International Civil Aviation Organization

SIP/2012/ASBU/Dakar-WP/28B

Aviation System Block Upgrades

Module N° B0-40/PIA-4

Improved Safety and Efficiency through the initial application of Data Link En-Route

Workshop on preparations for ANConf/12 − ASBU methodology
(Dakar, 16-20 July 2012)

Module N° B0-40

Improved Safety and Efficiency through the initial application of Data Link En-Route

Summary	**Implementation of an initial set of data link applications**	
Main Performance Impact	KPA-02 Capacity; KPA-04 Efficiency; KPA-10 Safety	
Operating Environment/Phases of Flight	En-route flight phases, including areas where radar systems cannot be installed such as remote or oceanic airspace.	
Applicability Considerations	Requires good synchronisation of airborne and ground deployment to generate significant benefits, in particular to those equipped. Benefits increase with the proportion of equipped aircraft.	
Global Concept Component(s)	IM – Information Management SDM – Service Delivery Management	
Global Plan Initiatives (GPI)	GPI-9 Situational awareness GPI-17 Implementation of data link applications GPI-18 Electronic information services	
Main Dependencies	(excerpt from dependency diagram to be included in V3). Predecessor of: B1-40 (but can also be combined with it)	
Global Readiness Checklist		Status
	Standards Readiness	Ready
	Avionics Availability	Ready
	Ground Systems Availability	Ready
	Procedures Available	Ready
	Operations Approvals	Ready

Module N° B0-40 - Baseline

- Prior to this module, air-ground communications used voice radio (VHF or HF depending on the airspace)
  - Known limitations in quality, bandwidth and security and areas with no radar surveillance.
- High density airspace controllers spend 50% of their time talking to pilots on the VHF voice channels where frequencies are a scarce resource
  - This represents a significant workload for controllers and pilots

Module N° B0-40 – Change Brought by the Module

- **Element 1 ✈ ADS-C over Oceanic and Remote Areas**
  - ADS-C provides an automatic dependent surveillance service over oceanic and remote areas, through the exploitation of position messages sent automatically by aircraft over data link at specified time intervals (ADS-Contract).
- **Element 2 ✈ Continental CPDLC**
  - The applications allow pilots and controllers to exchange messages with a better quality of transmission.

Module N° B0-40 –Intended Performance Operational Improvement

Element 1

ADS-C over Oceanic and Remote Areas

Capacity	Reduced separations allow increasing the offered capacity.
Efficiency	Routes/tracks and flights can be separated by reduced minima, allowing to apply flexible routings and vertical profiles closer to the user-preferred ones.
Flexibility	permits to make route changes easier
Safety	Increased situational awareness; better support to SAR
CBA	The business case has proven to be positive

Element 2

Continental CPDLC

Capacity	Reduced communication workload & better organisation of controller tasks allow to increase sector capacity
Safety	Increased situational awareness; reduced occurrences of misunderstandings; solution to stuck mike situations
CBA	The European business case has proven to be positive due.

Module N° B0-40 – Necessary Procedures (Air & Ground)

- Procedures have been described and are available in ICAO documents: Manual of Air Traffic Services Data Link Applications (Doc 9694), GOLD Global Operational Data Link Document

Module N° B0-40 – Necessary System Capability

- **Avionics**
  - Data Link implementations are based on two sets of ATS Data link services: FANS 1/A and ATN B1, both will exist. FANS1/A is deployed in Oceanic and Remote regions whilst ATN B1 is being implemented in Europe
  - Dual stack implementation (FANS 1/A and ATN B1) in the aircraft
- **Ground Systems**
  - ADS-C process and display position messages.
  - CPDLC messages need to be displayed to the relevant ATC unit.

Module N° B0-40 – Training and Qualification Requirements

- Automation support is needed for both the pilot and the controller which therefore will have to be trained to the new environment and to identify the aircraft/facilities which can accommodate the data link services in mixed mode environments.
- Training in the operational standards and procedures are required for this module
- Likewise, the qualifications requirements are identified in the regulatory requirements

Module N° B0-40 –Regulatory/Standardization needs and Approval Plan (Air & Ground)

- **Regulatory/Standardization:**
  - Use current published requirements .
  - New ICAO OPLINK Ops Guidance is under development
- **Approval Plans:**
  - Must be in accordance with application requirements

Module N° B0-40 – Reference Documents (1/2)

- **Standards**
  - Commission Regulation (EC) No 29/2009 of 16 January 2009 laying down requirements on data link services for the single European sky
  - EUROCAE ED-100A / RTCA DO-258A, Interoperability Requirements for ATS Applications using ARINC 622 Data Communications
  - EUROCAE ED-110 / RTCA DO-280, Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1 (Interop ATN B1)
  - EUROCAE ED-120 / RTCA DO-290, Safety and Performance Requirements Standard For Initial Air Traffic Data Link Services In Continental Airspace (SPR IC)
  - EUROCAE ED-122 / RTCA DO-306, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard)
  - EUROCAE ED-154 / RTCA DO-305, Future Air Navigation System 1/A – Aeronautical Telecommunication Network Interoperability Standard (FANS 1/A – ATN B1 Interop Standard)
- **Procedures:** Nil

Module N° B0-40 – Reference Documents (2/2)

- **Guidance Material**
  - ICAO Doc 9694, Manual of Air Traffic Services Data Link Applications;
  - New OPLINK Ops Guidance (under development).
- **Approval Documents**
  - ICAO Doc 9694, Manual of Air Traffic Services Data Link Applications;
  - FAA AC20-140A, Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS);
  - RTCA/EUROCAE DO-306/ED-122;
  - RTCA/EUROCAE DO-305/ED-154;
  - RTCA/EUROCAE DO-290/ED-120;
  - RTCA/EUROCAE DO-280/ED-110B;
  - RTCA/EUROCAE DO-258A/ED-100A;
  - EC Regulation No. 29/2009: Datalink Services Implementing Rule;
  - New OPLINK Material under development.

Module N° B0-40 Implementation - Benefits and Elements

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Benefits - Main Key Performance Areas (KPA)					
KPAs	**Access**	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	**N**	**Y**	**Y**	**N**	**Y**

Elements:

-ADS-C over oceanic and remote areas using FANS1/A or ATN B1

-VDL Mode 2 /Continental CPDLC

To be reflected in ANRF

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