on the approach and landing phase of a flight as well as for the ground operations. For the development of AWO in the EUR Region it is essential to make an inventory of these technical options and their potential impact on all operations, including ground operations.

Objective: To obtain knowledge on the impact of new technologies (other than MLS and GNSS) for the optimisation of AOP.

Milestones and Tasks:	**Responsibility**	**Target Dates:**
a) gain knowledge on the potential impact of new technologies (other than MLS and GNSS) on AWO.	ICAO AWOG	as necessary
b) EVS MASPs	EUROCAE	Completed [1]
c) EVS operations	EASA	Completed[~~3~~2]
d) CVS MASPs	EUROCAE	2010

Comments: This task is partly related to the development of A-SMGCS as it addresses notably the onboard capability required for taxiing on the airport. There will be a need to ensure compatibility/interoperability between on-board equipment and information/data received from third (Aerodrome/ATS) systems e.g. automated lighting systems to provide guidance and/or control. As far as development of technical and operational requirements for the approach and landing phases of flights are concerned the AWOG is the appropriate body.

IR OPS introduces also EVS operation. RTCA SC213 and EUROCAE WG 79 have been progressing EVS standard. EVS MASPs [1] has been published in 2008 reflecting the current existing system and taking due account of its limitations. ~~The same working groups are currently developing the CVS (combined Visual system) MASPS [2]~~It includes also. CVS (Combined Vision System) which ~~-~~is a system that combines the information of the two systems and EFVS (Enhanced Flight Vision system).~~:~~

The next step which is still currently under debate would enable this system to be used with no DH. ~~EVS and SVS, thus providing increased integrity and situation awareness for guiding the pilot. CVS would allow for AWO including CAT III C and removing the need of autoland capability for such operations.~~

The operational approval of E(F)VS is still not published as some remaining key issues are still pending. There is no EASA certification material however a CRI is used to certify these systems in compliance with ED 179.

IR OPS has not been published yet and is still being amended to address the comments received including some on EVS rules

Taxiing on board capability requirements is being investigated under SESAR WP6.7.

Reference document:

[1] ED-179: MASPS for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems.
~~[2] ED-180: MASPS for Enhanced, Synthetic and Combined Vision Systems with operational credit (other than NPA OPS 41) 41, reference ED-180~~ ~~**(due date: June 2010)**~~
[~~3~~2] IR OPS – NPA 02b
[~~4~~3] EASA **Temporary** Guidance Leaflet (TGL) 42 has been created to support **the operational approval of E(F)VS (with airworthiness appendix) – (pending)**

4.2 ATS Procedures

4.2.1 *Inventory of optimum wake turbulence separation for use in Low Visibility Procedures (LVP)*

Background and Rationale: According to ICAO provisions on separation capacity is decreasing during LVP to ensure the required level of safety. Therefore, wake turbulences are not an issue within current provisions. Further refinement of the current criteria may be necessary to manage the risks attached to LVP's, especially when new technologies may improve the landing capacity based on other protection requirements of the ground systems.. With reduction of separation minima due to the use of new technologies it should be considered if the existing wake turbulence criteria are still appropriate for LVP conditions.

Objective: Determination of optimum wake turbulence separations in LVP.

Milestones and Tasks:	Responsibility	Target Dates:
a) assess, in consultation with States and international organisations, if existing wake turbulence separations are appropriate for use in LVP	AWOG, PT/LVP	TBD
b) develop new wake turbulence separations and inclusion in PANS-ATM (Doc. 4444) and in the AWO-Manual as appropriate.	AWOG, ICAO ANC	TBD

Comments: An R&D programme may be necessary. Wake Turbulence research is being conducted by EUROCONTROL, which may contribute to this programme.

4.2.2 *Aeronautical Information Service (AIS) issues specific to AWO, including units of measurement*

Background and Rationale: Publication of Charts for AWO, and their contents, are governed by ICAO provisions contained in Annex 4, 15 and Doc. 8168. The implementation of WGS-84, as well as the advent of new Technologies and new Types of AWO procedures (e.g. Steep final, curved APP, RNAV), have called for the development of new/or revised ICAO provisions.

Objective: To prepare provisions for Charts and Maps to allow operations based on new technology.

Milestones and Tasks:	Responsibility	Target Dates:
a) assess the current ICAO provisions	ICAO ANC	completed

b) identify the need for new revised provisions	ICAO OCP	Completed
c) include new provisions in Annex 15 and 4	ICAO ANC	Completed [1][2]
d) identify the need for (Regional) Provisions on AIS/MAPs	AWOG, EUROCONTROL	As Necessary
e) GNSS prediction tool (Augur update to include EGNOS availability)	EUROCONTROL	End 2010
f) N~~otam~~OTAM service for GPS RAIM and EGNOS	EUROCONTROL	End 2010

Comments: The MDA/DA charting and operational issue is still under discussion. Annex 4 amendment 54 includes definitions and introduction of new provisions concerning the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). Minimum en-route altitudes, minimum obstacle clearance altitudes, logon address, ATS surveillance system terminology, aeronautical database requirements, approach fixes and points, aeronautical data quality requirements for gradients and angles, steep angle approach cautionary note, hot spot and intermediate holding, position including new symbols.

Reference documents:

[1] Annex 15 ~~Amendment 33~~

[2] Annex 4 ~~Amendment 54~~.

4.3 Mixed Mode operations

4.3.1 *Procedures for aircraft in sequence using different types of landing aids*

Background and Rationale: It is foreseen that ILS will co-exist for a long time beside MLS and GNSS. This will urge the need for appropriate ATS procedures to enable early benefits in a random mixture of ILS, MLS and GNSS traffic (e.g.: MLS-ILS-MLS to a single runway). A random mixture of ILS and MLS/GNSS traffic may cause substantial effects on the stability of the ATS operations. A new set of separation criteria could be the direct effect. R&D is necessary to substantiate the effects and to suggest operational, acceptable solutions. The immediate need is to manage a mix of ILS and MLS aircraft. Experience gained can later be applied to other mixes of traffic (e.g. ILS/GNSS or MLS/GNSS) as well.

Objective: Provide ATS procedures for the optimisation of a random mixture of ILS and MLS/GNSS traffic to a single runway.

Milestones and Tasks:	**Responsibility**	**Target Dates:**
a) development of ATS procedures to use in a random mixture of ILS and MLS traffic to a single runway in LVP	AWOG, PT/LVP	completed [1]
b) inclusion of general provisions for mixed MLS/GNSS and ILS/GNSS operations in PANS/ATM Doc. 4444	ICAO ANC	as necessary
c) identify the need for and if necessary develop proposed Regional Provisions (Doc. 7030) for mixed MLS/GNSS and ILS/GNSS	AWOG, PT/LVP, States	as necessary

Comments: States have the obligation to start R&D to develop these procedures to allow early benefits and forward the results to the ICAO ANC for incorporation in the relevant ICAO documentation. The AWOG shall follow these developments and focus on Regional Provisions in this field. There is a strong dependency between this issue and TKI 2.3.2. Additional work on Optimised Operations will allow capacity benefits to be achieved following the implementation of MLS and GNSS.

Currently material in mixed landing mode operations is only available in EUR DOC 013.

Reference documents:

[1] ICAO EUR Doc 013 – European Guidance Material on Aerodrome Operations under Limited Visibility Conditions

4.4 Aerodrome operations (AOP)

4.4.1 *Specific AOP*

Background and Rationale: With the increasing demand for optimised runway(s) utilisation and the increasing environmental constraints, providers, regulators and users should focus on new techniques for approach and landing. These techniques could potentially improve the capacity of aerodrome and reduce the negative impact on the environment (e.g. Intersection Take-Off; Multiple Touch-Down points; Reduced TO/LDG distances; Mixed operations; Noise alleviation; Operations on converging/intersecting runways).

Objective: Optimise AWO planning in the EUR Region by applying new ATS techniques for approach and landing.

Milestones and Tasks:	Responsibility	Target Dates:
a) inclusion of improved runway operations on parallel and near-parallel runways in PANS ATM Doc. 4444	ICAO	completed [1]
b) inclusion of PANS for advanced operations (e.g.: curved approaches, computed centreline, continuous descent) using MLS/GNSS in PANS-ATM Doc. 4444	ICAO ANC	as necessary
c) development of SUPPs on improved RWY operations (intersection take-offs, multiple line-ups, visual approaches/departures)	EUROCONTROL ADTMA	Completed [2]
d) development of PANS / SUPPs on converging/ intersecting RWYs	EUROCONTROL ADTMA, ICAO ANC	Completed [2]

Comments: Several tasks related to the optimisation of AOP were identified in the ECAC/APATSI programme. Some elements are being considered by the appropriate ICAO bodies for approval. Other elements are already being taken care of within IFPP. It should nevertheless be emphasised that there is no appropriate ICAO body studying these subjects. OCP and GNSSP stated that the separation aspects will not be taken into account in their work programme. The EUROCONTROL Working Group on Aerodrome and TMA operations is currently taking action in these directions.

SESAR WP6 and WP9 are investigating a number of improved operations under low visibility.

Reference documents:

[1] ICAO Doc 4444 – PANS-ATM

[2] ICAO EUR Doc 7030

4.4.2 *Non-visual aids to support ground operations during low visibility conditions - ASMGCS*

Background and Rationale: With the planning of AWO due account should be given to navigation requirements (related to situational awareness and guidance) in support of A-SMGCS. Special attention is necessary on the interface of landing and ground operations. This could eventually be improved by the introduction of new non-visual aids. The coordination of requirements for non-visual aids both for the approach and landing phase and for the guidance functionality on the ground is strongly recommended.

Objective: Streamlining the developments in the approach and landing phase of a flight with the developments in the field of Ground operations.

Milestones and Tasks:	**Responsibility**	**Target Dates:**
a) publication of initial ICAO operational requirements for A-SMGCS	ICAO ANC	completed [1]
b) determination of need for Regional Provisions for A-SMGCS in Doc 7030 (level 1 &2)	EANPG	~~TBD~~Completed [4]
c) validation of operational requirements for A-SMGCS (Level 1 &2)	EUROCONTROL States	~~TBD~~Completed [5] to [8]
~~d) identify the requirements on the navigation system from the A-SMGCS operational requirements~~	~~EANPG, EUROCONTROL States~~	~~TBD~~
d~~e~~)activities on Level 1/2 A-SMGCS	EUROCONTROL	completed [9]
e) activities on Level 3 & 4 A-SMGCS	SESAR	On going

Comment:

A_SMGCS level 1 & 2 Guidance Material will be published under a Community specification by end 2010. Data collection of aircraft position antenna is on going, it will help improve the performance of A-SMGCS.

A-SMGCS level 3 & 4 activities are to be develo~~p~~ped under SESAR WP6.7

Reference documents:

[1] ICAO Doc 9830 – Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual

[2] EUROCAE ED-116 MOPS for Surface Movement Radar Sensor Systems for Use in A-SMGCS

[2] EUROCAE ED-117 MOPS for Mode S Multilateration Systems for Use in A-SMGCS

[3] EUROCAE ED-128 - Guidelines for Surveillance Data Fusion in Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Levels 1 and 2

[4] ICAO Doc 7030 amendments – Jan/Feb 2009

[5] EUROCONTROL Operational Concept and Requirements for A-SMGCS Implementation Level 1 &2 – Edition 2.1, 30/06/2010

[6] EUROCONTROL definition of A-SMGCS Implementation Levels, Edition 1.2, 30/06/2010

[7] EUROCONTROL Functional Requirements for A-SMGCS Implementation Level 1, Edition 2.1, 30/06/2010

[8] EUROCONTROL Functional Requirements for A-SMGCS Implementation Level 2, Edition 2.1, 30/06/2010

[9] EUROCONTROL Preliminary Safety Case for A-SMGCS Levels 1 and 2, Edition 2.1, 30/06/2010

[10] EUROCAE Minimum Aviation System Performance Specifications (MASPS) for A-SMGCS (Level 1 and 2), Edition ED-87B, January 2008, including ED-87B amendment No 1 of January 2009

4.5 GNSS legal recording requirement

Objective: To support post accident/incident investigation.

Milestones and Tasks:	Responsibility	Target Dates:
a) Implement equipment or arrangements to meet legal recording requirements	States	Upon implementation

Reference documents:

[1] ICAO ANNEX 10

– END –

ICAO EUR STATUS OF A36-23 IMPLEMENTATION				
States requested to complete a PBN Implementation Plan	Responded to the ICAO Questionairre	Compliance with A36-23 deadlines(RNAV/RNP operations in en-route and terminal areas by 2016)	National PBN impl plan	APV/compliance with A36-23 deadlines(30% by 2014&100% by 2016) See also EUR FASID Supplement Table CNS4b
ALBANIA		yes	completed in the framework of LSSIP	Under review, yet no plan provided
ALGERIA				
ANDORRA				
ARMENIA	√	yes	In progress	Under review, yet no plan provided
AUSTRIA	√	yes	completed in the framework of LSSIP	APV Baro in Salzburg 2010; Linz and Klagenfurt 2011. Other airports to be planned
AZERBAIJAN	√	yes	In progress	partially
BELARUS				
BELGIUM	√	yes	completed	No plans provided, some training for ATC and procedures design for GPS NPA procedures in place
BOSNIA & HERZEGOVINA		yes	completed in the framework of LSSIP	Under review, yet no plan provided
BULGARIA		yes	completed in the framework of LSSIP	Under review, yet no plan provided
CYPRUS		yes	completed in the framework of LSSIP	No plan provided
CROATIA	√	yes	completed	Under review, yet no plan provided
CZECH REPUBLIC	√	yes	completed	APV Baro procedures planned for 2010-2015, and a feasibility study of airports being conducted for APV SBAS
DENMARK		yes	completed in the framework of LSSIP	No plan provided
ESTONIA	√	yes	completed	Under review, yet no plan provided
FINLAND	√	yes	completed	compliant
FRANCE	√	yes	completed	Plans to implement APV (LNAV/VNAV or LPV) procedures as the following 30 per cent by 2010, 70 per cent by 2014. Around 20 APV's per year.
GEORGIA				
GERMANY	√	yes	In progress	APV Baro is implemented 16 international airports and 6 regional airports./partially
GREECE		yes	completed in the framework of LSSIP	Under review, yet no plan provided
HUNGARY		yes	completed in the framework of LSSIP	Under review, yet no plan provided
ICELAND				
IRELAND	√	yes	In progress	in progress for Dublin TMA

ISRAEL				
ITALY	√	yes	completed in the framework of LSSIP	In progress. APV Baro procedures are planned for Bologna and Venezia airports, as well as Rome Fiumicino
KAZAKHSTAN				
KYRGYZSTAN				
LATVIA				Under review, no plan submitted yet
LITHUANIA	√	yes	completed	
LUXEMBOURG		yes	completed in the framework of LSSIP	Under review, yet no plan provided
MALTA		yes	completed in the framework of LSSIP	Under review
MONACO				
MONTENEGRO		yes	completed in the framework of LSSIP	Under review, yet no plan provided
MOROCCO				
NETHERLANDS	√	yes	Completed	In progress.5 APV Baro implemented in 2010 and 3 more APV Baro to be implemented until 2012.
NORWAY	√	yes	Completed	In progress./partially
POLAND		yes	completed in the framework of LSSIP	APV SBAS planned starting from 2011 when EGNOS signal will be available
PORTUGAL		yes	completed in the framework of LSSIP	APV Baro procedures to be implemented by 2010, and APV SBAS starting in 2011
REPUBLIC OF MOLDOVA		yes	completed in the framework of LSSIP	Under review, yet no plan provided
ROMANIA	√	yes	In progress	
RUSSIAN FEDERATION	√	yes	Completed	
SAN MARINO				
SERBIA		yes	completed in the framework of LSSIP	Under review, yet no plan provided
SLOVAKIA		yes	completed in the framework of LSSIP	Under review, yet no plan provided
SLOVENIA		yes	completed in the framework of LSSIP	Under review, yet no plan provided
SPAIN	√	yes	In progress	partially
SWEDEN	√	yes	Completed	APV SBAS implementations to start in 2011.
SWITZERLAND	√	yes	completed	Two APV Baro planned for 2010./partially
TAJIKISTAN				
THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA		yes	completed in the framework of LSSIP	APV baro planned to be implemented by 2011
TUNISIA				

TURKEY	√	**yes**	completed	Under review, yet no plan provided
TURKMENISTAN				
UKRAINE	√	**yes**	Partially completed	Under review, yet no plan provided
UNITED KINGDOM	√	**yes**	completed in the framework of LSSIP	APV Baro implemented in London Heathrow and Gatwick. APV Baro to be implemented in Manchester./partially
UZBEKISTAN	√	**yes**	Implementation anticipated 2015	

WORKING DRAFT OF

EUR ANP, VOLUME II, FASID

PART IV - CNS

Supplement Table CNS 4b
INSTRUMENT APPROACH PROCEDURES and ASSOCIATED NAVIGATION SERVICES AND FACILITIES

RECORD OF AMENDMENTS

Note: A consolidated text of this section, containing the following approved amendments to the EUR ANP, will be officially disseminated on an annual basis. This document is produced solely as reference material to assist States in the preparation of proposals for amendment to the EUR ANP.

AMENDMENTS

P. f. Amdt. Serial No.	Originator	Date of Approval letter	Date entered
State Letter EUR/NAT 09-588.TEC	Austria, Azerbaijan, Belgium, Germany, Greece, Italy, Netherlands, Romania, Russia, Spain, Sweden, Switzerland, Ukraine, Uzbekistan	05/01/2010	05/01/2010
State Letter EUR/NAT 10-442.TEC	Belarus, Denmark, Estonia, Germany, Greece, Latvia, Malta, Norway, Romania, Slovak Rep, Sweden, Switzerland, Turkey, Ukraine, United Kingdom	18/08/2010	18/08/2010

P. f. Amdt. Serial No.	Originator	Date of Approval letter	Date entered

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
ALBANIA					
TIRANA	18		ILS	No info	
			MLS	No plan	
ARMENIA					
YEREVAN	9	CAT II	ILS	1993/2000	
		CAT I	MLS	1994/1995	
		CATII	MLS	1996	
		CAT III	MLS	1997/2000	
GUMRI	2	CAT I	ILS	1998	
AUSTRIA					
GRAZ	35	CAT III	ILS	2009/2021	decision of renewal outstanding
INNSBRUCK	26	CAT III	ILS	2001/2012	
KLAGENFURT	28	CAT III	ILS	2003/2015	decision of renewal outstanding
LINZ	27	CAT III	ILS	2004/2016	decision of renewal outstanding
LINZ	09	CAT I	ILS	2005/2017	decision of renewal outstanding
SALZBURG	16	CAT III	ILS	2002/2014	decision of renewal outstanding
WIEN	11	CAT I	ILS	2007/2019	decision of renewal outstanding
WIEN	16	CAT III	ILS	2004/2016	decision of renewal outstanding
WIEN	29	CAT III	ILS	2006/2018	decision of renewal outstanding
WIEN	34	CAT I	ILS	2008/2020	decision of renewal outstanding
AZERBAIJAN					
HEYDAR ALIEYEV	16	CAT I	ILS	1992/2011	
	34	CAT I	ILS	1992/2011	
	18	CAT IIIA	ILS/DME	2004	
	36	CAT IIIA	ILS/DME	2004	
NAKHCHIVAN	14R	CAT I	ILS/DME	2004	
	32L	CAT I	ILS/DME	2004	
GANJA	30L	CAT I	ILS	1988	
	12L	CAT I	ILS/DME	2006	
	30R	CAT I	ILS/DME	2006	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
ZAGATALA	33	CAT I	ILS/DME	2007	
LENKORAN	33	CAT I	ILS/DME	2008	
BELARUS					
MINSK	31	CAT II	ILS	2007	
	13	CAT I	ILS	1998	
BELGIUM					
ANTWERPEN	29	CAT I	ILS	2007	installation date
		CAT III	ILS	20**	No info
		CAT III	MLS	20**	only alternative solution for CAT III
BRUXELLES	02	CAT I	ILS	2005	installation date
		CAT II	ILS	20**	No info
	20	CAT I	ILS	1999	installation date
		CAT I	ILS	2019	replacement
	07L	CAT I	ILS	2012	new installation
		CAT II	ILS	2013	estimate
		CAT III	ILS	2013	estimate
		CAT III	MLS	20**	only alternative solution for CAT III
	25L	CAT III	ILS	2006	installation date
		CAT III	MLS	20**	only alternative solution for CAT III
	25R	CAT III	ILS	2004	installation date
		CAT III	MLS	20**	only alternative solution for CAT III
CHARLEROI	25	CAT III	ILS	2009	installation date
		CAT III	MLS	20**	only alternative solution for CAT III
LIEGE	23L	CAT III	ILS	1997	installation date
		CAT III	ILS	2013	replacement
		CAT III	MLS	20**	only alternative solution for CAT III
	05R	CAT I	ILS	2000	installation date
		CAT I	ILS	2020	replacement
	23R	CAT I	ILS	2000	installation date
		CAT I	ILS	2019	replacement

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
		CAT II	ILS	2020	No info
		CAT III	ILS	2020	No info
		CAT III	MLS	20**	only alternative solution for CAT III
OOSTENDE	26	CAT I	ILS	2002	installation date
		CAT I	ILS	2022	replacement
		CAT II	ILS	2023	No info
		CAT III	ILS	2023	No info
		CAT III	MLS	20**	only alternative solution for CAT III
	08	CAT I	ILS	2001	installation date
		CAT I	ILS	2021	replacement
BEAUVECHAIN	22R	CAT I	ILS	2002	installation date
		CAT I	ILS	2015	replacement
	04L	CAT I	ILS	2015	
KLEINE-BROGEL	23R	CAT I	ILS	2000	installation date
		CAT I	ILS	2015	replacement
	05L	CAT I	ILS	2015	
FLORENNES	26R	CAT I	ILS	2000	installation date
		CAT I	ILS	2015	replacement
	08L	CAT I	ILS	2015	
KOKSIJDE	11	CAT I	ILS	2013	
	29	CAT I	ILS	2013	
BOSNIA AND HERZEGOVINA					
SARAJEVO	12	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	
BULGARIA					
BURGAS	22	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	
SOFIA	28	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
VARNA	9	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
CROATIA					
DUBROVNIK	12	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
OSIJEK	29	CAT I	ILS	1993/2000	
		CAT I	MLS	2000	
PULA	9	CAT	ILS		
		CAT I	MLS	2000	
	27	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	
RIJEKA	14	CAT I	ILS	1993/2000	
		CAT I	MLS	2000	
SPLIT	5	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
ZADAR	14	CAT I	ILS	1993/2000	
		CAT I	MLS	1999/2000	
ZAGREB	5	CAT II	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT II	MLS	1996	
		CAT III	MLS	1997/2000	
	23	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	
CYPRUS					
LARNACA	22	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	
NICOSIA	32	CAT I	ILS	1993/2000	
			MLS	No plan	
PAPHOS	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
CZECH REPUBLIC					
BRNO	28	CAT I	ILS MLS	1993 No plan	
CASLAV	32	CAT I	ILS MLS	1998 No plan	Military
KBELY	24	CAT I	ILS MLS	1997 No plan	Military
KARLOVY VARY	29	CAT I	ILS MLS	2005 no plan	
NAMEST	31	CAT I	ILS MLS	2001 no plan	Military
OSTRAVA	22	CAT II	ILS MLS	2008 No plan	
PARDUBICE	27	CAT I	ILS MLS	1999 No plan	Civil/Military
PRAHA	24R	CAT IIIB	ILS MLS	1996 No plan	
	24L	CAT III	ILS MLS	planned 2013 No plan	
	06L	CAT I	ILS MLS	1999 No plan	
	06R	CAT I	ILS MLS	planned 2013 No plan	
	31	CAT I	ILS MLS	1997 No plan	
	13	CAT I	ILS MLS	2008 No plan	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
PREROV	6	CAT I	ILS	2000	Civil/Military
			MLS	No plan	
VODOCHODY	28	CAT I	ILS	2002	
			MLS	No plan	
DENMARK					
ALBORG	08L	CAT I	ILS	1993/2000	
		CAT I	MLS	1994/2000	
	26R	CAT II	ILS	1993/2000	
		CAT I	MLS	1991/2000	
ARHUS/Tirstrup	10R	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
	28L	CAT III	ILS	1993/2000	
		CAT I	MLS	1995/2000	
BILLUND	9	CAT III	ILS	1993/2000	
		CAT II	MLS	1996/2000	
	27	CAT III	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT III	MLS	1996/2000	
	12	CAT	ILS/-	No info	
		CAT I	MLS	1996	
		CAT II	MLS	1997/2000	
	30	CAT	ILS/-	No info	
		CAT I	MLS	1996	
		CAT II	MLS	1997/2000	
ESBJERG	8	CAT I	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT II	MLS	1996/2000	
	26	CAT I	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT II	MLS	1996/2000	
KØBENHAVN/Kastrup	04R	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
	22L	CAT III	ILS	1993/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
		CAT I	MLS	1994	
		CAT II	MLS	1995/2000	
	04L	CAT II	ILS	1993/2000	
		CAT II	MLS	1996/2000	
	22R	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
	12	CAT I	ILS	1993/2000	
		CAT I	MLS	1999/2000	
	30	CAT I	ILS	1993/2000	
		CAT I	MLS	2000	
KØBENHAVN/Roskilde	21	CAT I	ILS	1993/2000	
		CAT I	MLS	2000	
	11	CAT I	ILS	1993/2000	
		CAT I	MLS	1999/2000	
ODENSE/Beldringe	24	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
RØNNE	11	CAT I	ILS	1993/2000	
		CAT I	MLS	1999/2000	
	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
SØNDERBORG	32	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
STAUNING	28	CAT I	ILS	No info	
		CAT I	MLS	1998/2000	
THISTED	28	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
ESTONIA					
TALLINN/Lennart Meri	8	CAT I	ILS/DME	2006/2009	
	26	CAT II	ILS/DME	2006/2009	
KURESSAARE	17	CAT I	ILS	2010	
TARTU	26	CAT I	ILS	2010	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
FINLAND					
ENONTEKIO	3	APV/baroVNAV		by 2016	
	21	CATI	ILS		implemented
		APV/baroVNAV		by 2016	
HALLI	26	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
HELSINKI/Malmi	18				no plans
	36				no plans
HELSINKI/Vantaa	04L	CAT II	ILS		implemented
		CAT III	ILS	2009	
		APV/baroVNAV		by 2016	
	04R	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	15	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	22L	CAT II	ILS		implemented
		CAT III	ILS	2009	
		APV/baroVNAV		by 2016	
	22R	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	33	APV/baroVNAV		by 2016	
IVALO	O4	APV/baroVNAV		by 2016	
	22	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
JOENSUU	10	APV/baroVNAV		by 2016	implemented
	28	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
JYVASKLA	12	APV/baroVNAV		by 2016	
	30	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
KEMI/TORNIO	18	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	36	APV/baroVNAV		by 2016	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
KAJAANI	7	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	25	APV/baroVNAV		by 2016	
KRUUNUPYY	1	APV/baroVNAV		by 2016	
	19	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
KUUSAMO	12	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	30	APV/baroVNAV		by 2016	
KITTILA	16	APV/baroVNAV		by 2016	
	34	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
KUOPIO	15	APV/baroVNAV		by 2016	
	33	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
LAPPEENRANTA	6	CAT I	ILS		
		APV/baroVNAV		by 2016	
	24	APV/baroVNAV		by 2016	
MARIEHAMN	3	APV/baroVNAV		by 2016	
	21	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
OULU	12	CAT II	ILS		implemented
		APV/baroVNAV		by 2016	
	30	APV/baroVNAV		by 2016	
PORI	12	APV/baroVNAV		by 2016	
	30	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
ROVANIEMI	3	APV/baroVNAV		by 2016	
	21	CAT II	ILS		implemented
		APV/baroVNAV		by 2016	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
SAVONLINNA	12	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	30	APV/baroVNAV		by 2016	
TAMPERE/PIRKKALA	6	APV/baroVNAV		2010	
	24	CAT I	ILS		implemented
		APV/baroVNAV		2010	
TURKU	8	APV/baroVNAV		by 2016	
	26	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
VAASA	16	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	34	APV/baroVNAV		by 2016	
VARKAUS	14	CAT I	ILS		implemented
		APV/baroVNAV		by 2016	
	32	APV/baroVNAV		by 2016	
FRANCE					
AJACCIO	3		ILS	1993/2000	
		CAT I	MLS	1994/2000	
BALE-MULHOUSE	16	CAT III	ILS	1993/2000	
		CAT I	MLS	1993	
		CAT II	MLS	1994/1995	
		CAT III	MLS	1996/2000	
BASTIA	34	CAT I	ILS	1993/2000	
		CAT I	MLS	1994/2000	
BEAUVAIS	31	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
BIARRITZ	27	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
BORDEAUX	23	CAT III	ILS	1993/2000	
		CAT I	MLS	1992	
		CAT II	MLS	1993/1994	
		CAT III	MLS	1995/2000	
BREST	26	CAT I	ILS	1993/2000	
		CAT I	MLS	1994/2000	
CAEN	31	CAT I	ILS	1993/2000	
			MLS	No plan	
CALAIS	24	CAT I	ILS	1993/2000	
			MLS	No plan	
CALVI	18		ILS	1993/2000	
		CAT I	MLS	1995/2000	
CHAMBERY	18	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
CHERBOURG	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
CLERMONT-FERRAND	27	CAT III	ILS	1993/2000	
		CAT I	MLS	1994	
		CAT II	MLS	1995	
		CAT III	MLS	1996/2000	
DEAUVILLE	30	CAT I	ILS	1993/2000	
			MLS	No plan	
DINARD	35	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
DOLE	6	CAT I	ILS	1993/2000	
			MLS	No plan	
GRENOBLE	9	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
LANNION	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
LA ROCHELLE	28	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
LE HAVRE	23	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
LE TOUQUET	14	CAT I	ILS	1993/2000	
		CAT	MLS	No plan	
LILLE	26	CAT III	ILS	1993/2000	
		CAT I	MLS	1994	
		CAT II	MLS	1995	
		CAT III	MLS	1996/2000	
LYON/Bron	35	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
LYON/Satolas	18L	CAT I	ILS	No info	
			MLS	No plan	
	18R	CAT I	ILS	No info	
			MLS	No plan	
	36L	CAT III	ILS	1993/2000	
		CAT I	MLS	1992	
		CAT II	MLS	1993	
		CAT III	MLS	1994/2000	
	36R	CAT I	ILS	No info	
			MLS	No plan	
MARSEILLE	14L	CAT III	ILS	1993/2000	
		CAT I	MLS	1993/1994	
		CAT II	MLS	1995	
		CAT III	MLS	1996/2000	
METZ-NANCY-LORRAINE	22	CAT II	ILS	1993/2000	
		CAT I	MLS	1994	
		CAT II	MLS	1995/2000	
MONTPELLIER	31R	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
NANTES	3	CAT III	ILS	1993/2000	
		CAT I	MLS	1993/1995	
		CAT II	MLS	1996	
		CAT III	MLS	1997/2000	
NICE	05R	CAT I	ILS	1993/2000	
		CAT I	MLS	1993/2000	
NIMES	18	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
	36		ILS	No info	
			MLS	No plan	
PARIS/Charles-de-Gaulle	9	CAT III	ILS	1993/2000	
		CAT I	MLS	1993/1994	
		CAT II	MLS	1995	
		CAT III	MLS	1996/2000	
	27	CAT III	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT II	MLS	1996/1997	
		CAT III	MLS	1998/2000	
	10	CAT III	ILS	1993/2000	
		CAT I	MLS	1996	
		CAT II	MLS	1997	
		CAT III	MLS	1998/2000	
	28	CAT III	ILS	1993/2000	
		CAT I	MLS	1990	
		CAT II	MLS	1991	
		CAT III	MLS	1992/2000	
PARIS/Le Bourget	7	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
PARIS/Orly	7	CAT III	ILS	1993/2000	
		CAT I	MLS	1993	
		CAT II	MLS	1994	
		CAT III	MLS	1995/2000	
	25	CAT II	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT II	MLS	1996/2000	
	26	CAT III	ILS	1993/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
		CAT I	MLS	1994	
		CAT II	MLS	1995	
		CAT III	MLS	1996/2000	
	02L	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
PAU	31	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
PERPIGNAN	33	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
POITIERS	21	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
QUIMPER	28	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
REIMS	25	CAT I	ILS	1993/2000	
			MLS	No plan	
RENNES	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
SAINT-BRIEUC	24	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
SAINT-ETIENNE	18	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
SAINT-NAZAIRE	26	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
STRASBOURG	23	CAT III	ILS	1993/2000	
		CAT I	MLS	1994	
		CAT II	MLS	1995	
		CAT III	MLS	1996/2000	
TARBES	20	CAT I	ILS	1993/2000	
		CAT I	MLS	1994/2000	
TOULOUSE	15R	CAT III	ILS	1993/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
		CAT I	MLS	1992	
		CAT II	MLS	1993	
		CAT III	MLS	1994/2000	
	33L	CAT I	ILS	1993/2000	
			MLS	No plan	
	15L	CAT I	ILS	No info	
			MLS	No plan	
TOURS	20	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
TOUSSUS-LE-NOBLE	25R	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
GEORGIA					
TBILISI	31	CAT II	ILS	1993/2000	
		CAT I	MLS	1994/1995	
		CAT II	MLS	1996	
		CAT III	MLS	1997/2000	
GERMANY					
ALLENDORF/Eder	29	APV baro-VNAV		2010	
AUGSBURG	7	APV baro-VNAV		2009	
	25	CAT I	ILS	2000/no info	
		APV baro-VNAV		2009	
BARTH	27	APV baro-VNAV		2010	
BAUTZEN	25	APV baro-VNAV		2010	
BAYREUTH	6	APV baro-VNAV		2010	
BERLIN/ Schönefeld - BBI	07 (new)	CAT III	ILS	-/2011	
		APV Baro-VNAV		-/2011	
		CAT III	MLS	No Info	
	25 (new)	CAT III	ILS	-/2011	
		APV Baro-VNAV		-/2011	
		CAT III	MLS	No Info	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	7	CAT III	ILS	1992/2011	
		APV Baro-VNAV		-/2009	
		CAT III	MLS	No Info	
	25	CAT III	ILS	1992/2011	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
BERLIN/Tegel	08L	CAT III	ILS	2006/no plan	
		APV Baro-VNAV		2009	
	26R	CAT III	ILS	2000/no plan	
		APV Baro-VNAV		2009	
	08R	CAT I	ILS	1993/no plan	
		APV Baro-VNAV		2009	
	26L	CAT II	ILS	1995/no plan	
		APV Baro-VNAV		2009	
BRAUNSCHWEIG-Wolfsburg	8	APV baro-VNAV		-/2010	
	26	CAT I	ILS	2001/no info	
		APV baro-VNAV		-/2010	
BREMEN	9	CAT III	ILS	1998/2013	
		CAT I	GBAS	-/2010	
		APV Baro-VNAV		2009	
	27	CAT III	ILS	2007/2022	
		CAT I	GBAS	-/2010	
		APV Baro-VNAV		-/2009	
BREMERHAVEN	16	APV baro-VNAV		2010	
	34	APV baro-VNAV		2010	
COBURG/ Brandensteinsebene	30	APV baro-VNAV		2010	
DONAUESCHINGEN-Villingen	36	APV baro-VNAV		2010	
Donauwörth HEL	295	APV/SPAB		-/2010	
DORTMUND	6	CAT II	ILS	2001/no info	
		APV baro-VNAV		2009	
	24	CAT II	ILS	1999/no info	
		APV baro-VNAV		2009	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
DRESDEN	4	CAT I	ILS	2007/2022	
		APV Baro-VNAV		2009	
	22	CAT III	ILS	1995/2010	
		APV Baro-VNAV		2009	
DUSSELDORF	05R	CAT III	ILS	1997/2013	
		APV Baro-VNAV		2009	
	23L	CAT III	ILS	1997/2013	
		APV Baro-VNAV		2009	
	05L	CAT I	ILS	1992/2011	
		APV Baro-VNAV		2009	
	23R	CAT III	ILS	1992/2009	
		APV Baro-VNAV		2009	
EGGENFELDEN	27	APV baro-VNAV		2010	
ERFURT	10	CAT III	ILS	2000/2015	
		APV Baro-VNAV		2009	
	28	CAT III	ILS	1998/2013	
		APV Baro-VNAV		2009	
FRANKFURT/Hahn	3	CAT I	ILS	1995/no info	
	21	CAT III	ILS	1994/no info	
FRANKFURT/Main	25 (new)	CAT III	ILS	-/2011	
		APV Baro-VNAV		-/2011	
		CAT III	MLS	No Info	
	07 (new)	CAT III	ILS	-/2011	
		APV Baro-VNAV		-/2011	
		CAT III	MLS	No Info	
	25R	CAT III	ILS	1993/2000	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
	07L	CAT III	ILS	1993/2000	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
	07R	CAT III	ILS	1993/2000	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
	25L	CAT III	ILS	1993/2000	
		APV Baro-VNAV		2009	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
		CAT III	MLS	No Info	
FRIEDRICHSHAFEN	6	CAT I	ILS	no info	
		APV baro-VNAV		2010	
	24	CAT III	ILS	no info	
		APV baro-VNAV		2010	
HAMBURG/ Finkenwerder	5	CAT I	ILS	2007/no info	
		APV baro-VNAV		2009	
	23	CAT I	ILS	2007/no info	
		APV baro-VNAV		2009	
HAMBURG/Hamburg	5	CAT I	ILS	2004/2019	
		APV Baro-VNAV		2009	
	15	CAT I	ILS	1997/2012	
		APV Baro-VNAV		2009	
	23	CAT III	ILS	2000/2015	
		APV Baro-VNAV		2009	
	33	APV Baro-VNAV		2009	
HANNOVER	09L	CAT III	ILS	2005/2020	
		APV Baro-VNAV		2009	
	09R	CAT I	ILS	1996/2012	
		APV Baro-VNAV		2009	
	27L	CAT I	ILS	1999/2012	
		APV Baro-VNAV		2009	
	27R	CAT III	ILS	1992/2009	
		APV Baro-VNAV		2009	
HERINGSDORF	28	CAT I	ILS	2005/no info	
HOF/Plauen	27	CAT I	ILS	1997/no info	
KARLSRUHE/Baden	3	CAT I	ILS	2003/no info	
		APV baro-VNAV		2010	
	21	CAT I	ILS	1997/no plan	
		CAT III	ILS	2010	
		APV baro-VNAV		2010	
KIEL	8	CAT I	ILS	1993/no info	
	26	CAT I	ILS	1993/no info	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
KÖLN/Köln-Bonn	14L	CAT III	ILS	2001/2016	
		APV Baro-VNAV		2009	
	14R	APV Baro-VNAV		2009	
	32L	APV Baro-VNAV		2009	
	32R	CAT III	ILS	1992/2010	
		APV Baro-VNAV		2009	
	6	APV Baro-VNAV		2009	
	24	CAT I	ILS	1994/2012	
		APV Baro-VNAV		2009	
LAHR	21	CAT I	ILS	1997/no info	
LEIPZIG-ALTENBURG	22	CAT I	ILS	2004/no info	
LEIPZIG-HALLE	08L	CAT III	ILS	2000/2015	
		APV Baro-VNAV		2009	
	08R	CAT III	ILS	1993/2009	
		APV Baro-VNAV		2009	
	26L	CAT III	ILS	1993/2009	
		APV Baro-VNAV		2009	
	26R	CAT III	ILS	2000/2015	
		APV Baro-VNAV		2009	
LÜBECK	7	CAT I	ILS	1992/no info	
	25	CAT I	ILS	1992/no info	
MAGDEBURG	27	APV baro-VNAV		2010	
MAGDEBURG/ Cochstedt	26	CAT I	ILS	2009/no info	
MEMMINGEN/Allgäu	6	APV baro-VNAV		2010	
	24	CAT I	ILS	2007/ -	
		APV baro-VNAV		2010	
MENGEN/ Hochtengen	26	APV baro-VNAV		2010	
MÖNCHENGLADBACH	13	CAT I	ILS	1998/no info	
	31	CAT I	ILS	1998/no info	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
MÜNCHEN	08 (new)	CAT III	ILS	-/2012	
		CAT I	GBAS	-/2012	
		CAT III	MLS	No Info	
	26 (new)	CAT III	ILS	-/2012	
		CAT I	GBAS	-/2012	
		CAT III	MLS	No Info	
	08L	CAT III	ILS	1991/2010	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
	08R	CAT III	ILS	1991/2010	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
	26L	CAT III	ILS	2008/2023	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
	26R	CAT III	ILS	2008/2023	
		APV Baro-VNAV		2009	
		CAT III	MLS	No Info	
MÜNSTER/ Osnabruck	7	CAT I	ILS	1999/2014	
		APV Baro-VNAV		2009	
	25	CAT III	ILS	1994/2010	
		APV Baro-VNAV		2009	
NIEDERRHEIN	27	CAT III	ILS	2007/no info	
NÜRNBERG	10	CAT I	ILS	1998/2013	
		APV Baro-VNAV		2009	
	28	CAT III	ILS	1999/2014	
		APV Baro-VNAV		2009	
OBERPFAFFENHOFEN	22	CAT I	ILS	2004/no info	
		APV baro-VNAV		2010	
PADERBORN	6	CAT I	ILS	2003/no info	
		APV baro-VNAV		2009	
	24	CAT I	ILS	2007/no info	
		APV baro-VNAV		2009	
SAARBRUCKEN	27	CAT I	ILS	1999/2014	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
		APV Baro-VNAV		2009	
	9	APV Baro-VNAV		2009	
SCHWÄBISCH-HALL	10	APV baro-VNAV		2010	
	28	CAT I	ILS	2004/no info	
		APV baro-VNAV		2010	
SCHWERIN-Parchim	24	CAT I	ILS	1996/no info	
SIEGERLAND	31	CAT I	ILS	1999/no info	
STRAUBING	28	APV baro-VNAV		-/2010	
STUTTGART	7	CAT III	ILS	1996/2012	
		APV Baro-VNAV		-/2009	
	25	CAT III	ILS	1996/2012	
		APV Baro-VNAV		2010	
WESTERLAND	32	CAT I	ILS	1991/no info	
WILHELMSHAVEN	2	APV baro-VNAV		2010	
	20	APV baro-VNAV		2010	
ZWEIBRÜCKEN	3	CAT I	ILS	2000/no info	
	21	CAT I	ILS	1999/no info	
GREECE					
ANDRAVIDA	34R	CAT I	ILS	planned	
LGAD		CAT II	MLS	2020+	
ALMIROS/Nea Anchialos	26	CAT II	ILS	2003	
LGBL		CAT II	MLS	2020+	
ATHINAI/Eleftherios Venizelos	03L	CAT II	ILS	2000	
LGAV		CAT III	MLS	2020+	
	03R	CAT II	ILS	2000	
		CAT III	MLS	2020+	
	21L	CAT II	ILS	2000	
		CAT III	MLS	2020+	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	21R	CAT II	ILS	2000	
		CAT III	MLS	2020+	
CHANIA/Ioannis Daskalogiannis	11	CAT I	ILS	planned	
LGSA		CAT II	MLS	2020+	
	11R	CAT II	MLS	2020+	
IOANNINA/King Pyrros	32	CAT I	ILS	planned	
LGPZ		CAT III	MLS	2020+	
IRAKLION/Nikos Kazantzakis	27	CAT I	ILS	planned	
LGIR		CAT II	MLS	2020+	
KALAMATA	35L	CAT I	ILS	1998	
LGKL		CAT II	MLS	2020+	
KAVALA/Megas Alexandros	05R	CAT I	ILS	planned	
LGKV		CAT II	MLS	2020+	
KERKIRA/Ioannis Kapodistrias	35	CAT II	ILS	planned	
LGKR		CAT II	MLS	2020+	
KOS/IPPOKRATIS	33	CAT I	ILS	planned	
LGKO		CAT II	MLS	2020+	
LARISSA	O8R	CAT II	ILS	planned	
LGLR		CAT II	MLS	2020+	
LIMNOS	O4R	CAT I	ILS	planned	
LGLM		CAT II	MLS	2020+	
Mobile All GREECE	–	CAT II	MLS	2020+	
(LGGG)	–	CAT II	MLS	2020+	
	–	CAT II	MLS	2020+	
	–	CAT II	MLS	2020+	
PREVEZA/Aktion	07L	CAT I	ILS	planned	
LGPZ		CAT II	MLS	2020+	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
RODOS/Diagoras	25	CAT I	ILS	2000	
LGRP		CAT II	MLS	2020+	
SANTORINI	34R	CAT I	ILS	planned	
LGSR		CAT II	MLS	2020+	
SKIROS	36	CAT I	ILS	planned	
LGSY		CAT II	MLS	2020+	
TANAGRA	28	CAT II	ILS	planned	
LGTG		CAT II	MLS	2020+	
THESSALONIKI/MAKEDONIA	16	CAT II	ILS	2002	
LGTS		CAT III	MLS	2020+	
	10	CAT I	ILS	2001	
		CAT III	MLS	2020+	
HUNGARY					
BUDAPEST/Ferihegy	13L	CAT II	ILS	1993/2000	
		CAT II	MLS	1996/2000	
	31R	CAT III	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT III	MLS	1996/2000	
	13R	CAT II	ILS	1993/2000	
		CAT I	MLS	1996	
		CAT II	MLS	1997/2000	
	31L	CAT II	ILS	1993/2000	
		CAT I	MLS	1996	
		CAT II	MLS	1997/2000	
IRELAND					
CONNAUGHT	27	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
CORK	17	CAT II	ILS	1993/2000	
		CAT II	MLS	1996/2000	
	35	CAT I	ILS	1993/2000	
		CAT I	MLS	1998/2000	
DUBLIN	10	CAT II	ILS	1993/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
		CAT II	MLS	1997	
		CAT III	MLS	1998/2000	
	28	CAT III	ILS	1993/2000	
		CAT II	MLS	1996	
		CAT III	MLS	1997/2000	
	16	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
SHANNON	6	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
	24	CAT II	ILS	1993/2000	
		CAT II	MLS	1994/2000	
ITALY					
ALGHERO	20	CAT I	ILS	2006	
ANCONA	22	CAT I	ILS	2005	
BARI	O7	CAT I	ILS	2005	
BERGAMO	28	CAT IIIB	ILS	1999	
BOLOGNA	12	CAT IIIB	ILS	1990	
BRESCIA	32	CAT IIIB	ILS	1998	
BRINDISI	32	CAT I	ILS	1989	
CAGLIARI	32	CAT I	ILS	2006	
CATANIA	O8	CAT I	ILS	2006	
CUNEO	21	CAT I	ILS	1990	
FIRENZE	O5	CAT I	ILS	2006	
FORLI'	12	CAT I	ILS	2008	
GENOVA	29	CAT I	ILS	2007	
LAMEZIA	28	CAT I	ILS	1977	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
MILANO/Linate	36	CAT IIIB	ILS	2008	
MILANO/Malpensa	35L	CAT IIIB	ILS	2007	
	35R	CAT IIIB	ILS	2006	
	17L	CAT I	ILS	2006	
NAPOLI	24	CAT I	ILS	1990	
	O6	CAT I	ILS	2006	
OLBIA	O6	CAT I	ILS	1999	
PALERMO	20	CAT I	ILS	2007	
	25	CAT I	ILS	2000	
PARMA	20	CAT I	ILS	2005	
PERUGIA	O1	CAT I	ILS	2000	
PESCARA	22	CAT I	ILS	1994	
PISA	04R	CAT I	ILS	2006	
RIMINI	31	CAT I	ILS	2006	
ROMA/Ciampino	15	CAT I	ILS	1989	
ROMA/Fiumicino	16L	CAT IIIB	ILS	1989	
	16R	CAT IIIB	ILS	1990	
	34R	CAT I	ILS	2007	
	34L	CAT I	ILS	1990	
	25	CAT I	ILS	2008	
TARANTO	35	CAT I	ILS	2006	
TORINO	36	CAT IIIB	ILS	1986	
TRAPANI	31	CAT I	ILS	2003	
TREVISO	O7	CAT II	ILS	2006	
TRIESTE	O9	CAT II	ILS	2005	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
VENEZIA	O4R	CAT IIIB	ILS	2005	
VERONA	O5	CAT IIIB	ILS	2001	
KAZAKHSTAN					
ALMA ATA	23	CAT II	ILS	1993/2000	
		CAT I	MLS	1994	
		CAT III	MLS	1995/2000	
	5		ILS	No info	
			MLS	No plan	
KYRGYZSTAN					
BISHKEK	26		ILS	No info	
			MLS	No plan	
LATVIA					
RIGA	18	CAT I	ILS	2008	
	36	CAT I	ILS	2008	
LIEPAJA	24	CAT I	ILS	2008	
LITHUANIA					
KAUNAS	8	CAT I	ILS	1990	
	26	CAT I	ILS	1991	
PALANGA	1				No ILS
	19	CAT I	ILS	2004	
SIAULIAI	14L	CAT I	ILS	1997	
	32R	CAT I	ILS	1997	
VILNIUS	2	CAT I	ILS	2006	
	20	CAT I	ILS	2006	
LUXEMBOURG					
LUXEMBOURG	6	CAT I	ILS	1993/2000	
		CAT I	MLS	1994/2000	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	24	CAT III	ILS	1993/2000	
		CAT I	MLS	1993	
		CAT III	MLS	1994/2000	
MALTA					
MALTA	31	CAT I	ILS	1993/2000	
	23	NON PRECISION	N/A	1993/2000	
	13	1	ILS	1993/200	
	5	NON PRECISION	N/A	No plan	
MONACO	No information/No plan				
NETHERLANDS					
AMSTERDAM/Schiphol					MLSes are planned only the actual year for implementation will depend on the actual need.
	27	CAT III	ILS/DME	in use	
		CAT I	MLS	planned only	
		CAT III	MLS	planned only	
	18R	CAT III	ILS/DME	in use	
		CAT I	MLS	planned only	
		CAT II	MLS	planned only	
		CAT III	MLS	planned only	
	18C	Cat III	ILS/DME	in use	
	18L	Cat III	ILS/DME	N/A	
	36R	CAT III	ILS/DME	in use	
		CAT II	MLS	not operational	
	6	CAT III	ILS/DME	in use	
		CAT I	MLS	not operational	
		CAT II	MLS	not operational	
		CAT III	MLS	not operational	
	36L	CAT III	ILS/DME	N/A	
	36C	CAT III	ILS/DME	in use	
	22	CAT I	ILS/DME	in use	
GRONINGEN/Eelde	23	CAT I	ILS/DME	in use	
		CAT I	MLS	planned only	
		CAT II	MLS	planned only	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
MAASTRICHT	21	CAT I	ILS/DME	in use	
		CAT I	MLS	planned only	
		CAT II	MLS	planned only	
	3	CAT III	ILS/DME	in use	
ROTTERDAM	24	CAT I	ILS/DME	in use	
		CAT I	MLS	planned only	
		CAT II	MLS	planned only	
	6	CAT I	ILS/DME	in use	
Eindhoven	4	CAT I	ILS/DME	in use	
	22	CAT I	ILS/DME	in use	
Den Helder	22	CAT I	ILS/DME	in use	DME not paired to ILS
Lelystad	5	CAT I	ILS/DME	planned only	
	23	CAT I	ILS/DME	not operational	
NORWAY					
Alta	11	CAT I	ILS		NPA as Back-Up
	29	NPA	VOR/DME		
Andenes	21	NPA	VOR/DME		
	14	NPA	LOC/MARKER		
	32	NPA	VOR/DME		
Bardufoss	10	NPA	LOC/DME		
	28	CAT I	ILS		NPA as Back-Up
Bergen	17	CAT I	ILS		NPA as Back-Up
	35	CAT I	ILS		NPA as Back-Up
Berlevaag	24	NPA	LOC/DME		
	06/24	APV	SCAT-1(GBAS)	/2013	
	06/24	APV/BARO-VNAV		/2013	
Bodo	07	CAT I	ILS	1995/	NPA as Back-Up
	25	CAT I	ILS		NPA as Back-Up
Bronnoysund	04	APV	SCAT-1(GBAS)	2006/	NPA as Back-Up
	22	APV/BARO-VNAV		/2013	
Baatsfjord	03	NPA	NDB/DME		
	21	NPA	LOC/DME	1999/	
	03/21	APV	SCAT-1(GBAS)	/2013	
Evenes	17	CAT I	ILS		NPA as Back-Up
	35	NPA	VOR/DME		
Fagernes	15	NPA	NDB/DME		

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	33	NPA	LOC/DME		
Floro	07	NPA	LOC/MARKER		
	25	NPA	VOR/DME		
Forde	07	NPA	LOC/DME	2004/	
	25	NPA	LOC/DME		
	07/25	APV	SCAT-1(GBAS)	/2013	
	07/25	APV/BARO-VNAV		/2013	
Hammerfest	05	NPA	LOC/DME		
	23	NPA	LOC/DME		
	05/23	APV	SCAT-1(GBAS)	/2013	
	05/23	APV/BARO-VNAV		/2013	
Hasvik	11	NPA	NDB/DME		
	29	NPA	LOC/DME		
	11/29	APV	SCAT-1(GBAS)	/2013	
	11/29	APV/BARO-VNAV		/2013	
Haugesund	14	CAT I	ILS		NPA as Back-Up
	32	NPA	VOR/DME		
Honningsvaag	08	NPA	LOC/DME		
	26	NPA	LOC/DME		
	08/26	APV	SCAT-1(GBAS)	/2013	
	08/26	APV/BARO-VNAV			
Kirkenes	06	NPA	VOR/DME		
	24	CAT I	ILS		NPA as Back-Up
Kristiansand	04	CAT I	ILS		NPA as Back-Up
	22	CAT I	ILS		NPA as Back-Up
Kristiansund	07	CAT I	ILS		NPA as Back-Up
	25	NPA	VOR/DME		
Lakselv	17	NPA	LOC/DME		
	35	CAT I	ILS		NPA as Back-Up
Leknes	03	NPA	LOC/DME		
	03/21	APV	SCAT-1(GBAS)	/2013	
	03/21	APV/BARO-VNAV		/2013	
Mehamn	17	NPA	LOC/DME		
	17/35	APV	SCAT-1(GBAS)	/2013	
	17/35	APV/BARO-VNAV		/2013	
Mo i Rana	14	NPA	LOC/DME		
	32	NPA	LOC/DME		
	14/32	APV	SCAT-1(GBAS)	/2013	
	14/32	APV/BARO-VNAV		/2013	
Molde	07	CAT I	ILS	2007/	NPA as Back-Up
	25	NPA	LOC/DME		
Mosjoen	34	NPA	LOC/DME		

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	16	NPA	VOR/DME		
	16/34	APV	SCAT-1(GBAS)	/2013	
	16/34	APV/BARO-VNAV		/2013	
Namsos	07	NPA	NDB/DME		
	25	NPA	LOC/DME		
	07/25	APV	SCAT-1(GBAS)	/2013	
	07/25	APV/BARO-VNAV			
Narvik	01	NPA	VOR/DME		
	19	NPA	LOC/DME		
	01/19	APV	SCAT-1(GBAS)	/2013	
	01/19	APV/BARO-VNAV		/2013	
Notodden	12	NPA	LOC/DME		
Oslo/Gardermoen	01L	CAT I	ILS	1997/	NPA as Back-Up
	19L	CAT I	ILS	1997/	NPA as Back-Up
	01R	CAT III	ILS	1998/	NPA as Back-Up
	01R	APV/BARO-VNAV		/2012	
	19R	CAT III	ILS	1998/	NPA as Back-Up
	19R	APV/BARO-VNAV		/2012	
Roros	32	CAT I	ILS		NPA as Back-Up
Rorvik	04	NPA	VOR/DME		
	22	NPA	VOR/DME		
	04/22	APV	SCAT-1(GBAS)	/2013	
	04/22	APV/BARO-VNAV		/2013	
Rost	03	NPA	VOR/DME		
	21	NPA	VOR/DME		
	03/21	APV	SCAT-1(GBAS)	/2013	
	03/21	APV/BARO-VNAV		/2013	
Rygge	12	NPA	NDB/DME		
	30	CAT I	ILS		NPA as Back-Up
Sandane	27	NPA	LOC/DME		
	09/27	APV	SCAT-1(GBAS)	/2013	
	09/27	APV/BARO-VNAV		/2013	
Sandefjord	18	CAT I	ILS		NPA as Back-Up
	36	CAT I	ILS	2009/	NPA as Back-Up
Sandnessjoen	03	NPA	VOR/DME		
	21	NPA	LOC/MARKER		
	03/21	APV	SCAT-1(GBAS)	/2013	
	03/21	APV/BARO-VNAV		/2013	
Skien	01	NPA	VOR/DME		
	19	NPA	LOC/DME		
Sogndal	06	NPA	LOC/DME	2006/	
	24	CAT I	ILS		NPA as Back-Up

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
Stavanger	11	CAT I	ILS		NPA as Back-Up
	29	NPA	VOR/DME		
	18	CAT II	ILS	2008/	NPA as Back-Up
	36	CAT I	ILS	1998	NPA as Back-Up
Stokmarknes	09	NPA	LOC/DME		
	27	NPA	LOC/DME	2004/	
	09/27	APV	SCAT-1(GBAS)	/2013	
	09/27	APV/BARO-VNAV		/2013	
Stord	15	NPA	LOC/DME		
	33	NPA	VOR/DME		
Svalbard	10	CAT I	ILS		
	28	NPA	LOC/DME		
Svolvaer	01	NPA	LOC/DME		
	01/19	APV	SCAT-1(GBAS)	/2013	
	01/19	APV/BARO-VNAV		/2013	
Sorkjosen	15	NPA	LOC/DME		
	15/33	APV	SCAT-1(GBAS)	/2013	
	15/33	APV/BARO-VNAV		/2013	
Tromso	01	CAT I	ILS		NPA as Back-Up
	19	CAT I	ILS		NPA as Back-Up
Trondheim	09	CAT I	ILS		NPA as Back-Up
	27	CAT I	ILS		NPA as Back-Up
Vadso	08	NPA	LOC/DME		
	26	NPA	NDB/DME		
	08/26	APV	SCAT-1(GBAS)	/2013	
	08/26	APV/BARO-VNAV		/2013	
Vardo	15	NPA	VOR/DME		
	33	NPA	VOR/DME		
	15/33	APV	SCAT-1(GBAS)	/2013	
	15/33	APV/BARO-VNAV		/2013	
Orland	15	CAT I	ILS		NPA as Back-Up
	33	CAT I	ILS	2001/	
Orsta/Volda	06	NPA	LOC/DME		
	06/24	APV	SCAT-1(GBAS)	/2013	
	06/24	APV/BARO-VNAV		/2013	
Aalesund	07	NPA	VOR/DME		NPA as Back-Up
	25	CAT I	ILS	2000/	NPA as Back-Up

POLAND

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
GDANSK	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
KRAKOW	26	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
POZNAN	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
RZESZOW	27	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
WARSZAWA	33	CAT II	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT II	MLS	1996/1998	
		CAT III	MLS	1999/2000	
	15		ILS	No info	
		CAT I	MLS	1998/2000	
	11	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/1997	
		CAT II	MLS	1999/2000	
PORTUGAL					
FARO	29	CAT I	ILS	1993/2000	
		CAT I	MLS	1996/2000	
LISBOA	3	CAT I	ILS	1993/2000	
		CAT I	MLS	1995/2000	
	21	CAT III	ILS	1993/2000	
		CAT I	MLS	1995	
		CAT II	MLS	1996	
		CAT III	MLS	1997/2000	
PORTO	18	CAT II	ILS	1993/2000	
		CAT I	MLS	1993	
		CAT II	MLS	1994/2000	
REPUBLIC OF MOLDOVA					

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
CHISINAU	8	CAT II	ILS/DME	2004	
	26	CAT I	ILS/DME	2004	
BELTS/Liadoveni	33	CAT I	ILS/DME	2004	
SERBIA					
BEOGRAD	12	CAT III	ILS	2008	
	30	CAT I	ILS	Before 2000	
ROMANIA					
ARAD	27	CAT II	ILS	2003	
BAIA MARE	10	CAT II	ILS	2015 Planned implementation	
BACAU	34	CAT II	ILS	2007	
BUCURESTI/Baneasa	7	CAT II	ILS	2008	
	25	CAT II	ILS	2010	
BUCURESTI/Otopeni	8L	CAT III	ILS	1998	
	26L	CAT III	ILS	1999	
	8R	CAT III	ILS	1998 Planned replacing 2012	
	26R	CAT III	ILS	2006 Planned replacing 2012	
CLUJ	26	CAT I	ILS	2009	
CONSTANTA	36	CAT II	ILS	1998	
CRAIOVA	27	CAT I	ILS	2010	
IASI	15	CAT II	ILS	2006	
ORADEA	19	CAT I	ILS	1993 Planned replacing 2011	
SATU-MARE	19	CAT II	ILS	2010	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
SIBIU	27	CAT II	ILS	2008	
SUCEAVA	34	CAT II	ILS	2015 Planned implementation	
TIMISOARA	11	CAT III	ILS	2008	
	29	CAT III	ILS	2004	
TARGU MURES	7	CAT II	ILS	2010	
TULCEA	34	CAT II	ILS	2006	
RUSSIAN FEDERATION					
ABAKAN	02R	NPA	ILS	1987	
		NPA	VOR/DME	1995	
	20L	NPA	ILS	1990	
ANADYR (Ugolny)	1	NPA	ILS	2006	
	19	NPA	ILS	2006	
		NPA	VOR/DME	2013	
ANAPA (Vityazevo)	4	NPA	ILS	2003	
		NPA	VOR/DME	2015	
	22	NPA	ILS	2015	
ARKHANGELSK (Talagi)	8	CAT I	ILS	1987	
		NPA	VOR/DME	2015	
	26	CAT I	ILS	2000	
ASTRAKHAN	9	CAT I	ILS	1988	
	27	NPA	ILS	1992	
		NPA	VOR/DME	2011	
BARNAUL	6	NPA	ILS	2001	
		NPA	VOR/DME	2015	
	24	NPA	ILS	1989	
BEGISHEVO	04	NINST			
	22	NPA	ILS	2004	
BELGOROD	11	NPA	VOR/DME	2015	
	29	NPA	ILS	2006	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
BLAGOVESCHENSK (Ignatyevo)	18	NPA	VOR/DME	1999	
		NPA	ILS	2015	
	36	CAT I	ILS	1999	
BRATSK	12	NPA	VOR/DME	1992	
	30	NPA	ILS	1989	
BRYANSK	17	NINST			
	35	NPA	ILS	1996	
CHEBOKSARY	6	NPA	ILS	1992	
		NPA	VOR/DME	2012	
	24	NPA	ILS	1988	
CHELYABINSK (Balandino)	9	CAT I	ILS	2000	
		NPA	VOR/DME	2000	
	27	CAT I	ILS	2000	
CHITA (Kadala)	11	NPA	ILS	2015	
		NPA	VOR/DME	2015	
	29	CAT I	ILS	2002	
ELISTA	9	NPA	ILS	2012	
	27	NPA	ILS	2012	
		NPA	VOR/DME	2010	
GROZNY (Severny)	26	NPA	ILS+DME	2006	
IRKUTSK	12	CAT I	ILS	2000	
		NPA	VOR/DME	1994	
	30	CAT I	ILS	1988	
KALININGRAD (Khrabrovo)	6	NPA	VOR/DME	2012	
		NPA	ILS	2012	
	24	CAT I	ILS	2005	
KAZAN	11L	NPA	ILS	2003	
		NPA	VOR/DME	1997	
	29R	NPA	ILS	2005	
KEMEROVO	5	NINST			

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	23	NPA	ILS	2001	
KHABAROVSK (Novy)	05R	CAT I	ILS	1988	
		CAT I	GBAS	2011	
	23L	CAT I	ILS	1992	
		NPA	VOR/DME	2005	
		CAT I	GBAS	2011	
	05L	NPA	ILS	2015	
		NPA	GBAS	2011	
	23R	NPA	ILS	2015	
		NPA	GBAS	2011	
KHANTY-MANSIYSK	06	NPA	ILS	1998	
		NPA	VOR/DME	1991	
	24	CAT I	ILS	1998	
KOGALYM	17	CAT I	ILS	1993	
	35	CAT I	ILS	1993	
KRASNODAR (Pashkovsky)	05R	CAT I	ILS	1999	
	23L	CAT I	ILS	2000	
		NPA	VOR/DME	2013	
	05L	NPA	ILS	2013	
	23R	NPA	ILS	2013	
KRASNOYARSK (Yemelyanovo)	11	CAT I	ILS	1993	
		NPA	VOR/DME	1995	
		CAT I	GBAS	2011	
	29	CAT II	ILS+DME	2009	
MAGADAN (Sokol)	10	CAT I	ILS	2005	
		NPA	VOR/DME	2010	
	28	NINST			
MAGNITOGORSK	1	NPA	ILS	2000	
		NPA	VOR/DME	2000	
	19	NPA	ILS	2000	
MAKHACHKALA (Uytash)	14	CAT I	ILS	2005	
		NPA	VOR/DME	2009	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	32	CAT I	ILS	1988	
MINERALNYYE VODY	12	CAT II	ILS	1987	
	30	CAT I	ILS	1990	
MOSCOW	14L	CAT I	ILS	2005	
(Domodedovo)	32R	CAT III	ILS+DME	2005	
		NPA	VOR/DME	2006	
	14R	CAT III	ILS+DME	2007	
	32L	CAT I	ILS+DME	2001	
MOSCOW	07R	CAT II	ILS	1997	
(Sheremetyevo)	25L	CAT II	ILS	1997	
		NPA	VOR/DME	1990	
	07L	CAT I	ILS	1997	
	25R	CAT III	ILS	2001	
MOSCOW	1	CAT I	ILS	2009	
(Vnukovo)	19	CAT II	ILS	2009	
	6	CAT I	ILS	1990	
	24	CAT II	ILS	1997	
MURMANSK	14	NPA	ILS	1997	
		NPA	VOR/DME	2015	
	32	CAT I	ILS	2004	
NALCHIK	6	NINST			
	24	CATI	ILS	2005	
		NPA	VOR/DME	2013	
NIZHNEVARTOVSK	3	CAT I	ILS	1997	
	21	CAT I	ILS	1999	
		NPA	VOR/DME	2000	
NIZHNY NOVGOROD	18L	NINST			
(Strigino)	36R	NINST			
		NPA	VOR/DME	2010	
	18R	CAT I	ILS	1996	
	36L	CAT I	ILS	1996	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
NOVOSIBIRSK	7	CAT I	ILS	1998	
(Tolmachevo)		NPA	VOR/DME	2000	
	25	CAT I	ILS	1986	
OMSK	7	NPA	ILS	1992	
(Tsentralny)		NPA	VOR/DME	2015	
	25	NPA	ILS	2006	
ORENBURG	8	CAT I	ILS	2006	
(Tsentralny)		NPA	VOR/DME	2015	
	26	CAT I	ILS	2004	
ORSK	7	NINST			
	25	NPA	ILS	1996	
OSTAFYEVO	08	NINST			
	26	NPA	ILS	2005	
PERM	3	NPA	ILS	2010	
(Bolshoe Savino)	21	CAT I	ILS	2001	
PETROPAVLOVSK-	16L	NINST			
KAMCHATSKY		NPA	VOR/DME	2010	
(Yelisovo)	34R	NPA	ILS	2005	
PETROZAVODSK	2	NINST			
(Besovets)	20	NINST			
		NPA	VOR/DME	2014	
PROVIDENIYA BAY	19	NPA	VOR/DME	2015	
ROSTOV-NA-DONU	4	CAT II	ILS	1990	
		NPA	VOR/DME	2010	
	22	CAT I	ILS	1988	
SAMARA	5	CAT I	GBAS	2009	
(Kurumoch)		NPA	VOR/DME	2010	
	23	CAT I	ILS	1999	
	15	CAT I	ILS	1990	
	33	CAT I	ILS	1991	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
SANKT-PETERBURG (Pulkovo)	10L	CAT IIIa	ILS	2006	
	28R	CAT IIIa	ILS	2006	
		NPA	VOR/DME	1989	
	10R	CAT II	ILS	1996	
	28L	CAT I	ILS	1998	
SARATOV (Tsentralny)	12	CAT I	ILS	1997	
		NPA	VOR/DME	2008	
	30	CAT I	ILS	1987	
SOCHI	2	CAT I	ILS+DME	2006	
		NPA	VOR/DME	2011	
	6	CATI	ILS+DME	1996	
STAVROPOL (Spakovskoye)	7	NPA	ILS	2005	
	25	NPA	ILS	1999	
SURGUT	7	NPA	ILS	1993	
		NPA	VOR/DME	2015	
		CAT I	GBAS	2010	
	25	NPA	ILS+DME	2008	
SYKTYVKAR	1	NPA	ILS	1986	
		NPA	VOR/DME	2015	
	19	NPA	ILS	2004	
TYUMEN (Roshchino)	3	CATI	ILS	1988	
		NPA	VOR/DME	2011	
	21	CAT I	ILS	2005	
		CAT I	GBAS	2009	
	12	NPA	ILS	2015	
	30	NPA	ILS	2015	
UFA		NPA	VOR/DME	2001	
	14R	CAT II	ILS	1991	
	32L	NPA	ILS	2013	
	14L	CAT I	ILS	1990	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	32R	CAT I	ILS	1990	
ULAN-UDE	8	NPA	ILS	2015	
(Mukhino)		NPA	VOR/DME	2015	
	26	NPA	ILS	2000	
ULYANOVSK	2	CAT I	ILS	1997	
(Vostochny)		NPA	VOR/DME	1985	
	20	CAT I	ILS	1996	
VLADIKAVKAZ		NPA	VOR/DME	2011	
(Beslan)	10	NPA	ILS	2001	
VLADIVOSTOK	07L	NPA	VOR/DME	2011	
(Knevici)	25R	NPA	ILS	2001	
VOLGOGRAD	11	CAT I	ILS	1993	
(Gumrak)		NPA	VOR/DME	2010	
	29	CAT I	ILS	1993	
VORONEZH	13	CAT I	ILS	1987	
(Chertovitskoye)		NPA	VOR/DME	2013	
	31	CAT I	ILS	2006	
YAKUTSK		NPA	VOR/DME	2008	
	23L	CAT I	ILS	1994	
YAROSLAVL					
(Tunoshna)	23	CAT I	ILS	2002	
YEKATERINBURG	08R	CAT I	ILS	1991	
(Koltsovo)	26L	CAT I	ILS	1993	
		NPA	VOR/DME	2014	
	08L	NINST			
	26R	CAT I	ILS	1993	
YUZHNO-SAKHALINSK	1	NPA	ILS	2004	
(Khomutovo)		NPA	VOR/DME	2012	
	19	NPA	ILS	2008	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
SLOVAKIA					
BRATISLAVA	22	CAT I	ILS	1993	
			MLS	No plan	
	31	CAT IIIA	ILS	2008	
			MLS	No plan	
KOSICE	1	CAT II	ILS	2002	
			MLS	No plan	
PIEŠŤANY	1	CAT I	ILS	2001	
			MLS	No plan	
POPRAD/TATRY	27	CAT I	ILS	1993	
			MLS	No plan	
SLIAC	36	CAT I	ILS	planned 2011	new installation, Civil/Military traffic
			MLS	No plan	
ŽILINA	6	CAT I	ILS	planned 2010	new installation
			MLS	No plan	
SLOVENIA					
LJUBLJANA	31	CAT II	ILS	1993/2000	
		CAT I	MLS	1996	
		CAT II	MLS	1997/2000	
MARIBOR	33	CAT I	ILS	1993/2000	
		CAT I	MLS	2000	
SPAIN					
ALBACETE	9	CAT I	ILS	in service	
	27	CAT I	ILS	in service	
ALICANTE	10	CAT I	ILS	in service	
ALMERIA	26	CAT I	ILS	in service	
	O8	APV/SBAS	SBAS		
	26	APV/SBAS	SBAS		

Location indicator	**RWY designation number**	**Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)**	**Approach navigation services/facilites if any (ILS, MLS, GBAS)**	**year of actual/planned implementation**	**Remarks**
ASTURIAS	29	CAT III	ILS	in service	
BADAJOZ	31	CAT I	ILS	in service	
BARCELONA	2	CAT I	ILS	in service	
	07L	CAT III	ILS	in service	
	07R	CAT III	ILS	in service	
	25R	CAT III	ILS	in service	
	25L	CAT III	ILS	in service	
BILBAO	12	CAT I	ILS	in service	
	30	CAT III	ILS	2011	Currently CAT I
CIUDAD REAL	10	CAT III	ILS	in service	
CORDOBA	3	APV/SBAS	SBAS		
	21	APV/SBAS	SBAS		
CUATRO VIENTOS	10	APV/SBAS	SBAS		
GERONA	20	CAT III	ILS	in service	
GRANADA	9	CAT I	ILS	in service	
	O6	APV/SBAS	SBAS		
IBIZA	6	CAT I	ILS	in service	
	24	CAT I	ILS	in service	
JEREZ	20	CAT I	ILS	in service	
LA CORUNA	22	CAT II	ILS	in service	
LEON	23	CAT I	ILS	in service	
LOGRONO	29	CAT I	ILS	2010	
MADRID/BARAJAS	18L	CAT III	ILS	in service	
	18R	CAT III	ILS	in service	
	33L	CAT III	ILS	in service	
	33R	CAT III	ILS	in service	
MADRID-GETAFE	5	CAT I	ILS	in service	
MADRID-TORREJON	23	CAT I	ILS	in service	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
MALAGA	12	CAT I	ILS	2011	
	13	CAT I	ILS	in service	
	31	CAT I	ILS	in service	
	13	CAT I	GBAS		
	31	CAT I	GBAS		
	13	APV/SBAS	SBAS		
	31	APV/SBAS	SBAS		
MENORCA	01L	CAT I	ILS	in service	
	19R	CAT I	ILS	2009	
MURCIA	5	CAT I	ILS	in service	
PALMA DE MALLORCA	06L	CAT I	ILS	in service	
	24L	CAT III	ILS	in service	
	24R	CAT I	ILS	in service	
PAMPLONA	15	CAT I	ILS	in service	
REUS	25	CAT I	ILS	in service	
SALAMANCA	21	CAT I	ILS	in service	
	O6	APV/SBAS	SBAS		
SAN SEBASTIAN	O4	APV/SBAS	SBAS		
SANTANDER	29	CAT I	ILS	in service	
	11	APV/SBAS	SBAS		
	29	APV/SBAS	SBAS		
SANTIAGO	17	CAT III	ILS	in service	
	35	CAT I	ILS	in service	
SEVILLA	9	CAT I	ILS	in service	
	27	CAT I	ILS	in service	
VALENCIA	12	CAT I	ILS	in service	
	30	CAT I	ILS	in service	
	12	APV/SBAS	SBAS		
VALLADOLID-VILLANUBLA	23	CAT III	ILS	in service	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
VIGO	20	CAT III	ILS	in service	
VITORIA	4	CAT II	ILS	in service	
ZARAGOZA	30R	CAT I	ILS	in service	
AFI REGION					
FUERTEVENTURA	01R	CAT I	ILS	in service	
	19L	CAT I	ILS	2009	
GRAN CANARIA	21R	CAT I	ILS	in service	
	03L	CAT I	ILS	in service	
LANZAROTE	3	CAT I	ILS	in service	
TENERIFE NORTE	12	CAT I	ILS	in service	
	30	CAT III	ILS	2009	
TENERIFE SUR	8	CAT I	ILS	in service	
	26	CAT I	ILS	in service	
SWEDEN					
ARVIDSJAUR	12	CAT I	ILS	in service	
	30	CAT I	ILS	in service	
BORLÄNGE	32	CAT I	ILS	in service	
ESKILSTUNA	36	CAT I	ILS	in service	
GÄLLIVARE	30	CAT I	ILS	in service	
GÄVLE	18	CAT I	ILS	in service	
GÖTEBORG/Landvetter	21	CAT II	ILS	in service	
	03	CAT II	ILS	in service	
GÖTEBORG/Säve	19	CAT I	ILS	in service	
HAGFORS	18	CAT I	ILS	in service	
HALMSTAD	19	CAT I	ILS	in service	
HEMAVAN-TÄRNABY	33	CAT I	ILS	in service	

Location indicator	**RWY designation number**	**Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)**	**Approach navigation services/facilites if any (ILS, MLS, GBAS)**	**year of actual/planned implementation**	**Remarks**
JÖNKÖPING	19	CAT I	ILS	in service	
KALMAR	16	CAT I	ILS	in service	
KARLSTAD	03	CAT I	ILS	in service	
	21	CAT I	ILS	in service	
KIRUNA	21	CAT I	ILS	in service	
KRAMFORS-SOLLEFTEÅ	35	CAT I	ILS	in service	
KRISTIANSTAD	19	CAT I	ILS	in service	
LIDKÖPING	24	CAT I	ILS	in service	
LINKÖPING/Malmen	19	CAT I	ILS	in service	
LINKÖPING/Saab	11	CAT I	ILS	in service	
	29	CAT I	ILS	in service	
LJUNGBYHED	29L	CAT I	ILS	in service	
LULEÅ/Kallax	14	CAT I	ILS	in service	
	32	CAT I	ILS	in service	
LYCKSELE	14	CAT I	ILS	in service	
MALMÖ	17	CAT II	ILS	in service	
	35	CAT I	ILS	in service	
MORA/Siljan	16	CAT I	ILS	in service	
NORRKÖPING	27	CAT I	ILS	in service	
	09	CAT I	ILS	in service	
OSKARSHAMN	19	CAT I	ILS	in service	
PAJALA-YLLÄS	11	CAT I	ILS	in service	
RONNEBY	19	CAT I	ILS	in service	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
SKELLEFTEÅ	28	CAT I	ILS	in service	
SKÖVDE	19	CAT I	ILS	in service	
STOCKHOLM/Arlanda	01L	CAT III	ILS	in service	
	19R	CAT I	ILS	in service	
	26	CAT I	ILS	in service	
	01R	CAT III	ILS	in service	
	19L	CAT III	ILS	in service	
STOCKHOLM/Bromma	12	CAT I	ILS	in service	
	30	CAT I	ILS	in service	
STOCKHOLM/Skavsta	26	CAT I	ILS	in service	
STOCKHOLM/Västerås	19	CAT I	ILS	in service	
STORUMAN	33	CAT I	ILS	in service	
SUNDSVALL-HÄRNÖSAND	34	CAT I	ILS	in service	
	16	CAT I	ILS	in service	
SÅTENÄS	19	CAT I	ILS	in service	
SÖDERHAMN	30	CAT I	ILS	in service	
TROLLHÄTTAN-VÄNERSBORG	33	CAT I	ILS	in service	
UMEA	14	CAT I	ILS	in service	
	32	CAT I	ILS	in service	
VILHELMINA	28	CAT I	ILS	in service	
VISBY	21	CAT I	ILS	in service	
VÄXJÖ/Kronoberg	19	CAT I	ILS	in service	
ÅRE ÖSTERSUND	12	CAT II	ILS	in service	
ÄNGELHOLM	14	CAT I	ILS	in service	
ÖREBRO	19	CAT I	ILS	in service	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	01	CAT I	ILS	in service	
ÖRNSKÖLDSVIK	12	CAT I	ILS	in service	
SWITZERLAND					
BALE-MULHOUSE	(see under France)				
BERNE (LSZB)	14	CAT I APV SBAS	ILS	1993/2000 2016	
LES EPLATURES (LSGC)	24	CAT I APV SBAS	ILS	 2011/2012	
GENEVE (LSGG)	O5	CAT I APV Baro VNAV	ILS	1993/2000 2015/2016	
	23	CAT III CAT I / III APV Baro VNAV	ILS GBAS	1993/2000 2016 2015/2016	
GRENCHEN (LSZG)	25	APV SBAS		2016 2016	
ALTENRHEIN (LSZR)	10	CAT I APV SBAS	ILS	before 1995 2011/2012	
LUGANO (LSZA)	O1	CAT I RNP AR	ILS	1993/2000 2016	
SION (LSGS)	26	CAT I RNP AR APCH	ILS	1993/2000 2016	
ZÜRICH (LSZH)	14	CAT III CAT I / III APV Baro VNAV	ILS GBAS	1993/2000 2016 2015/2016	
	16	CAT III APV Baro VNAV	ILS	1993/2000 2015/2016	
	28	CAT I APV Baro VNAV	ILS	1993/2000 2015/2016	
	34	CAT I APV Baro VNAV	ILS	1993/2000 2015/2016	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
TAJIKISTAN	No information/No plan				
THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA					
OHRID	2	CAT I	ILS	1993/2000	
		CAT I	MLS	1999/2000	
SKOPJE	34	CAT I	ILS	1993/2000	
		CAT I	MLS	1997/2000	
TURKEY					
AGRI	16	CATI	ILS	2010/2011	planned
ADANA	05	CAT I	ILS	1992/1993	in service
ANKARA/Esenboğa	21L	CAT I	ILS	1993/2000	Renewed-in service
	03R	CAT III	ILS	1993/2000	Renewed-in service
	21R	CAT II	ILS	1993/2000	Renewed-in service
	03L	CAT II	ILS	1993/2000	Renewed-in service
ANTALYA	36R	CAT II	ILS	1993/2000	in service
	36C	CAT I	ILS	2003/2005	in service
	18C	CAT I	ILS	2003/2005	in service
	18L	LOC	LLZ	2008/2009	in service
BATMAN	02	CATI	ILS	2010/2011	planned
BALIKESİR/Körfez	.05	CATI	ILS	2011/2012	planned
BURSA	25R	CAT I	ILS	1999/2000	in service
CANAKKALE	4	CATI	ILS	2009/2010	planned
DENIZLI/Cardak	24	CAT I	ILS	2000/2001	In Service
DIYARBAKIR	34R	CAT I	ILS	2006/2007	in service
ERZİNCAN	29	LOC	LLZ	2010/2011	planned
ERZURUM	26R	CAT I	ILS	1992/1993	in service
	08L	CATI	ILS	2010/2011	planned
GAZIANTEP	28R	CAT I	ILS	2006/2007	in service
HATAY	22	CAT I	ILS	2007/2008	in service
ISTANBUL/Ataturk	36R	CAT II	ILS	1993/19962000	In Service (Cat III Planned 2011)
	36L	CAT I	ILS	2000/2001	in service
	18R	CAT I	ILS	2000/2001	in service

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
	06	CAT III	ILS	2010	planned
	18L	CAT I	ILS	1995/1996	in service
	24	CAT I	ILS	1997/1998	in service
İSTANBUL/Sabiha GÖKÇEN	06	CATII	ILS	2000	in service
	24	CATI	ILS	2000	in service
IZMIR/Adnan Menderes	34R	CAT II	ILS	1993/2008	Renewed-in service
	16L	CAT II	ILS	1993/2000	in service
KARS	06	CAT I	ILS	1998/1999	in service
KAYSERI	25	CAT I	ILS	1998/1999	in service
KONYA	01L	CAT I	ILS	2004/2006	in service
MALATYA	21L	CAT I	ILS	2004/2006	in service
MUGLA/Dalaman	01	CAT II	ILS	1989/1990	in service
MUGLA/Milas Bodrum	11	CAT II	ILS	1998/1999	in service
	29	CAT II	ILS	1998/1999	in service
MUS	29R	CAT I	ILS	1995/1996	in service
NEVSEHİR/Kapadokya	11	CAT I	ILS	2004/2005	in service
SAMSUN/Carsamba	13	CAT II	ILS	1998/1999	in service
SANLIURFA/GAP	04	CAT I	ILS	2008/2009	in service
SIVAS	01	CAT I	ILS	2006/2007	in service
TEKIRDAG/Corlu	05	CAT I	ILS	1998/1999	in service
TRABZON	11	CAT I	ILS	1994/1995	in service
TURKMENISTAN	No information/No plan				
UKRAINE					
CHERNIVTSI	15	NPA	ILS	1993/2012	
	33	NPA	ILS	1993/2013	
DNIPROPETROVS'K	8	NPA	ILS	2002/2012	
	26	NPA	ILS	2008/2018	
DONETS'K	8	CAT I	ILS	2003/2013	
	26	CAT I	ILS	1991/2013	
IVANO-FRANKIVS'K	10	NPA	ILS	1993/2013	
	28	NPA	ILS	1993/2013	
KHARKIV	8	NPA	ILS	1993/2020	
	26	NPA	ILS	1993/2020	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
KHMEL'NYTS'KYI	34	NPA	ILS	1993/2011	
KRYVYI RIH	18	NPA	ILS	1993/2013	
	36	NPA	ILS	1993/2013	
KYIV/ANTONOV	15	CAT I	ILS	1998/2014	
	33	CAT I	ILS	1995/2012	
KYIV/BORYSPIL	18R	CAT II	ILS	1991/2014	
	18L	CAT I	ILS	1998/2013	
	36R	CAT IIIa	ILS	1998/2013	
	36L	CAT I	ILS	1989/2014	
KYIV/ZHULIANY	8	NPA	ILS	1993/2020	
	26	NPA	ILS/I	1993/2020	
LUHANS'K	9	NPA	ILS	2005/2021	
	27	NPA	ILS	1985/2013	
L'VIV	31	NPA	ILS	1993/2020	
	13	NPA	ILS	1993/2020	
MARIUPOL'	20	NPA	ILS	2002/2013	
MYKOLAIV	5	NPA	ILS	1986/2012	
	23	NPA	ILS	1985/2012	
ODESSA	34	CAT I	ILS	1991/2013	
	16	CAT I	MLS	1991/2013	
RIVNE	12	NPA	ILS	1993/2011	
SIMFEROPOL'	1	CAT I	ILS	2007/2023	
	19	CAT I	ILS	1993/2013	
VINNYTSIA/ Gavryshivka	13	NPA	ILS	1993/2010	
	31	NPA	ILS	1993/2012	
ZAPORIZHZHIA	2	NPA	ILS	1988/2013	
	20	NPA	ILS	1982/2013	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
UNITED KINGDOM					
ABERDEEN/Dyce	16	CAT I	ILS	1993 / -	
ABERDEEN/Dyce	34	CAT I	ILS	1993 / -	
BARROW/Walney Island	35	CAT I	ILS	2002 / -	
BELFAST/Aldergrove	17	CAT I	ILS	1993 / -	
BELFAST/Aldergrove	25	CAT III	ILS	1993 / -	
BELFAST/Aldergrove	07	APV Baro VNAV	GNSS	- / 2010	
BELFAST/Aldergrove	25	APV Baro VNAV	GNSS	- / 2010	
BELFAST/City	22	CAT I	ILS	2002 / -	
BIGGIN	21	CAT I	ILS	1993 / -	
BIRMINGHAM	15	CAT III	ILS	1993 / -	
BIRMINGHAM	33	CAT III	ILS	1993 / -	
BLACKPOOL	28	CAT I	ILS	1993 / -	
BLACKPOOL	10	RNAV NPA	GNSS	- / 2010	
BLACKPOOL	28	RNAV NPA	GNSS	- / 2010	
BOURNEMOUTH	08	CAT I	ILS	1993 / -	
BOURNEMOUTH	26	CAT III	ILS	1993 / -	
BRISTOL	09	CAT I	ILS	1993 / -	
BRISTOL	27	CAT III	ILS	1993 / -	
BRISTOL/FILTON	09	CAT I	ILS	1993 / -	
BRISTOL/FILTON	27	CAT I	ILS	1993 / -	
CAMBRIDGE	23	CAT I	ILS	1993 / -	
CARDIFF	12	CAT I	ILS	1993 / -	
CARDIFF	30	CAT I	ILS	1993 / -	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
COVENTRY	05	CAT I	ILS	1993 / -	
COVENTRY	23	CAT I	ILS	1993 / -	
CRANFIELD	03	RNAV NPA	GNSS	- / 2010	
CRANFIELD	21	CAT I	ILS	1993 / -	
CRANFIELD	21	RNAV NPA	GNSS	- /2010	
DONCASTER	02	CAT I	ILS	2006 / -	
DONCASTER	20	CAT III	ILS	2006 / -	
DUNDEE	09	CAT I	ILS	1993 / -	
DURHAM/Tees valley	23	CAT I	ILS	1993 / -	
DURHAM/Tees valley	05	CAT I	ILS	1993 / -	
EAST MIDLANDS	09	CAT I	ILS	1993 / -	
EAST MIDLANDS	27	CAT III	ILS	1993 / -	
EDINBURGH	06	CAT III	ILS	1993 / -	
EDINBURGH	06	TBA	MLS	- / TBA	Under consideration - date TBA
EDINBURGH	24	CAT III	ILS	1993 / -	
EDINBURGH	24	TBA	MLS	- / TBA	Under consideration - date TBA
EXETER	26	CAT I	ILS	1993 / -	
EXETER	08	CAT I	ILS	1993 / -	
EXETER	08	RNAV NPA	GNSS	2008 / -	
EXETER	26	RNAV NPA	GNSS	- / 2010	
FARNBOROUGH	06	CAT I	ILS	1993 / -	
FARNBOROUGH	24	CAT I	ILS	1993 / -	
GLASGOW	05	CAT III	ILS	1993 / -	
GLASGOW	05	TBA	MLS	- / TBA	Under consideration - date TBA
GLASGOW	23	CAT III	ILS	1993 / -	
GLASGOW	23	TBA	MLS	- / TBA	Under

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
					consideration - date TBA
GUERNSEY	09	CAT I	ILS	1993 / -	
GUERNSEY	27	CAT I	ILS	1993 / -	
HAWARDEN	04	CAT I	ILS	1993 / -	
HAWARDEN	22	CAT I	ILS	1993 / -	
HUMBERSIDE	20	CAT I	ILS	1993 / -	
INVERNESS	05	CAT I	ILS	1993 / -	
INVERNESS	23	CAT I	ILS	1993 / -	
ISLE OF MAN	08	CAT I	ILS	1993 / -	
ISLE OF MAN	26	CAT I	ILS	1993 / -	
JERSEY	09	CAT I	ILS	1993 / -	
JERSEY	27	CAT I	ILS	1993 / -	
KIRKWALL	09	CAT I	ILS	1993 / -	
KIRKWALL	27	CAT I	ILS	1993 / -	
LEEDS BRADFORD	14	CAT I	ILS	1993 / -	
LEEDS BRADFORD	32	CAT III	ILS	1993 / -	
LIVERPOOL	09	CAT I	ILS	1993 / -	
LIVERPOOL	27	CAT III	ILS	1993 / -	
LONDON/City	09	CAT I	ILS	1997 / -	
LONDON/City	27	CAT I	ILS	1997 / -	
LONDON/Gatwick	08L	APV Baro VNAV	GNSS	2009 / -	
LONDON/Gatwick	08R	CAT III	ILS	1993 / -	
LONDON/Gatwick	08R	APV Baro VNAV	GNSS	2009 / -	
LONDON/Gatwick	08R	TBA	MLS	- / TBA	Under consideration - date TBA
LONDON/Gatwick	26L	CAT III	ILS	1993 / -	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
LONDON/Gatwick	26L	APV Baro VNAV	GNSS	2009 / -	
LONDON/Gatwick	26L	TBA	MLS	- / TBA	Under consideration - date TBA
LONDON/Gatwick	26R	APV Baro VNAV	GNSS	2009 / -	
LONDON/Heathrow	09L	CAT III	ILS	1993 / -	
LONDON/Heathrow	09L	CAT III	MLS	2009 / -	
LONDON/Heathrow	09L	APV Baro VNAV	GNSS	- / 2010	
LONDON/Heathrow	09R	CAT III	ILS	1993 / -	
LONDON/Heathrow	09R	CAT III	MLS	2009 / -	
LONDON/Heathrow	09R	APV Baro VNAV	GNSS	- / 2010	
LONDON/Heathrow	27L	CAT III	ILS	1993 / -	
LONDON/Heathrow	27L	CAT III	MLS	2009 / -	
LONDON/Heathrow	27L	APV Baro VNAV	GNSS	2009 / -	
LONDON/Heathrow	27R	CAT III	ILS	1993 / -	
LONDON/Heathrow	27R	CAT III	MLS	2009 / -	
LONDON/Heathrow	27R	APV Baro VNAV	GNSS	- / 2010	
LONDON/Luton	08	CAT III	ILS	1993 / -	
LONDON/Luton	26	CAT III	ILS	1993 / -	
LONDON/Stansted	04	CAT III	ILS	1993 / -	
LONDON/Stansted	04	TBA	MLS	- / TBA	Under consideration - date TBA
LONDON/Stansted	22	CAT III	ILS	1993 / -	
LONDON/Stansted	22	TBA	MLS	- / TBA	Under consideration - date TBA
LONDONDERRY/Eglington	08	CAT I	ILS	- / 2010	Planned ILS
LONDONDERRY/Eglington	26	CAT I	ILS	1993 / -	
LYDD	03	RNAV NPA	GNSS	2009 / -	
LYDD	21	CAT I	ILS	1999 / -	
LYDD	21	RNAV NPA	GNSS	2009 / -	
MANCHESTER	05L	CAT III	ILS	1993 / -	
MANCHESTER	05L	APV Baro VNAV	GNSS	- / 2010	
MANCHESTER	05R	CAT I	ILS	1993 / -	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
MANCHESTER	05R	TBA	MLS	- / TBA	Under consideration - date TBA
MANCHESTER	05R	APV Baro VNAV	GNSS	- / 2010	
MANCHESTER	23L	TBA	ILS	1993 / -	
MANCHESTER	23L	TBA	MLS	- / TBA	Under consideration - date TBA
MANCHESTER	23L	APV Baro VNAV	GNSS	- / 2010	
MANCHESTER	23R	CAT III	ILS	1993 / -	
MANCHESTER	23R	APV Baro VNAV	GNSS	- / 2010	
MANCHESTER/Woodford	25	CAT I	ILS	1993 / -	
MANSTON/Kent International	10	APV Baro VNAV	GNSS	- / 2010	
MANSTON/Kent International	28	CAT I	ILS	2000 / -	
MANSTON/Kent International	28	APV Baro VNAV	GNSS	- / 2010	
NEWCASTLE	7	CAT III	ILS	1993 / -	
NEWCASTLE	25	CAT III	ILS	1993 / -	
NEWQUAY	12	CAT I	ILS	2008 / -	
NEWQUAY	30	CAT III	ILS	2008 / -	
NORWICH	09	RNAV NPA	GNSS	- / 2010	
NORWICH	27	CAT I	ILS	1993 / -	
NORWICH	27	RNAV NPA	GNSS	- / 2010	
OXFORD/Kiddlington	19	CAT I	ILS	1993 / -	
PLYMOUTH	31	CAT I	ILS	1993 / -	
PLYMOUTH	31	RNAV NPA	GNSS	2009 / -	
PRESTWICK	13	CAT I	ILS	1993 / -	
PRESTWICK	13	APV Baro VNAV	GNSS	- / 2010	
PRESTWICK	31	CAT I	ILS	1993 / -	
PRESTWICK	31	APV Baro VNAV	GNSS	- /2010	
SOUTHAMPTON	02	APV Baro VNAV	GNSS	- /2010	
SOUTHAMPTON	20	CAT I	ILS	1993 / -	

Location indicator	RWY designation number	Approach procedure (CAT I/II/III, APV/ baroVNAV,APV/SBAS)	Approach navigation services/facilites if any (ILS, MLS, GBAS)	year of actual/planned implementation	Remarks
SOUTHEND	6	CAT I	ILS	1993 / -	
SUMBURGH	27	CAT I	ILS	1993 / -	
UZBEKISTAN					
TASHKENT	O8L	CAT II	ILS	1997/	
	O8R	CAT I	ILS	1991/	
	26R	CAT I	ILS	1997/	
BUKHARA	O1	CAT I	ILS	1997/	
URGENCH	31	CAT I	ILS	1997/	
SAMARKAND	O9	CAT I	ILS	1997/	
TERMEZ	25	CAT I	ILS	1990/	

APPENDIX L

(paragraph 4.7.5 refers)

EUR Doc 019
NAT Doc 006, Part II

INTERNATIONAL CIVIL AVIATION ORGANIZATION

VOLCANIC ASH CONTINGENCY PLAN
-
EUR AND NAT REGIONS

~~July~~ [Month] 2010

THIS DOCUMENT IS ISSUED BY THE EUR/NAT OFFICE OF ICAO
UNDER THE AUTHORITY OF THE EANPG AND THE NAT SPG

TABLE OF CONTENTS

FOREWORD

Within and adjacent to the North Atlantic (NAT) and European (EUR) Regions there are areas of volcanic activity which are likely to affect flight in the NAT and EUR Regions. This plan sets out standardised guidelines for the alerting of aircraft when eruptions occur, and procedures to be followed.

Volcanic ash may be a hazard for flight operations. Recent encounters with volcanic ash have resulted in one or more of the following and other problems:

- Engine failures and malfunctions
- Subsequent failure of electrical, pneumatical and hydraulic systems
- Blocking of sensors, resulting inter alia in erroneous airspeed indications
- Smoke, dust and/or chemical pollution of cabin air; resulting in the need for aircrews to use oxygen masks
- Communication problems
- Loss of visibility through cockpit windows

Regulatory authorities of State of the Operator[1], or State of Registry [2]as appropriate, should therefore prescribe appropriate operational procedures for flight crew to be followed in case of operation in or near airspaces that are contaminated by volcanic ash. Operators are required by ICAO Annex 6 to assess the risk of operation in volcanic ash and to implement appropriate mitigation measures in accordance with their Safety Management System as approved by the State of the Operator/Registry as appropriate.

It should be noted that this document is an Air Traffic Management (ATM) contingency plan including its interfaces with supporting services such as Aeronautical Information Service (AIS}})) and Meteorological (MET) and that the Plan therefore primarily addresses the Provider States[3]. Where distinct actions by the Meteorological Watch Offices (MWOs) are described, these are additional procedures to be considered by MWOs. Where actions by Volcanic Ash Advisory Centres (VAACs) and operators are described, these are for clarification only.

Volcanic Ash can also affect the operation of aircraft on aerodromes. In extreme cases, aerodromes might no longer be available for operation at all, resulting in repercussions on the ATM system; e.g. diversions, revised traffic flows, etc.

These suggested procedures are not intended to establish or confirm a safe level of ash concentration. Values have been agreed to depict an area of ash concentration as low, medium or high. Operation through any area where volcanic ash is forecast is at the discretion of the operator.

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[1] The term “State of the Operator” refers to the role of a Contracting State as the regulatory authority with regard to aircraft operators having been issued an Aircraft Operator’s Certificate (AOC) by that` State.

[2] The term “State of Registry” refers to the State on whose register the aircraft is entered.

[3] The term “Provider State” refers to the role of a Contracting State as responsible for the provision of air navigation services within airspace over its territory and, as agreed by Regional Air Navigation Meeting, within defined airspace over the High Seas.

NOTE All modeled ash concentrations are subject to a level of uncertainty relative to errors in the estimation of the eruption strength.

Considering that a commercial aircraft will travel about 150 km (80 NM) in 10 minutes and that volcanic ash can rise to flight levels commonly used by turbine-engine aeroplanes in half that time, timely response to reports of volcanic ash is essential.

It is imperative that information on the volcanic activity is disseminated as soon as possible. In order to assist staff in expediting the process of originating and issuing relevant messages (SIGMET, NOTAM, ASHTAM), a series of templates should be available for different stages of the volcanic activity. Examples of SIGMET, NOTAM and ASHTAM announcing operational measures and volcanic activities in the different stages and are contained in ~~Attachment~~ Appendix I. ASHTAM will not be promulgated by service providers in the NAT Region.

A list of ICAO registered volcanoes should be available at the international NOTAM office with volcano name, number and nominal position.

In order to ensure the smooth implementation of the Contingency Plan in case of an actual volcanic eruption, annual VOLCEX exercises should be conducted.

Terminology

Area of Low Contamination: An airspace of defined dimensions where volcanic ash may be encountered at concentrations equal to or less than $2x10^{-3}$ g/m^3.

Area of Medium Contamination: An airspace of defined dimensions where volcanic ash may be encountered at concentrations greater than $2x10^{-3}$ g/m^3, but less than $4x10^{-3}$ g/m^3.

Area of High Contamination: An airspace of defined dimensions where volcanic ash may be encountered at concentrations equal to or greater than $4x10^{-3}$ g/m^3, or areas of contaminated airspace where no ash concentration guidance is available.

It should be noted that “defined dimensions” refers to horizontal and vertical limits.

The response to a volcanic event that affects air traffic has been divided into three distinct phases as described briefly below. Volcanic activity at many locations is continuously monitored by the scientific community. Furthermore, flight crew are required to report observations of significant volcanic activity by means of a Special Air Report(AIREP). Arrangements are in place to ensure that such information is transferred without undue delay to the appropriate aeronautical institutions responsible for subsequent action.

ALERTING PHASE The initial response, “raising the alert”, commences when a volcanic eruption is expected. Alerting information will be provided by SIGMET, NOTAM or ASHTAM as appropriate and disseminated to affected aircraft in flight by the most expeditious means. In addition to the normal distribution list, the NOTAM/ASHTAM will be addressed to meteorological/volcanological agencies.

If it is considered that the event could pose a hazard to aviation, a Danger Area[4] will be declared by NOTAM around the volcanic

[4] Wherever this document discusses the possible establishment of Danger Areas, States are not prevented from establishing Restricted or Prohibited Areas over the sovereign territory of the State if considered necessary by the State concerned.

source. Normally, clearances will not be issued through the Danger Area.

REACTIVE PHASE The Reactive Phase commences at the outbreak of the volcanic eruption and entrance of volcanic ash into the atmosphere and mainly pertains to aircraft in flight. A "Start of Eruption SIGMET" will be issued and a Danger Area will be declared by NOTAM. Normally, clearances will not be issued through the Danger Area.

PROACTIVE PHASE The Proactive Phase commences with the issuance of the first Volcanic Ash Advisory (VAA) and Volcanic Ash Graphic (VAG) after completion of reactive responses. Supplementary modelled ash concentration charts may be available. The T+0 hours and T+6 hours forecasts of the contaminated area are to be issued as SIGMET. The volcanic ash forecasts up to T+18 hours are to be used to prepare SIGMET. SIGMET shall be issued as soon as practicable but not more than 12 hours before the commencement of the period of validity, and shall be valid for up to 6 hours. The T+12 hours and T+18 hours (and further into the future, if available) volcanic ash forecasts of contaminated areas are to be issued as used to prepare NOTAM/ASHTAM. Significant changes may result in a reversion to a temporary Reactive Phase situation and unscheduled issuance of VAA, VAG and ash concentration charts, SIGMET and NOTAM/ASHTAM. As appropriate, Danger Areas will be notified via NOTAM.

Note that where SIGMET and NOTAM are mentioned in this document, volcanic ash SIGMET and volcanic ash NOTAM are being referred to.

This document pays due respect to Standards and Recommended Practices in ICAO Annexes, WMO procedures, and guidance material contained in ICAO documents, including, but not limited to, the following:

ICAO Annex 3 – *Meteorological Services for International Air Navigation*; ICAO Annex 11 – *Air Traffic Services*; ICAO Annex 15 - *Aeronautical Information Services*; ICAO Doc 4444 – *Procedures for Air Navigation Services – Air Traffic Management;* ICAO Doc 8126 – *Aeronautical Information Services Manual*; ICAO Doc 8896 – *Manual of Aeronautical Meteorological Practice*; ICAO Doc 9691 – *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds*; ICAO Doc 9766 – *Handbook on the International Airways Volcanic Watch*; ICAO Doc 9859 – *Safety Management Manual*; ICAO EUR Doc 014 – *EUR SIGMET and AIRMET Guide*; and WMO No.386 Volume I (*Manual of Global Telecommunications System*) Part II (*Operational Procedures for the Global Telecommunications System*).

1. ALERTING PHASE

1.1 This phase is characterised by a limited availability of information on the extent and severity of the volcanic event. The purpose of this phase is to ensure the safety of aircraft in flight and to promulgate information as a matter of urgency. Regardless of the extent of information available the Alerting Phase actions should be carried out for every event.

1.2 ORIGINATING ACC ACTIONS (eruption in its own flight information region)

1.2.1 In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring, or a volcanic ash cloud being reported which could pose a hazard to aviation, an Air Traffic Area Control Centre (ACC), on receiving information of such an occurrence, should carry out the following:

a) Define an initial Danger Area in accordance with established procedures,; if no such procedures have been established, the danger area should be defined as a circle with a radius of 222 km (120 NM). If the eruption has not commenced or if no information on upper winds is available, the circle should be centred on the estimated location of the volcanic activity. If the eruption has started and predicted upper wind information is available, the circle should be centred 111 km (60 NM) downwind from the volcano whilst enclosing it. The purpose of this initial Danger Area is to ensure safety of flight in the absence of any prediction from a competent authority of the extent of contamination.

b) Advise the associated Meteorological Watch Office (MWO) and the appropriate VAAC (unless the initial notification originated from either of these entities). The VAAC will then inform the appropriate Air Traffic Flow Management (ATFM) units.

c) Alert flights already within the Danger Area and offer assistance to enable aircraft to exit the area in the most expeditious and appropriate manner. Aircraft that are close to the Danger Area should be offered assistance to keep clear of the area. Tactically re-clear flights which would penetrate the Danger Area onto routes that will keep them clear. The ACC should immediately notify other affected ACC's of the event and the location and dimensions of the Danger Area. It should also negotiate any re-routings necessary for flights already coordinated but still within adjacent flight information regions (FIRs). It is also expected that adjacent ACCs will be asked to reroute flights not yet coordinated to keep them clear of the Danger Area.

d) Ensure that a NOTAM/ASHTAM is originated. This must provide as precise information as is available regarding the activity of the volcano. The name (where applicable), reference number and position of the volcano should be included along with the date and time of the start of the eruption (if appropriate). It is imperative that this information is issued by the international NOTAM office and disseminated as soon as possible.

e) In order to assist staff in expediting the process of composing the NOTAM/ASHTAM, a series of templates should be available for this stage of the volcanic activity. Example NOTAM and ASHTAM are provided in Attachment Appendix I.

1.2.2 In addition to sending the NOTAM/ASHTAM and any subsequent NOTAM/ASHTAM to the normal distribution list, it will be sent to the relevant meteorological agencies after adding the appropriate World Meteorological Organisation (WMO) header. Example NOTAM and ASHTAM are provided in ~~Attachment~~ Appendix I.

1.3 ADJACENT ACC ACTIONS

1.3.1 During the Alerting Phase aircraft should be tactically rerouted to avoid the Danger Area. Any ash contamination should be contained within a limited area and disruption to traffic should not be excessive. Adjacent ACCs should take the following action to assist:

a) When advised, re-clear flights to which services are being provided and which will be affected by the Danger Area.

b) Unless otherwise instructed, continue normal operations except:

i) if one or more routes are affected by the Danger Area, stop clearing aircraft on these routes and take steps to reroute onto routes clear of the Danger Area; and

ii) initiate a running plot of the affected area.

1.4 ATFM UNIT ACTION

1.4.1 The ATFM unit and the VAAC will determine how their initial communications will take place on the basis of bilateral agreements. Upon reception of preliminary information on volcanic activity from the VAAC, the ATFM unit should initiate actions in accordance with its procedures to ensure exchange of information between Air Navigation ~~s~~Service Providers (ANSP), MWOs, VAACs and aircraft operators concerned.

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2. REACTIVE PHASE

2.1 This phase commences at the outbreak of volcanic eruption. Major activities of the Reactive Phase are: Issuance of an eruption commenced SIGMET, eruption commenced NOTAM/ASHTAM and~~,~~ rerouting of airborne traffic~~,~~. ~~first VAA and issuance of SIGMET/NOTAM/ASHTAM based on the first VAA.~~ As appropriate, Danger Areas will be notified via NOTAM. This phase will last until such time as the Proactive Phase can be activated.

2.2 ORIGINATING ACC ACTIONS (eruption in its own FIR)

2.2.1 The ACC providing services in the FIR within which the volcanic eruption takes place should inform flights about the existence ~~and~~ , extent and forecast movement of volcanic ash and provide information useful for the safe conduct of flights.

2.2.2 Rerouting of traffic commences immediately or may be in progress if the alerting time has been sufficient to facilitate activation of the Alerting Phase. The ACC should assist in rerouting aircraft around the Danger Area as expeditiously as possible. Adjacent ACCs should also take the Danger Area into account and give similar assistance to aircraft as early as possible.

2.2.3 During this phase the ACC should:

a) Maintain close liaison with its associated MWO. The MWO should issue a SIGMET message on the extent and forecast movement of the ash cloud and the forecast extent of the ash contamination at least every 6 hours, valid for 6 hours, based on the valid VAA as supplemented by additional appropriate sources of information.

b) Based on these forecasts and in cooperation with the adjacent ACCs, ATFM measures should be devised and updated when necessary to enable aircraft to remain clear of Danger Areas.

c) Ensure a NOTAM is originated to define a Danger Area.

d) Ensure that reported differences between published information and observations (pilot reports, airborne measurements, etc.) are forwarded as soon as possible to the appropriate authorities.

e) Should significant reductions in intensity of volcanic activity take place during this phase and the airspace no longer is contaminated by volcanic ash, a NOTAMC cancelling the last active NOTAM shall be issued stating the cause for cancellation; new ASHTAM should be promulgated to update the situation. Otherwise, begin planning for the Proactive Phase in conjunction with the appropriate ATFM unit and the affected ACCs.

2.3 ADJACENT ACC ACTIONS

2.3.1 During the Reactive Phase adjacent ACCs should take the following actions:

a) Maintain close liaison with the appropriate ATFM unit and the originating ACC to design, implement and keep up to date ATFM measures which will enable aircraft to remain clear of Danger Areas.

b) In the event that tactical measures additional to those issued by the appropriate ATFM unit are required, the adjacent ACC should, in cooperation with the originating ACC, impose such measures. Details are included in the ATFM Procedures section of this document.

c) Maintain a running plot of the affected area.

d) Begin planning for the Proactive Phase in conjunction with the appropriate ATFM unit and ACCs concerned.

2.4 ATFM UNIT ACTIONS

2.4.1 During the Reactive Phase, depending on the impact of the volcanic ash, the appropriate ATFM unit should organise the exchange of latest information on the developments with the VAAC, ANSPs, and MWOs and operators concerned.

3. PROACTIVE PHASE

3.1 The Proactive Phase commences with the issuance of the first VAA/VAG by the VAAC after completion of the reactive responses. The VAA/VAG will contain forecasts of the expected vertical and horizontal extent of the volcanic ash cloud, and its expected movement, at six-hourly time-steps for the period T+0 to T+18 hours. In addition, ~~T~~the meteorological office co-located with the VAAC will, where feasible, issue ash concentration forecasts to supplement the VAA/VAG information, at six-hourly intervals with a nominal validity time of 00~~:~~00Z, 06~~:~~00Z, 12~~:~~00Z and 18~~:~~00Z which will define Areas of Low, Medium and High Contamination.

3.2 Following the Reactive Phase, the VAA/VAG and (where available) ash concentration forecasts ~~for the time of issuance T+0 hours and T+6 hours~~ should be used to define airspace volumes encompassing the furthest extent of contamination predicted for that period. These volumes should be used to:

a) Publish NOTAM indicating the extent of Danger Areas, indicating which areas of contamination are included therein;

b) Issue SIGMET warning of potential hazard from areas of volcanic ash contamination;

c) Publish NOTAM to separately indicate the extent of Areas of Medium Contamination if not included in a Danger Area; and

d) Apply appropriate ATFM measures.

3.3 ~~For the l~~Longer term forecasts~~, T +12 hours and T +18 hours forecasts~~ (i.e. beyond T+6 hours) should be used to generate NOTAM in order to ensure that adequate information is available to support flight planning. These messages should differentiate between levels of contamination.

3.4 Operators should use the information published regarding Areas of Low, Medium and High Contamination to plan their flights in accordance with their regulatory requirements and the service that will be provided in the airspace concerned. Operators should be aware that, depending on the State concerned, Danger Areas may be established to contain an Area of High Contamination, Areas of Medium/High Contamination, or Areas of Low/Medium/High Contamination.

3.5 The volcanic ash may affect any combination of airspace; therefore, it is impossible to prescribe measures to be taken for any particular situation. Nor is it possible to detail the actions to be taken by any particular ACC. The following guidance may prove useful during the Proactive Phase but should not be considered mandatory:

a) ACCs affected by the movement of the ash should ensure that ~~continue to originate~~ NOTAM/ASHTAM continue to be originated at appropriate intervals. ACCs concerned and the appropriate ATFM unit should continue to publish details on measures taken.

b) Depending on the impact of the volcanic ash, the appropriate ATFM unit may take the initiative to organise teleconferences to exchange latest information on the developments with the VAACs, ANSPs and MWO's and operators concerned.

c) During this phase the VAAC should endeavour to assess the vertical extent of the ash contamination and provide appropriate VAA/VAG to define the contaminated airspace as accurately as possible. For the purpose of flight planning, operators should treat the horizontal and vertical limits of the Danger Area to be over-flown as they would mountainous terrain. Operators are cautioned regarding the risk of cabin depressurisation or engine failure resulting in the inability to maintain level flight above the Danger Area, especially where Extended Twin Operations (ETOPS) aircraft are involved.

d) Any reported differences between published information and observations (pilot reports, airborne measurements, etc.) should be forwarded as soon as possible to the appropriate authorities; and

e) When the airspace is no longer contaminated by volcanic ash, a NOTAMC cancelling the active NOTAM shall be promulgated. New ASHTAM should be promulgated to update the situation.

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4. ATFM PROCEDURES

4.1 Depending on the impact of the volcanic ash, the appropriate ATFM unit should organize the exchange of latest information on the developments with the VAACs, ANSPs and MWOs and operators concerned.

4.2 The ATFM unit will apply ATFM measures on request of the ANSPs concerned. The measures should be reviewed and updated in accordance with updated information. Operators should also be advised to maintain watch for NOTAM/ASHTAM and SIGMET for the area.

NOTE Procedures applicable to the EUROCONTROL Central Flow Management Unit (CFMU) area of responsibility are contained in the EUROCONTROL – Basic CFMU Handbook. This document is available at http://www.cfmu.eurocontrol.int/cfmu/public/standard_page/library_index.html

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5. AIR TRAFFIC CONTROL PROCEDURES[5]

5.1 If volcanic ash is reported or forecast in the FIR for which the ACC is responsible, the following procedures should be followed:

a) Relay all available information immediately to pilots whose aircraft could be affected to ensure that they are aware of the horizontal and vertical extent of the ash contamination;

[5] This information is adapted from the *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* (Doc 9691). Refer to this document for full details.

b) If requested, suggest appropriate rerouting to assist flights to avoid areas of known or forecast ash contamination;

c) When appropriate, remind pilots that volcanic ash may not be detected by ATC radar systems;

d) If modelled ash concentration charts are available showing Areas of Low, Medium and High Contamination, the Provider State may establish Danger Areas. Depending on the State concerned, the Danger Areas will be established to contain an Area of High Contamination, Areas of Medium/High Contamination, or Areas of Low/Medium/High Contamination;

e) In the absence of ash concentration guidance, the entire area of forecast volcanic ash should be considered as an Area of High Contamination, for the purposes of applying ATC procedures, until ash concentration guidance is available;

f) Normally, ATC should not provide a clearance for an aircraft to enter or operate within a Danger Area. Assistance to enable an aircraft to exit a Danger Area in the most expeditious and appropriate manner should be provided;

g) In the NAT Region, so far as practicable, Organized Tracks will not be established through a Danger Area. If Organized Tracks are established through contaminated areas, a note will be included on the NAT Track Message to identify such tracks; and

h) If the ACC has been advised by an aircraft that it has entered an area of ash contamination and indicates that a distress situation exists:

   i) consider the aircraft to be in an emergency situation;

   ii) do not initiate any climb clearances to turbine-powered aircraft until the aircraft has exited the area of ash contamination; and

   iii) do not attempt to provide vectors without pilot concurrence.

5.2 Experience has shown that the recommended escape manoeuvre for an aircraft which has encountered volcanic ash is to reverse its course and begin a descent (if terrain permits). However, the final responsibility for this decision rests with the pilot.

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6. GENERAL GUIDANCE FOR THE DEVELOPMENT OF ATS CONTINGENCY PLANS FOR VOLCANIC ASH[6]

6.1 In a contingency plan relating to volcanic ash certain steps need to be taken to provide a coordinated and controlled response for dealing with an event of this nature. Responsibilities should be clearly defined for the manager in charge, supervisors and Air Traffic Controllers (ATCOs). The plan should also identify the officials who need to be contacted, the type of messages that are to be created, the proper distribution of the messages and how to conduct business.

6.2 ATCOs need to be trained and be made aware of the potential effects if aircraft encounter unsafe levels of volcanic ash.

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[6] This information is adapted from the *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* (Doc 9691). Refer to this document for full details.

6.3 Some particular points of guidance are as follows:

a) Volcanic ash contamination may extend for hundreds of miles horizontally and reach the stratosphere vertically

b) Volcanic ash may block the pitot-static system of an aircraft, resulting in unreliable airspeed indications;

c) Braking conditions at airports where volcanic ash has recently been deposited on the runway will affect the braking ability of the aircraft. This is more pronounced on runways contaminated with wet ash. Pilots and ATCOs should be aware of the consequences of volcanic ash being ingested into the engines during landing and taxiing. For departure it is recommended that pilots avoid operating in visible airborne ash; instead they should allow sufficient time for the particles to settle before initiating a take-off roll, in order to avoid ingestion of ash particles into the engine. In addition, the movement area to be used should be carefully swept before any engine is started;

d) Volcanic ash may result in the failure or power loss of one or all engines of an aeroplane; and

e) Airports might have to be declared unsafe for flight operations. This might have consequences for the ATM system.

6.4 The ACC in conjunction with ATFM units serves as the critical communication link between the pilot, dispatcher and meteorologists during a volcanic eruption. During episodes of volcanic ash contamination within the FIR, the ACC has two major communication roles. First and of greatest importance is its ability to communicate directly with aircraft en route which may encounter the ash. Based on the information provided in the volcanic ash SIGMET and VAAs and working with MWO, the ATCOs should be able to advise the pilot of which flight levels are affected by the ash and the projected trajectory and drift of the contamination. Through the use of radio communication, ACCs have the capability to coordinate with the pilot alternative routes which would keep the aircraft away from the volcanic ash.

6.5 Similarly, through the ~~issuance~~ origination of a NOTAM/ASHTAM for volcanic activity the ACC can disseminate information on the status and activity of a volcano even for pre-eruption increases in volcanic activity. NOTAM/ASHTAM and SIGMET together with AIREPs are critical to dispatchers for flight planning purposes. Operators need as much advance notification as possible on the status of a volcano for strategic planning of flights and the safety of the flying public. Dispatchers need to be in communication with pilots en route so that a coordinated decision can be made between the pilot, the dispatcher and ATC regarding alternative routes that are available. The ACC should advise the ATFM unit concerning the availability of alternative routes. It cannot be presumed, however, that an aircraft which is projected to encounter ash will be provided with the most desirable route to avoid the contamination. Other considerations have to be taken into account such as existing traffic levels on other routes and the amount of fuel reserve available for flights which may have to be diverted to other routes to allow for the affected aircraft to divert.

6.6 The NOTAM/ASHTAM for volcanic activity provides information on the status of activity of a volcano when a change in its activity is, or is expected to be, of operational significance. They are originated by the ACC and issued through the respective international NOTAM office based on the information received from any one of the observing sources and/or advisory information provided by the associated VAAC. In addition to providing the status of activity of a volcano, the NOTAM/ASHTAM also provides information on the location, extent and movement of the ash contamination and the air routes and flight levels affected. NOTAM can also be used to limit access to the airspace affected by the volcanic ash. Complete guidance on the issuance of NOTAM and ASHTAM is provided in Annex 15 — *Aeronautical Information Services*. Included in Annex 15 is a volcano level of activity colour code chart. The colour code chart alert may be used to provide information on the status of the volcano, with "red" being the most severe, i.e. volcanic eruption in progress with an ash column/cloud reported above flight level 250, and "green" at the other extreme being volcanic activity considered to have ceased and volcano reverted to its normal pre-eruption state. It is very important that NOTAM for volcanic ash be cancelled and ASHTAM be updated as soon as the volcano has reverted to its normal pre-eruption status, no further eruptions are expected by volcanologists and no ash is detectable or reported from the FIR concerned.

6.7 It is essential that the procedures to be followed by ACC personnel, including supporting services such as MET, AIS and ATFM should follow during a volcanic eruption/ash cloud event described in the foregoing paragraphs are translated into local staff instructions (adjusted as necessary to take account of local circumstances). It is also essential that these procedures/instructions form part of the basic training for all ATS, AIS, ATFM and MET personnel whose jobs would require them to take action in accordance with the procedures. Background information to assist the ACC or Flight Information Centre (FIC) in maintaining an awareness of the status of activity of volcanoes in their FIR(s) is provided in the monthly Scientific Event Alert Network Bulletin published by the United States Smithsonian Institution and sent free of charge to ACCs/FICs requesting it.

APPENDIX A

ANTICIPATED PILOT ISSUES WHEN ENCOUNTERING VOLCANIC ASH

1. ATCOs should be aware that flight crews will be immediately dealing with some or all of the following issues when they encounter volcanic ash:

a) Smoke or dust appearing in the cockpit which may prompt the flight crew to don oxygen masks (could interfere with the clarity of voice communications);

b) Acrid odour similar to electrical smoke;

c) Multiple engine malfunctions, such as stalls, increasing Exhaust Gas Temperature (EGT), torching, flameout, and thrust loss causing an immediate departure from assigned altitude;

d) On engine restart attempts, engines may accelerate to idle very slowly, especially at high altitudes (could result in inability to maintain altitude or Mach number);

e) At night, St. Elmo's fire/static discharges may be observed around the windshield, accompanied by a bright orange glow in the engine inlet(s);

f) Possible loss of visibility due to cockpit windows becoming cracked or discoloured, due to the sandblast effect of the ash;

g) Cockpit windows could be rendered completely opaque; and/or

h) Sharp distinct shadows cast by landing lights as compared to the diffused shadows observed in clouds (this affects visual perception of objects outside the aircraft).

2. Simultaneously, ATC can expect pilots to be executing contingency procedures. This may include a possible course reversal and/or an emergency descent.

APPENDIX B

ACTION TAKEN BY METEOROLOGICAL WATCH OFFICES (MWO) IN THE EVENT OF A VOLCANIC ERUPTION[~~7~~]

1. On receipt of information of a volcanic eruption and/or the existence of volcanic ash, the MWO will:

a) Notify, if necessary, the VAAC designated to provide VAA/VAG for the FIR for which the ~~ACC~~ MWO is responsible that a volcanic eruption and/or ash has been reported. In the event that the MWO becomes aware, from a source other than an ACC, of the occurrence of pre-eruption activity, a volcanic eruption or ash from any other source ~~other than the ACC~~, the information will be passed with all available relevant details on the extent, forecast movement and concentration of volcanic ash immediately to the ACC and to the designated VAAC;

b) Reported differences between ash encounters by aircraft and the information published in VAA/VAG, SIGMET or NOTAM/ASHTAM received by an ACC shall be made available as soon as possible to the respective MWO, preferably in the form of an AIREP. The MWO will relay the information to the respective originators of the published information;

c) Notify adjacent MWOs designated to provide ~~VAA~~ SIGMET that a volcanic eruption and/or ash cloud has been reported, provide available relevant details on the extent, forecast movement and (if known) concentration of volcanic ash. In the event that any other MWO becomes aware of the occurrence of volcanic ash cloud from any source other than the VAAC, the information should be passed immediately to the VAAC and any adjacent MWO(s) downstream of the moving ash cloud;

d) As soon as practicable, advise the ACC and the VAAC whether or not the volcanic ash is identifiable from satellite images/data, ground based or airborne measurements or other relevant sources;

e) Issue SIGMET relating to the ~~expected movement~~ horizontal and vertical extent of volcanic ash cloud and its expected movement for a validity period of up to 6 hours~~, to which is appended an 'outlook' providing information for up to a further 12 hours~~. The SIGMET shall include an observed (or forecast) position of the ash cloud at the *start* of the period of validity, and a forecast position at the *end* of the period of validity. The SIGMET should be based on the advisory information provided by the VAAC. Include in the SIGMET ~~address~~ distribution list the three Regional OPMET Centres (ROC) in London, Toulouse and Vienna. As well as inter-regional distribution, the ROCs will ensure dissemination of the SIGMET to all the VAACs, the London World Area Forecast Centre (WAFC)~~, the Vienna~~ ~~International OPMET data base~~ and the three ~~r~~Regional OPMET ~~d~~Data ~~b~~Banks (RODB);

f) provide information to assist with the origination of NOTAM by ACCs and maintain continuous coordination with ACCs, adjacent MWOs and the VAAC concerned to ensure consistency in the issuance and content of SIGMET and NOTAM/ASHTAM; and

~~[7] This information is adapted from the *Handbook on the International Airways Volcano Watch (IAVW)* (Doc 9766). Refer to this document for full details.~~

g) provide, if possible, regular volcanic briefings, based on the latest available ash observations and forecasts, to ACCs, ATFM units, Airport Operators and aircraft operators concerned, giving an outlook for ~~more than~~beyond T+12 hours.

APPENDIX C

ACTION TO BE TAKEN BY THE VOLCANIC ASH ADVISORY CENTRE (VAAC) IN THE EVENT OF A VOLCANIC ERUPTION[8]

1. On receipt of information from a MWO or any other source, of significant pre-eruptive/eruption activity and/or a volcanic ash cloud observed, the VAAC should:

a) Initiate the volcanic ash computer trajectory/dispersal model in order to provide advisory information on volcanic ash trajectory to MWOs, ACCs, ATFM units and operators concerned;

b) Review satellite images/data and any available pilot reports of the area for the time of the event to ascertain whether a volcanic ash cloud is identifiable and, if so, its extent and movement;

c) Inform the appropriate ATFM unit of the volcanic ash activity;

d) Prepare and issue advisories on the extent, and forecast trajectory, of the volcanic ash contamination in message format for transmission to the MWOs, ACCs, ATFM units and operators concerned in the VAAC area of responsibility, ~~to the London WAFC,~~ and to the three Regional OPMET Centres (ROC) in London, Toulouse and Vienna. ~~International OPMET data base~~ As well as inter-regional distribution, the ROCs will ensure dissemination of the advisory to all the VAACs, the London World Area Forecast Centre (WAFC), ~~and to other VAACs~~and the three Regional OPMET Data Banks (RODB);

e) Monitor subsequent satellite information or other available observations to assist in tracking the movement of the volcanic ash;

f) Continue to issue advisory information (i.e. VAA/VAG), for validity periods T+0, T+6, T+12 and T+18 hours after data time, to MWOs, ACCs, ATFM units and operators concerned at least at 6 hour intervals, and preferably more frequently, until such time as it is considered that the volcanic ash is no longer identifiable from satellite data, no further reports of volcanic ash are received from the area and no further eruptions of the volcano are reported; and

g) Maintain regular contact with other VAACs and meteorological offices concerned, and, as necessary, the Smithsonian Institute Global Volcanism Network, in order to keep up to date on the activity status of volcanoes in the VAAC area of responsibility.

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[8] ~~This information is adapted from the *Handbook on the International Airways Volcano Watch (IAVW)* (Doc 9766). Refer to this document for full details.~~

APPENDIX D

PROCEDURES FOR THE PRODUCTION OF MODELLED ASH CONCENTRATION CHARTS

1. The following procedures are to be applied by the meteorological office of a Provider State, having accepted, by regional air navigation agreement, the responsibility for providing a VAAC within the framework of the International Airways Volcano Watch (IAVW).

2. All (VAA) and Volcanic Ash Graphics (VAG) information issued by a Mmeteorological Ooffice under designation as a VAAC within the framework of the IAVW shall be prepared in accordance with ICAO provisions.

3. Additionally, where feasible, the meteorological office may issue modelled ash concentration charts and corresponding coordinate data files at 6-hourly intervals showing the different ash concentrations for the validity periods T+0, T+6, T+12 and T+18 hours after data time. These charts will show forecast ash distribution in terms of Areas of Low, Medium and High Contamination and be published at the same time, and with the same validity periods, as the VAA/VAG described above. Updated charts and data files should be distributed prior to the end of the validity time of those previously distributed.

4. These data may be used by Provider States to prepare SIGMET, and NOTAM/ASHTAM and to establish Danger Areas as appropriate.

APPENDIX E

RECOMMENDED ACTIONS BY STATES OF THE OPERATOR/REGISTRY WITH REGARDS TO AIRCRAFT OPERATIONS IN THE EVENT OF A VOLCANIC ERUPTION

Safety Risk Assessments For Flights In Airspace Proximate To Volcanic Ash

1 Introduction

1.1 It is recommended that States of the Operator/Registry as appropriate which intend to allow operators under their jurisdiction to operate in areas of volcanic ash contamination consider requiring operators to carry out a safety risk assessment prior to carrying out such operations.

1.2 Safety risk assessments should be completed prior to planned operations in airspace or to/from aerodromes which may be contaminated by volcanic ash.

2 Applicability

2.1 All operators conducting flights in airspace and/or to/from aerodromes which could be affected by volcanic ash.

3 Recommendations

3.1 In accordance with ICAO Annex 6, Chapter 3, paragraph 3.3- Safety Management, it is recommended that States of the Operator/Registry as appropriate require all operators, planning to operate in areas where the presence of volcanic ash is forecast, to carry out a safety risk assessment prior to planned operations. The safety risk assessment should include a requirement for the operator to:

a) Conduct their own risk assessment and develop operational procedures to address any remaining risks;

b) Put in place appropriate maintenance ash damage inspections; and

c) Ensure that any ash related incidents are reported by AIREP and followed up by a Volcanic Activity Report (VAR).

3.2 Guidance in the preparation of such a safety risk assessment is provided in Appendix F of this document.

APPENDIX F

EXAMPLE SAFETY RISK ASSESSMENT PROCESS

1 Introduction

1.1 The safety risk assessment process is described in the *Safety Management Manual* (Doc 9859) .The process involves identifying the hazards associated with the activity (in this case airspace proximate to volcanic ash or flying to and from aerodromes affected by volcanic ash), considering the seriousness of the consequences of the hazard occurring (the severity), evaluating the likelihood or probability of it happening, deciding whether the consequent risk is acceptable and within the organisation's safety performance criteria (acceptability), and finally taking action to reduce the safety risk to an acceptable level (mitigation).

2 Hazard Identification

2.1 A hazard is any situation or condition that has the potential to cause adverse consequences. A suggested list of topics, that is not necessarily exhaustive, to be considered is attached at **Appendix G**

3 The Safety Risk Assessment

3.1 Risk is an assessment of the likelihood and the severity of adverse consequences resulting from a hazard.

3.2 To help an operator decide on the likelihood of a hazard causing harm, and to assist with possible mitigation of any perceived safety risk, all relevant stakeholders should be consulted.

3.3 The safety risk from each hazard should be assessed using a suitably calibrated safety risk assessment matrix. An example risk assessment matrix is given in *Safety Management Manual* (Doc 9859) but an alternative which aligns with an organisation's own Safety Management System (SMS) would be equally appropriate. The safety risk should be derived by considering the severity of the safety outcome arising from the hazard, together with the likelihood of the outcome.

3.4 The severity of any adverse consequences resulting from a particular hazard should be assessed using a suitably calibrated severity scale. Example scales are given in *Safety Management Manual* (Doc 9859) but an alternative, which aligns with an organisation's own SMS would be equally appropriate. Note that, for any flight, the safety outcome of a volcanic ash encounter may be significant.

3.5 Risk Likelihood

3.5.1 The likelihood or probability of adverse consequences resulting from a particular hazard should then be assessed. The likelihood should be agreed using a suitably calibrated likelihood or probability scale. An example probability scale is given in *Safety Management Manual* (Doc 9859), but an alternative which aligns with an organisation's own SMS would be equally appropriate.

3.5.2 When assessing likelihood or probability the following factors should be taken into account:

- The degree of exposure to the hazard.

- Any historic incident or safety event data relating to the hazard. This can be derived from data from industry, regulators, other operators, Air Navigation Service Providers, internal reports etc.
- The expert judgement of relevant stakeholders.

3.5.3 The results of the assessment should be recorded in a hazard log, sometimes referred to as a risk register. An example of a hazard log is at **Appendix H**.

3.6 Risk Tolerability

3.6.1 At this stage of the process the safety risks should be classified in a range from acceptable to unacceptable. A suitable set of definitions for Risk Classification is given in *Safety Management Manual* (Doc 9859).

3.6.2 Appropriate mitigations for each identified hazard should then be considered, recorded on the hazard log and implemented. Mitigations must be adopted in order to reduce the safety risks to an acceptable level, but additional mitigation wherever reasonably practicable should also be considered where this might reduce an already acceptable safety risk even further. Thus, the mitigation process should reduce the safety risk to be as low as reasonably practicable.

3.6.3 Not all hazards can be suitably mitigated in which case the operation should not proceed.

3.7 Mitigating Actions

3.7.1 Mitigating actions by themselves can introduce new hazards. Where an organisation has an effective SMS then procedures will exist for continual monitoring of hazard, risk and involvement of qualified personnel in accepting the mitigating actions or otherwise. Operators without an effective SMS should repeat the safety risk assessment following any mitigation process and at regular intervals as the circumstances on which the original assessment was predicated may have changed. This ensures ongoing safety management or monitoring.

3.8 Records

3.8.1 The results of the safety risk assessment should be documented and promulgated throughout the organisation and submitted to the operator's national safety authority. Actions should be completed and mitigations verified and supported by evidence prior to the start of operations.

3.8.2 Any assumptions should be clearly stated and the safety risk assessment reviewed at regular intervals to ensure the assumptions and decisions remain valid.

3.8.3 Any safety performance monitoring requirements should also be identified and undertaken through the organisation's safety management processes.

APPENDIX G

EXAMPLE TABLE OF CONSIDERATIONS FOR PLANNED OPERATIONS IN AIRSPACE OR TO/FROM AERODROMES WHICH MAY BE CONTAMINATED BY VOLCANIC ASH.

Considerations	Guidance
Operator Procedures	
Type Certificate Holder Guidance	Operators must obtain advice from the Type Certificate Holder and engine manufacturer concerning both operations in potentially contaminated airspace and/or to/from aerodromes contaminated by volcanic ash, including subsequent maintenance action.
Guidance for Company Personnel	Publish procedures for flight planning, operations and maintenance. Review of flight crew procedures for detection of volcanic ash and associated escape manoeuvres. Type Certificate Holder advice on operations to/from aerodromes contaminated by volcanic ash including performance.
Flight Planning	These considerations will be applicable to all flights that plan to operate in airspace or to/from aerodromes which may be contaminated by volcanic ash.
NOTAM and ASHTAM	The operator must closely monitor NOTAM and ASHTAM to ensure that the latest information concerning volcanic ash is available to crews.
SIGMETs	The operator must closely monitor SIGMETs to ensure that the latest information concerning volcanic ash is available to crews.
Departure, Destination and any Alternates	Degree of contamination, additional performance, procedures and maintenance consideration.
Routing Policy	Shortest period in and over contaminated area.
Diversion Policy	Maximum allowed distance from a suitable alternate. Availability of alternates outside contaminated area. Diversion policy after an ash encounter.

Minimum Equipment List / Dispatch Deviation Guide	Consider additional restrictions for dispatching aircraft: • air conditioning packs; • engine bleeds; • air data computers; • standby instruments; • navigation systems; • Auxiliary Power Unit (APU); • Airborne Collision Avoidance System (ACAS); • Terrain Awareness Warning System (TAWS); • provision of crew oxygen; and • supplemental oxygen for passengers. (This list is not necessarily exhaustive.)

Considerations	**Guidance**
Operator Procedures	
Provision of Enhanced Flight Watch	Timely information to and from crew of latest information.
Fuel Policy	Consideration to the carriage of extra fuel.

Considerations	**Guidance**
Crew Procedures	These considerations will be applicable to all flights that plan to operate in airspace or to/from aerodromes which may be contaminated by volcanic ash.
Pilot Reports	Requirements for reporting in the event of an airborne encounter. Post-flight reporting.
Mandatory Occurrence Reports	Reminder regarding the necessity for filing MORs following an encounter.
Standard Operating Procedures	Review changes to normal and abnormal operating procedures: • pre-flight planning; • operations to/from aerodromes contaminated with volcanic ash; • supplemental oxygen; • engine-out procedures; and • escape routes. (This list is not necessarily exhaustive.)

Technical Log	Any actual or suspected volcanic ash encounter will require a tech log entry and appropriate maintenance action prior to subsequent flight. Penetration (detail and duration) of airspace or operations to/from aerodromes which may be contaminated by volcanic ash will require a tech log entry.

Considerations	Guidance
Maintenance Procedures	Operators, who are operating in areas of ash contamination, are recommended to enhance vigilance during inspections and regular maintenance and potentially adjust their maintenance practices, based upon the observations, to prevent unscheduled maintenance. Observations should include signs of unusual or accelerated abrasions, corrosion and / or ash accumulation. Operator co-operation is requested in reporting to manufacturers and the relevant authorities their observations and experiences from operations in areas of ash contamination. If significant observations are discovered beyond normal variations currently known, manufacturers will share these observations, and any improved recommendations for maintenance practices, with all operators and the relevant authorities.

Note: The above list is not necessarily exhaustive and operators must make their own assessments of the hazards on the specific routes they fly.

____

APPENDIX H

EXAMPLE OF A HAZARD LOG (RISK REGISTER)

HAZARD		Incident Sequence Description	Existing Controls	Outcome (Pre-Mitigation)			Additional Mitigation Required	Outcome (Post-Mitigation)			Actions and Owners	Monitoring and Review Requirements
No.	Description			Severity	Likelihood	Risk		Severity	Likelihood	Risk		

(additional rows as necessary)

APPENDIX I

EXAMPLE SIGMET, NOTAM, ASHTAM

Guidance on WMO headers referred to in Alerting Phase, paragraph 1.2.2 refers can be found in WMO No.386 Volume I (*Manual of Global Telecommunications System)* Part II *(Operational Procedures for the Global Telecommunications System)*

NOTAM Offices are reminded that ASHTAM (or NOTAM for volcanic ash) should be distributed via AFTN to their associated MWO, the SADIS Gateway and all the VAACs, in accordance with guidelines contained in ICAO Doc 9766 Chapter 4 paragraph 4.3.

1. SIGMET

```
WVUK02 EGRR 180105
EGGX SIGMET 2 VALID 180105/180705 EGRR-
EGGX SHANWICK OCEANIC FIR VA ERUPTION MT KATLA PSN N6337
W01901 VA CLD OBS AT 0100Z N6100 W02730 - N6100 W02230 -
N5800 W01730 - N5630 W02000 FL200/350 MOV SE 35KT FCST
0705Z VA CLD APRX N5800 W02000 - N5730 W01200 - N5500
W00910 - N5430 W01530 - N5800 W02000=
```

Note: PSN replaces LOC as per Amendment 75 to Annex 3 (applicable 18 November 2010)

2. NOTAM alerting pre-eruptive activity

```
(A0777/10NOTAMN
Q)BIRD/QWWXX/IV/NBO/W/000/999/6337N01901WXXX
A) BIRD B) 1002260830 C) 1002261100  E) INCREASED
VOLCANIC ACTIVITY, POSSIBLY INDICATING IMMINENT ERUPTION,
REPORTED FOR VOLCANO KATLA 1702-03 6337.5N01901.5W
ICELAND-S. VOLCANIC ASHCLOUD IS EXPECTED TO REACH 50,000
FEET FEW MINUTES FROM START OF ERUPTION.AIRCRAFT ARE
REQUIRED TO FLIGHT PLAN TO REMAIN AT LEAST XXXNM CLEAR OF
VOLCANO AND MAINTAIN WATCH FOR NOTAM/SIGMET FOR AREA.
F) GND G) UNL)
```

Note: XXX is a distance established by the Provider State in accordance with paragraph 1.2.1 a)

3. NOTAM establishing Danger Area after initial eruption

```
(A0778/10 NOTAMR A0777/10
Q) BIRD/QWWXX/IV/NBO/W/000/999/6337N01901WXXX
A) BIRD
B) 1002260900 C) 1002261200
E) VOLCANIC ERUPTION REPORTED IN VOLCANO KATLA 1702-03
6337.5N01901.5W ICELAND-S. VOLCANIC ASHCLOUD REPORTED
REACHING FL500. AIRCRAFT ARE REQUIRED TO REMAIN AT LEAST
XXXNM CLEAR OF VOLCANO AND MAINTAIN WATCH FOR
NOTAM/SIGMET FOR BIRD AREA.
F) GND G) UNL)
```

Note: XXX is a distance established by the Provider State in accordance with paragraph 1.2.1 a)

4. NOTAM establishing Danger Area to include Area of High [or High/Medium or High/Medium/Low] Contamination

```
(A0503/10 NOTAMN
Q)EGGN/QWWXX/IV/NBO/AE/000/350
A) EGPX B) 1005182300 C) 1005190500
E) TEMPORARY DANGER AREA HAS BEEN ESTABLISHED FOR
VOLCANIC ASH AREA OF HIGH CONTAMINATION IN AREA
5812N00611W 5718N00216W 5552N00426W 5629N00652W
F) SFC
G) FL350)
```

5. NOTAM to define Area of Medium Contamination for which a Danger Area has not been established

```
(A0207/10 NOTAMN
Q)EUEC/QWWXX/IV/AE/000/200
A) EIAA B) 1005190700 C) 1005191300
E) VOLCANIC ASH AREA OF MEDIUM CONCENTRATION
CONTAMINATION REPORTED FORECAST IN AREA 5243N00853W
5330N00618W 5150N00829W
F) SFC
G) FL200)
```

6. ASHTAM alerting pre-eruptive activity

```
VALI0021 LIRR  01091410
ASHTAM 005/10
A) ROMA FIR B) 01091350 C) ETNA 101-06 D) 3744N01500E
E) YELLOW ALERT
J) VULCANOLOGICAL AGENCY
```

7. ASHTAM alerting eruptive activity

```
VALI0024 LIRR  01151800
ASHTAM 015/10
A) ROMA FIR B) 01151650 C) ETNA 101-06 D) 3744N01500E
E) RED ALERT F) AREA AFFECTED 3700N01500E 3900N01600E
3800N001700W SFC/35000FT  G) NE H) ROUTES AFFECTED WILL
BE NOTIFIED BY ATC  J) VULCANOLOGICAL AGENCY
```

8. ASHTAM alerting reduction in eruptive activity

```
VALI0035 LIRR  01300450
ASHTAM 025/10
A) ROMA FIR B) 01300350 C) ETNA 101-06 D) 3744N01500E
E) YELLOW ALERT FOLLOWING ORANGE J) VULCANOLOGICAL AGENCY
```

- END -

APPENDIX M

(paragraph 4.7.14 refers)

PROPOSAL FOR AMENDMENT TO THE EUR ANP (DOC 7754)
VOLUME I (BASIC ANP) PART VI (MET)

...

~~**AIRCRAFT OBSERVATIONS AND REPORTS**~~

~~12. The meteorological watch offices (MWO) designated as the collecting centres for air-reports received by voice communications within the FIR/UIR for which they are responsible, are shown in FASID Table MET 1B, Column 1.~~

Editorial note: Renumber subsequent paragraphs accordingly

...

FORECASTS

...

19. When the area forecast for low-level flights is issued as a GAMET, the following regional procedures should be followed:

a) the term "widespread" should be used to indicate a spatial coverage of more than 75 per cent of the area concerned;

b) "mountain obscuration – MT OBSC" should be used to indicate widespread mountain obscuration. Depiction should also include additional information on cloud type causing obscuration together with, where feasible, height of cloud base and top above mean sea level (AMSL).

~~b)~~c) section II of the GAMET area forecast should include the following information in addition to the provisions in Annex 3:

1) short description of general weather situation in addition to the description of pressure centres and fronts;

2) information about mean surface wind speed also for values less than ~~60 km/h~~ 15m/s (30kt);

3) upper wind and temperature in mountainous areas for altitude 15000ft, or higher if necessary;

4) representative upper wind and temperature information for points not separated by more than 500km;

5) information about widespread surface visibility of 5000 m or more together with the weather phenomena (if any) causing a reduction of visibility and inserted between the upper wind and cloud information; and

6) state of the sea and sea surface temperature (see note);

7) an outlook concerning expected hazardous weather phenomena during the following validity period;

Note: With regards 19 ~~b)~~ c) 6) above, States under whose jurisdiction off-shore structure or other points of significance in support of off-shore helicopter operations are located should, in consultation with the appropriate operators, establish or arrange for the information on the state of the sea and sea surface temperature to be included in all low-level area forecasts.

~~c)~~d) the visibility and cloud base information in section II may be complemented in the form of visibility/cloud base categories (paragraphs 18 and 19 refer).

...

24. When low-level forecast is issued as a SIGWX chart or as a wind and temperature (W+T) chart, it should, as appropriate, include the information as described in paragraph 19. The graphical part of a SIGWX chart should depict the weather situation at the beginning of validity period. Significant changes of initial weather parameters should be depicted together with time intervals determining duration of expected changes.

...

EXCHANGE OF OPERATIONAL METEOROLOGICAL INFORMATION
(FASID Tables MET 2A)
[EANPG conclusion 46/26, 49/14]

...

34. The operational meteorological information as specified in FASID Table MET 2A should be disseminated through the ~~EUR distribution system, MOTNE~~ European Regional OPMET Data Exchange (EUR RODEX) system, which should ensure distribution to the EUR States, to the international EUR OPMET data banks and to the uplink stations of the international satellite communication system (ISCS) and the satellite distribution system for information relating to air navigation (SADIS). The designated ~~inter-regional OPMET gateways (IROG)~~ Regional OPMET Centres (ROC) in London, Toulouse and Vienna should ensure the availability in the EUR Region of all required OPMET data issued outside the EUR Region.

Note:-Further guidance concerning the EUR OPMET exchange procedures and EUR OPMET data banks is provided in the ICAO "EUR OPMET Data Management Handbook" (ICAO EUR Doc 018)

...

APPENDIX N

(paragraph 4.7.14 refers)

**PROPOSAL FOR AMENDMENT TO THE EUR ANP (DOC 7754)
VOLUME II (FASID) PART VI (MET)**

METEOROLOGICAL OBSERVATIONS AND REPORTS
(FASID Table MET 1C)

4. FASID Table MET 1C contains the requirements for meteorological observations and reports, in the form of METAR/SPECI, from offshore structures or other points of significance to support offshore helicopter operations in the EUR Region.

Editorial note: Renumber subsequent paragraphs accordingly

EXCHANGE OF OPERATIONAL METEOROLOGICAL INFORMATION
(FASID Tables MET 2A and 2B)

...

~~5.~~6. FASID Table MET 2B contains the exchange requirements to the EUR Region for SIGMET- and AIRMET-messages, volcanic ash and tropical cyclone advisories and special air reports to satisfy international flight operations in the EUR Region and for uplink to SADIS.

Note: The EUR OPMET data exchange programme is managed by the EANPG through its OPMET ~~Bulletin~~ Data Management Group (~~B~~DMG) and coordinated by the ICAO EUR/NAT Office. The ~~B~~DMG is composed of experts from, amongst others, the ~~MOTNE centres~~ Regional OPMET Centres (ROC) of the EUR Regional OPMET Data Exchange (EUR RODEX) system, and manages a process for coordination in the EUR Region of the implementation of changes in the collection and distribution of OPMET data on the AIRAC dates.

...

FASID Table MET-1A. METEOROLOGICAL SERVICE REQUIRED AT AERODROMES

EXPLANATION OF THE TABLE

Column

1 State

2 Name of the aerodrome or location where meteorological service is required (see Note 1)

3 ICAO location indicator of the aerodrome

4 Designation of the aerodrome:

RG = international general aviation, regular use

RS = international scheduled air transport, regular use

RNS = international non-scheduled air transport, regular use

AS = international scheduled air transport, alternate use

ANS - international non-scheduled air transport, alternate use

5 Name of the primary meteorological office responsible for the provision of meteorological service at the aerodrome indicated in column 1(see Note 1)

6 ICAO location indicator of the responsible primary meteorological office

7 Name of the secondary meteorological office responsible for the provision of meteorological service at the aerodrome indicated in column 1, if applicable (see Notes 1 and 2)

8 ICAO location indicator of the responsible secondary meteorological office, if applicable

9 Requirement for trend forecasts (TR)

Y – Yes: Required

10 Requirement for 9-hour validity aerodrome forecasts in TAF code (9H)

Y – Yes: Required

11 Requirement for 24-hour validity aerodrome forecasts in TAF code (24H)

Y – Yes: Required

12 Requirement for 30-hour validity aerodrome forecasts in TAF code (30H)

Y – Yes: Required

13 Availability of OPMET information (METAR/SPECI and TAF):

F - Full : OPMET data as listed issued for the aerodrome all through the 24-hour period

P - Partial : OPMET data as listed not issued for the aerodrome for the entire 24-hour period

N - None : No OPMET data issued for the time being

14 Remarks

Note 1: The name is extracted from the ICAO Location Indicators (Doc 7910) updated quarterly. If a State wishes to change the name appearing in Doc 7910 and this table, ICAO should be notified officially.

Note 2: A secondary meteorological office may be included if the primary meteorological office is closed part of the 24-hour period or a specific day of the week. Offices responsible under exceptional (e.g. back-up) conditions should not be listed.

State	Aerodrome			Responsible MET Office (RMO)				Forecasts				Issuance of OPMET info	Remark
	Name (as in Doc 7910)	ICAO loc ind	Type	RMO1 - Name	ICAO loc ind	RMO2 - Name	ICAO loc ind	TR	TAF 9H	TAF 24H	TAF 30H		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Austria													
	...	...	...	...	...		...	...	...	...	...	...	...
	HOHENEMS-DORNBIRN	LOIH	RG	~~INNSBRUCK~~ SALZBURG	~~LOWI~~ LOWS				Y			P	12-hour TAF provided
	...	...	...	...	...		...	...	...	...	...	...	...
	ST. JOHANN/TIROL	LOIJ	RG	~~INNSBRUCK~~ SALZBURG	~~LOWI~~ LOWS							N	
	...	...	...	...	...		...	...	...	...	...	...	...
	WELS	LOLW	RG	~~LINZ~~ WIEN-SCHWECHAT	~~LOWL~~ LOWW							N	
Belgium													
	...	...	...	...	...		...	...	...	...	...	...	...
	CHARLEROI/BRUSSELS SOUTH	EBCI	RS	CHARLEROI/BRUSSELS SOUTH	EBCI	BRUSSELS/BRUSSELS-NATIONAL	EBBR	Y	Y			F	
	...	...	...	...	...		...	...	...	...	...	...	...
Bulgaria													
	BURGAS	LBBG	RS	BURGAS	LBBG			Y	~~Y~~	Y		F	
	GORNA ORIAHOVITSA	LBGO	RNS	GORNA ORIAHOVITSA	LBGO			Y		Y		P	
	PLOVDIV	LBPD	RS	PLOVID	LBPD			Y		Y		F	
	...	...	...	...	...		...	...	...	...	...	...	...
Croatia													
	BRAC/BRAC I.	LDSB	RNS	~~BRAC/BRAC I.~~SPLIT/KASTELA	~~LDSB~~LDSP				Y			P	
	DUBROVNIK/CILIPI	LDDU	RS	DUBROVNIK/CILIPI	LDDU	SPLIT/KASTELA	LDSP	Y		Y		F	TREND not 24-hours
	LOSINJ/LOSINJ I.	LDLO	RNS	~~LOSINJ/LOSINJ I.~~ PULA/PULA	~~LDLO~~ LDPL	~~PULA/PULA~~	~~LDPL~~		Y			P	
	OSIJEK/KLISA	LDOS	RNS	OSIJEK/KLISA	LDOS	ZAGREB/PLESO	LDZA		Y			~~F~~ P	
	PULA/PULA	LDPL	RS	PULA/PULA	LDPL	ZAGREB/PLESO	LDZA	Y		Y		F	TREND not 24-hours
	...	...	...	...	...		...	...	...	...	...	...	...
	SPLIT/KASTELA	LDSP	RS	SPLIT/KASTELA	LDSP	ZAGREB/PLESO	LDZA	Y		Y		F	TREND not

													24-hours
	...	...	...	...	...		...	...	...	...	...	...	...
	ZADAR/ZEMUNIK	LDZD	RS	ZADAR/ZEMUNIK	LDZD	~~ZAGREB/PLESO~~ SPLIT/KASTELA	~~LDZA~~ LDSP	Y	Y			F	TREND not 24-hours
	...	...	...	...	...		...	...	...	...	...	...	...
Denmark													
	...	...	...	...	...		...	...	...	...	...	...	...
	BORNHOLM/RONNE	EKRN	RS	DANISH METEOROLOGICAL INSTITUTE	EKMI				Y			~~F~~ P	
	ESBJERG	EKEB	RS	DANISH METEOROLOGICAL INSTITUTE	EKMI				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	KOLDING/VAMDRUP	EKVD	RG	DANISH METEOROLOGICAL INSTITUTE	EKMI				Y			~~F~~ P	
	~~LOLLAND FALSTER/MARIBO~~	~~EKMB~~	~~RG~~	~~DANISH METEOROLOGICAL INSTITUTE~~	~~EKMI~~	-						~~F~~	
	ODENSE	EKOD	RG	DANISH METEOROLOGICAL INSTITUTE	EKMI				Y			~~F~~ P	
	SINDAL	EKSN	RG	DANISH METEOROLOGICAL INSTITUTE	EKMI				Y			~~F~~ P	
	SONDERBORG	EKSB	RG	DANISH METEOROLOGICAL INSTITUTE	EKMI				Y			~~F~~ P	
	STAUNING	EKVJ	RG	DANISH METEOROLOGICAL INSTITUTE	EKMI				Y			~~F~~ P	
	~~THISTED~~	~~EKTS~~	~~RG~~	~~DANISH METEOROLOGICAL INSTITUTE~~	~~EKMI~~	-						~~F~~	
Estonia													
	KARDLA	EEKA	RG	METEOROLOGICAL AND HYDROLOGICAL INSTITUTE	EEMH				Y			P	TAF on request
	KURESSAARE	EEKE	RG	METEOROLOGICAL AND HYDROLOGICAL INSTITUTE	EEMH				Y			P	TAF on request
	PARNU	EEPU	RG	METEOROLOGICAL AND HYDROLOGICAL INSTITUTE	EEMH				Y			P	TAF on request
	...	...	...	...	...		...	...	...	...	...	...	...
	TARTU	EETU	RG	METEOROLOGICAL AND HYDROLOGICAL INSTITUTE	EEMH				Y			P	TAF on request
Finland													
	...	...	...	...	...		...	...	...	...	...	...	...
	VAASA	EFVA	~~RG~~RS	~~HELSINKI~~TAMPERE-PIRKKALA	~~EFHK~~EFTP					Y		F	
	...	...	...	...	...		...	...	...	...	...	...	...
France													

	~~REIMS-CHAMPAGNE~~	~~LFSR~~	~~RG~~	~~LILLE-LESQUIN~~	~~LFQQ~~	~~REIMS-CHAMPAGNE~~	~~LFSR~~	~~Y~~	~~Y~~				
Lithuania													
	...	...	...	...	...		...	...	...	...	...	...	...
	KAUNAS INTL	EYKA	RS	VILNIUS INTL	EYVI				Y			P	12-hour TAF provided
	...	...	...	...	...		...	...	...	...	...	...	...
Norway													
	...	...	...	...	...		...	...	...	...	...	...	...
	ALTA	ENAT	RNS	TROMSO	ENVN				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	KIRKENES/HOYBUKTMOEN	ENKR	RNS	TROMSO	ENVN				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	STAVANGER/SOLA	ENZV	RS	BERGEN	ENVV			Y		Y		~~P~~ F	
	...	...	...	...	...		...	...	...	...	...	...	...
	SANDEFJORD/TORP	ENTO	RS	OSLO	ENMI				Y			~~F~~ P	
	TROMSO/LANGNES	ENTC	RS	TROMSO	ENVN			Y	Y	~~Y~~		F	
	...	...	...	...	...		...	...	...	...	...	...	...
Portugal													
	...	...	...	...	...		...	...	...	...	...	...	...
	LISBOA	LPPT	RS	LISBOA	LPPT			Y		~~Y~~	Y	F	
	...	...	...	...	...		...	...	...	...	...	...	...
Romania													
	ARAD/ARAD	LRAR	RS	ARAD/ARAD	LRAR				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	ORADEA/ORADEA	LROD	RS	ORADEA/ORADEA	LROD				Y			~~F~~ P	
	SATU MARE/SATU MARE	LRSM	RS	SATU MARE/SATU MARE	LRSM				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	SUCEAVA/STEFAN CEL MARE-SUCEAVA	LRSV	RNS	SUCEAVA/STEFAN CEL MARE-SUCEAVA	LRSV				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	TULCEA/DELTA DUNARII	LRTC	RNS	TULCEA/DELTA DUNARII	LRTC				Y			~~F~~ P	
Slovakia													

	...	...	...	...	...		...	...	...	...	...	...	...
	PIESTANY	LZPP	RNS	BRATISLAVA/M.R.STEFANIK	LZIB				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	ZILINA	LZZI	RS						Y			~~F~~ P	
Slovenia													
	LJUBLJANA/J. PUCNIK	LJLJ	RS	LJUBLJANA/J. PUCNIK	LJLJ			Y		Y		F	
	MARIBOR/E. RUSJAN	LJMB	RS	LJUBLJANA/J. PUCNIK	LJLJ					Y		F	
	...	...	...	...	...		...	...	...	...	...	...	...
Spain													
	...	...	...	...	...		...	...	...	...	...	...	...
	MADRID/CUATRO VIENTOS (CIV)	LECU /LEVS (MIL)	RG	MADRID (MET)	LEMC			~~Y~~	Y			P	OPMET only issued with indicator LEVS
	...	...	...	...	...		...	...	...	...	...	...	...
	MURCIA/SAN JAVIER	LELC	RNS	VALENCIA (MET)	LEVA			Y		Y		P	
Switzerland													
	BERN-BELP	LSZB	RS	ZURICH FLUGHAFEN	LSZH			Y	Y			~~F~~ P	
	BUOCHS	LSZC	RG	ZURICH FLUGHAFEN	LSZH				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	GRENCHEN	LSZG	RG	ZURICH FLUGHAFEN	LSZH			Y	Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	LUGANO	LSZA	RS	ZURICH FLUGHAFEN	LSZH				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
	SION	LSGS	RS	GENEVE	LSGG				Y			~~F~~ P	
	ST. GALLEN-ALTENRHEIN	LSZR	RS	ZURICH FLUGHAFEN	LSZH				Y			~~F~~ P	
	...	...	...	...	...		...	...	...	...	...	...	...
Turkey													
	...	...	...	...	...		...	...	...	...	...	...	...
	BURSA/YENISEHIR (MIL-CIV)	LTBR	RNS	BURSA/YENISEHIR (MIL-CIV)	LTBR			Y	Y	~~Y~~		F	
	DENIZLI/CARDAK (MIL-CIV)	LTAY	RNS					Y	Y	~~Y~~		F	
	...	...	...	...	...		...	...	...	...	...	...	...
	KARS	LTCF	RNS	KARS	LTCF				Y			F	

	...	...	...	...	...		...	...	...	...	...	...	...
	VAN/ FERIT MELEN	LTCI	RNS	VAN/ FERIT MELEN	LTCI			Y	Y	~~Y~~		F	

FASID Table MET 2A

OPMET INFORMATION (METAR, SPECI AND TAF) REQUIRED IN ISCS AND SADIS

EXPLANATION OF THE TABLE

Column

1 Aerodromes in the AOP Tables of the Air Navigation Plans

Note: The name is extracted from the ICAO Location Indicators (Doc 7910) updated quarterly. If a state wishes to change the name appearing in Doc 7910 and this table, ICAO should be notified officially.

2 Aerodromes not listed in the AOP Tables of the Air Navigation Plans

Note: The name is extracted from the ICAO Location Indicators (Doc 7910) updated quarterly. If a state wishes to change the name appearing in Doc 7910 and this table, ICAO should be notified officially.

3 Location indicator

4 Availability of METAR/SPECI

5 Requirement for aerodrome forecasts in TAF code

C - Requirement for 9-hour validity aerodrome forecasts in TAF code (9H)
T - Requirement for 18/24-hour validity aerodrome forecasts in TAF code (18/24H)
X - Requirement for 30-hour validity aerodrome forecasts in TAF code (30H)

6 Availability of OPMET information

F - Full : OPMET data as listed issued for the aerodrome all through the 24-hour period
P - Partial : OPMET data as listed not issued for the aerodrome for the entire 24-hour period
N - None : No OPMET data issued for the time being

FASID Table MET 2A for the EUR Region is accessible via the following URL:
http://www2.icao.int/en/anb/met-aim/met/Pages/default.aspx

(Click *FASID Table MET 2A* under 'Operational Databases')

Editorial note: The existing FASID Table MET 2A for the EUR Region is to be deleted *in toto* from Part VI (MET) of the EUR ANP (Doc 7754) and replaced with the above hyperlink to the operational OPMET database maintained by ICAO Headquarters.

- END -

APPENDIX O - Proposal for Amendment to the EUR SUPPs – Chapter 2, Flight Plans

(paragraph 4.8.11 refers)

2.1.1 Date of flight

Nil.

Note.— The PANS-ATM, 11.4.2.2.2.5, states that "if a flight plan is filed more than 24 hours in advance of the estimated off-block time of the flight to which it refers, that flight plan shall be held in abeyance until at most 24 hours before the flight begins so as to avoid the need for the insertion of a date group into that flight plan". The following specifies details regarding the insertion of a date group into the flight plan.

2.1.1.1 If a flight plan for a flight conducted wholly in the EUR Region is filed more than 24 hours in advance of the estimated off-block time (EOBT), it is mandatory to provide the date of the flight (DOF). If the flight plan is filed less than 24 hours in advance of the EOBT, the date of the flight may be optionally indicated. This information will be inserted in Item 18 of the flight plan as a 3-letter indicator (DOF) followed by an oblique stroke and date of flight in a 6-figure group format:

DOF/YYMMDD (YY = year; MM = month; DD = day)

2.1.2 Area navigation (RNAV) specifications

2.1.2.1 Operators of approved aircraft for basic area navigation conducting flights wholly or partly in the airspace specified in paragraph 4.1.1.2 and 4.1.1.4, and not RNAV 5 (B-RNAV) operations as set out in 4.1.1.5.2. approved but which have been granted an exemption, shall insert the designator "R" RNAVX in Item 10 18 of the flight plan preceded by EUR/. Where a failure or degradation results in the aircraft being unable to meet the B-RNAV requirements before departure, the operator of the aircraft shall insert the designator RNAVINOP in item 18 of the flight plan preceded by EUR/.

2.1.2.2 Operators of aircraft approved for precision area navigation (P-RNAV) RNAV 5 (B-RNAV)operations as set out in 4.1.1.5.2, shall, in addition to insert the designator "R", also insert the designator "P" in Item 10 of the flight plan and specify in Item 18 of the flight plan one or more of the designators "B1", "B2", "B3", "B4", "B5", preceded by PBN/.

2.1.2.3 Operators of State aircraft not equipped with approved for RNAV 1 and/or precision area navigation (P-RNAV) operations, as set out in 4.1.1.4, shall not insert the designators "S" or "R" or "P" in Item 10 of the flight plan and specify in Item 18 of the flight plan one or more of the designators "D1", "D2", "D3", "D4", preceded by PBN/. Instead, STS/NONRNAV shall be inserted in Item 18 of the flight plan.

2.1.2.4 Where a failure or degradation results in the aircraft being unable to meet the P-RNAV functionality and accuracy requirements of 4.1.1.5.2.4 before departure, the operator of the aircraft shall not insert the designator "P" in Item 10 of the flight plan. Subsequently, for a flight for which a flight plan has been submitted, an appropriate new flight plan shall be submitted and the old flight plan cancelled. For a flight operating based on a repetitive flight plan (RPL), the RPL shall be cancelled and an appropriate new flight plan shall be submitted.

2.1.2.5 In addition, where a failure or degradation results in the aircraft being unable to meet the B-RNAV functionality and accuracy requirements of 4.1.1.5.2.6 before departure, the operator of the aircraft shall not insert the designators "S" or "R" or "P" in Item 10 of the flight plan. Since such flights require special handling by ATC, Item 18 of the flight plan shall contain STS/RNAVINOP. Subsequently, for a flight for which a flight plan has been submitted, an appropriate new flight plan shall be submitted and the old flight plan cancelled. For a flight operating based on an RPL, the RPL shall be cancelled and an appropriate new flight plan shall be submitted.

……

2.1.8 Indication of 8.33 kHz channel spacing capability

2.1.8.1 For flights conducted wholly or partly in the volume of airspace where the carriage of 8.33 kHz channel spacing radio equipment is mandatory, as specified in 3.2.1, in addition to the letter S and/or any other letters, as appropriate, the letter Y shall be inserted in Item 10 of the flight plan for aircraft equipped with 8.33 kHz channel spacing capable radio equipment, or the indicator ~~STS~~EUR/EXM833 shall be included in Item 18 for aircraft not equipped but which have been granted exemption from the mandatory carriage requirement. Aircraft normally capable of operating above FL 195 but planning to fly below this level shall include the letter Y as specified above.

Note.— In the case of “~~STS~~EUR/EXM833”, a list of exemptions will have to be published in the States’ AIPs. The absence of the letter Y in Item 10 will be taken as a lack of 8.33 kHz capable equipment.

……

2.1.13 Special handling (STS)

~~Nil.~~

2.1.13.1 Regarding flights for which the flight plan contents should not be known to a wider audience, the designator PROTECTED shall be inserted in Item 18 of the flight plan, preceded by EUR/.

2.1.14 Controller-pilot data link communications (CPDLC)

2.1.14.1 Flights planning to use CPDLC over the aeronautical telecommunication network (ATN) shall include in Item 18 of the flight plan the indicator CODE/ followed by the 24-bit aircraft address (expressed in the form of alphanumerical code of six hexadecimal characters).

Example: CODE/F00001

2.1.1.4.2 For flights conducted wholly or partly in the EUR CPDLC airspace specified in paragraph 3.3.1.1, and not equipped with CPDLC capabilities but which have been granted an exemption, the indicator ~~RMK~~EUR/CPDLC shall be included in Item 18 of the flight plan.

……

2.2.3 Slot allocation exemptions

2.2.3.1 The following flights are exempted from ATFM slot allocations:

a) flights carrying Head of State or equivalent status [“STS/HEAD”]; ~~and~~

b) flights conducting search and rescue operations [“STS/SAR”]~~.~~;

c) flights used for a life critical medical emergency evacuation [“STS/MEDEVAC”]; and

d) flights used for fire-fighting [“STS/FFR”].

REPORTING FORM ON
AIR NAVIGATION DEFICIENCIES IN THE EUR REGION

DEF ID	DEF Priority	State	DEF Type	DEF Req - ICAO Doc	DEF Req - Detail	DEF Descr	Reported by	Date Reported	DEF Rmk	Cor Act Recom ICAO	CAP Submited	CAP Description	CAP Exec Body	CAP / Expected Target Date
Remark: According to the Uniform Methodology, deficiencies are prioritized with regard to their implications on the safety or regularity and eficiency, as follows: **U priority** = Urgent requirements having a direct impact on safety and requiring immediate corrective actions. **A priority** = Top priority requirements necessary for air navigation safety. **B priority** = Intermediate requirements necessary for air navigation regularity and efficiency.														
EUR-AIS-01-02	A	Kazakhstan	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not Implemented	COG/ AIM TF	1/12/2004	The difficulties which impede CIS States to speed up and complete the implementation of WGS-84 are systematic and have legal and financial aspects.	Implement WGS-84	Y	Draft order for implementation of WGS-84 submitted for approval by the Ministry of Transport and Ministry of Defence	Kazakhstan CAA	2010
EUR-AIS-01-03	A	Kyrgyzstan	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not implemented	COG/ AIM TF	1/12/2004	The difficulties which impede CIS States to speed up and complete the implementation of WGS-84 are systematic and have legal and financial aspects.	Implement WGS-84	Y	Government Resolution of 8 August 2007 on WGS-84 implementation; CAA developed national implementation programme which is being coordinated.	Kyrgyzstan CAA	2010
EUR-AIS-01-04	A	Russian Federation	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not fully implemented	COG/ AIM TF	15/05/2009	The difficulties which impede CIS States to speed up and complete the implementation of WGS-84 are systematic and have legal and financial aspects.	Implement WGS-84 or equivalent PZ-90	Y	Implementation on-going up to 2012. *Coordinate's conversion matrix PZ-90.02 <--> WGS-84 published in AIP.*	Russian Federation CAA	2012
EUR-AIS-01-05	A	Tajikistan	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not implemented	COG/ AIM TF	1/12/2004	The difficulties which impede CIS States to speed up and complete the implementation of WGS-84 are systematic and have legal and financial aspects.	Implement WGS-84	N		Tajikistan CAA	ASAP

REPORTING FORM ON
AIR NAVIGATION DEFICIENCIES IN THE EUR REGION

DEF ID	DEF Priority	State	DEF Type	DEF Req - ICAO Doc	DEF Req - Detail	DEF Descr	Reported by	Date Reported	DEF Rmk	Cor Act Recom ICAO	CAP Submited	CAP Description	CAP Exec Body	CAP / Expected Target Date
EUR-AIS-01-06	A	Turkmenistan	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not implemented	COG/ AIM TF	1/12/2004	The difficulties which impede CIS States to speed up and complete the implementation of WGS-84 are systematic and have legal and financial aspects.	Implement WGS-84	N		Turkmenistan CAA	ASAP
EUR-AIS-01-07	A	Uzbekistan	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not implemented	COG/ AIM TF	1/12/2004	The difficulties which impede CIS States to speed up and complete the implementation of WGS-84 are systematic and have legal and financial aspects.	Implement WGS-84	N		Uzbekistan CAA	2010
EUR-AIS-01-08	A	Belarus	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not implemented	COG/ AIM TF	15/05/2008	The difficulties which impede CIS States to speed up and complete the implementation of WGS-84 are systematic and have legal and financial aspects.	Implement WGS-84	N		Belarus CAA	ASAP
EUR-AIS-01-09	A	Azerbaijan	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not fully implemented	COG/ AIM TF	15/05/2008		Complete implementation of WGS-84 (Baku Airport)	Y	The implementation of WGS-84 has been initiated and a plan has been established for the full implementation by 2010	Azerbaijan CAA	2010
EUR-AIS-01-10	A	Ukraine	WGS-84	An 15	Par. 3.7.1, 3.7.2	WGS-84 - Not fully implemented	COG/ AIM TF	15/05/2008		Complete implementation of WGS-84	Y	WGS-84 implementation initiated in 1999 with a Government Resolution. WGS-84 has been implemented for majority of aerodromes.	Ukraine CAA	ASAP
EUR-AIS-02-02	A	Belarus	QMS for AIS	An 15	Par. 3.2	QMS not implemented	COG/ AIM TF	15/05/2008		Implement QMS for AIS	N		Belarus CAA	ASAP

REPORTING FORM ON
AIR NAVIGATION DEFICIENCIES IN THE EUR REGION

DEF ID	DEF Priority	State	DEF Type	DEF Req - ICAO Doc	DEF Req - Detail	DEF Descr	Reported by	Date Reported	DEF Rmk	Cor Act Recom ICAO	CAP Submited	CAP Description	CAP Exec Body	CAP / Expected Target Date
EUR-AIS-02-03	A	Georgia	QMS for AIS	An 15	Par. 3.2	QMS not implemented	COG/ AIM TF	15/05/2008		Implement QMS for AIS	N		Georgia CAA	ASAP
EUR-AIS-02-04	A	Kazakhstan	QMS for AIS	An 15	Par. 3.2	QMS not implemented	COG/ AIM TF	15/05/2008		Implement QMS for AIS	N		Kazakhstan CAA	ASAP
EUR-AIS-02-05	A	Kyrgyzstan	QMS for AIS	An 15	Par. 3.2	QMS not implemented	COG/ AIM TF	15/05/2008		Implement QMS for AIS	N		Kyrgyzstan CAA	ASAP
EUR-AIS-02-08	A	Tajikistan	QMS for AIS	An 15	Par. 3.2	QMS not implemented	COG/ AIM TF	15/05/2008		Implement QMS for AIS	N		Tajikistan CAA	ASAP
EUR-AIS-02-09	A	Turkmenistan	QMS for AIS	An 15	Par. 3.2	QMS not implemented	COG/ AIM TF	15/05/2008		Implement QMS for AIS	N		Turkmenistan CAA	ASAP
EUR-AIS-02-10	A	Uzbekistan	QMS for AIS	An 15	Par. 3.2	QMS not implemented	COG/ AIM TF	15/05/2008		Implement QMS for AIS	N		Uzbekistan CAA	2011
EUR-AIS-02-11	A	Bosnia& Herzegovina	QMS for AIS	An 15	Par. 3.2	QMS not implemented	Eurocontrol / COG	20/10/2009		Implement QMS for AIS	N		Bosnia& Herzegovina CAA	ASAP
EUR-AIS-02-12	A	Greece	QMS for AIS	An 15	Par. 3.2	QMS not implemented	Eurocontrol / COG	20/10/2009		Implement QMS for AIS	N		Greece CAA	ASAP
EUR-AIS-02-13	A	Malta	QMS for AIS	An 15	Par. 3.2	QMS not implemented	Eurocontrol / COG	20/10/2009		Implement QMS for AIS	N		Malta CAA	ASAP
EUR-AIS-02-15	A	FYROM	QMS for AIS	An 15	Par. 3.2	QMS not implemented	Eurocontrol / COG	20/10/2009		Implement QMS for AIS	N		FYROM CAA	ASAP
EUR-AIS-03-01	U	Italy	Non-adherence to AIRAC proc.	An 15	Par. 6.1.1	Last minute postponement of AIRAC	Eurocontrol / COG	17/09/2010		Comply with An. 15, ch. 6	N		Italy CAA	ASAP
EUR-AIS-03-02	U	Spain	Non-adherence to AIRAC proc.	An 15	Par. 6.1.1	Last minute postponement of AIRAC	Eurocontrol / COG	17/09/2010		Comply with An. 15, ch. 6	N		Spain CAA	ASAP
EUR-AIS-03-03	U	Kyrgyzstan	Non-adherence to AIRAC proc.	An 15	Par. 6.1.1		COG/ AIM TF	6/10/2010		Comply with An. 15, ch. 6	N		Kyrgyzstan CAA	ASAP

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EUR-AIS-03-04	U	Tajikistan	Non-adherence to AIRAC proc.	An 15	Par. 6.1.1		COG/ AIM TF	6/10/2010		Comply with An. 15, ch. 6	N		Tajikistan CAA	ASAP
EUR-AIS-03-05	U	Turkmenistan	Non-adherence to AIRAC proc.	An 15	Par. 6.1.1		COG/ AIM TF	6/10/2010		Comply with An. 15, ch. 6	N		Turkmenistan CAA	ASAP
EUR-AIS-04-01	A	Azerbaijan	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Azerbaijan CAA	ASAP
EUR-AIS-04-02	A	Belarus	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Belarus CAA	ASAP
EUR-AIS-04-03	A	Georgia	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Georgia CAA	ASAP

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EUR-AIS-04-04	A	Kazakhstan	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Kazakhstan CAA	ASAP
EUR-AIS-04-05	A	Kyrgyzstan	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Kyrgyzstan CAA	ASAP
EUR-AIS-04-06	A	Moldova	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Moldova CAA	ASAP
EUR-AIS-04-07	A	Russian Federation	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Russian Federation CAA	ASAP

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EUR-AIS-04-08	A	Tajikistan	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Tajikistan CAA	ASAP
EUR-AIS-04-09	A	Turkmenistan	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Turkmenistan CAA	ASAP
EUR-AIS-04-10	A	Uzbekistan	Aeronautical charts and flight instrument procedures	An 4/ Doc 8168 (PANS-OPS)	Par. 9.9.4.3, 10.9.4.3, 11.10.9/ Flight Instrument Procedures	Non-compiance with ICAO An. 4 & Doc 8168 (PANS-OPS) provisions	COG/ AIM TF	2/12/2009	Lack of mechanism to ensure compliance with ICAO An. 4 and Doc. 8168 (PANS-OPS) provisions.	Comply with ICAO SARPs	N		Uzbekistan CAA	ASAP
EUR-ATM-02-01	A	Kazakhstan	Harmoni-zation of flight levels	An 2	Par. 3.1.3 Ap. 3	Non-ICAO SARPS compliant flight level system		1/12/2003	The lack of harmonization of flight levels in accordance with ICAO SARPS slows down the implementation of ICAO strategic objectives and global initiatives.	Implement flight levels system in accordance with ICAO SARPs	Y	EURASIA RVSM Implementation Project on-going	Kazakhstan CAA	Nov 2011
EUR-ATM-02-02	A	Kyrgyzstan	Harmoni-zation of flight levels	An 2	Par. 3.1.3 Ap. 3	Non-ICAO SARPS compliant flight level system		1/12/2003	The lack of harmonization of flight levels in accordance with ICAO SARPS slows down the implementation of ICAO strategic objectives and global initiatives.	Implement flight levels system in accordance with ICAO SARPs	Y	EURASIA RVSM Implementation Project on-going	Kyrgyzstan CAA	Nov 2011

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EUR-ATM-02-03	A	Russian Federation	Harmoni-zation of flight levels	An 2	Par. 3.1.3 Ap. 3	Non-ICAO SARPS compliant flight level system		1/12/2003	The lack of harmonization of flight levels in accordance with ICAO SARPS slows down the implementation of ICAO strategic objectives and global initiatives.	Implement flight levels system in accordance with ICAO SARPs	Y	EURASIA RVSM Implementation Project on-going	Russian Federation CAA	Nov 2011
EUR-ATM-02-04	A	Tajikistan	Harmoni-zation of flight levels	An 2	Par. 3.1.3 Ap. 3	Non-ICAO SARPS compliant flight level system		1/12/2003	The lack of harmonization of flight levels in accordance with ICAO SARPS slows down the implementation of ICAO strategic objectives and global initiatives.	Implement flight levels system in accordance with ICAO SARPs	Y	EURASIA RVSM Implementation Project on-going	Tajikistan CAA	Nov 2011
EUR-ATM-02-05	A	Turkmenistan	Harmoni-zation of flight levels	An 2	Par. 3.1.3 Ap. 3	Non-ICAO SARPS compliant flight level system		1/12/2003	The lack of harmonization of flight levels in accordance with ICAO SARPS slows down the implementation of ICAO strategic objectives and global initiatives.	Implement flight levels system in accordance with ICAO SARPs	Y	EURASIA RVSM Implementation Project on-going	Turkmenistan CAA	Nov 2011
EUR-ATM-02-06	A	Uzbekistan	Harmoni-zation of flight levels	An 2	Par. 3.1.3 Ap. 3	Non-ICAO SARPS compliant flight level system		1/12/2003	The lack of harmonization of flight levels in accordance with ICAO SARPS slows down the implementation of ICAO strategic objectives and global initiatives.	Implement flight levels system in accordance with ICAO SARPs	Y	EURASIA RVSM Implementation Project on-going	Uzbekistan CAA	Nov 2011
EUR-ATM-03-01	A	Cyprus	ATS coordination procedures	An 11, EUR ANP	SARPs and reg. procedures related to coordination between ACCs	Safety deficiencies in the N part of Nikosia FIR			Long lasting issue. Any solution envisaged requires political agreement between the parties involved		N		Cyprus	ASAP

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EUR-ATM-03-02*,**	A	Turkey	ATS coordination procedures	An 11, EUR ANP	SARPs and reg. procedures related to coordination between ACCs	Safety deficiencies in the N part of Nikosia FIR			Long lasting issue. Any solution envisaged requires political agreement between the parties involved		N		Turkey	ASAP
EUR-ATM-04-10	U	Moldova Republic	Provision of air space safety monitoring data	An 11	Par. 3.3.5.1	The State authority concened does not report the required data to the RMA	EUR RMA	15/11/2007	THE EUR air space SAFETY MONITORING REPORT 2007 - Reporting Status "N"	Required monitoring data to be sent to the RMA on a regular basis	N		Moldova CAA	ASAP
EUR-ATM-04-11	U	Morocco	Provision of air space safety monitoring data	An 11	Par. 3.3.5.1	The State authority concened does not report the required data to the RMA	EUR RMA	15/11/2007	THE EUR air space SAFETY MONITORING REPORT 2007 - Reporting Status "N"	Required monitoring data to be sent to the RMA on a regular basis	N		Morocco CAA	ASAP
EUR-ATM-04-26	U	Hungary	Provision of air space safety monitoring data	An 11	Par. 3.3.5.1	The State authority concened does not report the required data to the RMA	EUR RMA	15/11/2007	THE EUR air space SAFETY MONITORING REPORT 2007 - Reporting Status "0" (applies to zero occurrence reports)	Required monitoring data to be sent to the RMA on a regular basis	N		Hungary CAA	ASAP

*Note: Turkey expressed disagreement with deficiency (paragraph 6.12 of the EANPG/49 report refers). **Note: CAP under development. On-going negociations facilitated by EC, Eurocontrol and ICAO.

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EUR-ATM-04-31	U	Algeria	Provision of air space safety monitoring data	An 11	Par. 3.3.5.1	The State authority concerned does not report the required data to the RMA	EUR RMA	12/10/2009	THE EUR air space SAFETY MONITORING REPORT 2007 - Reporting Status "0" (applies to zero occurrence reports)	Required monitoring data to be sent to the RMA on a regular basis	N		Algeria CAA	ASAP