

Presented by

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Engineering



A380 FANS and Data link

ATN Conference 2005 – London, 20-21 September

Agenda

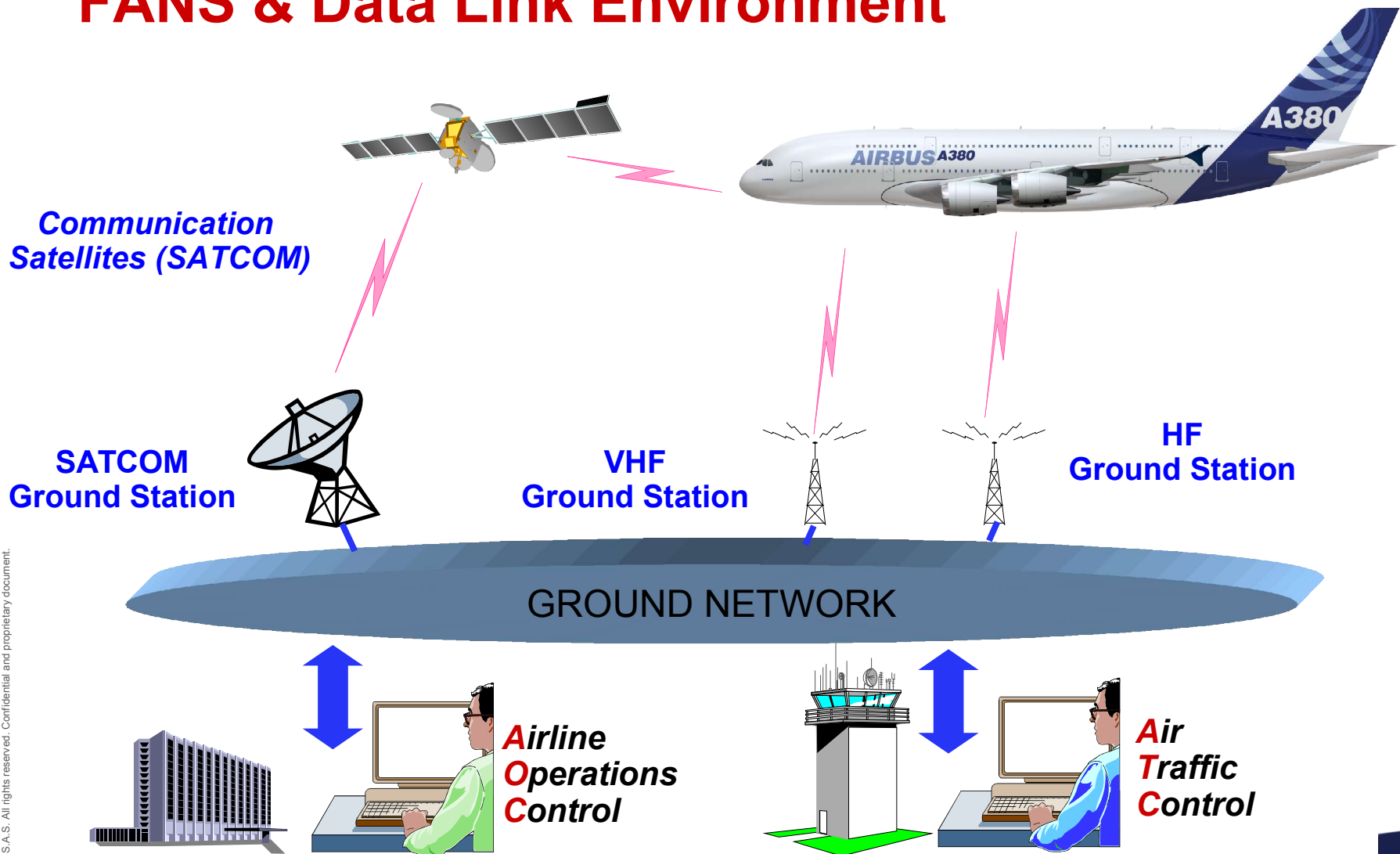
- A380 FANS/Data Link perimeter
- A380 FANS/Data Link architecture
- New Control Panels and Terminals
- FANS/Data Link Human Machine Interfaces
- Summary

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A380 FANS/Data Link perimeter

FANS & Data Link Environment



A380 FANS/Data Link perimeter

FANS function perimeter – applications

‣ FANS A applications

- **CPDLC** (Controller Pilot Datalink Communication)
- **ADS** (Automatic Dependent Surveillance)

‣ A623 ATS applications

- **DCL** (Departure Clearance)
- **OCL** (Oceanic Clearance)
- **ATIS** (Automatic Terminal Information System)

Perimeter of A380 FANS functions = FANS A+ on LR

A380 FANS/Data Link perimeter

AOC function perimeter - applications :

► Flight Operations

Out Off On In reports, Position report, Diversion report, Approach report, Parking, Flight initialization, Last Minute Change, Loadsheet, Pushback, Taxi, Crew list, Company info, Estimated Time of Arrival, Fuel information,...

► Weather

TAF/METAR, Wind data, Meteorological reports, TWIP,...

► Delay

Departure delay, Take-off delay, Enroute delay, Gate delay,...

► Maintenance

Snag report, Maintenance telex, Aircraft performance report, Engine report, MEL advisory,...

► Telex

Perimeter of A380 AOC functions = AOC on LR

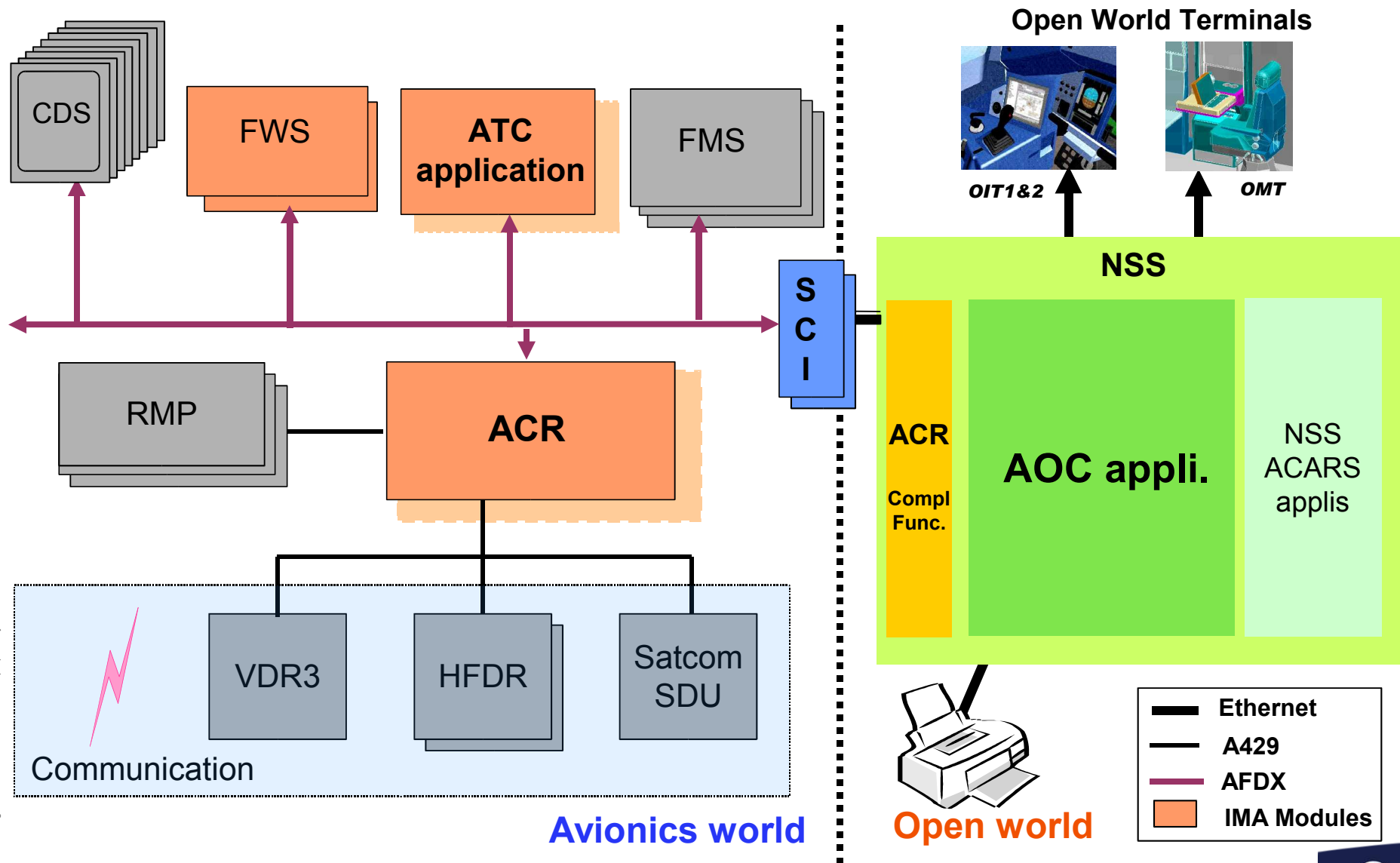
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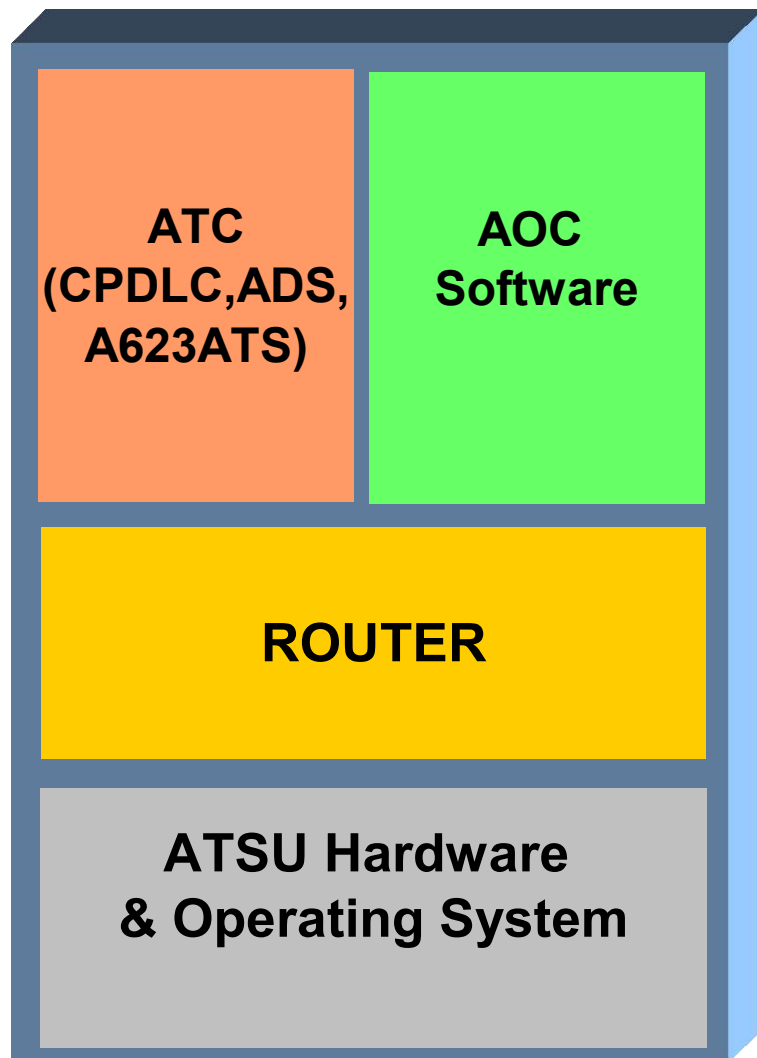
- A380 FANS/Data Link perimeter
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A380 FANS/Data Link Architecture

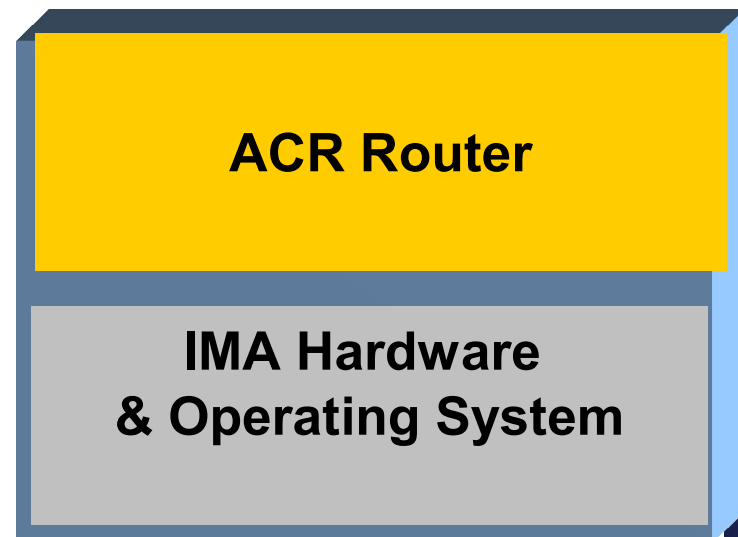
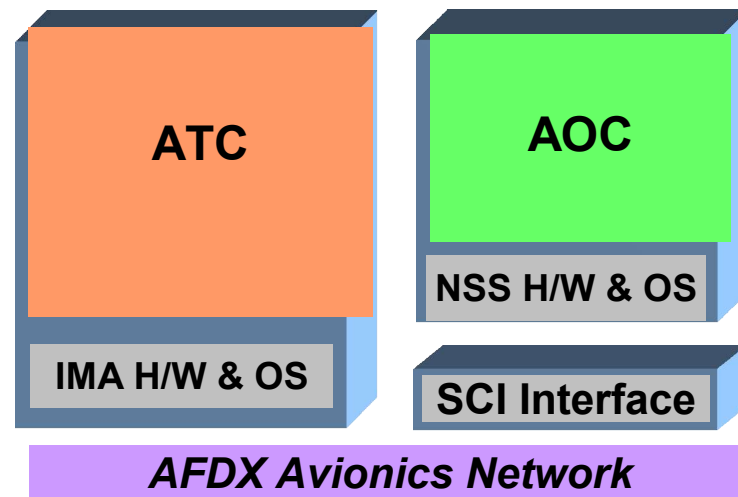


A380 FANS/Data Link Architecture

Airbus A320&A330/A340



Airbus A380



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New Control Panels and Terminals

Objectives for the A380 cockpit

- **General objectives :**

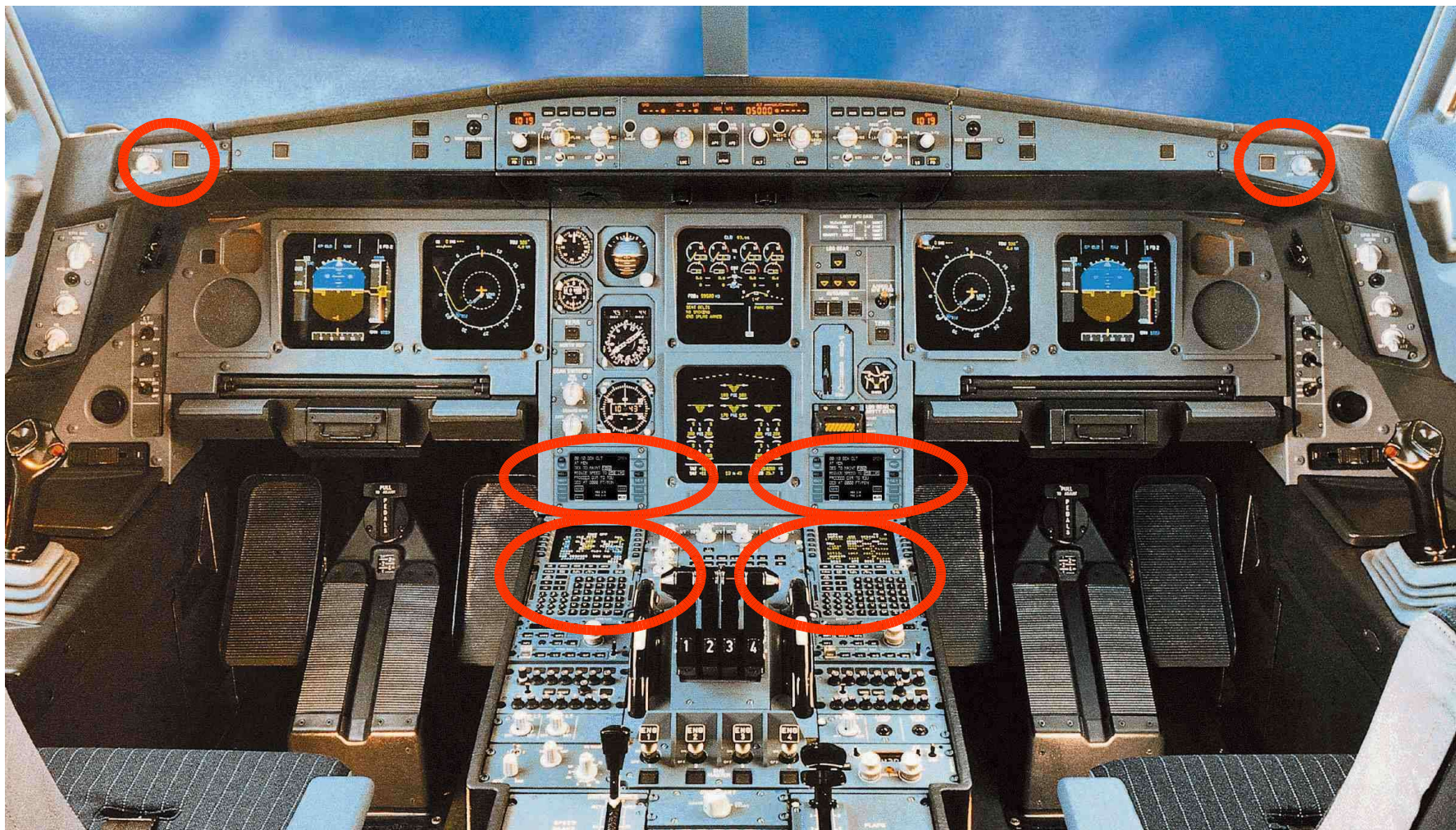
- Improve interface readability
- Facilitate interface manipulation
- Improve guidance in crew task

- **ATC Data Link specific objectives :**

- **Improve ATC Requests editing** (visibility of a whole request on a single page)
- **Improve ATC Clearances answering** (for negative answers with predetermined response or free text)
- **Improve navigation inside the interface and the access to information** (simplified architecture of the pages)

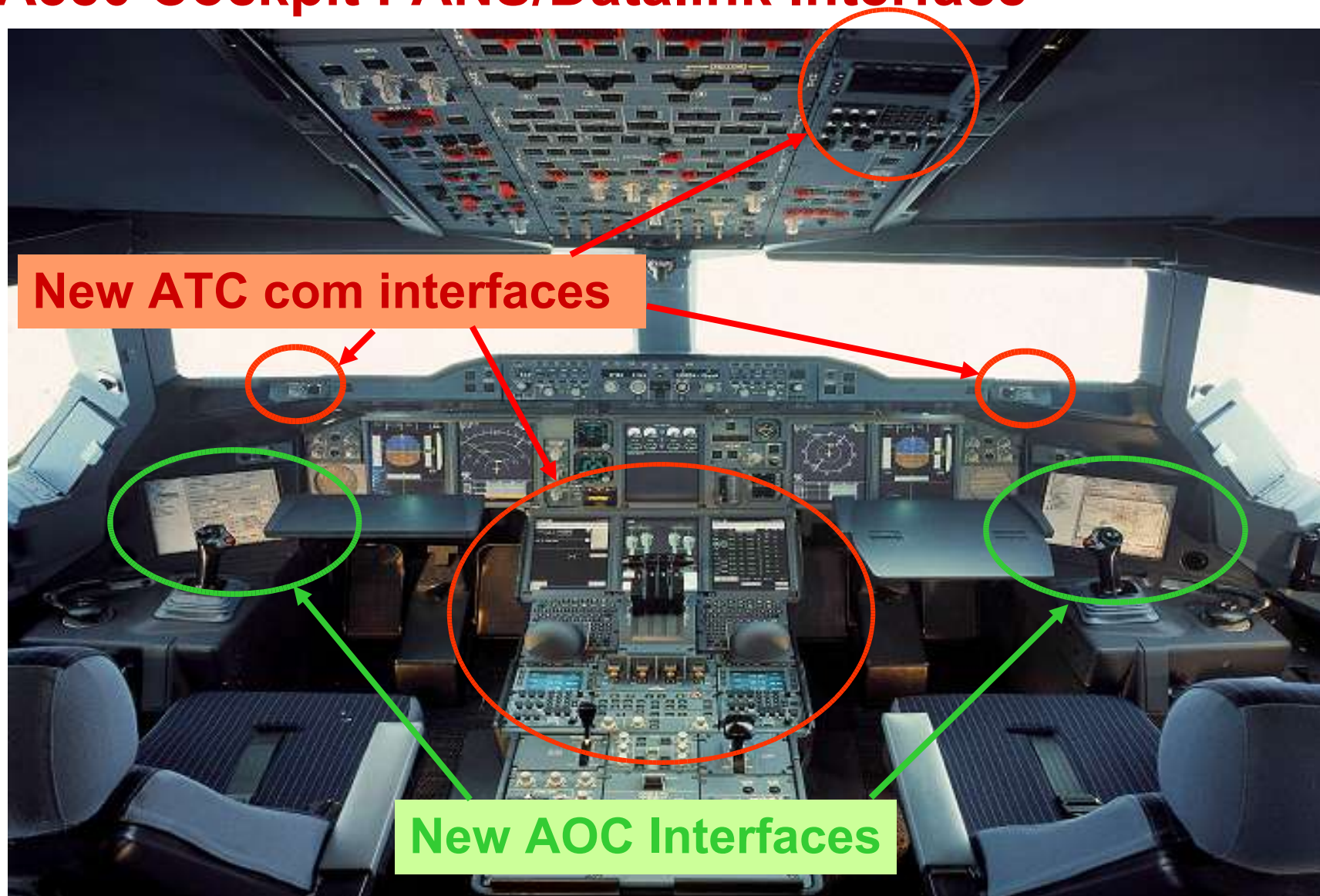
New Control Panels and Terminals

A330/A340 Cockpit FANS/Datalink Interface



New Control Panels and Terminals

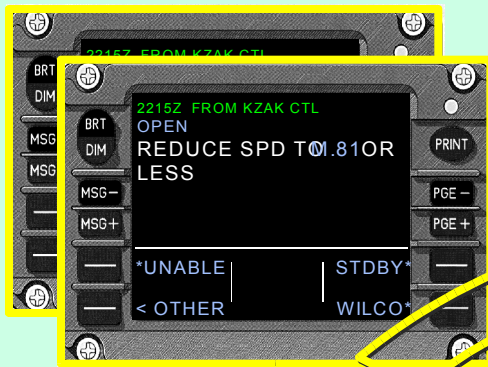
A380 Cockpit FANS/Datalink Interface



New Control Panels and Terminals

A320/A330/A340

2 DCDUs



A380

System Display



**1 Unique and Central
Mail Box**

New Control Panels and Terminals

A320/A330/A340



3 MCDU



3 RMP (Radio Management Panel)



2 KCCU (Keyboard and Cursor Control Unit)

A380

2 MFD (Multi Function Display)



New Control Panels and Terminals – Pedestal Keyboard Cursor Control Unit

Cursor Navigation keys

Functional
short cuts

Alphabetic
QWERTY pad

Wheel

Numeric pad

Screen cursor
allocation

Track-ball

Validation key

Spares



New Control Panels and Terminals – Radio Management Panel (RMP)

ACR HMI Overview



**Aircraft Data Link addressing
parameters**

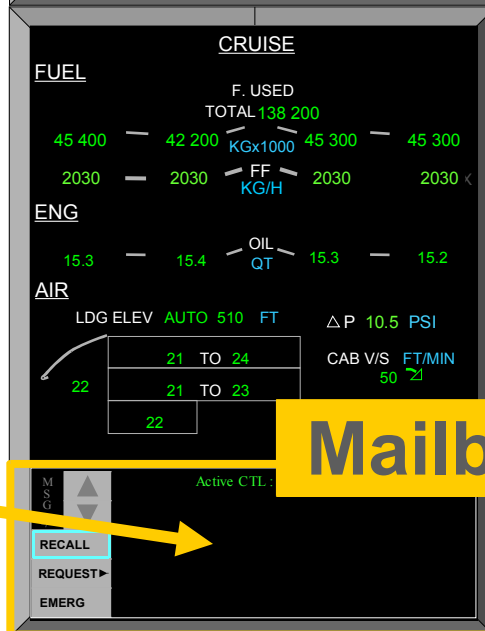
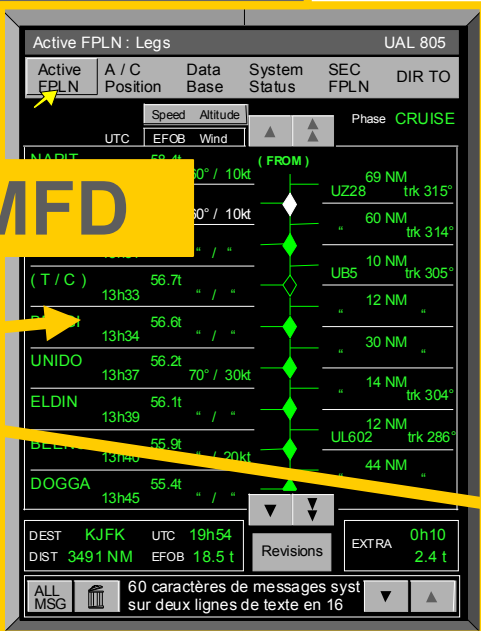
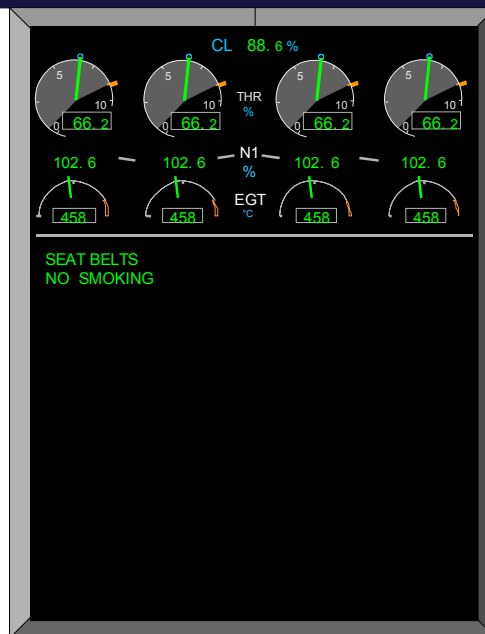
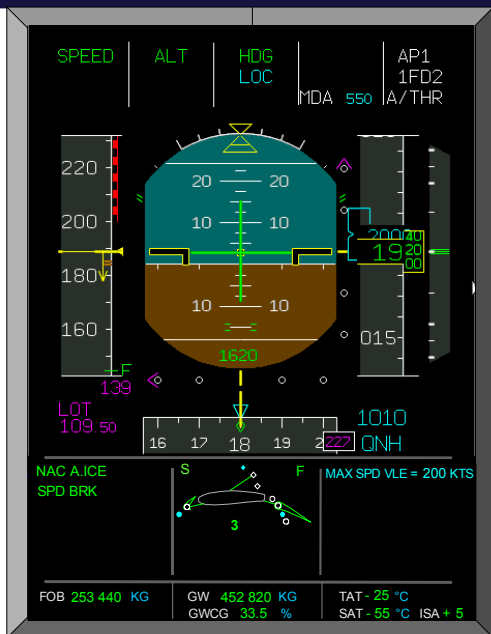


Radio and Data Link status



VHF DSP selection

New Control Panels and Terminals – Keyboard Cursor Control Unit interactivity



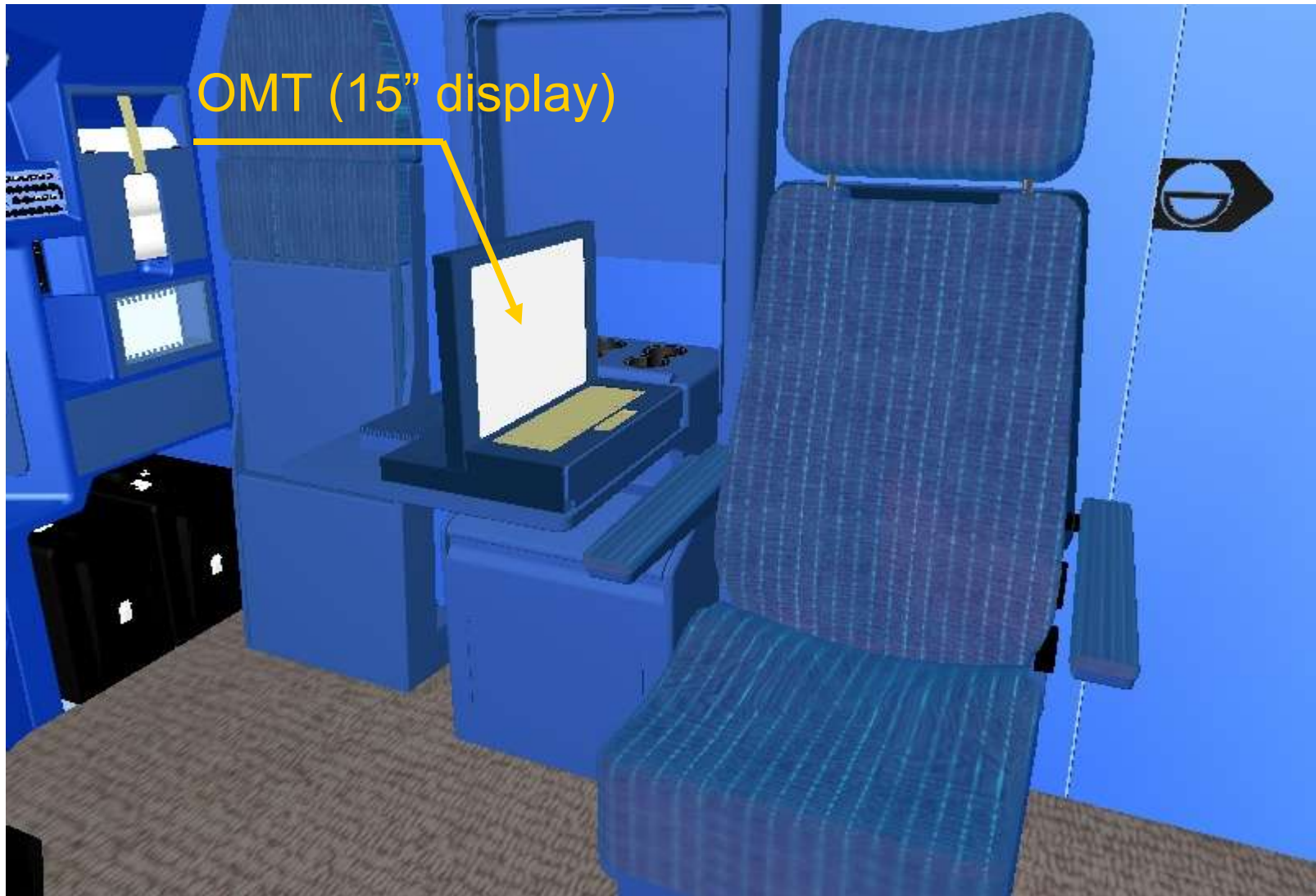
New Control Panels and Terminals

On-board Integrated Terminal-OIT



New Control Panels and Terminals

On-board Maintenance Terminal-OMT



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FANS-ATC HMI

- **MFD-ATC COM pages :**

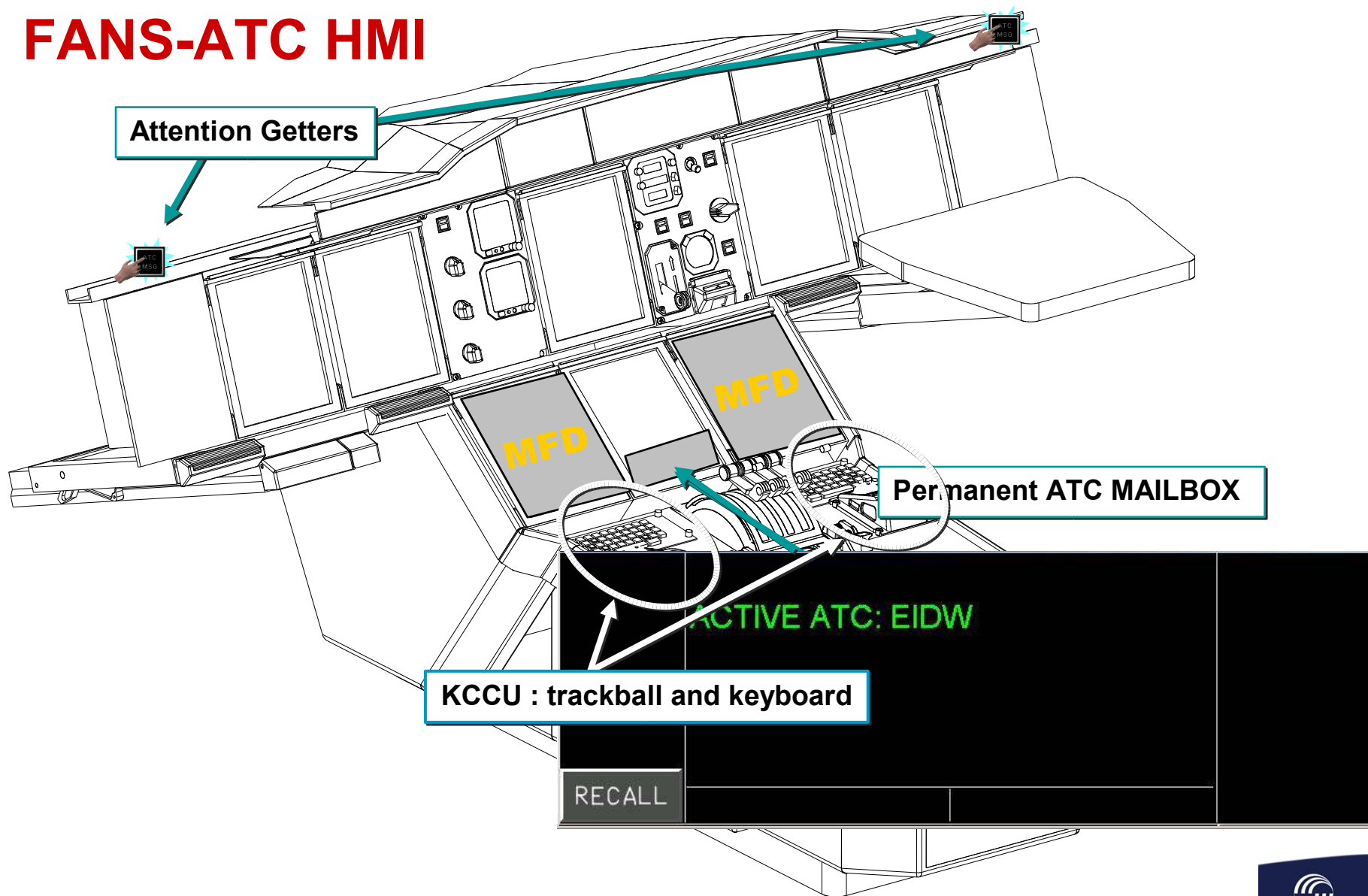
- Notification
- Requests
- Reports
- MSG Records,
- ATIS application
- Emergency messages

- **ATC MailBox :**

- All uplink and downlink CPDLC messages
- All uplink and downlink DCL and OCL A623 messages

A380 FANS/Data Link Human Machine Interface

FANS-ATC HMI



A380 FANS/Data Link Human Machine Interface

FANS-ATC HMI: Example of use Request to ATC

- **1st step :**

Request to ATC prepared on ATC COM page

ATC COM AIB123

CONNECT REQUEST REPORT MSG RECORD ATIS EMER

REQUEST

REQUEST DIR TO TADEX

REQUEST CLB TO FL 380

START AT

VERTICAL

LATERAL

SPEED

CLEARANCE

WHEN CAN WE EXPECT

OTHER

ADD TEXT

CANCEL

CLEAR INFO

TRANSFER TO MAILBOX

- **2nd step :**

Transfer to mailbox then "SEND" to ATC.

CRUISE

FUEL

F. USED

TOTAL 138 200

45 400 42 200 45 300 45 300

2030 2030 2030 2030

KGx1000

FF

KG/H

ENG

OIL

QT

15.3 15.4 15.3 15.2

AIR

LDG ELEV AUTO 510 FT

21 TO 24

21 TO 23

22

22

ΔP 10.5 PSI

CAB W/S 50 FT/MIN

CAB ALT 3500 FT

TAT 51 °C

SAT 38 °C

23H56

GWOG 37.5 %

GW 370 000 KG

ISA +5

FOB 30 000 KG

1041Z TO EGGX CTL OPEN

REQUEST DIR TO TADEX

REQUEST CLB TO FL380

SEND

CANCEL

PRINT

MSG 1/1

RECALL

A380 FANS/Data Link Human Machine Interface

Data Link-AOC HMI

- **OIT and OMT display,**
- **MailBoxes for uplink and downlink messages viewing,**
- **FormView for message composition and data consultation,**
- **Navigation tree re-configuration based on Flight Phase**
 - Pre-flight
 - In-Flight
 - Post-Flight

A380 FANS/Data Link Human Machine Interface

Data Link-AOC HMI

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OIS Secure Day

MESSAGES folder always open.

COMPANY COM

Messages

- Inbox
- Outbox
- Sent

Pre-flight

- Requests
- INIT Data
- Weather
- Reports

 - Departure Delay
 - Takeoff Delay

- Free-text
- Flight log

In-flight

Post-flight

Log Files

Home

Print Store Upd... Zoo... Undo Redo Help Close

INIT Data

Date		Flight ID	
Departure Airport		Destination Airport	
ETD		Flight Time	
FOB			
Captain Name			
Captain Name Confirmation		First Officer Name	
Second Officer 1 Name		Second Officer 2 Name	

Send

COMPAN...

At application opening, INIT Data is displayed.
INIT Data is the home page for standard AOC.

A380 FANS/Data Link Human Machine Interface

Data Link-AOC HMI: Pre-Flight

OIS Secure Day 0 msg Clear ... AI0642

COMPANY COM Home Print Store Upd... Zoo... Undo Redo Help Close

Messages

- Inbox
- Outbox
- Sent
- Pre-flight
- Post-flight
- Log Files

Pre-flight

Requests

- INIT Data
- Weather

Reports

- Departure Delay
- Takeoff Delay
- Freetext

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COMPAN...

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FANS/Data link on A380

- ✓ Keeps the same perimeter than on A340/A330 and A320
- ✓ Integrates avionics novelties in its architecture (AFDX, IMA modules, NSS-OIS Open World)
- ✓ Improves HMI via new control panels and terminals (KCCCU, RMP, OITs, OMT)

Glossary

ACARS	Aircraft Comm, Addressing and Reporting System	OCL	Oceanic Clearance
ACR	Aircraft Communication Router	OIT	On-Board Integrated Terminal
ADS	Automatic Dependent Surveillance	OMT	On-Board Maintenance Terminal
AFDX	Avionics Full-Duplex network	OS	Operating System
AOC	Airline Operational Communication	RMP	Radio Management Panel
ATC	Air Traffic Control	SCI	Secure Communication Interface
ATIS	Automatic Terminal Information System	SDU	Satellite Data Unit
ATS	Air Traffic Services	VHF (VDR)	Very High Frequency (VHF Data Radio)
ATSU	Air Traffic Services Unit		
CDS	Centralised Display System		
CPDLC	Controller-Pilot Data Link Communication		
DCDU	Data Communication Display Unit		
DCL	Departure Clearance		
FANS	Future Air Navigation System - see CNS/ATM		
FMS	Flight Management System		
FWS	Flight Warning System		
HF(HFDR)	High Frequency (Data Radio)		
HFDL	High Frequency Data Link		
HMI	Human Machine Interface		
H/W	Hardware		
IMA	Integrated Modular Avionics		
IOM	Input Output Module		
KCCU	Keyboard and Cursor Control Unit		
LR	Long Range (A330/340 family)		
MCDU	Multipurpose Control and Display Unit		
MFD	Multi Function Display		
ND	Navigation Display		
NSS	Network Server System		
NSS-OIS	Network Server System-On-Board Information System		

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**AN EADS JOINT COMPANY
WITH BAE SYSTEMS**

A380 Communications Means

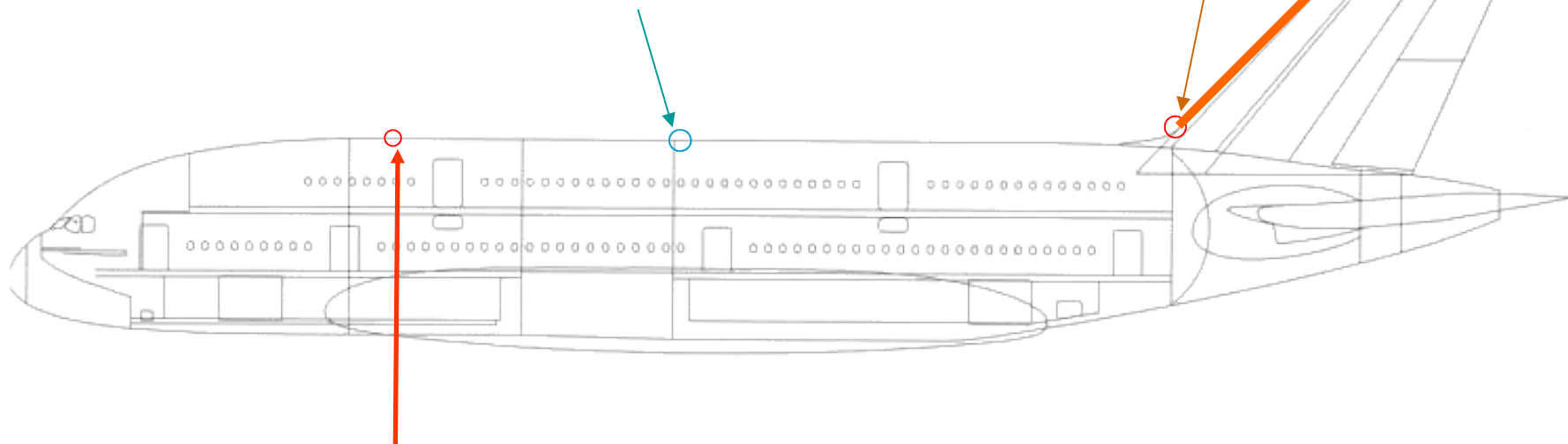
3 VHF Data Radio (Mode2+ModeA):

- 3 VDR transceivers
- 3 associated VDR antennas

Only VDR3 used for DataLink

Dual HFDR Installation:

- 2 HF data radio
- 2 HF antenna coupler
- 1 HF shunt-type antenna



SATCOM Aero-H+ installation:

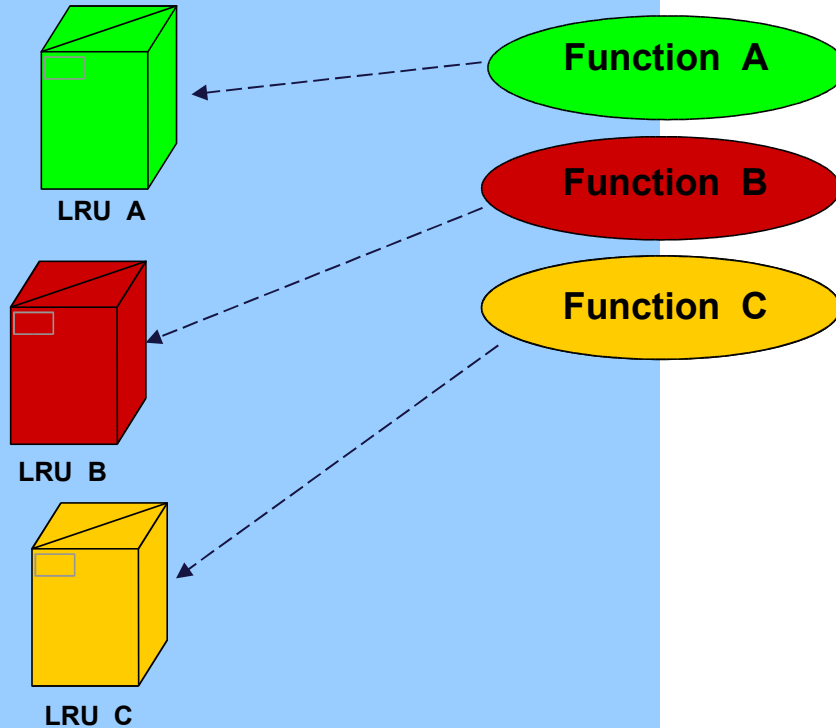
- 1 Data channel (from 600 bps to 10.5 kbps)
- 6 Voice channels

With High Speed option (64 Kbps)



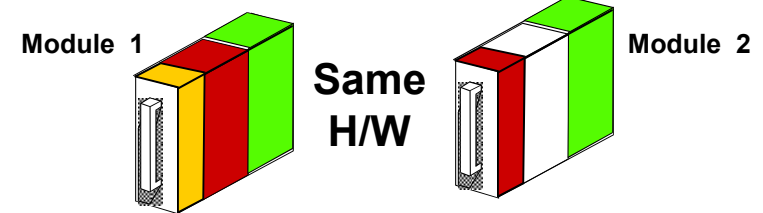
IMA Modules: Comparison with Conventional Avionics

Conventional Avionics



**Basically,
1 equipment per function.**

Integrated Modular Avionics (IMA)

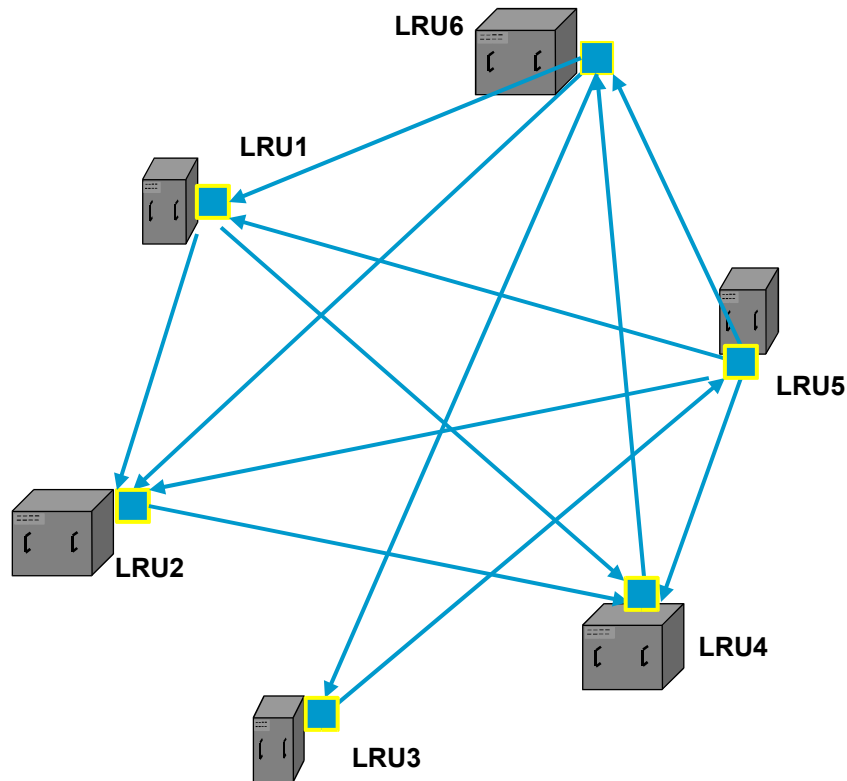


**Standard computing modules
running
several applications**



AFDX network: Comparison with A429

ARINC 429 world



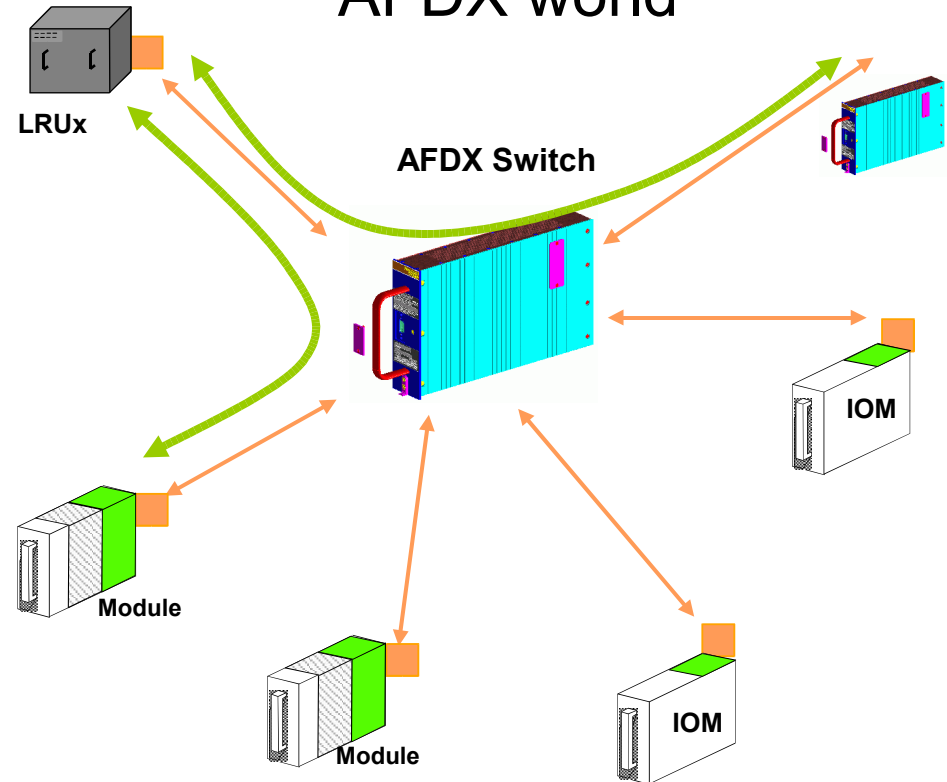
■ ARINC 429 interface — ARINC 429 link

- **Performance: 10 to 100 kbits/s**
- **1 new link = 1 new cable**



EYDCC-PR047954v1

AFDX world



■ AFDX interface — AFDX link ↔ Data flow

- **Performance: up to 100 Mbits/s**
- **Static cabling configuration**
- **1 new link = AFDX switch configuration table update**

Avionics architecture on AFDX

