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INFORMATION PAPER

**AERONAUTICAL COMMUNICATIONS PANEL (ACP)
13th MEETING OF WORKING GROUP M (Maintenance)**

Montreal, Canada 18 – 21 November 2008

Agenda Item 1: Status of on-going data communications programs

LINK 2000+ UpLink 11 Newsletter

(Presented by Danny Van Roosbroek)

SUMMARY

This information paper provides an update on the activities of the LINK 2000+ data link programme in Europe. Notably, it contains information on the Single European Sky Data Link Services implementing rule.

ACTION

The working group is invited to note the information provided.

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Link 2000+ Events

EUROCONTROL Specification
Formal Consultation Workshop,
13 November 2008,
EUROCONTROL, Brussels

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TO THE IR CONTENTS:

www.eurocontrol.int/ses/public/standard_page/sk_dls.html

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'Time for a drink'

The European Commission accepts the Single European Sky Data Link Services Implementing Rule

For many moons, the aviation community has been eagerly anticipating a final decision on the publication of the Single European Sky Data Link Services Implementing Rule (DLS IR). Now finally the answer is with us; the Single Sky Committee (SSC) gave a positive decision to adopt the DLS IR at its meeting of 30 September 2008. The key element of this decision is that the dates proposed by the EUROCONTROL Agency's IR drafting team in its October 2007 submission to the European Commission were accepted without change.

'What are those dates?' I hear you say. Well that is the subject of our lead article overleaf. Although some changes to the draft DLS IR text delivered by the Agency were made in the SSC Working Sessions held in March and May, the main elements of the rule remained unchallenged. The European Commission had delivered the Mandate for the Agency to develop this rule in May 2005, so this marks the conclusion of more than 3 year's deliberation with our Stakeholders on this subject. EUROCONTROL's Regulatory Unit led the development and formal consultation processes, which achieved a delicate balance where all parties can declare success.

As many people have said, 'This calls for a drink'; needless to say – we agreed.

'This is the most complex rule we have yet tackled since it involved so many Stakeholders. In particular, it places obligations directly on both Airspace Users and Air Navigation Service Providers for an end to end system involving pilots and controllers. In many ways, this was seen as a test case for interoperability regulation', said Mr Eduardo Morere Molinero, responsible for Single European Sky interoperability issues at the European Commission.

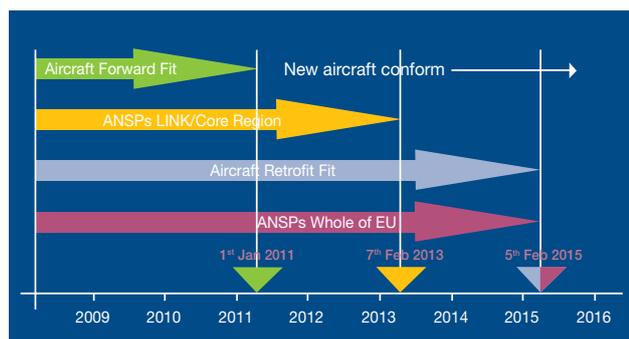
So after all the years of standards development, validation and Pioneer operations, the DLS IR sets the scene for full scale implementation, the final phase of LINK 2000+. It is clear that both the test capability at EUROCONTROL Experimental Centre and the operational capability at Maastricht Upper Area Control Centre were fundamental in reaching this goal.

During the development of the IR, we were often asked 'What Next after LINK 2000+?' The answer of course is SESAR; but how to get there? At the end of this issue of *Uplink*, we briefly present an outline proposal for a Data Link Roadmap that may one day sew the seeds of future implementing rules.

Key Points of the Data Link Services Implementing Rule

The DLS IR targets airspace users operating above FL285 and Air Navigation Service Providers operating in the EU region.

This article and the figures below summarise the key elements of the DLS IR in layman's terms, but is not exhaustive and in no way replaces the need for careful reading of the text itself.



IR Key Dates

Key dates:

- **1st Jan 2011** – After this date all new aircraft operating above FL 285 must be delivered with a compliant system.
- **7th Feb 2013** – By this date all LINK Region Air Navigation Service Providers (ANSPs) must have implemented an operational compliant system (see the yellow region on the opposite map).
- **7th Feb 2015** – By this date all aircraft operating above FL 285 must have been retrofitted with a compliant system.
- **7th Feb 2015** – By this date all EU Region ANSPs must have implemented an operational compliant system (see the pink region on the opposite map).
- **31st Dec 2017** – Aircraft which are at least 20 years old and which will cease operation in the concerned airspace before 31 December 2017 are exempt.
- **1st Jan 2014** – Aircraft with individual airworthiness certificate before this date that are equipped with Future Air Navigation System (FANS) are exempt for the lifetime of the aircraft. Aircraft entering into service after 1 January 2014 shall comply with the rule.
- **1st Jan 2014** – State aircraft should comply with the rule if equipped with non-military data link.

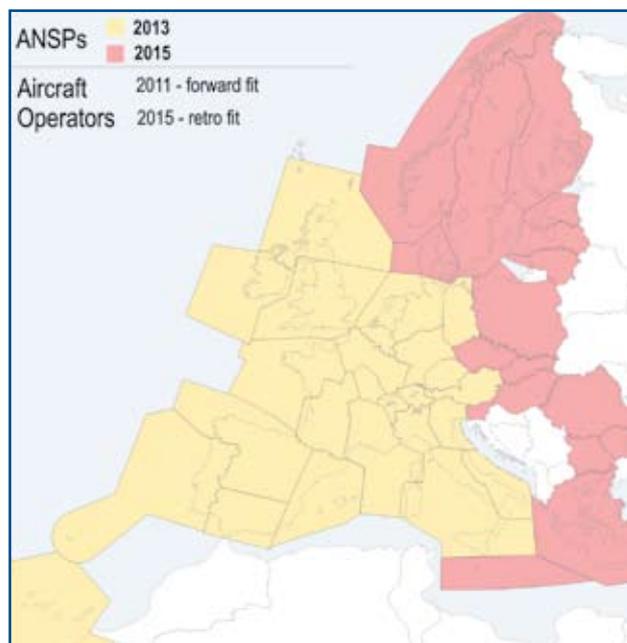
Other key elements:

- Aircraft flying for testing, delivery and maintenance purposes are exempt.
- The Baseline Technology is ATN/VDL Mode 2, but other technology may be acceptable subject to demonstrated compliance to standards, capability of exchanging data with Air Traffic Services and formal regulatory acceptability of the solution proposed.

A EUROCONTROL Specification to complement the Data Link Services Implementing Rule

To ensure interoperability, EUROCONTROL has decided to develop a Specification defining detailed requirements, explanatory materials and conformity assessment materials for the DLS IR. The intention is to provide the basis for a recognised Community Specification and a means of compliance with the IR.

The draft EUROCONTROL Specification is undergoing formal consultation, using the mechanisms of the EUROCONTROL Notice of Proposed Rule-Making process.



Regions of Applicability

Link Integration Team

Pioneer Phase

The number of equipped Pioneer aircraft continues to grow. Today there are almost 280 Pioneer aircraft equipped and the number is expected to reach 330 by the end of the year.

Royal Jordanian joined Link 2000+ as a Pioneer airline with its Airbus 320 fleet.



In preparation of future VDL Mode 2 network expansion, an ARINC-SITA internetworking enhancement is now fully operational. This represents a significant step in the full realisation of the Communication Service Provider (CSP) interconnection principle and will enable ANSPs to exchange Data Link with equipped airlines irrespective of their contracted VDL Mode 2 CSP. The LINK 2000+ Test Facility provided essential support during the intensive testing period.

Support to the Air Navigation Service Providers

Given the good progress with the airborne and communication service provision components, the LIT focus shifted to the ANSP side. A first technical coordination meeting with ENAV took place in April. As ENAV decided to provide the VDL2 communication service in Italy, as DFS in Germany and AENA in Spain, the meeting covered both roles that ENAV will play – as a CSP and an ANSP. Follow-up actions and an initial tests schedule have been agreed.

PM CPDLC Upgrade

On the airborne side, Honeywell and Airbus presented their product upgrade plans to PM CPDLC at the latest LIT meeting held in Reims UAC. The plans show products availability by early 2010. Initial interoperability tests at the application level

were performed between Airbus and the LINK 2000+ Test Facility early this year. The results were encouraging and Airbus will use them in further product development. Honeywell also requested support from the LIT and the Test Facility. An initial plan has already been agreed for laboratory testing and flight trials of PM CPDLC product.

On the ground system side, Maastricht UAC plans to have the new Data Link Front End Processor implementing PM CPDLC in operations around mid 2009.

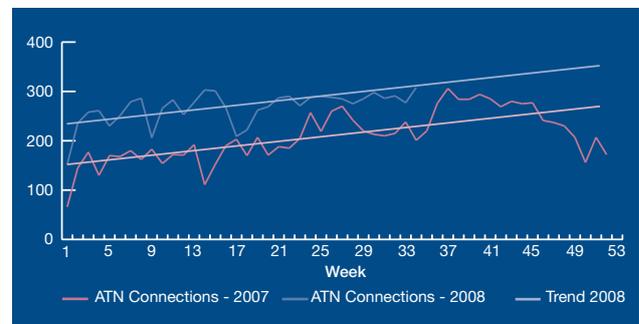
EUROCONTROL Specification on Data Link Services

The Draft EUROCONTROL Specification on Data Link Services is supposed to become the Means of Compliance for the European Commission's Single European Sky Data Link Services Implementing Rule. The Specification is based on the LINK 2000+ baseline document as already endorsed by the LINK Stakeholders.

In accordance with the EUROCONTROL Regulatory and Advisory Framework (ERAF), the Draft EUROCONTROL Specification on Data Link Services (DLS ES) has been subject to the Formal Consultation phase that started early in July and lasted for the past three-month period. EUROCONTROL Regulatory Unit provided significant support. A Workshop will follow on 13 November in Brussels, addressing the comments and presenting the document updates performed. The final agreed EUROCONTROL Specification on DLS is planned to be released by the end of 2008.

Central Reporting Office

The LINK 2000+ Statistics Reporting and Analysis Tool is working well with further enhancements and updates planned for this year. The tool provides statistics for use at the LINK

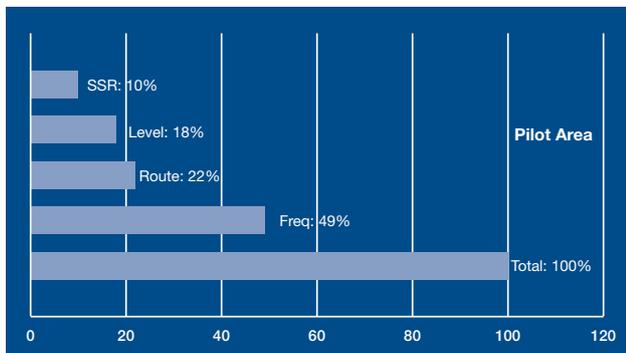


CPDLC Connections 2007/2008

Link Integration Team

2000+ Programme working level, but is also open to other stakeholders for their own local statistics/monitoring activities. Lufthansa and DFS have already shown interest in using the tool.

Today the level of flights performed by CPDLC equipped aircraft is around 3% and Maastricht UAC controllers are eager to see more and more equipped. Currently, an average of 50 flights a day conduct CPDLC with Maastricht UAC, compared to 40 in 2007; the figures show a constant upward trend. Out of the 16.005 uplinked operational messages exchanged in total between January and May 2008, the transfers to the next sector/centre represent almost 50%, followed by the route and level change clearances with 22% and 18% respectively.



Uplink CPDLC Jan-May

VDL Mode 2 Focus Group

The VDL2 Focus Group (sub-group of the LIT) played a major role in reaching agreement at the Airlines Electronic Engineering Committee (AEEC) on the mandatory support of the Autotune option for VDL Mode 2 multi-frequency operations. The latest VDL Mode 2 traffic simulations performed by EUROCONTROL re-enforced the need for this solution.

Other important agreements at the AEEC level concern additional LIT coordinated material proposing network usage optimisation.

The recently agreed ARINC 631-5 Specification, planned for publication in October time frame, reflects all these agreements. This timely achievement facilitates a single avionics upgrade step implementing the Autotune option for VDL Mode 2 multi-frequency operations together with the PM CPDLC, for compliancy with the DLS IR.

Further to these important achievements, the VDL2 Focus Group will now concentrate on producing a VDL2 multi-frequency validation plan and coordinating its implementation together with the stakeholders.

Agency Support to the Data Link Services Implementing Rule

During or after the process of implementation of the rule, the stakeholders may need support or clarifications with regard to operational, technical and/or institutional aspects. To meet that demand, EUROCONTROL will provide the following support:

1. Maintenance of the EUROCONTROL Specification and associated standards.
2. The Link Integration Team (LIT), to address all Stakeholders' implementation issues: operational, technical, safety and testing.
3. The LINK 2000+ Test Facility, to support problem investigation and stakeholders in technical and interoperability tests. It may also support applicants in certification and operational approval tests.
4. The Central Reporting Office, to report and monitor CPDLC, ATN and VDL Mode 2 operations and performance.
5. The Programme Support Office, to administer and monitor aircraft operator equipage plans, ANSP implementation plans, incentives scheme and exemption cases.
6. Safety Case Development for individual ANSPs.
7. The Web Site, structured to inform different groups of stakeholders and a Frequently Asked Questions section.

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Operational Focus Group

Human Factors Material in the Operational Guidance Documents

Earlier this year, the LINK 2000+ Programme decided to take a new look at Human Factors by updating the related section of the operational guidance documents. The OFG discussed the results of the initial findings at its meeting in Aix-en-Provence and approved the proposals for the next phase of the work. It is expected that the revised documents will be published at the end of 2008.

Reporting of CPDLC Problems via Radio Telephony

Basing themselves on feedback from controllers in Maastricht UAC, the OFG has also discussed the reporting of eventual CPDLC problems on R/T. Although guidance and suggested R/T phraseology are available from ICAO, there is a need for increased awareness of this material. Consequently, it was agreed to add/modify the relevant sections in the operational guidance documents to clarify the procedures.

Voice Read-back - use Mode S Selected Flight Level Information instead?

During the LINK 2000+ Workshop in October 2007, a group of pioneer airlines offered a partial solution to get rid of the need for voice read-back for certain type of instructions. The idea would be to use the increasing availability of various aircraft parameters downlinked through Mode S extended squitter, specifically the Selected Flight Level. Controller observation of the correct change of this parameter could then replace the need for pilots to read-back Flight Level clearances.



The OFG agreed that there would be some merit to trial this method. This would be sometime during 2009 at the earliest, after the introduction of the new Flight Data Processing System in Maastricht UAC. The OFG will then re-evaluate its position in light of the status of other developments (in particular PM CPDLC).

The MONITOR Concept

The LINK 2000+ Programme describes two different operational methods for the transfer of flights between sectors and Area Control Centres (ACC) within its Air Traffic Control Communications Management (ACM) service. These are the "Contact" method and "Monitor" method, both described in the "ATC Data Link Manual for LINK 2000+ Services". Their common objective is to reduce the number of routine communication exchanges between pilots and controllers during transfers.

Given the unresolved issues associated with the overall "Monitor" concept found in 2003, it was decided to re-evaluate the use of the associated "MONITOR" and "MONITORING" messages once sufficient operational experience with the "Contact" version of ACM had been gained.

That time has now come and the LINK 2000+ Programme has identified the key problem areas and discussed potential solutions with the OFG. The most important issue evolves around the main difference between the two methods – when using the "Monitor" method, the flight crew will NOT announce their presence via voice on the new frequency, but just wait to be called. Put simply, how can the controller be sure that the flight crew has actually switched to his frequency? Promising mid-term technical solutions to this are under development, but there is also the intention to start trials of some short-term solutions in the 2009-2010 time frame.

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EVALINK: First Findings from a Successful French Experiment

EVALINK: a Technical Evaluation of CPDLC Services

EVALINK live trials took place on four controller working positions in Reims ACC from January to March 2008 (10:00 to 16:00 local time). It was an opportunity to test inter-centre coordination between the contiguous Upper Flight Information Regions of Reims and Maastricht. EVALINK provided Data Link Initiation Capability, ATC Communications Management (ACM), ATC Clearances (ACL), and ATC Microphone Check services over an ATN/VDL M2 communication infrastructure, as required by the Data Link Services Implementing Rule. It also offered accommodation of FANS 1/A aircraft. The Air Server, jointly developed with Thales ATM, was intensively tested with operational data and fully validated.

Interoperability

Air/Ground Interoperability: the air / ground interoperability was extensively tested and validated during the tests performed with the Link 2000+ Test Facility in mid 2007, and then during the live experiment. A lot of CPDLC messages were exchanged between the air server and various types of avionics (FANS and ATN), allowing DSNA to gather a huge amount of data. Only a few non-nominal cases were registered, with no major issues.

ARINC/SITA Interconnection: EUROCONTROL Maastricht, who has a contract with ARINC, requested interconnection between ARINC's and SITA's networks in order to reach SITA aircraft. On their side, DSNA, who has a contract with SITA, asked for symmetrical functionality, to reach ARINC aircraft during EVALINK. This was put in place in mid December 2007, and since then, all Link 2000+ partners benefit from this new feature.

Ground/Ground Interoperability: the inter-centre frequency transfer of aircraft between Reims and Maastricht was an important aspect of EVALINK. Several hundreds of transfers were successfully performed and gave good input on ground-ground transfer operations.

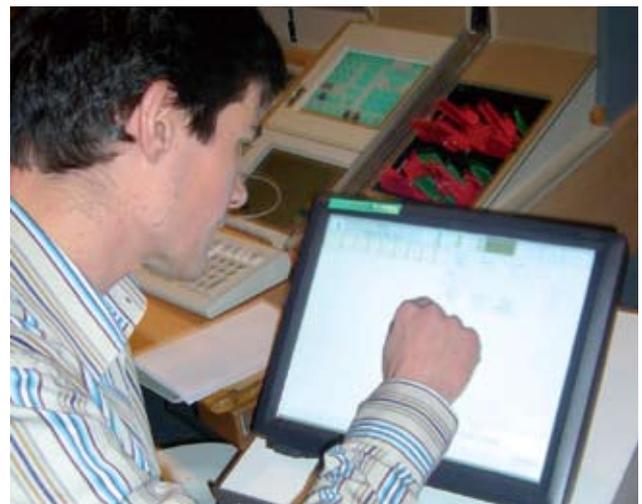
Accommodation: DSNA offered FANS accommodation during the EVALINK experiment, as a good opportunity to gain experience with it. Interoperability between message sets worked well, but differences in procedures, performances and behaviour of the avionics with regard to uplink message latency gave controllers the feeling that the oceanic and continental contexts were not harmonised.

Safety and Human Factors

EVALINK was a technical experiment; the controller's data link environment was intentionally not representative of the future operational system. As a result, no firm operational conclusion could be drawn. However, as the CPDLC HMI was used in the control room, a human factor team collected and analysed the feedback from the controllers. The data collected is currently being correlated with technical data.

Choice between Data link and Voice: controllers were able to quickly choose the most efficient way of communication depending on the context. Their choice was compliant with EVALINK working methods.

The voice Read Back Procedure: this procedure generated some uncomfortable situations when voice read back was not received on time, as the controllers could not easily determine whether this was due to transmission delay, potential technical failure, or pilot reaction time.



A French experimenter using the Evalink dedicated HMI in Reims

Performance

The performance results presented here are based on an important number of uplink messages. About 4000 were sent to aircraft, around 75% of which were FANS aircraft. Controllers particularly appreciated the data link transfer messages, and the following clearances: 'Proceed direct to position', and 'Climb / Descend to level'. As for downlink messages, very few pilot requests were received.

When the ATN infrastructure was used, the performance was in line with ED-120 technical requirements (RCTP): for 95% of messages, less than 7 seconds were needed between the CPDLC message uplink and the associated Logical Acknowledgement reception (ED-120 requires less than 16 seconds).

The ground system performance was steady and nominal. Although the air-ground sub-network could have degraded the performances, the VDL M2 sub-network worked very well: the mean round trip delay of the Aviation VHF Link Control frames equalled 0.8 second.

However, one must bear in mind that few aircraft are currently VDL M2 equipped, which reduces the impact of Airline Operational Communications load on this network. The progressive migration of aircraft towards VDL M2 thanks to the DLS IR mandate will result in increased use of the channel. The growth of demand must be monitored and dealt with through a scalable capacity (Multi-frequency VDL M2) for future operations.

For FANS aircraft, only 79% of messages took less than 16 seconds between the CPDLC uplink sending and Arinc 620 MAS message reception. For 95%, it took 52 seconds. This performance was too slow with regard to ED-120 requirements. This may be explained by the fact that a great majority of FANS transactions relied on the plain old ACARS sub-network rather than VDL M2. The good performance observed for FANS over VDL M2 (but on very few transaction samples) confirms this.

Users found that the level of performance depended on the aircraft equipage. For ATN, 94% of transactions initiated by the ground side were completed in less than 60 seconds and 100% in less than 120 seconds. For FANS, 74% were completed in less than 60 seconds and 83% in less than 120 seconds. However, this low result did not impact safety of operations as timers indicated to controllers and/or pilots when they had to revert to voice communication.

Experimenters experienced very different transaction performance depending notably on the technologies. They were concerned about the lack of predictability in transaction delays (mainly caused by FANS aircraft).

Here is a synthetic table:

	ATN/VDL m2	FANS
MEAN	2.8 secs	13.7 secs
Standard deviation	2.6 secs	20.1 secs
TT (95)	6 secs	51 secs
< 16 seconds	99.6%	78.8%

Technical Performance during EVALINK Experiment

Conclusion

EVALINK was a great success for the French DSNA and for the Link 2000+ Programme. Despite minor difficulties, which were quickly resolved, the EVALINK system and its state-of-the-art Air Server, jointly developed with Thales Air Systems Company, proved to be reliable, interoperable and safe throughout the experiment.

More aircraft than expected took part in the exchange of CPDLC messages and a huge amount of data was collected. Several factors contributed to this result:

- The airlines actively participated in EVALINK. The experimenters could have accepted more logon requests with a wider geographical coverage and a longer daily trial period (especially before 10:00 local time).
- The controllers daily asked upstream ACCs to motivate aircrew to logon to Reims ACC.

Many avionics systems were tested, and as a result air/ground interoperability of French ground implementation was ensured.

For the first time in the Link 2000+ Programme, ground/ground interoperability was achieved with Maastricht UAC.

Controllers very much appreciated the use of the ACM service which avoids misunderstandings, errors, and tiresome repetitions of frequencies. Gains in capacity were not investigated due to the ACL voice read back procedure which compromises its benefits. Little was learned about the task sharing as the controller working environment in EVALINK was not meant to be representative of the future system. Controllers were concerned that voice read back could generate uncomfortable situations, and that communication delays were sometimes too long and unpredictable (especially for FANS aircraft - confirming DSNA's intention not to offer the ACL service to ED-100A FANS 1/A aircraft).

It should be noted that voice read back will be removed as soon as possible in the DLS IR compliant operational system.

Finally, EVALINK gave valuable input to the French safety case for full scale CPDLC deployment and interesting feedback for future validation cases in the mid and long terms (4-FLIGHT and SESAR programs).

Maastricht Upper Area Control Centre



A New CPDLC Controller Human Machine Interface

Maastricht UAC has developed a new, label based, CPDLC Controller Human Machine Interface (HMI) to be introduced with the new Flight Data Processing System, scheduled for implementation at the end of 2008.

Following the previous use of a Touch Input Device during PETAL I and II, and the present window based CPDLC-HMI at Maastricht's Operational Display System, the HMI has followed a logical development process towards a label based solution. The end-users, the Maastricht UAC air traffic controllers, have driven and supported the entire process.

The new functionality provides an important step towards handling large numbers of simultaneous CPDLC operations in each sector, as well as offering simplified input functionality directly from the radar track label instead of from a separate window. To optimise the transition to the new system, present input sequences will be used, modified for CPDLC uplinks simply by adding one single mouse click.

Easily said, but how is this aim going to be achieved in practise? Let us look at a few examples.

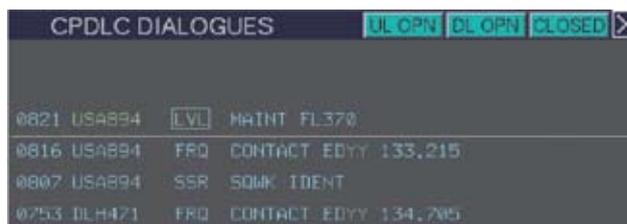
To begin with, the Cleared Flight Level (CFL) concept was introduced at Maastricht UAC. Present Flight Level clearances were enhanced with an additional CPDLC option at the end of the input sequence, allowing the air traffic controller to uplink any CFL input to the CPDLC aircraft.

Similarly, any heading or a direct-to-route input was simply enhanced with CPDLC functionality by one simple mouse click at the end of the input sequence, saving valuable frequency time.

In addition, the frequency transfer menu of the next sector frequency will be enhanced with a short three letter sector identification improving the user-friendliness of our most frequently used CPDLC uplink.

The new CPDLC window will contain a history of all CPDLC messages sent and received in the relevant sector, and will no longer be used as the main interface to uplink messages. The window will also display any CPDLC dialogue error message.

Generally these modifications are also seen as enablers for additional CPDLC uplink clearances to be implemented in 2009 and 2010.



New CPDLC Window

Link 2000+ Test Facility EUROCONTROL Experimental Centre



Support Activities

Interoperability Testing with ATSU FANS-B Prototype Capable PM CPDLC

Interoperability test sessions were successfully conducted in January 2008 between a prototype of Airbus FANS-B ATSU capable Protected Mode Controller Pilot Data Link

Communications (PM CPDLC) in Toulouse, and the Test Facility ground End Systems (ESs) in Bretigny. The tests were achieved via SITA Air/Ground Communications Service Provider ATN/VDL M2 LINK 2000+ infrastructure.

The objective of the test session was to perform:

- an operational scenario with nominal test cases;
- some degraded test cases (including inappropriate algorithm identifier, erroneous computed integrity check);
- some test cases with configuration changes in order to validate different computed values of the integrity check (Flight ID values, Aircraft ID values, Ground Facility Designator values).

It definitely helped Airbus in getting some confidence for the development of their next standard which will be PM CPDLC compliant.

Maastricht – Bretigny Interconnection over Internet Protocol Suite

Since May 2008, Bretigny EUROCONTROL Experimental Centre's and Maastricht Test and Development System's ATN ground/ground routers have been successfully interconnected over IPS using the ICAO SARPs IP v4 Subnetwork Dependent Convergence Function.

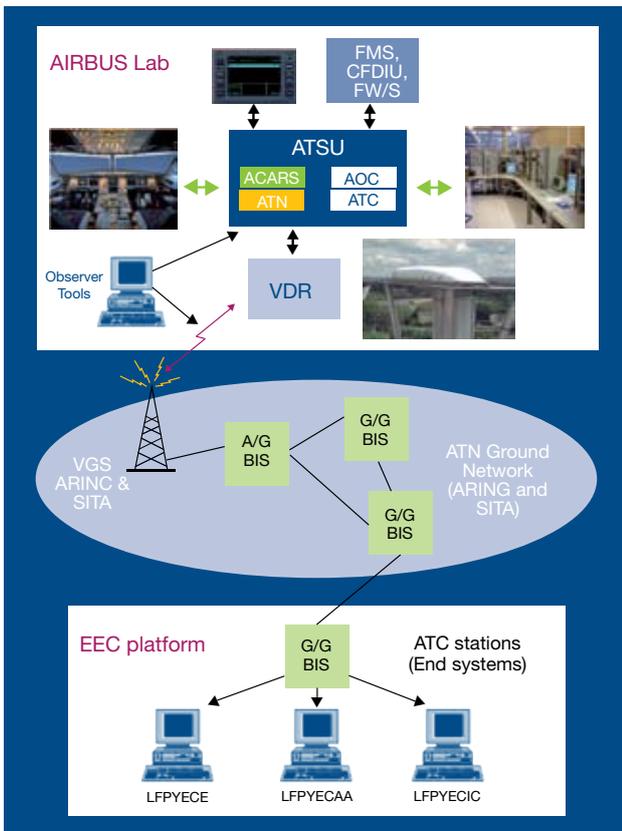
The ATN traffic exchanged between both routers is encapsulated within IP traffic which is itself conveyed in a Virtual Private Network (VPN) tunnel. The VPN tunnel is managed on CISCO Routers respectively located on the Bretigny and Maastricht sides. Traffic flow is conveyed via EUROCONTROL corporate network.

The IP interconnection is currently replacing the previous connection based on ISDN network.

TUfly Certification Test

The subject certification test was performed on Friday 23 May between a TUfly 737-800 aircraft hosting the Honeywell Mark II CMU ICAO ATN/CPDLC compliant product, and both LFPYECAA and LFPYECEO ESs CM/CPDLC ground test tools from the LINK 2000+ Test Facility.

The CM/CPDLC scenario as prepared with EAD Aerospace was performed from a grounded aircraft at Hanover, with Logon request from the aircraft sent to LFPYECAA.



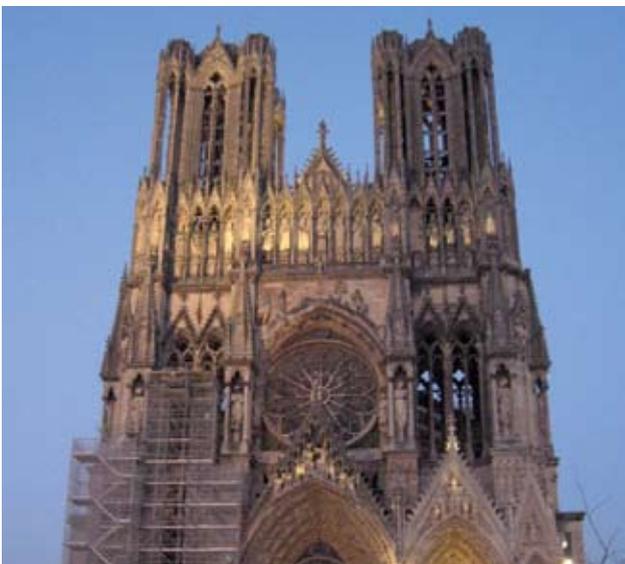
Link 2000+ Test Facility EUROCONTROL Experimental Centre



After successful CPDLC exchanges with LFPYECAA, a center-to-center transfer was exercised from LFPYECAA to LFPYECEO ESs.

Investigations Support during EVALINK Trials

The Test Facility supported investigations of technical and operational issues faced during the EVALINK experiment. The Link Integration Team meeting in Reims ACC in February 2008 was the opportunity to discuss some issues and see the French DSNAs HMI ground implementation and technical installation. Thanks again to all DSNAs colleagues for their very nice welcome.



Information Events

The ATC Global Exhibition

The Test Facility presented its Air/Ground CPDLC mock-up at the ATC 2008 exhibition. The mock-up is based on the Rockwell-Collins CMU 900 HMI implementation.

Training Cooperation with EUROCONTROL Institute of Air Navigation Services

In April and October 2008, IANS invited the Test Facility Manager to take part in the training course 'Data Link Technology in Europe'. This gave the audience the opportunity to learn about the Link 2000+ validation and support activities carried out in the EUROCONTROL Experimental Centre.

New Training at EUROCONTROL Experimental Centre

In April 2008, the Test Facility delivered its first session of training on the future European Air Traffic Management system elaborated by SESAR. It included a presentation on LINK 2000+ and gave an overview of the support and testing activities managed by the Test Facility, which displayed its CPDLC mock-up in the showroom on that occasion.

Next to come...

In the short-term, the Test Facility will provide support to Maastricht UAC in the context of the implementation of their new Air/Ground Data Link System. In addition, it will provide co-ordination activities and support to ENAV on their network infrastructure and ANSP implementation.

Test Facility upgrades will be initiated in order to enhance the monitoring of the ATN routes information exchanged on the ground ATN infrastructure. Enhancements of the EEC ARINC Air/Ground Test System (AGTS) to support the VDL M2 multi frequency are also foreseen.

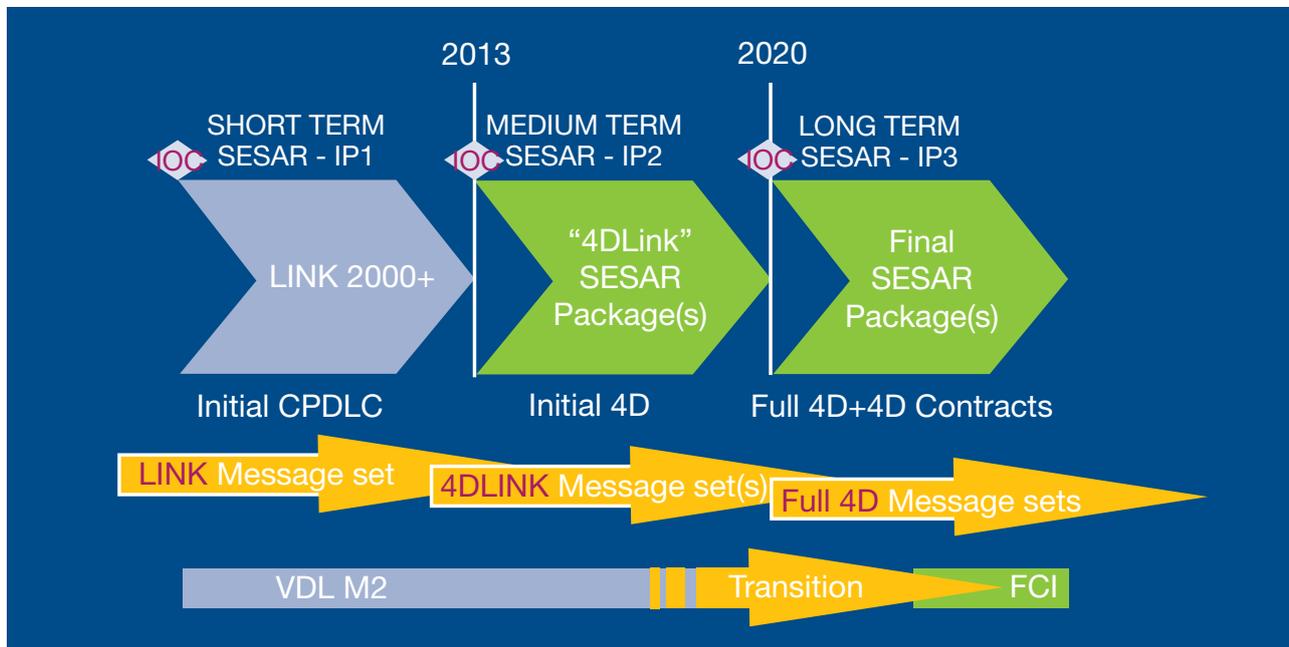
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Glossary (A-Z)

ACARS	Aircraft Communications Addressing and Reporting System
ACC	Area Control Centre
ACL	Air Traffic Control Clearances
ACM	Air Traffic Control Communications Management
ACSP	Air/Ground Communications Service Provider
AEEC	Airlines Electronic Engineering Committee
AGTS	Air/Ground Test System
AMC	Air Traffic Control Microphone Check
ANSP	Air Navigation Service Provider
AOC	Airline Operational Communications
ATN	Aeronautical Telecommunications Network
ATSU	Air Traffic Services Unit
AVLC	Aviation VHF Link Control
CFL	Cleared Flight Level
CLNP	Connectionless Network Protocol (ISO 8473 Standard)
CM	Context Management
CMU	Communications Management Unit
CPDLC	Controller Pilot Data Link Communication
CRO	Central Reporting Office
CSP	Communication Service Provider
DLFEP	Data Link Front End Processor
DLIC	Data Link Initiation Capability
DLS ES	Data Link Services EUROCONTROL Specifications
DLS IR	Data Link Services Implementing Rule
EEC	EUROCONTROL Experimental Centre
ENPRM	EUROCONTROL Notice of Proposed Rule-Making
ES	End System
FANS	Future Air Navigation System
FANS 1/A	First generation of FANS Products from Boeing and Airbus
FANS 1/A+	Later generation of FANS Products from Boeing and Airbus
FANS B	Airbus ICAO ATN/CPDLC compliant product for the A-320 family (ATSU FANS-B)
HMI	Human Machine Interface
IANS	Institute of Air Navigation Services
IP	Internet Protocol
IP v4	Internet Protocol version 4
IPS	Internet Protocol Suite
IR	Implementing Rule
ISDN	Integrated Services Digital Network
LACK	Logical Acknowledgement
LIT	Link Integration Team
Mark II	Honeywell ICAO ATN/CPDLC compliant CMU
MAS	Message Assurance
nFDPS	new Flight Data Processing System
OFG	Operational Focus Group
PETAL	Preliminary EUROCONTROL trials of Air / Ground Data Link
PM CPDLC	Protected Mode CPDLC
R/T	Radio Telephony
SARPs	Standards and Recommended Practises
SES	Single European Sky
SESAR	Single European Sky ATM Research Programme
SFL	Selected Flight Level
SNDCF	Subnetwork Dependent Convergence Function
TID	Touch Input Device
UAC	Upper Area Control Centre
VDL	VHF Digital Link
VDL-M2	VHF Digital Link Mode 2
VPN	Virtual Private Network

The Data Link Roadmap

A Proposal



As stated in the Editorial of this newsletter, a Data Link Implementation Roadmap proposal is being formulated to answer the following questions: what next after LINK 2000+? How does it fit with SESAR? The proposal targets evolution rather than revolution as the practical way forward, and has been shaped by the:

1. strategic SESAR context – Data Link and the use of trajectories being an integral part of the Master Plan;
2. status of international Data Link activities (FAA NextGEN and SC214/WG78 standards development);
3. practical experience of the Link 2000+ Programme;
4. practical constraints for the industrial development for Data Link products (in particular Flight Management Systems).

4DLINK is a proposal for the next Data Link package. It targets Initial 4D trajectories and airport services. This capability fits in Implementation Package 2 (IP2) as identified by the SESAR Master Plan.

One key feature over and above LINK 2000+ will be the integration of the Data Link communications function with the Flight Management Computer on the aircraft. This will enable the first step in the evolution towards the SESAR trajectory based concept.

What is the status of this activity?

- The draft operational concept is available and will be finalised by the end of 2008.
- The draft EUROCAE WG78/RTCA214 standards will be ready for validation by the end of 2009.
- The roadmap was provided as information to the Agency's Stakeholder Consultation Group in May.
- The proposal will be co-ordinated with SESAR Joint Undertaking for further action.

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