

SANDRA Project

Seamless **A**eronautical **N**etworking through
integration of **D**ata links, **R**adios, and **A**ntennas



AGCFG/5 and NexSAT/10 Meeting, 24 -25 March 2009, Brussels

Outline

- SANDRA Facts
- The Context
- Problem Statement
- The Vision
- The Demonstrator
- Work Breakdown Structure, Top Level Time Plan and Study Logic
- SANDRA and SESAR
- Contacts

SANDRA Facts

- Proposal presented: 7 May 2008
- Status : Negotiation
- Funding Scheme: Large Scale Integrated Project, FP7
- Duration: 4 years
- Kick-Off: Foreseen in June
- Total budget: 23.9 M€
- Nr. of Partners: 31 partners

Topic AAT.2008.4.4.2:

Integrated approach to network centric aircraft communications for global aircraft operations

SANDRA – List of Partners

- 1 Selex Comms
- 2 Thales Alenia Space
- 3 Alenia Aeronautica
- 4 Thales Avionics
- 5 Thales Aerospace UK
- 6 Thales TRT - UK
- 7 DLR
- 8 RadioLabs
- 9 Selex S.I.
- 10 ACREO Sweden
- 11 Pisa University
- 12 Airtel ATN
- 13 Altys
- 14 Bradford University
- 15 Cyner
- 16 Dassault Aviation
- 17 DFS
- 18 EADS IW
- 19 Gatehouse
- 20 IMST
- 21 INRIA Fr
- 22 Intecs
- 23 KLM
- 24 Lionix
- 25 Monitorsoft
- 26 NLR
- 27 Salzburg University
- 28 SITA
- 29 SLOT Consulting
- 30 Triagnosys
- 31 Twente University



Aeronautics and Air Transport Research Work-programme 2008 (DG RTD)

Level 2 Topics

4.4.2 Integrated approach to network centric aircraft communications for global aircraft operations

Definition, development & demonstration of an **aircraft communication concept** which will integrate a full range of applications and services including:

- **airlines** operations,
- **cabin crew** operations,
- in-flight and on-ground **passenger services**,
- **airport** operations,
- **security** services and
- **air traffic management** related operations (in line with SESAR),

Unification of networking protocols

Development of **proved concepts for the transition** from current procedures to the new system

→ ATM Context

- SESAR Definition Phase has defined new concepts of operations, including trajectory based ATM, SWIM and CDM
- Future Communications Study (FCS) has provided inputs to identify the communication enablers supporting the future operating concepts

→ The Need

- To establish the feasibility of integrating the SESAR concepts into the overall communications system of a future airliner
- To take into account the integration of all the communications domains to pursue economical efficiency
- To speed up research and standardization on key themes

Problem Statement

→ Services

- Disparate communication systems for the different service domains

→ Network

- Air transport industry faces a complex network architecture evolution with the coexistence of different protocol suites (ATN/OSI, IPS, ACARS)
- Development of future aeronautical networks based on IPS

→ Data links

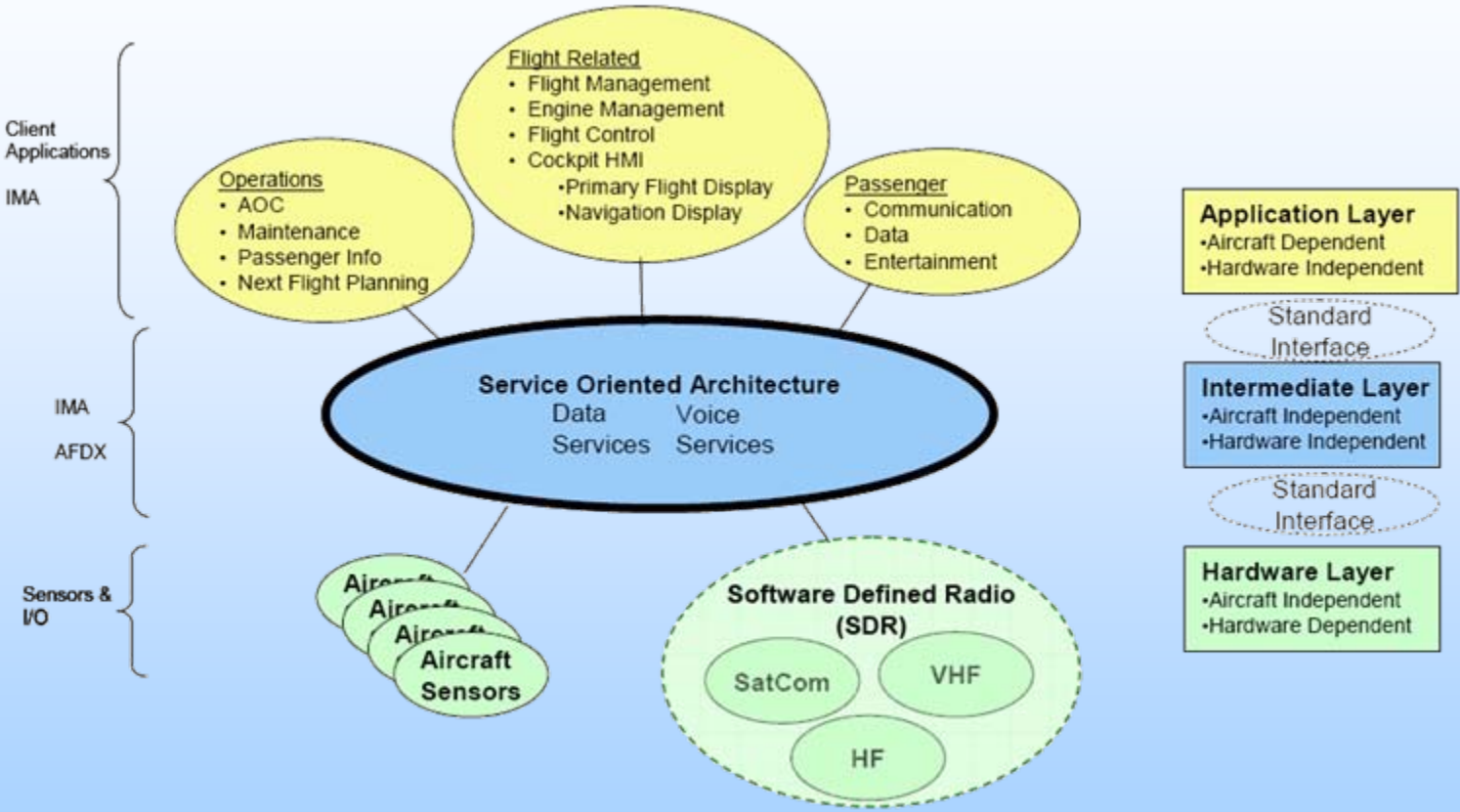
- Several data links are required to fulfill the communication requirements
- Stand alone radio systems represent considerable extra in terms of size, weight, and cost in avionics

→ Antennas

- Desire to integrate and rationalise antennas

→ **An integrated modular approach is missing** and of paramount importance to improve efficiency and cost-effectiveness by ensuring a high degree of flexibility, scalability, modularity and reconfigurability.

SANDRA Vision Based on the FCS



Service Oriented Avionics Architecture

Source: Future Communication Study - Action Plan 17
Final Conclusions and Recommendations Report

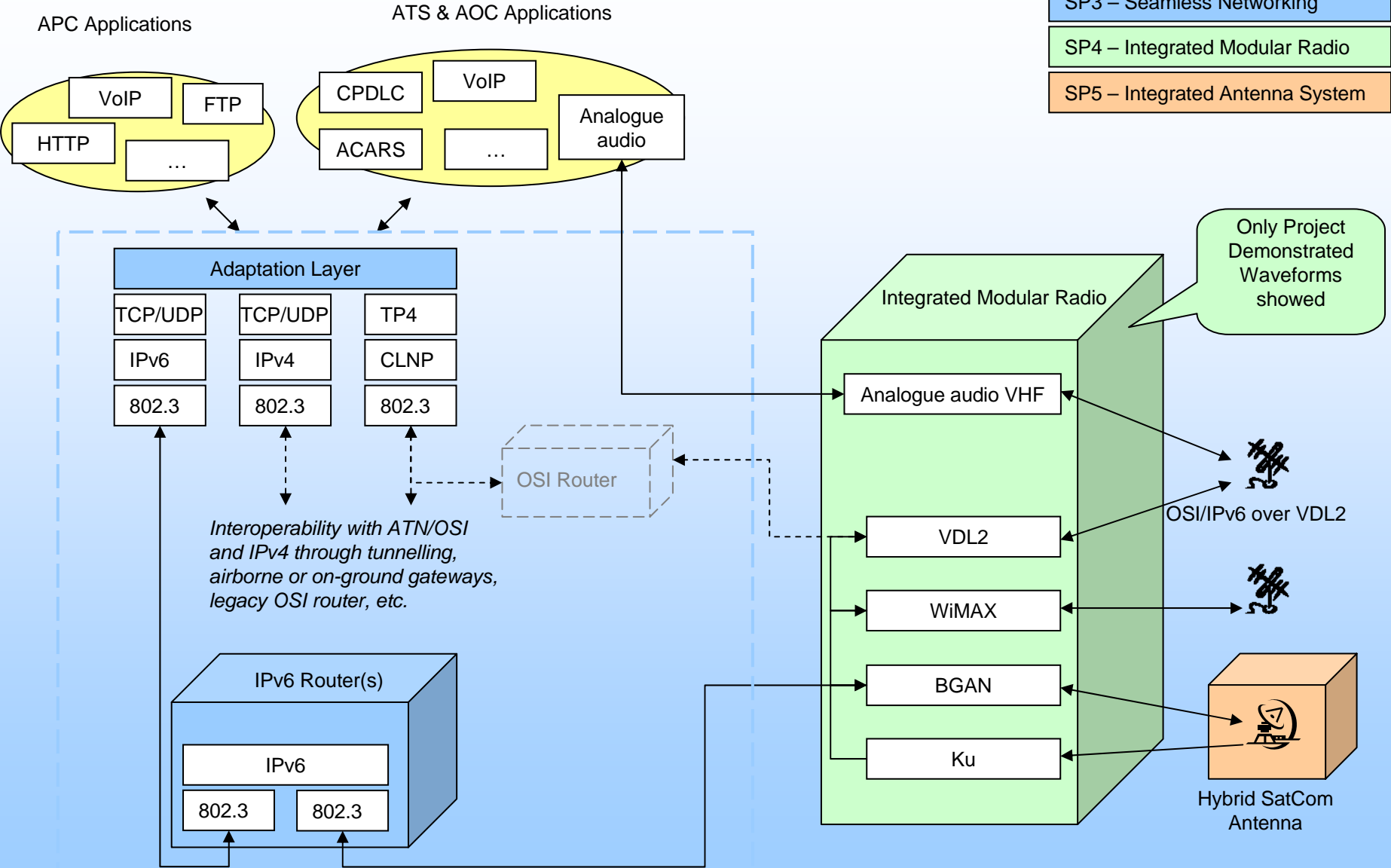
SANDRA – The Vision

- Integration of aeronautical communication systems using well-proven industry standards to enable a cost-efficient global provision of distributed services

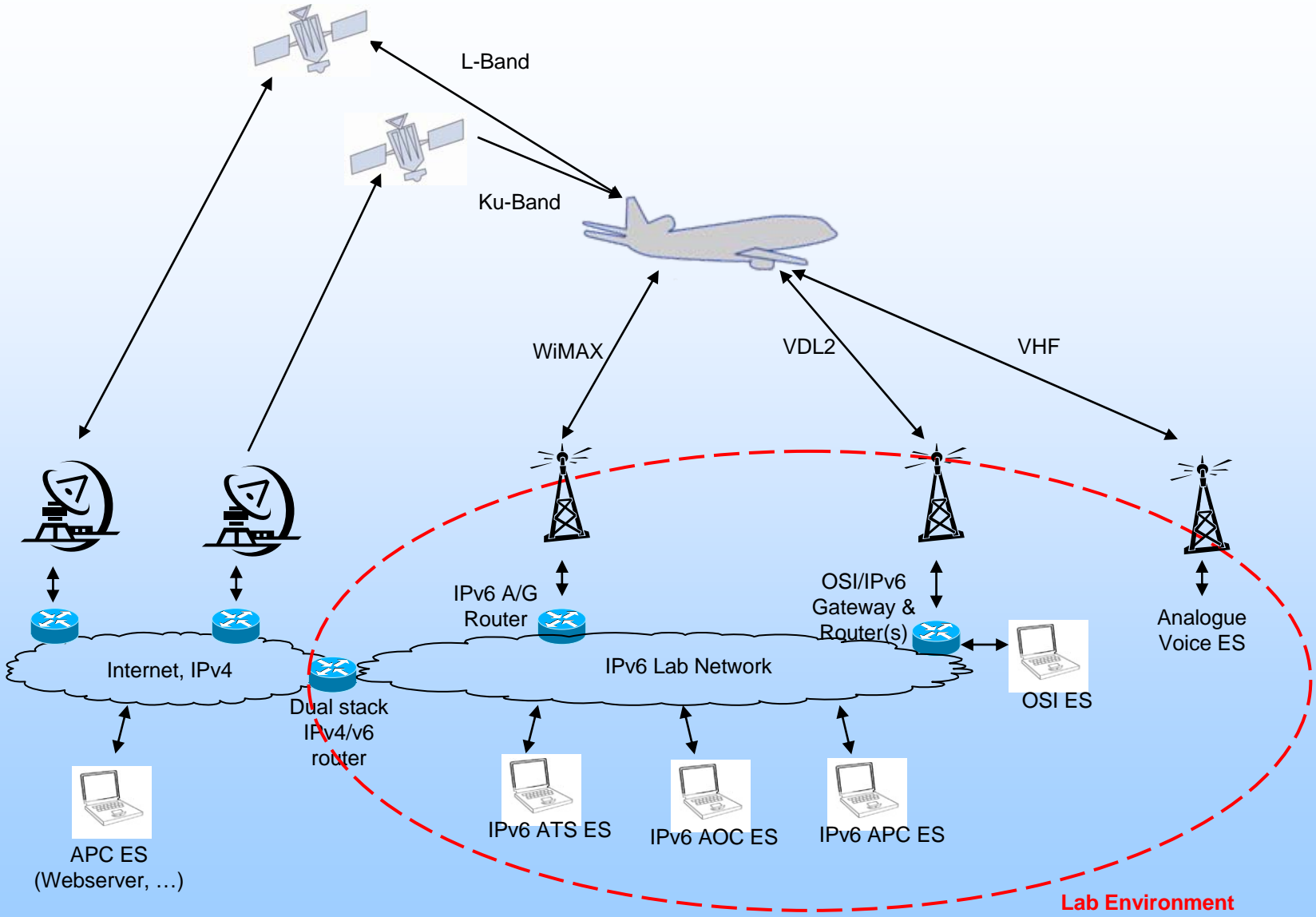
- **Integration at different levels:**
 - **Service integration**
 - Integration of a full range of applications and services (ATS, AOC/AAC, APC)
 - **Network integration**
 - Interworking of different radio access technologies through a common IP-based aeronautical network
 - Interoperability of network technologies (ACARS, ATN/OSI, IPS)
 - **Radio integration**
 - Integration of radio technologies in an Integrated Modular Radio platform
 - **Antenna integration**
 - Hybrid Ku/L band SatCom antenna to develop an asymmetric high data rate DL
 - **WiMAX** adaptation for integrated multidomained airport connectivity

SANDRA Trials, Airborne Side

- SP3 – Seamless Networking
- SP4 – Integrated Modular Radio
- SP5 – Integrated Antenna System



SANDRA Trials, Ground Side



SANDRA – Work Breakdown Structure (1/2)

→ SP 1 – Management (SELEX)

- Robust Project & Risk Management
- SP Coordination
- Liaison to SESAR

→ SP 2 – Requirements & Global System Architecture (TAS)

- Broad consolidation of experiences from different domains
- Defining the multidomain architectural approach

→ SP 3 – Seamless Networking (DLR)

- Selection and specification of networking solutions to enable service and technology integration
- Focus on IPv6 as unification point
- Simulation and prototype implementation

→ SP 4 – Integrated Modular Radio (TAUK)

- Find a radio solution (Integrated Modular Radio) that minimizes the number of transceivers that are required to be fitted on an aircraft and maximizes the reusability by reconfiguration of the radio resources
- To prove the applicability of the Integrated Modular Radio to all current, legacy, and future radio systems
- Investigate the integration of the Integrated Modular Radio resources into the overall Integrated Modular Avionics architecture of a future civil airliner

SANDRA – Work Breakdown Structure (2/2)

→ SP 5 – Integrated Antenna System (TAUK)

- Hybrid L/Ku band antenna for broadband Satcom
- To prove the feasibility of the asymmetric high data rate broadband communication concept with a single phased array antenna system
- To investigate the optical beamforming theme

→ SP 6 – Global Airport Connectivity (SELEX)

- Define and validate a technical profile and architecture for a surface communication system based on Wimax IEEE 802.16e standard for ATS/AOC communications, compliant with SESAR/FCI recommendations.
- Satisfy the need to have a AeroWimax working before 2011 otherwise we may loose the MLS band

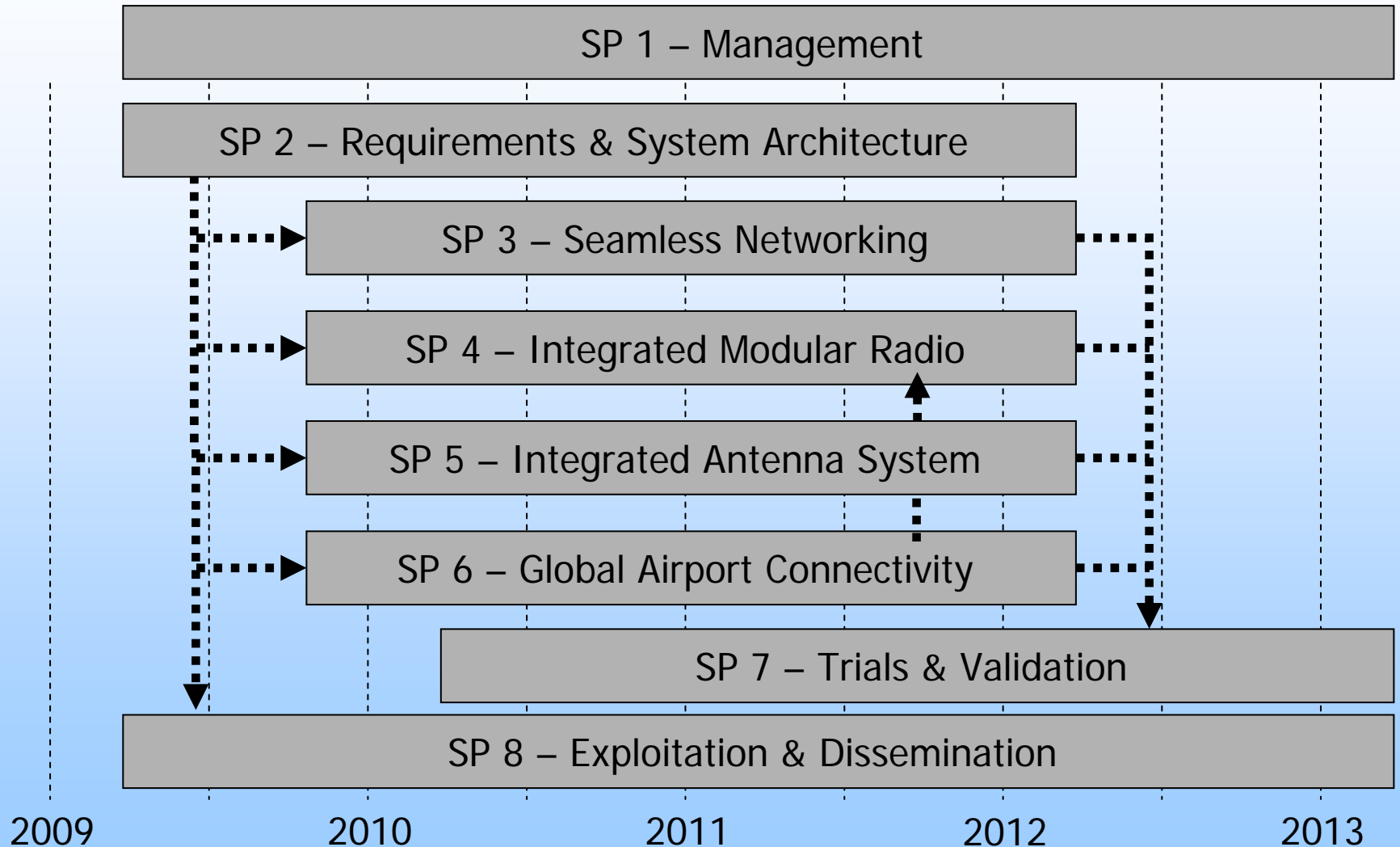
→ SP 7 – Trials & Validation (DLR)

- Integration of SP3, SP4 and SP5 outputs in a global test-bed
- Performing of lab and on-ground validation with global test-bed
- In-flight validation

→ SP 8 – Exploitation & Dissemination (SELEX)

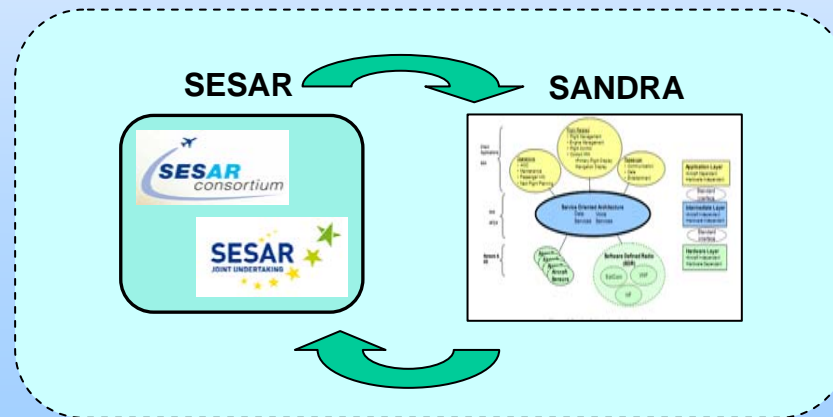
- Coordination with SESAR on standardisation, exploitation, regulatory aspects, transition, roadmaps

SANDRA – Top Level Time Plan and Study Logic



SESAR/SANDRA – Management Relationship

- **SESAR JU will be represented in the SANDRA Project Management Committee**
- **SANDRA “SESAR Permanent Committee”:**
 - Will have steering capability on SANDRA
 - Will be composed of SESAR representatives and SANDRA representatives
 - Will not be an “information only” body



SANDRA Contacts – Core Team

→ SELEX COMMS

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→ THALES

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