



International Civil Aviation Organization

CNS/MET/SG/6-IP/45

Sixth Meeting of CNS/MET Sub-Group of APANPIRG

Bangkok, Thailand, 15 – 19 July 2002

Agenda Item 4: Air-ground Communications

SITA AIRCOM AIR-GROUND ATN DATA LINK

(Presented by SITA)

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Air-ground ATN Data Link

CNS/MET/SG/6
15-19 July 2002

Adrian Goodfellow

Aircraft Services

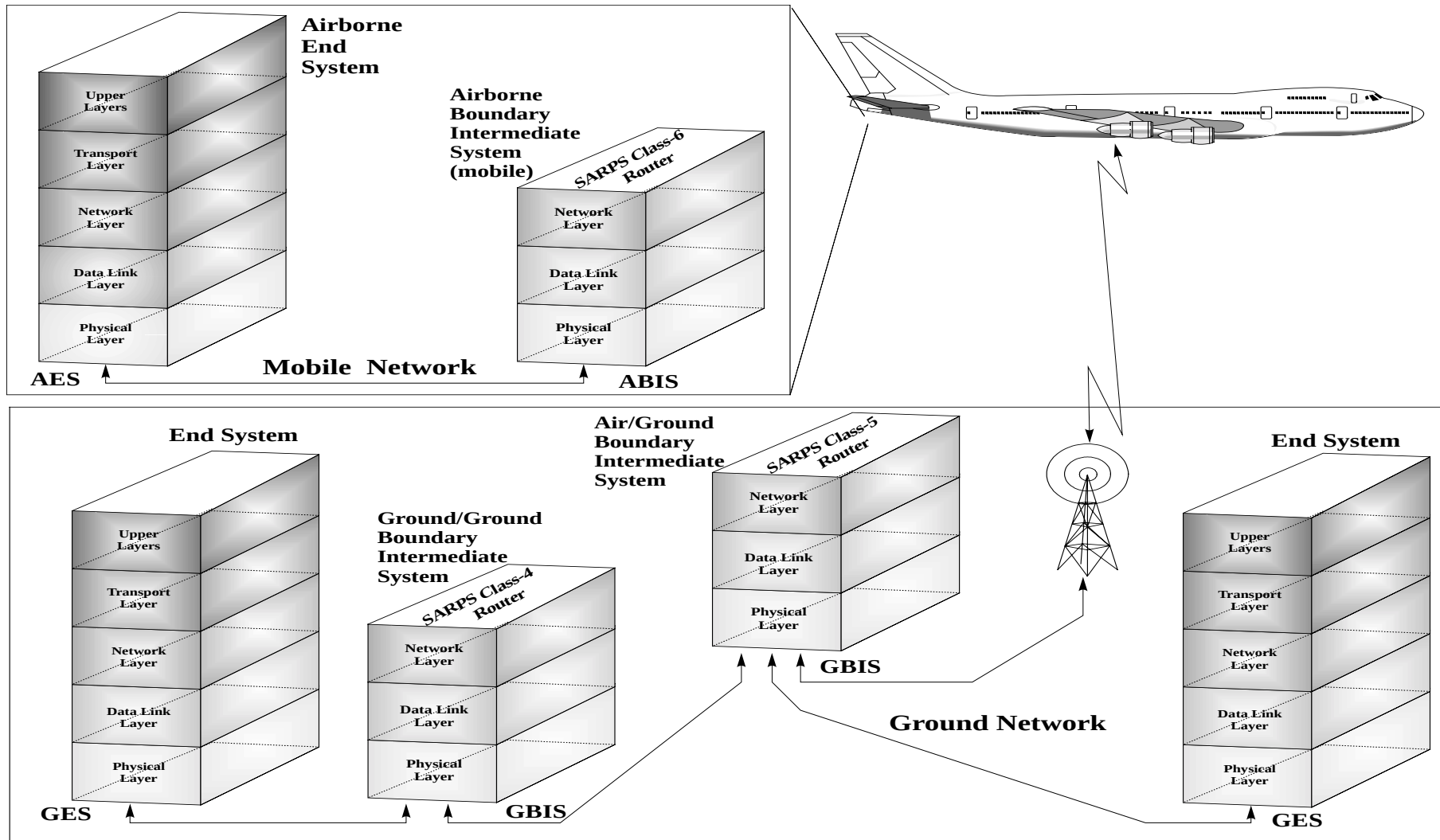
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The SITA logo is displayed in white, bold, sans-serif capital letters. It is positioned in the center of a blue banner that features a background image of a cloudy sky.

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ATN Structure



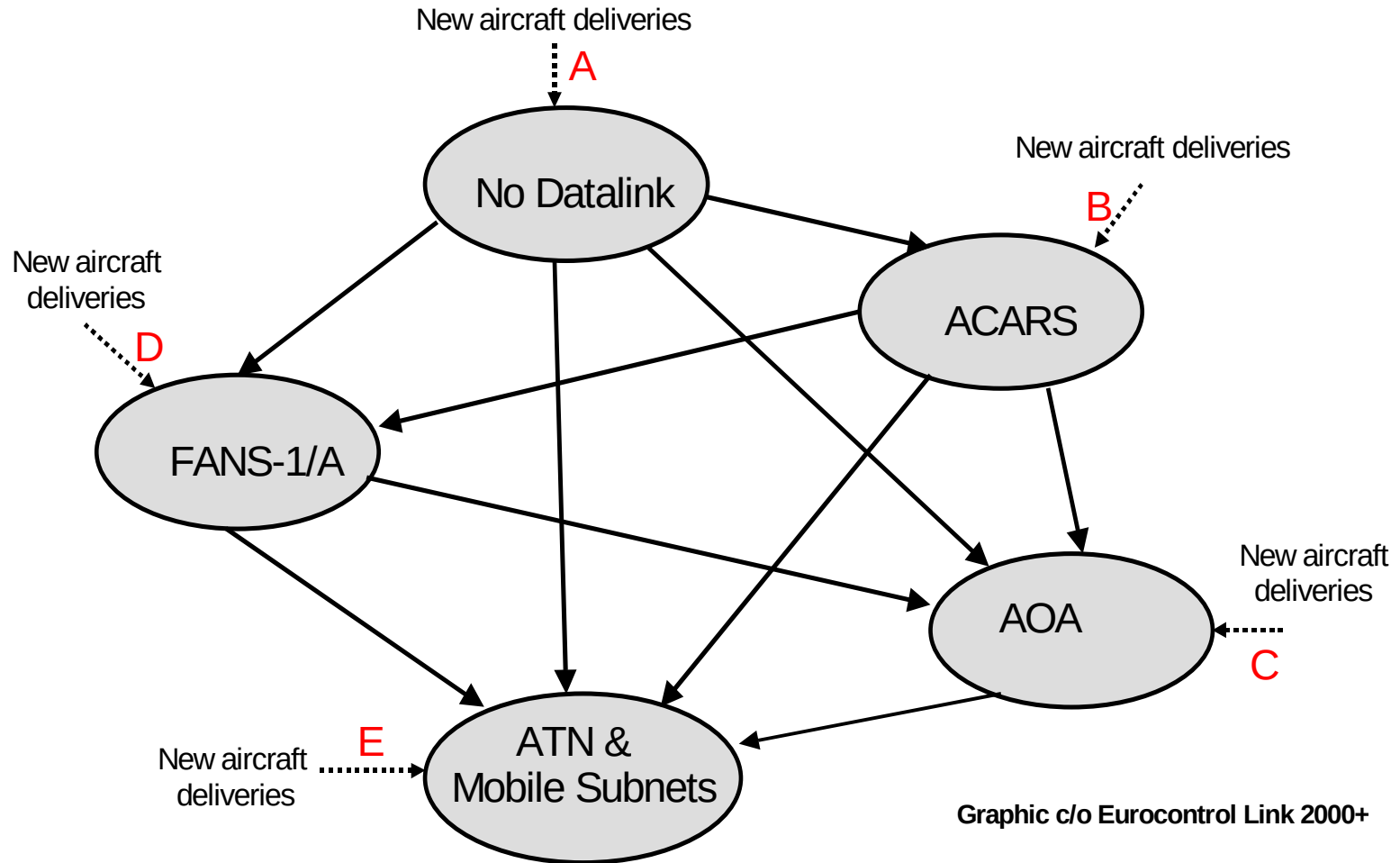
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ATN Structure - Routers

- ICAO CNS/ATM implementation will see different levels of ATN routers functionality:
 1. Ground - ground router
 2. Air - ground - air router
 3. Avionics router
- Each router will see differing levels of ATN SARPs compliance and features
 - Each router has varying levels of complexity and associated costs
 - Each router has explicit network compliance issues for existing Data Service Providers such as SITA
- Router deployment will be linked to application
- Implementation is only based on benefits to airlines and airspace managers

Aircraft Capabilities



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Aircraft Capabilities

Given the multifunctional avionics requirement we will see a graceful migration from FANS to ATN:

- **FANS 1/A initial ATN dual stack on ground systems**
- **FANS 1/A over VDL Mode 2, ATN “Convergence Pack”, ATN aircraft – 2002**
- **Full ATN integrated FMS solution by 2006**

Supported by AC, ANZ, DHL, QF and UAL.

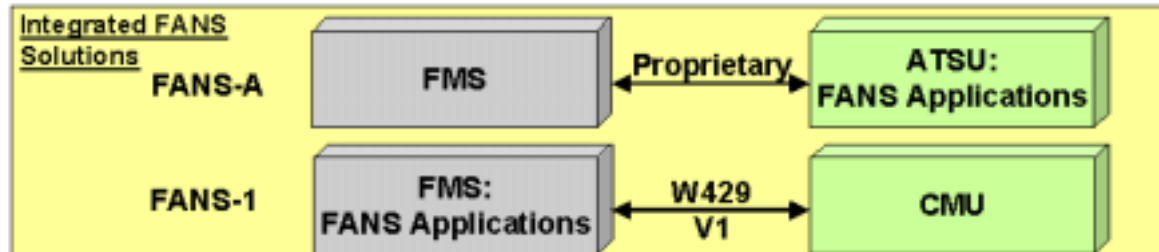
Support for FANS1/A capability in FAA CPDLC Build 1A Project – UAL, Continental, AC, QF and DHL.

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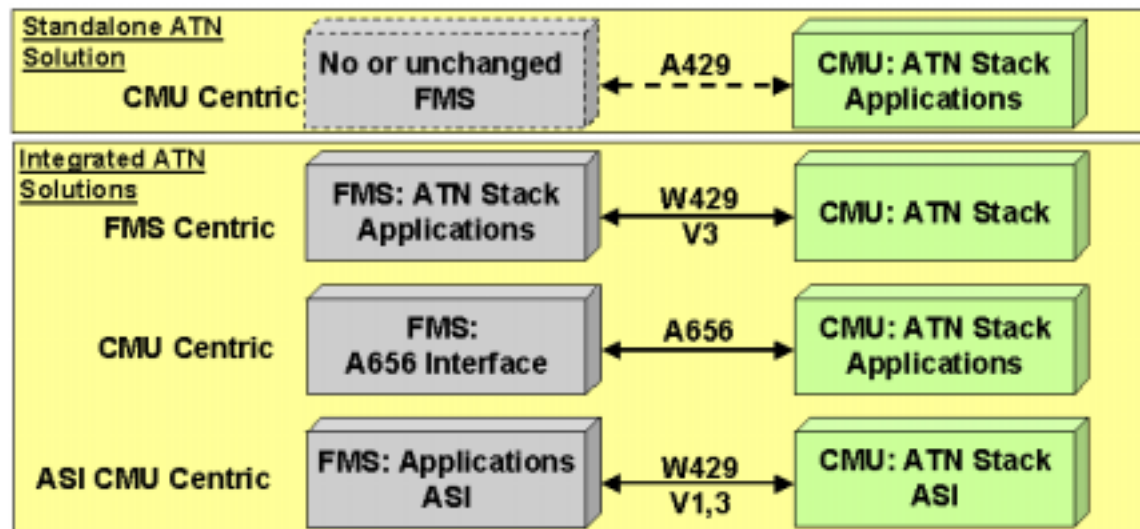
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Aircraft Capabilities

FANS Current Architectures



Current and Possible ATN Architectures



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Aircraft Capabilities

Transition from ACARS to AOA:

■ BFE Market

- Collins: 1Q01 (red label)
- Honeywell: 2Q01 (CMU Mk II red label)
3Q01 (CMU Mk III red label)

■ SFE Market

- Airbus/Aerospatiale ATSU:
 - Single aisle aircraft: 1Q02 (black label)
 - Dual aisle aircraft: 3Q02 (black label)
- B777: in 2003

VHF ACARS to VDL transition

- VHF Data Link (VDL) standards were developed by the ICAO Aeronautical Mobile Communications Panel
- VDL Mode 1
 - Interim step for migration from existing ACARS and ICAO compliant VHF datalink
 - MSK modulation, 2400 bps, 25 KHz VHF channel
- VDL Mode 2
 - ATN compliant VHF datalink
 - D8PSK modulation, 31.5 Kbps, 25 KHz VHF channel
- VDL Mode 3
 - D8PSK modulation, 31.5 Kbps, 25 KHz VHF channel
 - Integrated voice and data capability, 4 slot TDMA
- VDL Mode 4
 - D8PSK modulation, 31.5 Kbps, 25 KHz VHF channel
 - 9600 slot TDMA with inherent ADS-B message structure

VHF ACARS to VDL transition

- SITA has contracted with HARRIS Corp to develop a VHF Ground Station (VGS) , provisioning ICAO standard VHF Digital Link (VDL) Mode 2 service.
- SITA will increase VHF AIRCOM data link capacity by introducing VDL mode 2 service providing 10-20 times more capacity by channel
- SITA is already offering ACARS over AVLC (AOA) service at 10 locations in Europe.
- SITA VGS supports successful VDL flight tests in Europe with KLM and Eurocontrol.
- Currently there are some 680 ACARS RGS that will be replaced with VDL Mode 2 capable hardware by 2007.

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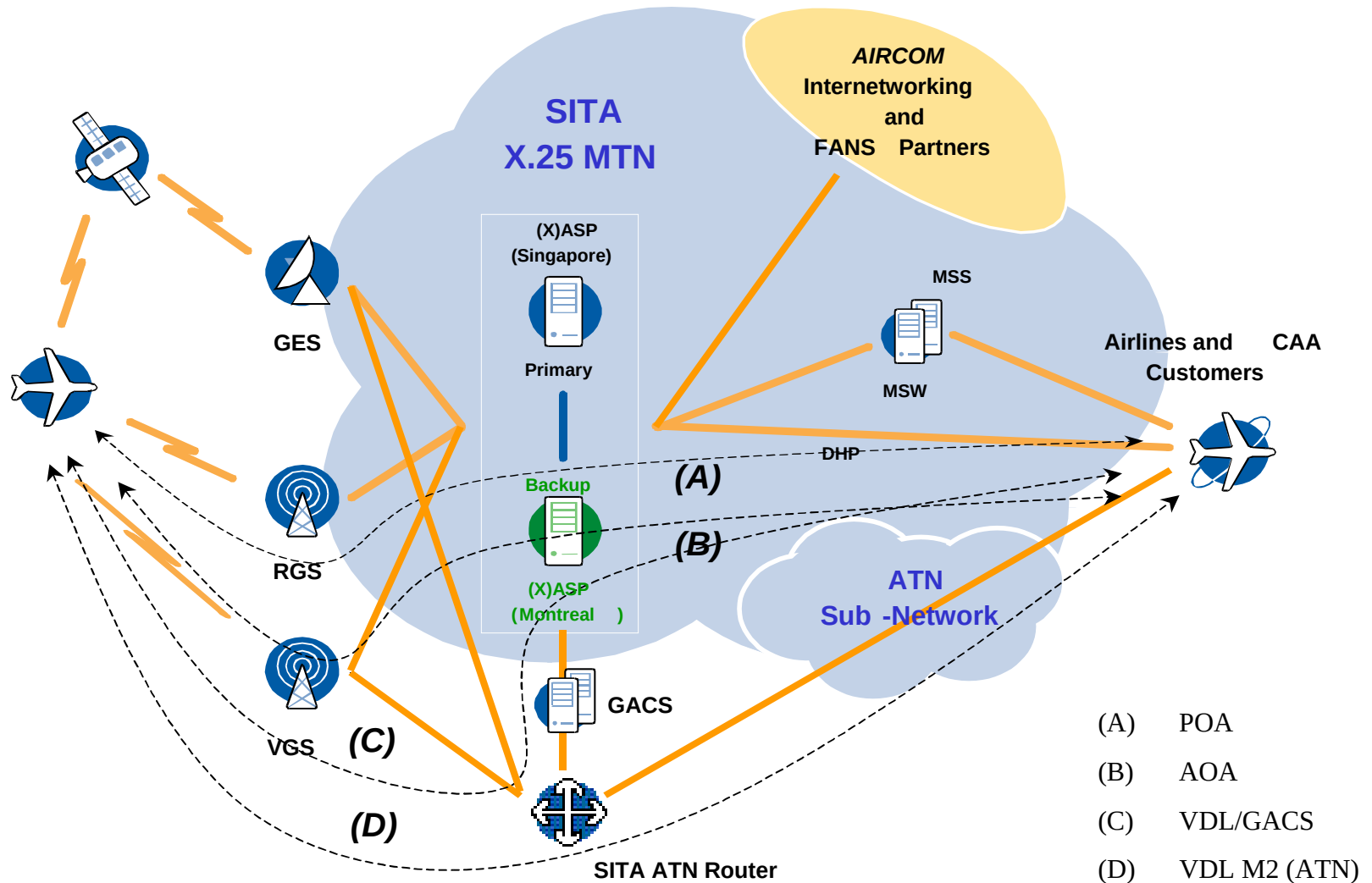
VHF ACARS to VDL transition

	ACARS	AOA	VDL Mode 2
Standards	AEEC Standard	AEEC Standard ICAO Standard	AEEC Standard ICAO Standard
Bit Rate	Character	Bit	Bit
Data Rate	2400bps	31.5 kbps	31.5 kbps
Frequency for equivalent RF	8-10	1	1
Avionics	ARINC 716/724 ARINC 750/758 Mode A	ARINC 750/758 AOA s/w Revision	ARINC 750/758 ATN s/w Revision
Host Processing	ACARS	ACARS	ATN
Messages	ARINC 618/620	ARINC 618/620	ARINC 618/622
Service Availability	Now	1Q 2003	1Q 2003

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VHF Data link Network Evolution



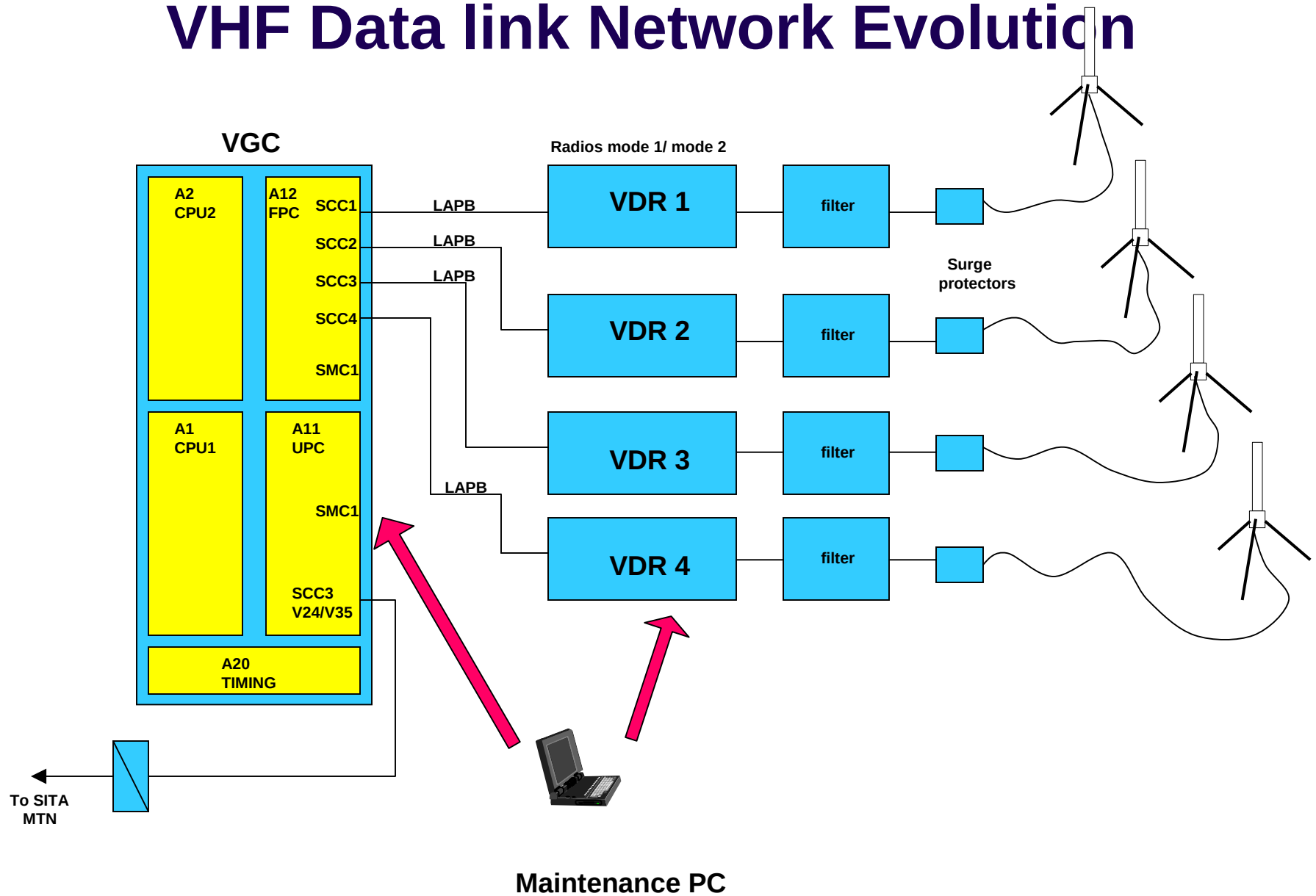
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VHF Data link Network Migration

- POA : VGS to replace RGS for provision of old “Plain ACARS” (POA) service . ACARS messages still supported as before by (X) ASP platforms in Montreal and Singapore.
- VDL mode 2/AOA : Provision of VDL mode 2 AOA (ACARS over AVLC).Higher level message formats are identical to POA without any changes to the airborne and ground application.
- VDL mode 2/GACS : Support ACARS over ATN VDL Mode 2. This service requires the implementation of ATN Avionics , ATN ground routers and the Generic ATN Communication services (GACS) gateway implemented as a DSP ATN end system .
- VDL mode 2/ATN:End to end support of VDL mode 2 in an ATN environment

VHF Data link Network Evolution



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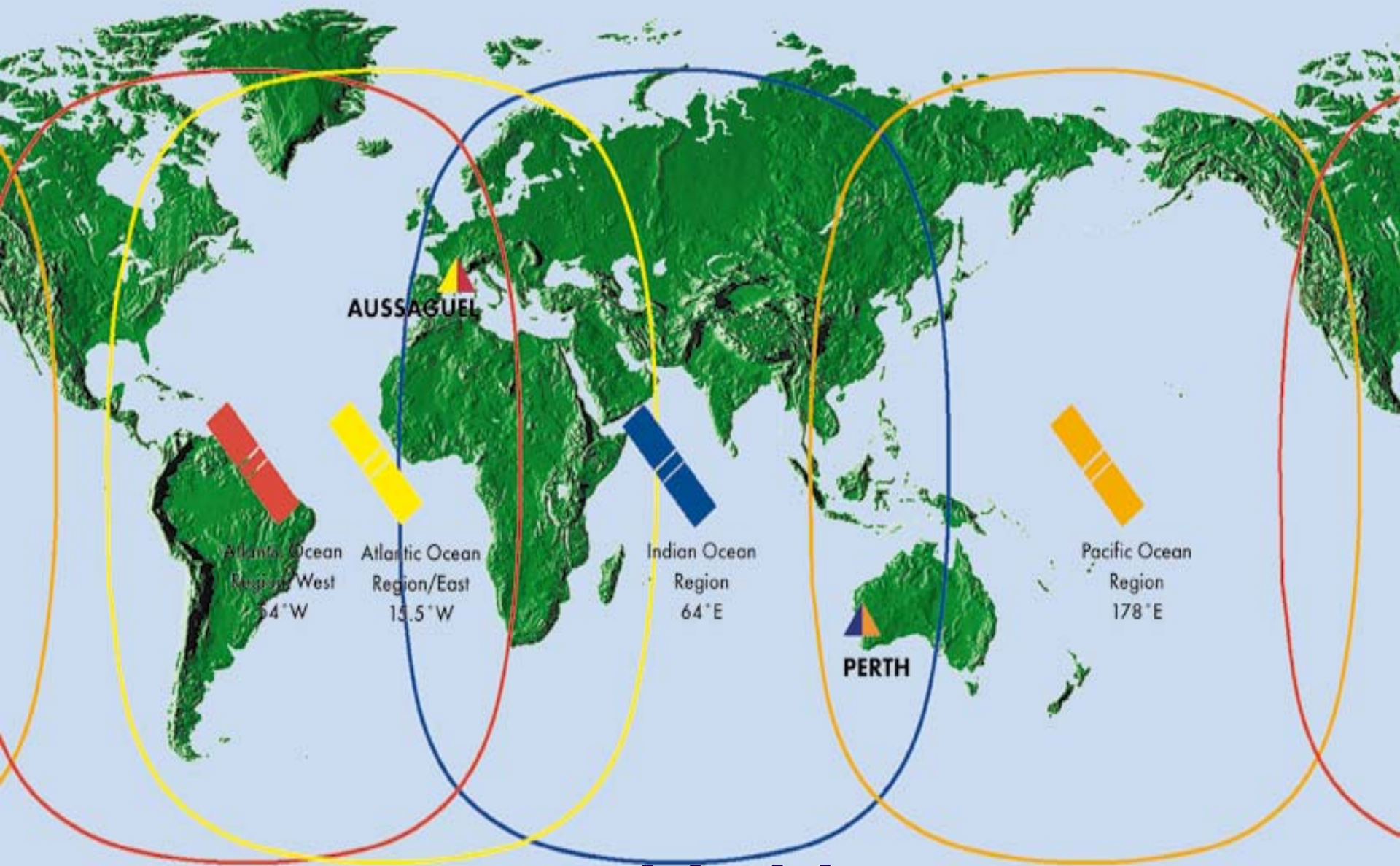
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Satellite AIRCOM

- **Aeronautical Mobile Satellite Services (AMSS) standards were developed by the ICAO Aeronautical Mobile Communications Panel (AMCP)**
- **ICAO AMSS SARPs based on the Inmarsat service:**
 - **Circuit mode**
 - **Packet mode**
 - **Data 2**
 - **Data 3**
- **ICAO AMSS and ATN SARPs compliant Data-3 Service is available today as demonstrated in the ADS Europe and Australian 'INCA' projects (Data-3 Service validation was provided by SITA and Inmarsat)**

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Inmarsat worldwide coverage

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