ICAO Seminar on the Implementation of G/G and A/G Datalink Applications in the SAM Region

September 2012

AIRBUS Solutions and Roadmap

FANS: A/G Data link Applications over ACARS & ATN

Presented by
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1. Data Link Communication Reminders
2. Complete Range of AIRBUS FANS Solutions
3. AIRBUS FANS Roadmap
4. AIRBUS Customer Support
FANS concept – Ground networks

**ACARS**

Aircraft Communication and Addressing Reporting System

Oceanic and Remote areas

**AIRBUS solution**: FANS A+ package

**ATN**

Aeronautical Telecommunication Network

Continental areas since end of 2006

**AIRBUS solution**: FANS B+ package
Architecture in ACARS Environment – FANS A+

Avionics

Air/Ground media

Ground network

Ground users

SATCOM

ATSU

VDL-A

VDL-2

HFDL

ACARS

AOC

ATC
Architecture in ATN Environment – FANS B+

- SATCOM
- AVDL-A
- VDL-2
- HFDL
- ACARS
- AOC
- ATC (A623)
- ATC (CPDLC)
- ATSU
- Avionics
- Air/Ground media
- Ground network
- Ground users

If installed
CPDLC & ADS-C in the World

In case of errors or omissions, please inform fltops.ops@airbus.com
The Data Link Mandates Published or Expected

**Europe**
**LINK 2000+**
- **Published**
- **Forwardfit**: 01JAN2011 / **Retrofit**: 05FEB2015
- Details on [EUROCONTROL website](#): ATN B1
- AIRBUS solution: FANS B+

**North Atlantic**
- **Published**
- **Organized Track System**: 2013 / MNPS: 2017
- Requirements for CPDLC and ADS-C: FANS 1/A
- AIRBUS solution: FANS A or A+

**Data Link Recording**
- **FAA**: Forwardfit and Retrofit from 06DEC2010
- **EASA**: Forwardfit from 08APR2014 (not yet published)
- AIRBUS solutions available on all aircraft
Data Link Communication Reminders
Complete Range of AIRBUS FANS Solutions
AIRBUS FANS Roadmap
AIRBUS Customer Support
AIRBUS FANS Solutions

FANS A+ over ACARS in oceanic and remote areas

FANS B+ over ATN in continental areas

FANS A+ applications
COM : CPDLC
SURV : ADS-C

ATS 623 applications
› Digital ATIS – D-ATIS
› Departure Clearance – DCL
› Oceanic Clearance – OCL

FANS B+ applications
COM : CPDLC

ATS 623 applications
› Digital ATIS – D-ATIS
› Departure Clearance – DCL
› Oceanic Clearance – OCL

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Reminder about ADS-B and ADS-C

**ADS-Broadcast**
- Surveillance
- Continental
- Mode S Transponder
- 250 NM from ADS-B ground receiver
- Data broadcast every 0.5 sec

**ADS-Contract**
- Operations
- Procedural Control
- Oceanic and Remote
- ATSU – FANS A/A+
- Worldwide with SATCOM and HF data link
- End-to-End connection: Periodic, On Demand, On Event contracts
Introduction to FANS A+

**FANS A**
- 1st AIRBUS product capable of CPDLC over ACARS
- Certified in 2000 on A330/A340
- Initial CPDLC & ADS-C operations in the Pacific
- FMS link: Route clearance upload

**FANS A+**
- Upgrade series of FANS A and former FANS A+ versions
- 1st version certified in 2004 on A330/A340 aircraft, later on A320 Family aircraft and A380 aircraft
- Latest version certified in 2011
- Enhancements (in-service experiences) from FANS operations all over the world

**FANS A+ Options**
- HF Data Link (HFDL)
- VHF Data Link Mode 2 (VDL 2): Higher data rate compared to VDL Mode A
- Frequency loading into RMP
- Data link recording by CVR (FAA/EASA)
- ATS 623 Departure & Oceanic Clearances, D-ATIS
Introduction to FANS B+

**FANS B**
- 1st AIRBUS product capable of ATN/VDL2 for CPDLC
- Certified in OCT 2006 on A320 Family
- LINK 2000+ Pioneer phase

**FANS B+**
- Upgrade of FANS B
- Certified in DEC 2010 on A320 Family
- Eligible to European LINK 2000+ mandate (EC 29/2009)
- Protected Mode (PM): Voice read-back no longer required

**FANS B+ Options**
- Frequency loading into RMP
- Data link recording by CVR (FAA, EASA)
- ATS 623 Departure & Oceanic Clearances, D-ATIS
AIRBUS FANS in A320/A330/A340 Cockpit

DCDU: Datalink Control & Display Unit
AIRBUS FANS in A380 Cockpit

A350 will apply the same with integrated HMI for FANS A+ and FANS B+, to be retrofitted on A380 afterwards.

Commonality with A320/330/340 operating principles

A380 Cockpit interactivity = More efficient workflow
Receiving an Uplink Message
Sending a Downlink Message
Functional Architecture of Current Solutions

Cockpit Interfaces
- AOC
- D-ATIS
- DCL
- OCL
- ADS-C

A623

FMS
CVR
RMP

A/C Router
- ACARS

Comm Means
- VDL A
- VDL2
- SATCOM
- HFDL

CPDLC

FANS A+

AOC
- AFN
- CPDLC

FANS B+

AOC
- D-ATIS
- DCL
- OCL

Cockpit Interfaces
- CVR
- RMP

Comm Means
- VDL A
- VDL2
- SATCOM
- HFDL

A/C Router
- ACARS
- ATN

Airbus Solutions and Roadmap for FANS

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System Architecture of Current Solutions

Applications

LRU ATSU

A/G Router

Comm Means

Cockpit Interfaces

IMA ATC Applications

A320/A330/A340

A380/A350

VDR SDU HFDR

VDR SDU HFDR

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Data Link Communication Reminders

Complete Range of AIRBUS FANS Solutions

AIRBUS FANS Roadmap

AIRBUS Customer Support
AIRBUS FANS Roadmap

2010

Today

2015

2020

FANS A+

FANS B+

FANS A+

FANS A+C

FANS A+

FANS A+

FANS A+C

FANS A+B

FANS A+C

FANS A+B

FANS A+C

DR

DR

DR

DR

DR

DR

2010

Today

2015

2020

ICAO ASBU > Block 0

FANS 1/A

ATN B1

Block 1

ATN B2

Block 2

ATN B2 standardization in progress by RTCA SC214 / EUROCAE WG78

Data link Recording
Architecture in ACARS Environment – FANS A+

SATCOM

VDL-A

VDL-2

HFDL

ACARS

ATSU

Avionics

Air/Ground media

Ground network

Ground users
The AIRBUS FANS Alphabet

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>FANS</th>
<th>ACARS</th>
<th>ATN</th>
<th>Applications</th>
<th>Uploadable clearances into the FMS</th>
<th>Std</th>
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<td>CPDLC</td>
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* Protected Mode (PM) CPDLC
FANS A+ over Iridium

**Iridium**
- 66 Low Earth Orbit satellites
- Full globe coverage
- Voice and Data services
- Eligible for FANS 1/A operations
- [www.iridium.com](http://www.iridium.com)

**AIRBUS Feasibility Study**
- Evaluation of Iridium solution at aircraft level (interference, integration, etc)
- For **routine** (e.g. AOC) and **safety** (e.g. FANS 1/A or ATC voice) communications
- **First availability**: 1Q2014 on A320
The AIRBUS Support for our Customers

**Engineering**
- Support to aircraft definition and retrofit
- In-service support

**Flight Operations**
- Flight operations expertise
- Assistance to EIS and operational approval, in-service support
- Academic briefing
- Full set of Flight Operations documents

**Assistance to Operational Approval**
- Turnkey solution “A la carte”
- Engineering & Flight Operations expertise
- By [QUOVADIS](#) subsidiary
Conclusion

Data Link
- FANS 1/A over ACARS
  AFN, CPDLC, ADS-C
- ATN B1 over ATN
  CM, CPDLC
- A623 Applications over ACARS
  DCL, OCL, D-ATIS
- European mandate for ATN B1
  NAT mandate for FANS 1/A

AIRBUS Solutions
- FANS A+ over ACARS
  on A320/A330/A340/A380
- FANS B+ over ATN
  on A320
- FANS A+B over ACARS & ATN
  on A350 then A380

AIRBUS Roadmap
- Development roadmap consistent with GANP/ASBUs
- FANS A+C compliant with ATN B2
  on A320/A330/A340/A380/A350

Customer Support
- Engineering & Flight Operations Support available
- Turnkey solution
  A la carte by QUOVADIS subsidiary

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• **A623**: ARINC protocol defining a set of data link applications (DCL, OCL, D-ATIS)

• **ACARS**: Aircraft Communication and Addressing Reporting System

• **ACR**: Avionics CommunicationRouter

• **ADS-C**: Automatic Dependent Surveillance - Contract

• **ADS-B**: Automatic Dependent Surveillance - Broadcast

• **AFN**: ATS Facility Notification

• **AOC**: Airline Operations Control

• **ATN**: Aeronautical Telecommunication Network

• **ATSU**: Air Traffic Service Unit

• **CM**: Context Management

• **CPDLC**: Controller Pilot Data Link Communication

• **CVR**: Cockpit Voice Recorder

• **D-ATIS**: Digital ATIS

• **DCL**: Departure Clearance

• **DR**: Data link Recording

• **FANS**: Future Air Navigation System

• **FMS**: Flight Management System

• **HFDL**: HF Data Link

• **HFDR**: HF Data Radio

• **IMA**: Integrated Modular Avionics

• **LRU**: Line Replaceable Unit

• **OCL**: Oceanic Clearance

• **RMP**: Radio Management Panel

• **SDU**: Satellite Data Unit

• **VDL**: VHF Data Link

• **VDR**: VHF Data Radio