



LDACS

The SESAR R&D perspective

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SESAR Joint Undertaking

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Founding Members

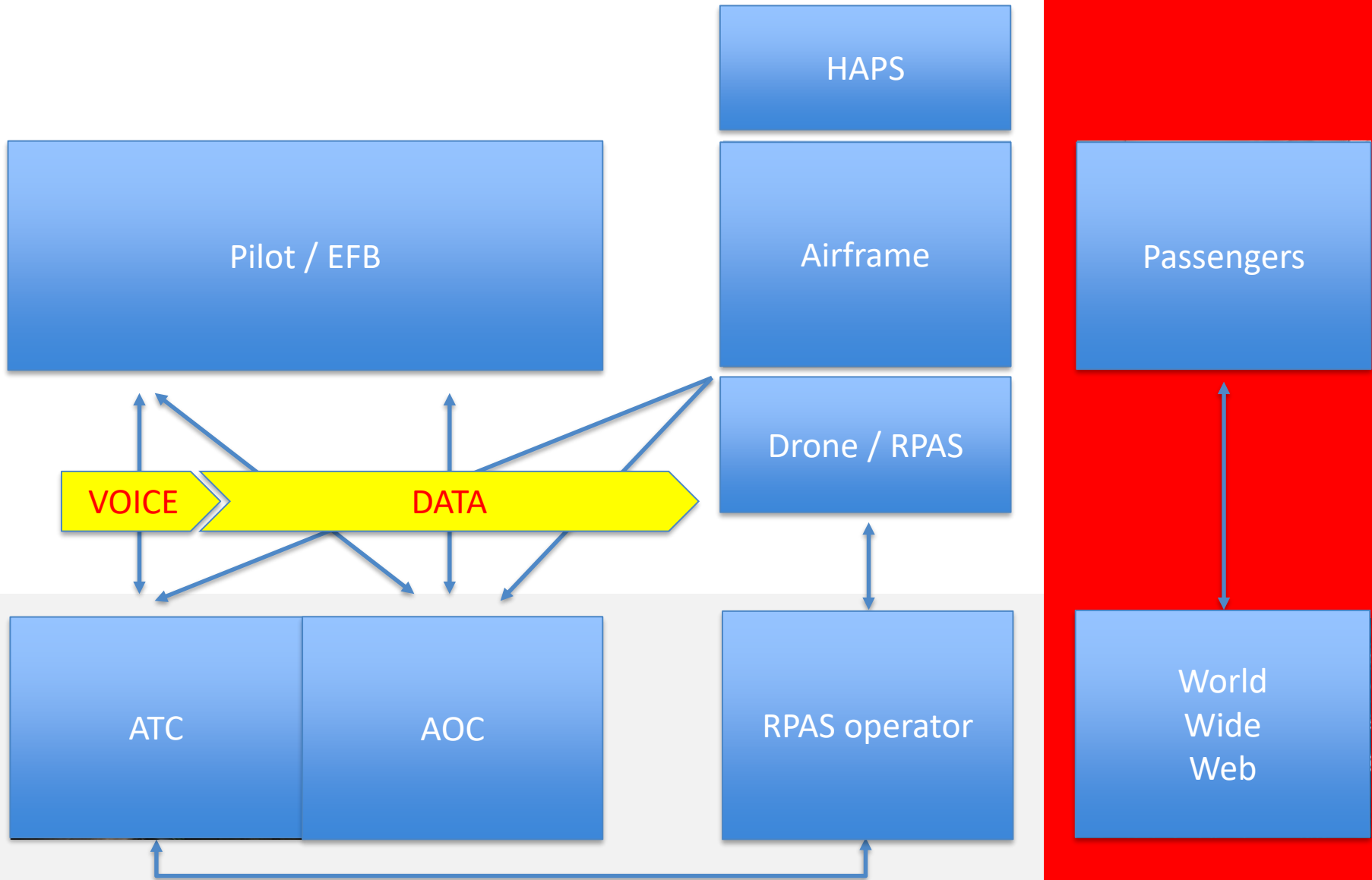


EUROPEAN UNION



EUROCONTROL

Air ground communication



Evolution of A/G information exchanges



Today

ATC *Tactical conflict management*

- Voice Clearances over broadcast (R/T)
- CPDLC (over VLDM2 / SATCOM)
 - *climb/descent clearances,*
 - *direct clearances*
 - *turns and headings*
 - *Sector hand-over*

Airspace User

- AOC to AC communication

Tomorrow

ATC *Shift towards pre-tactical conflict management*

- Voice Clearances over broadcast (R/T)
- **Trajectory-Based Operations (TBO)**
 - *EPP downlink*
 - *Complex clearances*
 - *4D trajectory negotiations*
- **Flight centric -> long range point to point**
- **AC as a sensor (downlink)**

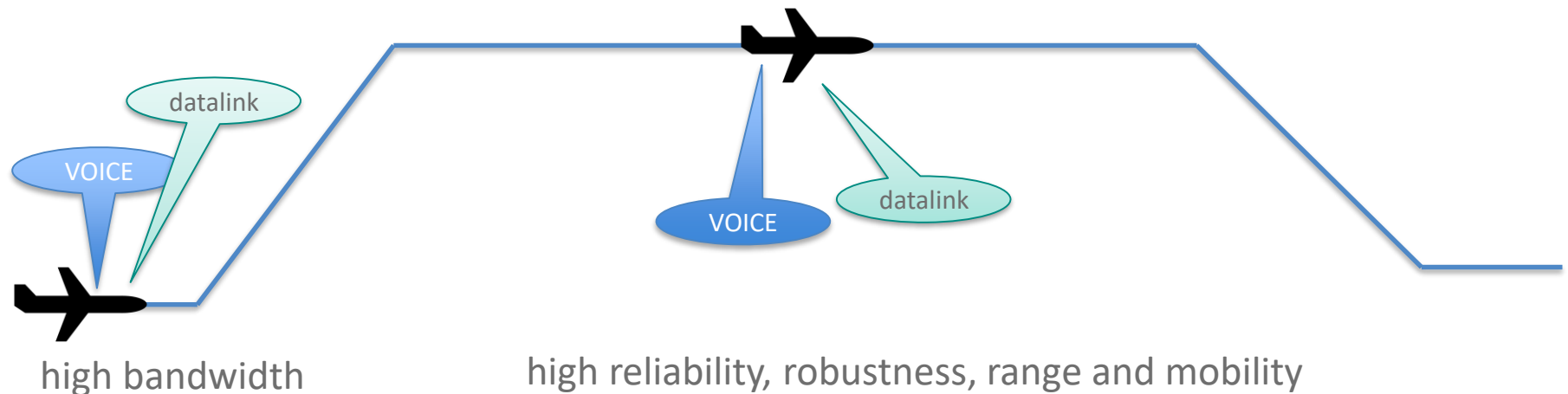
Airspace User

- AOC to AC communication
- **In flight AIM/MET updates to EFB (uplink)**
- **Flight performance data (downlink)**

New Entrants

- **IFR integration of RPAS**
- **U-space / UTM / UAM**
- **HAPS**

- L-band Digital Aeronautical Communications System
- Upcoming air-to-ground communications standard
- Key component within the FCI for aviation A/G communication
- Design and protocols for transmitter and receiver
- Extension of LDACS communications towards navigation (A-PNT)
- Secure, scalable and spectrum efficient



Spectrum

- Current HF and VHF data links cannot provide broadband services now or in the future, due to the lack of available spectrum and unsurmountable challenges during the transition period
- Aeronautical L-Band between 960 MHz and 1164 MHz
- Can be co-located with DME in the L-band
- Designed as a cellular system to avoid co-channel interference problems (unlike VLDM2)
- Safety critical exchange remains segregated from in-flight entertainment services

Scalability

- Enables 50 to 200 times higher throughput, than that of VDLM2
- Scalable allows for a stepwise deployment
- Gradual transition from VDLM2 to full LDACS (expansion on a need basis)

Safety and security (QoS)



- AVAILABILITY: LDACS manages service priorities and thus, guarantees bandwidth, low latency, and high continuity of service for safety-critical applications while also accommodating airline AOC services
- INTEGRITY, CONFIDENTIALITY: Authentication and encryption

Interoperability

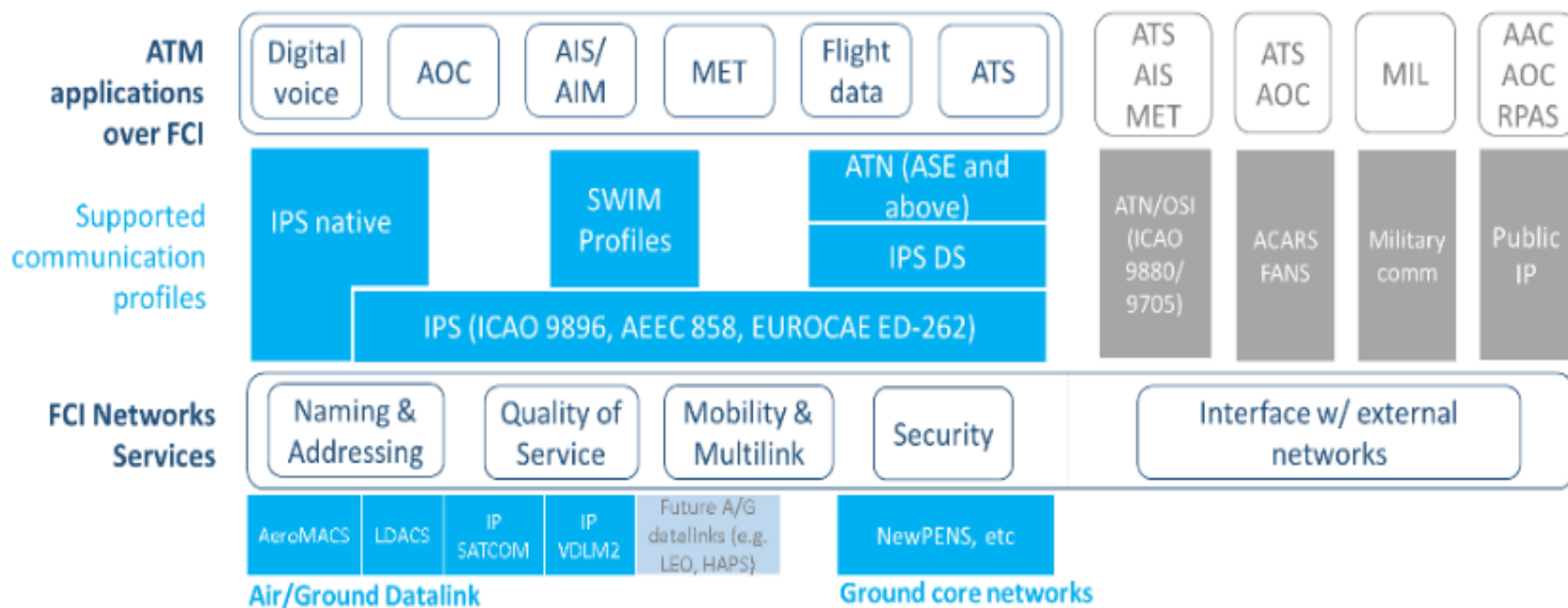
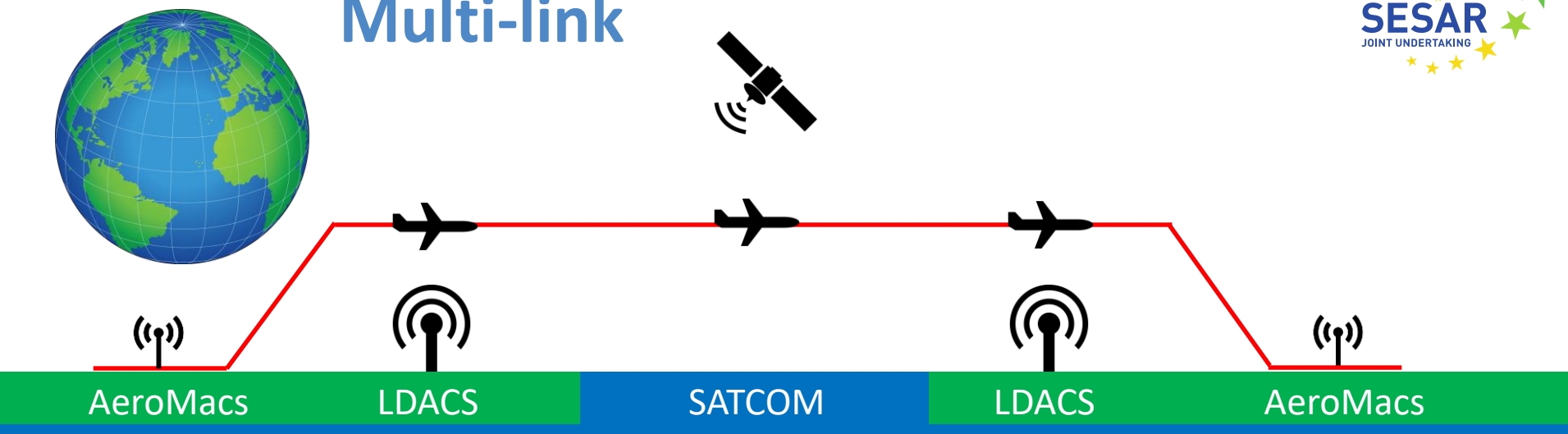
Compatible with existing and future protocols

- ADS-C (Automatic Dependent Surveillance – Contract)
- EPP (Extended Projected Profile)
- ATS/B2 CPDLC (Controller Pilot Data Link Communications)
- Expected to serve the emerging ATS/B3 services
- SWIM services

Avionics

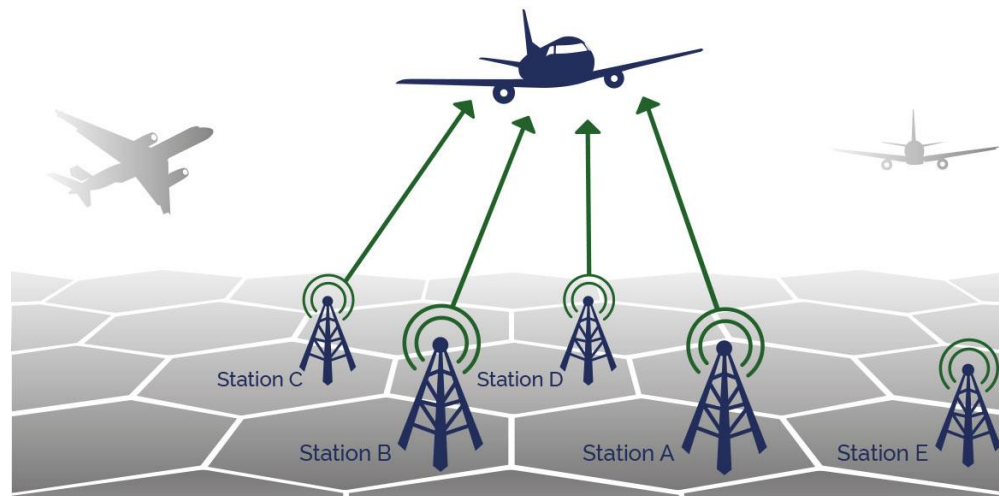
- Multi-mode LDACS/VDL radio, no need for additional on-board space
- Dual-band VHF-/L-Band antenna with the same footprint as current VHF antenna

Multi-link



LDACS as iCNS: Communications and navigation at the same time

- Ranging data, similar to DME (Distance Measuring Equipment)
 - Enables A-PNT (Alternative Position, Navigation and Timing)
 - ... and potentially A-SUR
 - To supplement the existing on-board GNSS
-
- Without the need for dedicated NAV spectrum!



Overview of conducted/ongoing R&D



1) Datalink

- 2008 : Initial specification by EUROCONTROL
- 2011 – 2017 : TRL 2 achieved by SESAR Project P15.02.04
- 2016 : ICAO standardization started, LDACS SARPs endorsed in October 2018
- 2019 : TRL4 completed in SESAR 2020 wave 1 PJ.14-02-01
- Current : TRL6 validation ongoing in SESAR 2020 wave 2 PJ14 WP03 (Sol 60)

2) A-PNT

- Current : TRL4 validation ongoing in SESAR 2020 wave 2 PJ 14 WP10 (Sol 81)

3) Digital Voice

- Current : TRL 4 validation ongoing in SESAR 2020 wave 3 PJ33-W3-02

4) Surveillance

- Future exploratory research?
- Need for an iCNS vision on redundancy

L-band Digital Aeronautical Communications System

Provides terrestrial A/G

Required for future operational needs

- Scalable & broadband (due to operating in the L-band)
- Integrated into the multi-link concept
- Prioritisation mechanism
- For safety critical purposes AND ALSO for other aeronautical services
- Secure: Authentication and encryption
- Scalable: Seamless transition from VLDM2
- SWIM ready
- Enables A/G Digital Voice
- Potentially re-use for A-PNT and SUR (without new spectrum needs)



LDACS, the SESAR R&D perspective

Thank you very much
for your attention!



Founding Members

