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

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Airline CNS/ATM Support

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AIRBUS

1. Data Link Communication Reminders

2. Complete Range of AIRBUS FANS Solutions

3. AIRBUS FANS Roadmap

4. AIRBUS Customer Support

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FANS concept – Ground networks

ACARS

Aircraft Communication and Addressing Reporting System

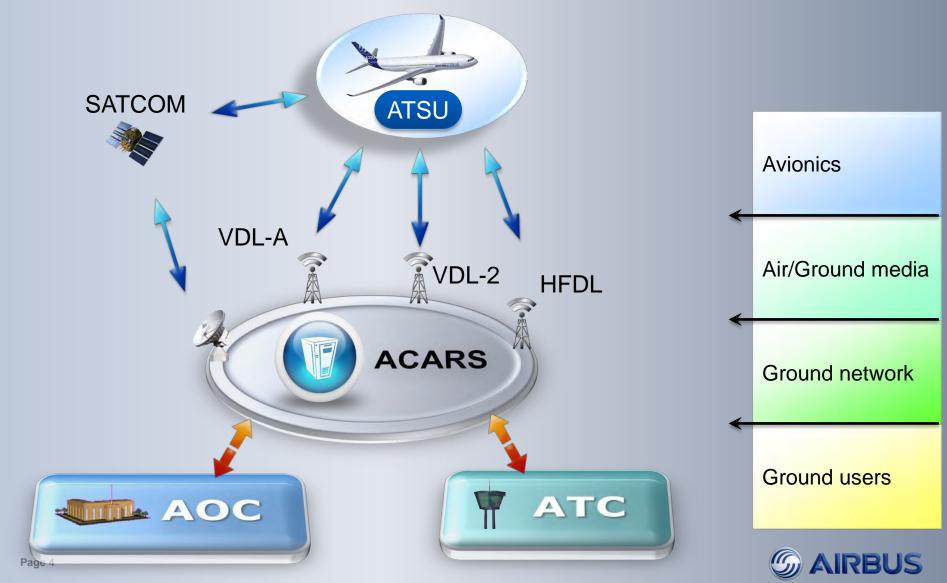Oceanic and Remote areas
AIRBUS solution : FANS A+ package

ATN

Aeronautical Telecommunication Network
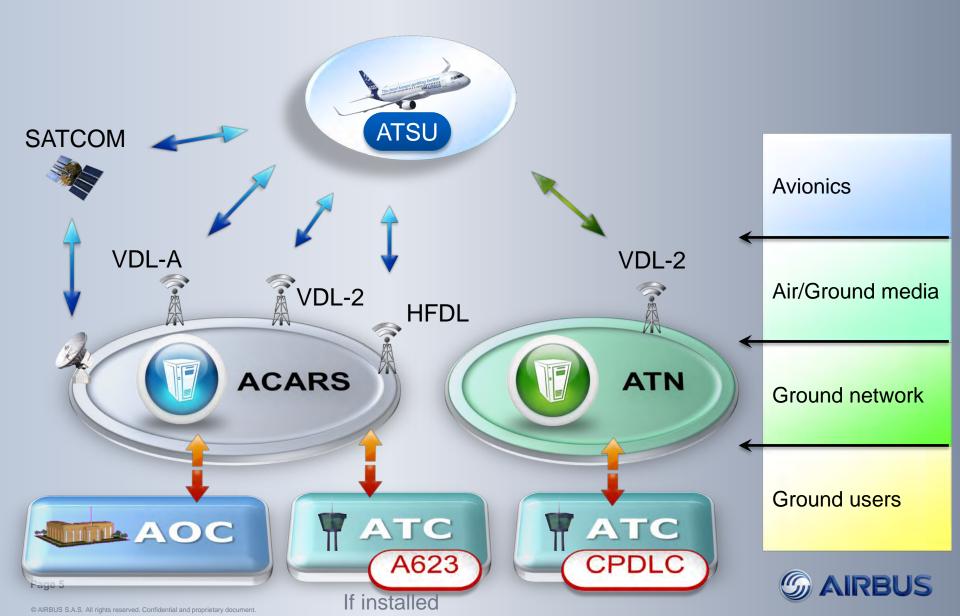
Continental areas since end of 2006
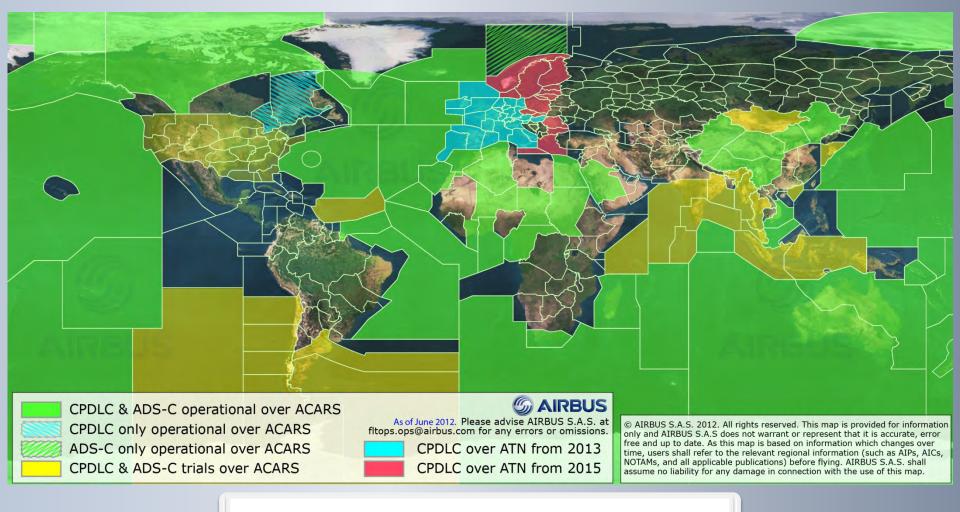**AIRBUS solution :** FANS B+ package

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Architecture in ACARS Environment – FANS A+

SATCOM

ATSU

VDL-A

VDL-2

HFDL

ACARS

AOC

ATC

Avionics

Air/Ground media

Ground network

Ground users

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Architecture in ATN Environment – FANS B+

SATCOM

ATSU

VDL-A

VDL-2

HFDL

VDL-2

ACARS

ATN

AOC

ATC
A623

ATC
CPDLC

Avionics

Air/Ground media

Ground network

Ground users

If installed

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CPDLC & ADS-C in the World

Legend:
- CPDLC & ADS-C operational over ACARS
- CPDLC only operational over ACARS
- ADS-C only operational over ACARS
- CPDLC & ADS-C trials over ACARS
- CPDLC over ATN from 2013
- CPDLC over ATN from 2015

As of June 2012. Please advise AIRBUS S.A.S. at fltops.ops@airbus.com for any errors or omissions.

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

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Data Link Communication Reminders

Complete Range of AIRBUS FANS Solutions

AIRBUS FANS Roadmap

AIRBUS Customer Support

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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

ADS-Contract

Surveillance	**Operations**	Procedural Control
Continental	**Airspace**	Oceanic and Remote
Mode S Transponder	**Avionics**	ATSU – FANS A/A+
250 NM from ADS-B ground receiver	**Range**	Worldwide with SATCOM and HF data link
Data broadcast every 0.5 sec	**Data Link**	End-to-End connection: Periodic, On Demand, On Event contracts

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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

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Introduction to FANS B+

FANS B

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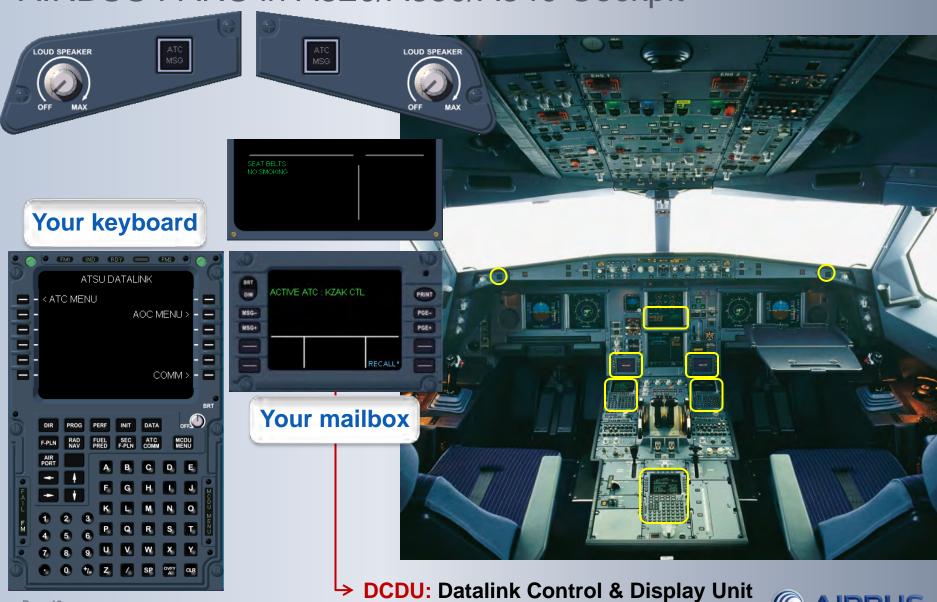- LINK 2000+ Pioneer phase

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

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AIRBUS FANS in A320/A330/A340 Cockpit

Your keyboard

SEAT BELTS
NO SMOKING

ATSU DATALINK

< ATC MENU

AOC MENU >

COMM >

ACTIVE ATC : KZAK CTL

RECALL*

Your mailbox

DCDU: **Datalink Control & Display Unit**

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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.
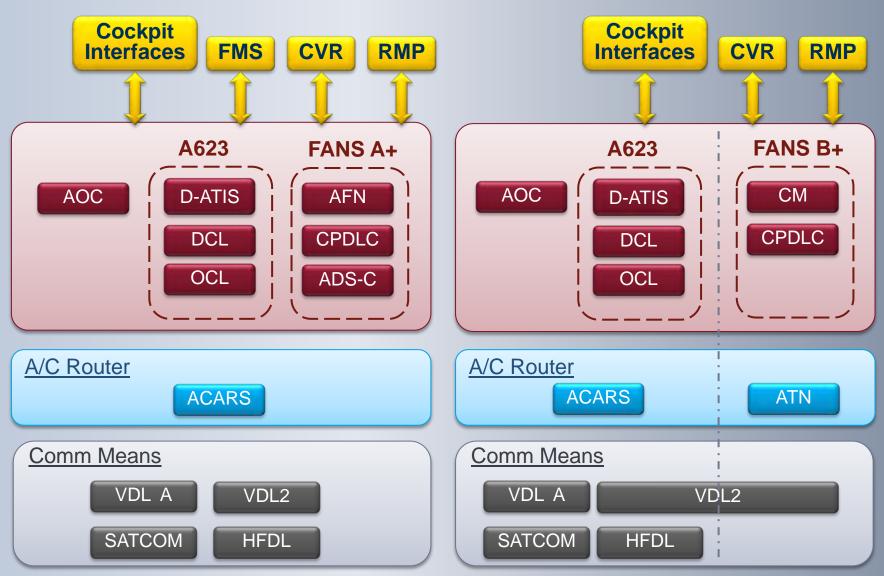
Commonality with A320/330/340 operating principles

**A380 Cockpit interactivity
=
More efficient workflow**

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Receiving an Uplink Message

Sending a Downlink Message

ACTIVE ATC : KZAK

2 ADS CONNECTIONS

RECALL

ATC COM   AIB123
CONNECT   REQUEST   REPORT   MSG RECORD   ATIS   EMER
REQUEST

◄ VERTICAL
◄ LATERAL
SPEED
◄ CLEARANCE
◄ WHEN CAN WE EXPECT
◄ OTHER

ESC   ▲   DIR   PERF   INIT   NAV AID   MAIL BOX
CLR INFO   ◄ ▼ ►   F-PLN   DEST   SEC INDEX   SURV   ATC COM   ND

Q W E R T Y U I O P ←
A S D F G H J K L
/ Z X C V B N M SP ENT

ESC KBD
◄◄ ►►

1 2 3
4 5 6
7 8 9
. 0 +/-

CCD   KBD
ON   ON
OFF   OFF
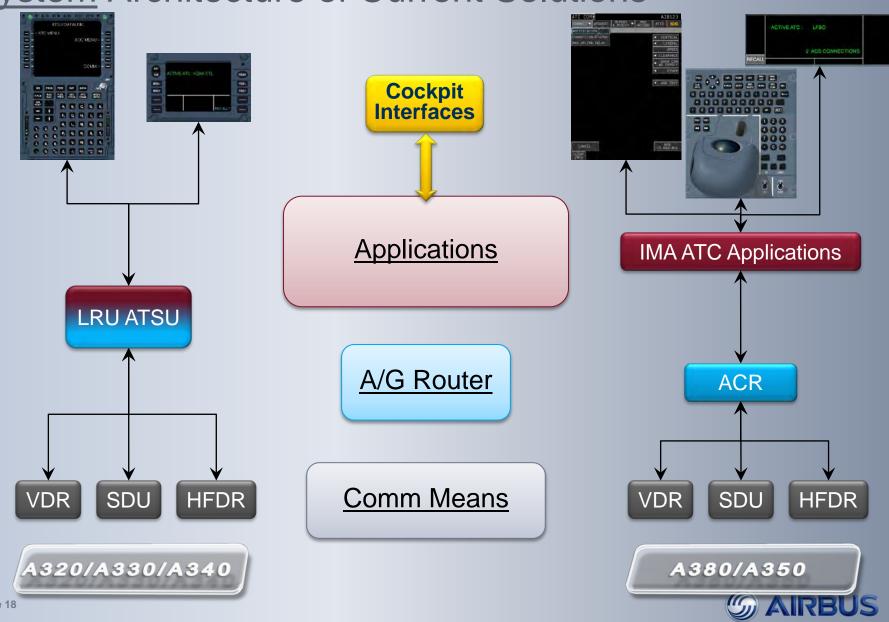
Functional Architecture of Current Solutions

Cockpit Interfaces · **FMS** · **CVR** · **RMP**

A623 / FANS A+

- AOC
- A623: D-ATIS, DCL, OCL
- FANS A+: AFN, CPDLC, ADS-C

A/C Router
- ACARS

Comm Means
- VDL A, VDL2, SATCOM, HFDL

Cockpit Interfaces · **CVR** · **RMP**

A623 / FANS B+

- AOC
- A623: D-ATIS, DCL, OCL
- FANS B+: CM, CPDLC

A/C Router
- ACARS, ATN

Comm Means
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System Architecture of Current Solutions

Cockpit Interfaces

Applications

IMA ATC Applications

LRU ATSU

A/G Router

ACR

VDR	SDU	HFDR

Comm Means

VDR	SDU	HFDR

A320/A330/A340

A380/A350

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Data Link Communication Reminders

Complete Range of AIRBUS FANS Solutions

3 AIRBUS FANS Roadmap

AIRBUS Customer Support

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AIRBUS FANS Roadmap

ATN B2 standardization in progress by RTCA SC214 / EUROCAE WG78

FANS A+ | FANS A+ | FANS B+ DR DR | FANS A+C DR | A320

FANS A+ | FANS A+ | FANS A+C DR | A330 / A340

FANS A+ DR | FANS A+B DR | FANS A+C DR | A380

FANS A+B DR | FANS A+C DR | A350

2010 | **Today** | **2015** | **2020**

DR Data link Recording

ICAO ASBU > **Block 0** | **Block 1** | **Block 2**

FANS 1/A
ATN B1

ATN B2

Architecture in ACARS Environment – FANS A+

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Ground network

Ground users

If installed

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The AIRBUS FANS Alphabet

Aircraft	FANS	ACARS	ATN	Applications				Uploadable clearances into the FMS	Std
				AFN	CM	CPDLC	ADS-C		
A330/A340	A	✓		✓		✓	✓	✓	FANS 1/A
A320/A330/A340/A380	A+	✓		✓		✓	✓	✓	FANS 1/A
A320	B		✓		✓	✓			ATN B1
	B+		✓		✓	✓ *			ATN B1
A350/A380	A+B	✓		✓		✓	✓	✓	FANS 1/A
			✓		✓	✓ *		✓	ATN B1
A320/A330/A340/A380/A350	A+C	✓		✓		✓	✓	✓	FANS 1/A
			✓		✓	✓ *	✓	✓	ATN B2
A320/A330/A340/A380/A350	A623	✓		DCL, OCL, D-ATIS					

* Protected Mode (PM) CPDLC

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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

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

A320
A340
A330
A350
A380

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Data Link Communication Reminders

Complete Range of AIRBUS FANS Solutions

AIRBUS FANS Roadmap

4 AIRBUS Customer Support

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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

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Conclusion

Data Link	AIRBUS Solutions	AIRBUS Roadmap	Customer Support
FANS 1/A over ACARS AFN, CPDLC, ADS-C	**FANS A+ over ACARS** on A320/A330/A340/A380	**Development roadmap consistent with GANP/ASBUs**	**Engineering & Flight Operations Support** available
ATN B1 over ATN CM, CPDLC	**FANS B+ over ATN** on A320	**FANS A+C compliant with ATN B2** on A320/A330/A340/ A380/A350	**Turnkey solution** A la carte by QUOVADIS subsidiary
A623 Applications over ACARS DCL, OCL, D-ATIS	**FANS A+B over ACARS & ATN** on A350 then A380		
European mandate for ATN B1 **NAT mandate** for FANS 1/A			

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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 Communication Router
- **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

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