



International Civil Aviation Organization

**Aeronautical Telecommunication Network/Internet
Protocol Suite Working Group**

**Fifth Meeting (ATN/IPS WG/5)
(Cairo, Egypt, 11 - 13 March 2013)**

Agenda Item 4: Review and update of MID ATN plans and Implementation issues

AIDC IMPLEMENTATION IN THE MID REGION

(Presented by the Secretariat)

SUMMARY

This paper presents the operational benefits of the implementation of ATS Inter-facility Data Communications (AIDC) detailed in Aviation System Block Upgrade (ASBU), under module B0-25 and proposes the development of AIDC implementation plan

Action by the meeting is at paragraph 3.

REFERENCES

- ATN/IPS WG/4 Report
- CNS SG/5 Report
- MIDANPIRG/13 Report
- Working Document ASBU

1. INTRODUCTION

1.1 Automated data exchange between ATC systems support timely dissemination of relevant flight data, particularly in regard to coordination and transfer of flights between ATS units. ATS Inter-facility Data Communication (AIDC) application exchanges information between ATS units in support of critical ATC functions, including notification of flights approaching a Flight Information Region (FIR) boundary, coordination of boundary-crossing conditions, and transfer of control.

1.2 The automation gains of AIDC implementation would provide significant safety and efficiency benefits such as:

- a) Reduced workload for controllers
- b) Reduction of readback/hearback errors during coordination
- c) Reduced “controller to controller” coordination errors; and language barrier issues
- d) Increased in support for performance based navigation initiatives and emerging technologies with automation.

2. DISCUSSION

2.1 The meeting may wish to note that MIDANPIRG/13 noted that CNS/ATM/IC SG/6 reviewed the operational improvements contained in the ASBU Working Document and agreed to the need of identification of those operational improvements which are of relevance to the MID Region. However, it was highlighted that the whole concept of ASBU will be finalized by the AN-Conf/12 and accordingly MIDANPIRG/13 Meeting supported the following operational improvement identified and agreed that the MIDANPIRG Subsidiary bodies, further review them taking into consideration the outcome of the AN-Conf/12:

- Improved Airport Accessibility
- Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration - AIDC
- Service Improvement through Digital Aeronautical Information Management
- Improved Operations through Enhanced En-Route Trajectories
- Improved Flexibility and Efficiency in Descent Profiles (CDOs)
- Improved Flexibility and Efficiency in Departure Profiles
- Improved Runway Safety (A-SMGCS)
- Improved Airport Operations through A-CDM
- Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B.

2.2 The AN Conf/12, discussed the revised draft Fourth Edition of the Global Air Navigation Plan (Doc 9750, GANP), and noted that this version builds on past planning documents in that it provides a global planning framework which, among other things, provides a timeline for which future improvements can be implemented by States in accordance with their needs. In addition, it identifies the need for the development of standards and recommended practices, regulatory requirements, procedures and technology associated with the Aviation System Block Upgrades (ASBU). The ASBUs are supplemented by communications, navigation, surveillance (CNS), avionics and information management roadmaps. High-level impediments to implementation such as cyber security were identified and considered during the discussions. Arrangements to ensure the periodic update of the ASBUs and roadmaps on a rolling fifteen-year planning horizon were discussed.

2.3 The meeting may wish to note that AN Conf/12 agreed that the ASBUs and associated technology roadmaps were an integral part of the GANP and a valuable implementation tool kit. Furthermore, AN Conf/12 agreed that the policy and associated principles in the GANP were fundamental to long-term planning and therefore put forth a significant effort in establishing high-level principles to guide development of the policy.

2.4 The ATN/IPS WG/4 discussed in detail the operational improvements related to Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration –AIDC and agreed to provide support for the implementation of the ATS Inter-Facility Data Communication (AIDC) in the Region utilizing the advanced Ground-Ground infrastructure, accordingly the ATN/IPS WG/4 Meeting developed the draft structure for AIDC Implementation plan which was reviewed and updated by the CNS SG/5 Meeting as at **Appendix A** to this working paper, it was agreed that the CNS/ATM/IC SG to also review this plan and the interface control document for MID Region.

2.5 The CNS SG/5 Meeting requested all States to provide their feedback and tasked the ATN-IPS WG/5 Meeting to consolidate the feedback and present them to the Seminar on implementation of AIDC that will be held in June 2013 and to next meeting of CNS/ATM/IC Sub-Group for final review and submittal to MIDANPIRG/14 for endorsement. Accordingly, the CNS SG/5 Meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 5/1: MID AIDC IMPLEMENTATION PLAN

That States,

- a) support ICAO to organize seminar on implementation of AIDC;*
- b) participate actively the Seminar; and*
- c) with support of ICAO secretariat complete the MID AIDC Implementation Plan.*

2.6 An extract from the ASBU working document as at **Appendix B** to this working paper provides the details for the implementation of AIDC as defined by the ICAO Manual of Air Traffic Services Data Link Applications (Doc 9694).

2.7 Based on the operational requirements, the meeting may wish to consider the availability and capacity of the existing regional telecommunication network for the suitability of implementing AIDC, also it would be necessary to review the AIDC messages defined in the PANS-ATM and the ICD document, complete and finalize the OLDI/AIDC implementation activities, including carrying out an interface and technical interconnection analysis for the identified AIDC/OLDI implementation between ATS Units.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) provide feedback requested by draft conclusion 5/1 in para 2.5;
- b) refine and update the draft AIDC implementation in **Appendix A** to this working paper; and
- c) propose any further actions for the AIDC implementation in the Region.

APPENDIX A

ATS INTER-FACILITY DATA COMMUNICATION (AIDC)
IMPLEMENTATION PLAN

EXPLANATION OF THE TABLE

Column

- 1 State/Administration – the name of the State/Administration;
- 2 Location of AIDC end system – the location of the AIDC end system under the supervision of State/Administration identified in column 1;
- 3 AIDC Pair – the correspondent AIDC end system;
Location – location of the correspondent AIDC end system
State/Administration – the name of the State/Administration responsible for management of the correspondent AIDC end system
- 4 AIDC standard used – the AIDC standard adopted for the AIDC connection between the corresponding AIDC pair, AFTN, AFTN/AMHS or ATN;
- 5 Target Date of Implementation – date of implementation of the AIDC end system;
- 6 Remarks – any additional information describing the AIDC end system or the AIDC service between the corresponding AIDC pair.

State/Administration	Location of AIDC end system	AIDC/OLDI Pair		AIDC standard used	Target date of Implementation	Remarks
		Correspondent location	Correspondent State/Administration			
1	2	3		4	5	6
Egypt	CANC Cairo	Cairo	Athens	CIDIN	Implemented	OLDI V... IS
		Cairo	Jeddah	AMHS	Implemented	ICD V.2.0
	Cairo Air Navigation Center	Cairo	Sudan	AFTN	TBD	ICD V.2.0
		Cairo	Riyadh	AFTN	TBD	ICD V.2.0
Bahrain						
Iran						
Iraq						
Jordan						
Kuwait						

State/Administration	Location of AIDC end system	AIDC Pair		AIDC standard used	Target date of Implementation	Remarks
		Correspondent location	Correspondent State/Administration			
1	2	3		4	5	6
Lebanon						
Libya						
Oman	Muscat International Airport	MUSCAT	ABUDHABI	AMHS	TBD	AMHS circuit operational need to im
		MUSCAT	MUMBAI	AFTN	TBD	
		MUSCAT	KARACHI	AFTN	TBD	
		MUSCAT	JEDDAH	AFTN	TBD	
		MUSCAT	SALALAH	AFTN	TBD	
		MUSCAT	BAHRAIN	AFTN	TBD	
		MUSCAT	BAHRAIN	AMHS	-	
Qatar						
Saudi Arabia						
Sudan						
Syria						
UAE						
Yemen						

Module B0-25

Module N° B0-25: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration

Summary	To improve coordination between air traffic service units (ATSUs) by using ATS interfacility data communication (AIDC) defined by the ICAO <i>Manual of Air Traffic Services Data Link Applications</i> (Doc 9694). The transfer of communication in a data link environment improves the efficiency of this process particularly for oceanic ATSUs.	
Main performance impact as per Doc 9854	KPA-02 – Capacity, KPA-04 – Efficiency, KPA-07 – Global Interoperability, KPA-10 – Safety.	
Operating environment/ Phases of flight	All flight phases and all type of ATS units.	
Applicability considerations	Applicable to at least two area control centres (ACCs) dealing with en-route and/or terminal control area (TMA) airspace. A greater number of consecutive participating ACCs will increase the benefits.	
Global concept component(s) as per Doc 9854	CM – conflict management	
Global plan initiatives (GPI)	GPI-16: Decision support systems	
Main dependencies	Linkage with B0-40	
Global readiness checklist		Status (ready now or estimated date)
	Standards readiness	√
	Avionics availability	No requirement
	Ground systems availability	√
	Procedures available	√
	Operations approvals	√

1. Narrative

1.1 General

1.1.1 Flights which are being provided with air traffic services are transferred from one air traffic services (ATS) unit to the next in a manner designed to ensure safety. In order to accomplish this objective, it is a standard procedure that the passage of each flight across the boundary of the areas of responsibility of the two units is co-ordinated between them beforehand and that the control of the flight is transferred when it is at, or adjacent to, the said boundary.

1.1.2 Where it is carried out by telephone, the passing of data on individual flights as part of the coordination process is a major support task at ATS units, particularly at area control centres (ACCs). The operational use of connections between flight data processing systems (FDPSs) at ACCs replacing phone coordination (on-line data interchange (OLDI)) is already proven in Europe.

1.1.3 This is now fully integrated into the ATS interfacility data communications (AIDC) messages in the *Procedures for Air Navigation Services – Air Traffic Management*, (PANS-ATM, Doc 4444) which describes the types of messages and their contents to be used for operational

communications between ATS unit computer systems. This type of data transfer (AIDC) will be the basis for migration of data communications to the aeronautical telecommunication network (ATN).

1.1.4 The AIDC module is aimed at improving the flow of traffic by allowing neighbouring air traffic services units to exchange flight data automatically in the form of coordination and transfer messages.

1.1.5 With the greater accuracy of messages based on the updated trajectory information contained in the system and where possible updated by surveillance data, controllers have more reliable information on the conditions at which aircraft will enter in their airspace of jurisdiction with a reduction of the workload associated to flight coordination and transfer. The increased accuracy and data integrity permits the safe application of reduced separations.

1.1.6 Combined with air-ground data link applications, AIDC also allows the transfer of aircraft logon information and the timely initiation of establishing controller-pilot data link communications (CPDLC) by the next air traffic control (ATC) unit with the aircraft.

1.1.7 These improvements outlined above translate directly into a combination of performance improvements.

1.1.8 Information exchanges between flight data processing systems are established between air traffic services units for the purpose of notification, coordination and transfer of flights and for the purpose of civil/military coordination. These information exchanges rely upon appropriate and harmonized communication protocols to secure their interoperability.

1.1.9 Information exchanges apply to:

- a) communication systems supporting the coordination procedures between air traffic services units using a peer-to-peer communication mechanism and providing services to general air traffic; and
- b) communication systems supporting the coordination procedures between air traffic services units and controlling military units, using a peer-to-peer communication mechanism.

1.2 **Baseline**

1.2.1 The baseline for this module is the traditional coordination by phone, and procedural and/or radar distance/time separations.

1.3 **Change brought by the module**

1.3.1 The module makes available a set of messages to describe consistent transfer conditions via electronic means across ATS units' boundaries. It consists of the implementation of the set of AIDC messages in the flight data processing systems (FDPS) of the different ATS units involved and the establishment of a Letter of Agreement (LoA) between these units to set the appropriate parameters.

1.3.2 Prerequisites for the module, generally available before its implementation, are an ATC system with flight data processing functionality and a surveillance data processing system connected to each other.

1.4 **Other remarks**

1.4.1 This module is a first step towards the more sophisticated 4D trajectory exchanges between both ground/ground and air/ground according to the ICAO *Global Air Traffic Management Operational Concept* (Doc 9854).

2. **Intended performance operational improvement**

2.1 Metrics to determine the success of the module are proposed in the *Manual on Global Performance of the Air Navigation System* (Doc 9883).

<i>Capacity</i>	Reduced controller workload and increased data integrity supporting reduced separations translating directly to cross sector or boundary capacity flow increases.
<i>Efficiency</i>	The reduced separation can also be used to more frequently offer aircraft flight levels closer to the flight optimum; in certain cases, this also translates into reduced en-route holding.
<i>Global interoperability</i>	Seamlessness: the use of standardized interfaces reduces the cost of development, allows air traffic controllers to apply the same procedures at the boundaries of all participating centres and border crossing becomes more transparent to flights.
<i>Safety</i>	Better knowledge of more accurate flight plan information.
<i>Cost Benefit Analysis</i>	Increase of throughput at ATS unit boundary and reduced ATCO workload will outweigh the cost of FDPS software changes. The business case is dependent on the environment.

3. **NECESSARY PROCEDURES (AIR AND GROUND)**

3.1 Required procedures exist. They need local analysis of the specific flows and should be spelled out in a Letter of Agreement between ATS units; the experience from other regions can be a useful reference.

4. **Necessary System capability**

4.1 **Avionics**

4.1.1 No specific airborne requirements.

4.2 Ground systems

4.2.1 Technology is available. It consists in implementing the relevant set of AIDC messages in flight data processing and could use the ground network standard AFTN-AMHS or ATN. Europe is presently implementing it in ADEXP format over IP wide area networks.

4.2.2 The technology also includes for oceanic ATSUs a function supporting transfer of communication via data link.

5. Human Performance

5.1 Human factors considerations

5.1.1 Ground interoperability reduces voice exchange between ATCOs and decreases workload. A system supporting appropriate human-machine interface (HMI) for ATCOs is required.

5.1.2 Human factors have been taken into consideration during the development of the processes and procedures associated with this module. Where automation is to be used, the HMI has been considered from both a functional and ergonomic perspective (see Section 6 for examples). The possibility of latent failures, however, continues to exist and vigilance is required during all implementation activity. In addition it is important that human factor issues, identified during implementation, be reported to the international community through ICAO as part of any safety reporting initiative.

5.2 Training and qualification requirements

5.2.1 To make the most of the automation support, training in the operational standards and procedures will be required and can be found in the links to the documents in Section 8 to this module. Likewise, the qualifications requirements are identified in the regulatory requirements in Section 6 which are integral to the implementation of this module.

6. Regulatory/standardization needs and Approval Plan (Air AND Ground)

- Regulatory/standardization: use current published criteria that include:
 - a) ICAO Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management*;
 - b) EU Regulation, EC No 552/2004.
- Approval plans: to be determined based on regional consideration of ATS interfacility data communications (AIDC).

7. Implementation and demonstration activities (As known at time of writing)

7.1 Although already implemented in several areas, there is a need to complete the existing SARPs to improve harmonization and interoperability. For Oceanic data link application, North Atlantic (NAT) and Asia and Pacific (APAC) (cf ISPACG PT/8- WP.02 - GOLD) have defined some common coordination procedures and messages between oceanic centres for data link application (ADS-C CPDLC).

7.2 Current use

- **Europe:** It is mandatory for exchange between ATS units.
http://europa.eu/legislation_summaries/transport/air_transport/124070_en.htm

The European Commission has issued a mandate on the interoperability of the European air traffic management network, concerning the coordination and transfer (COTR) between ATS units through REG EC 1032/2006 and the exchange of flight data between ATS units in support of air-ground data link through REG EC 30/2009. This is based on the standard OLDI-Ed 4.2 and ADEXP-Ed 3.1.

- **EUROCONTROL:** Specification of interoperability and performance requirements for the flight message transfer protocol (FMTP). The available set of messages to describe and negotiate consistent transfer conditions via electronic means across centres' boundaries have been used for trials in Europe in 2010 within the scope of EUROCONTROL's FASTI initiative.
- **India:** AIDC implementation is in progress in Indian airspace for improved coordination between ATC centres. Major Indian airports and ATC centres have integrated ATS automation systems having AIDC capability. AIDC functionality is operational between Mumbai and Chennai ACCs. AIDC will be implemented within India by 2012. AIDC trials are underway between Mumbai and Karachi (Pakistan) and are planned between India and Muscat in coordination with Oman.
- **AIDC:** is in use in the Asia-Pacific Region, Australia, New-Zealand, Indonesia and others.

7.3 Planned or ongoing activities

7.3.1 To be determined.

7.4 Currently in operation

7.4.1 To be determined.

8. Reference Documents

8.1 Standards

- ICAO Doc 4444, *Procedures for Air Navigation Services - Air Traffic Management*, Appendix 6 - *ATS Interfacility Data Communications (AIDC) Messages*
- ICAO Doc 9880, *Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Part II — Ground-Ground Applications — Air Traffic Services Message Handling Services (ATSMHS)*.

8.2 Procedures

8.2.1 To be determined.

8.3 Guidance material

- ICAO Doc 9694, *Manual of Air Traffic Services Data Link Applications*; Part 6;
- GOLD Global Operational Data Link Document (APANPIRG, NAT SPG), June 2010;
- Pan Regional Interface Control Document for Oceanic ATS Interfacility Data Communications (PAN ICD) Coordination Draft Version 0.3. 31 August 2010;
- Asia/Pacific Regional Interface Control Document (ICD) for ATS Interfacility Data Communications (AIDC) available at http://www.bangkok.icao.int/edocs/icd_aidc_ver3.pdf, ICAO Asia/Pacific Regional Office.
- EUROCONTROL Standard for On-Line Data Interchange (OLDI); and EUROCONTROL Standard for ATS Data Exchange Presentation (ADEXP).

-END-