



# Next Generation Radio Architecture Framework

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ICAO FSMP– February , 2018- Mexico city

**AIRBUS**

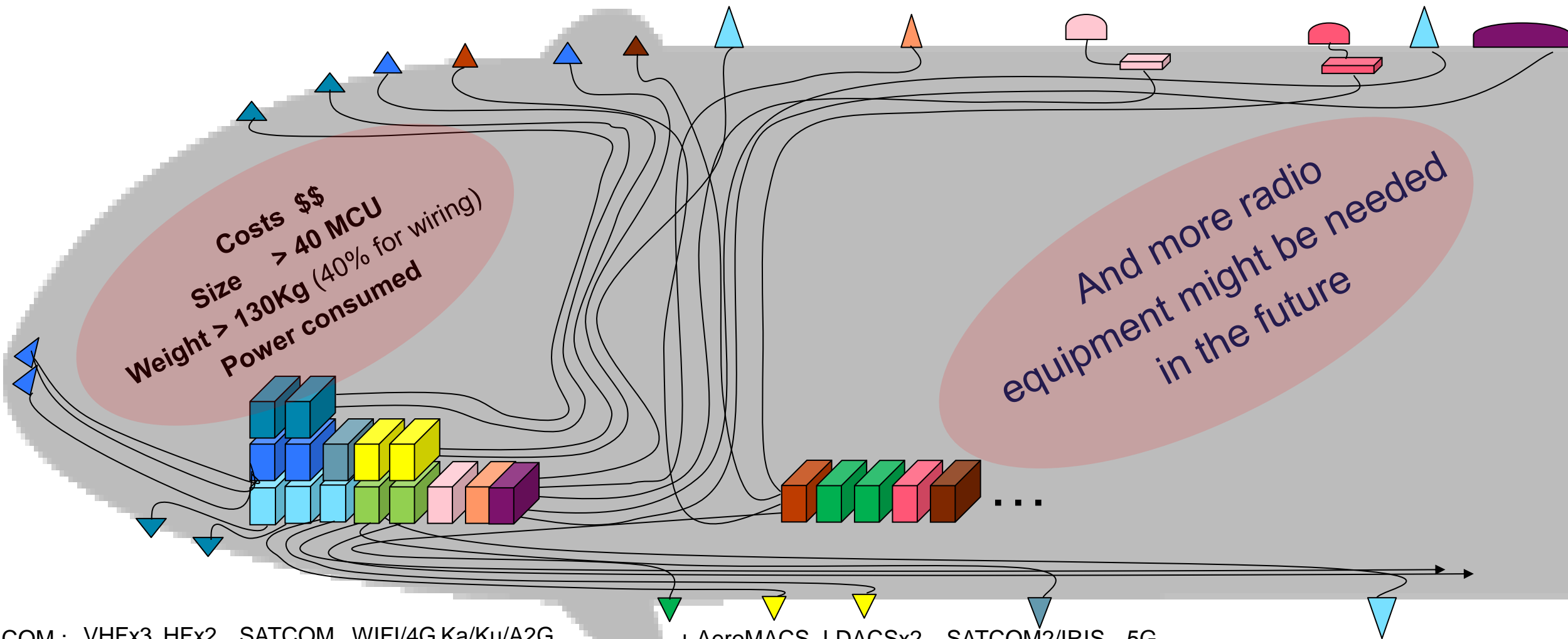
***This presentation on Next Generation Radio Architecture was made last week during the AEEC Systems Architecture and Interfaces (SAI) Subcommittee (8-9 Feb)***

New concepts of distributed architectures are emerging for the CNS (Communication, Navigation, Surveillance) radio systems, which show very promising benefits in terms of costs, size, weight, and power consumption.

Need to keep this momentum to launch standardization activities on Airborne side

*Introduction*  
***Opportunities and  
Challenges***

# Aircraft carry many radio equipment

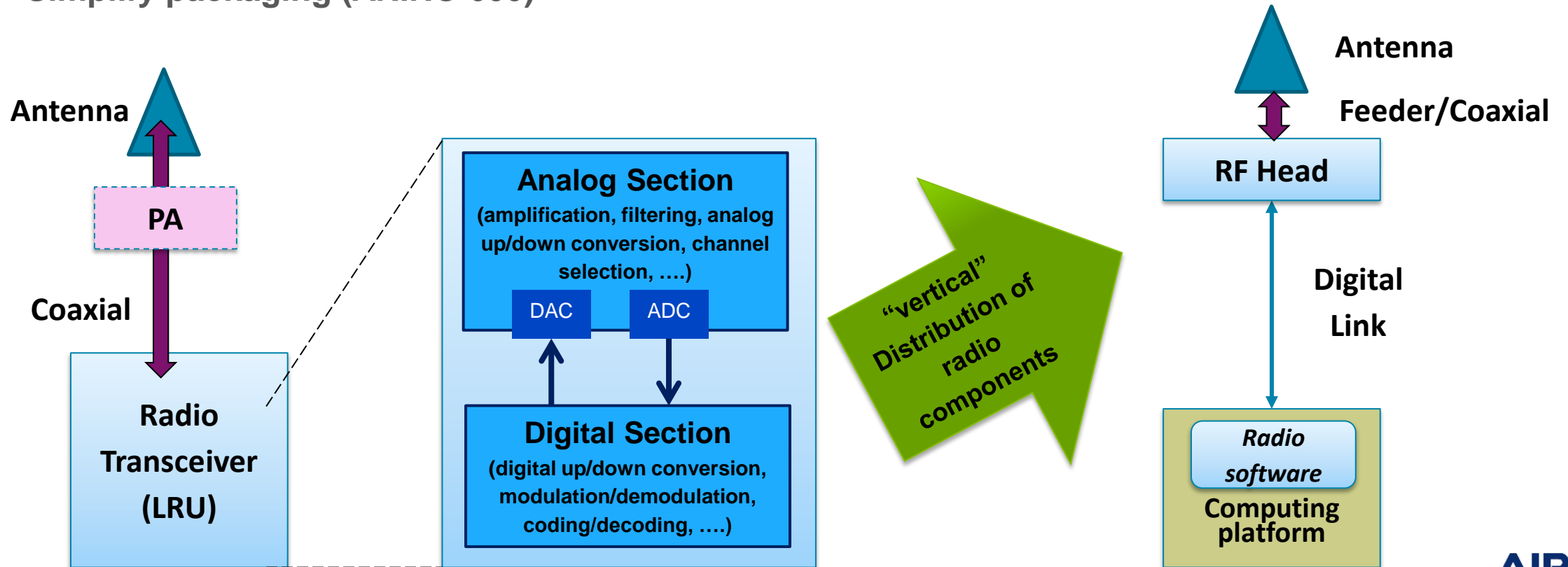


COM : VHFx3 HFx2 SATCOM WIFI/4G Ka/Ku/A2G  
NAV : GNSS/LOC/GLIDEx2 VOR/MARKER DMEx2  
SURV: TCAS/XPDR/MODE S/ADS-Bx2

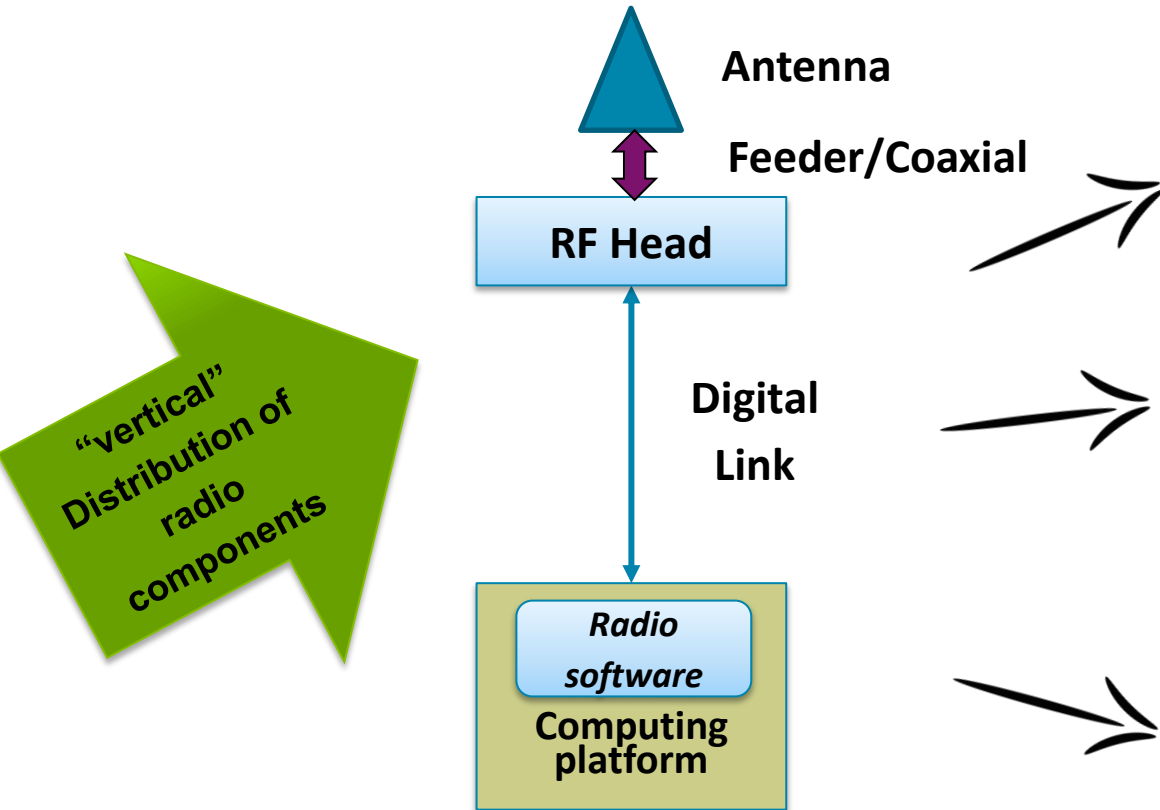
# Airbus study: How to lower SWaP (Size Weight and Power) and Costs of CNS radio systems ?

⇒ Suppliers consensus =

- Encourage « distributed » architectures with parts of the RF processing placed close to the Antenna
- Simplify radio physical interfaces (digital audio distribution, multiplexed avionics interfaced)
- Simplify packaging (ARINC 600)



# Distributed architectures benefits



## Simplified RF section

Reduction of signal amplification needs

**Direct reduction of Size, Weight, Power consumption & Cost**

Full reusability across different Aircraft platforms (common P/N)

## Simplified Aircraft Wiring

Reduction of interference issues

Thinner, **lighter**, and bundled digital cables

**Reduction of installation burden**

## Less specific hardware platform in the avionics bay

Platform **costs** factorization

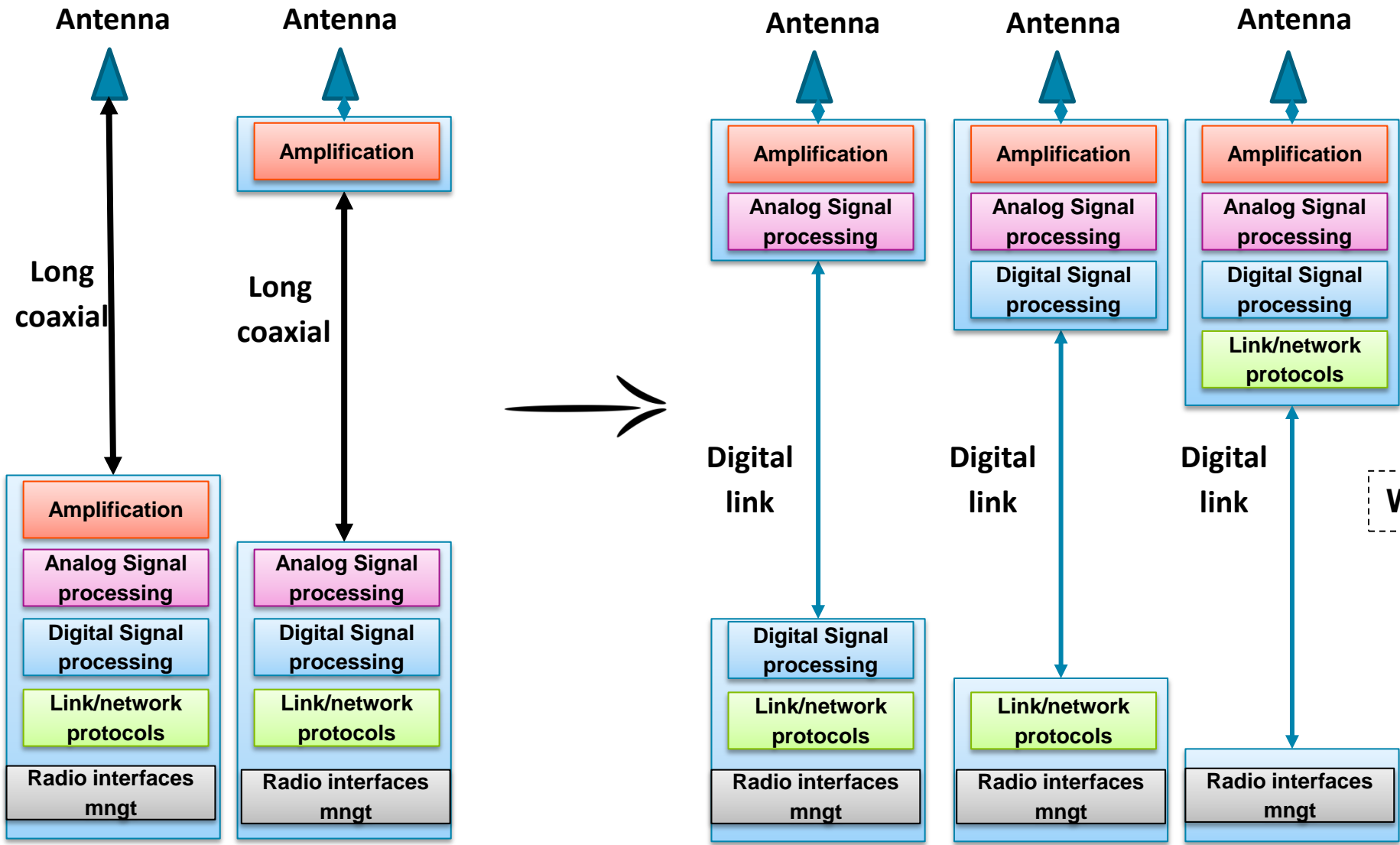
**Weight/size/power reduction** with multi-software integration

Adaptability to Aircraft platforms specificities (eg Short range vs Long range) and evolutions

**Flexibility** for evolutions, options, decommissioning (software update)

Easier transition to simpler interfaces and packaging

# Vertical distribution options , and ... questions



What are the (best) option(s) for the future and why ?

Which fit and form options for distributed radio front ends ?

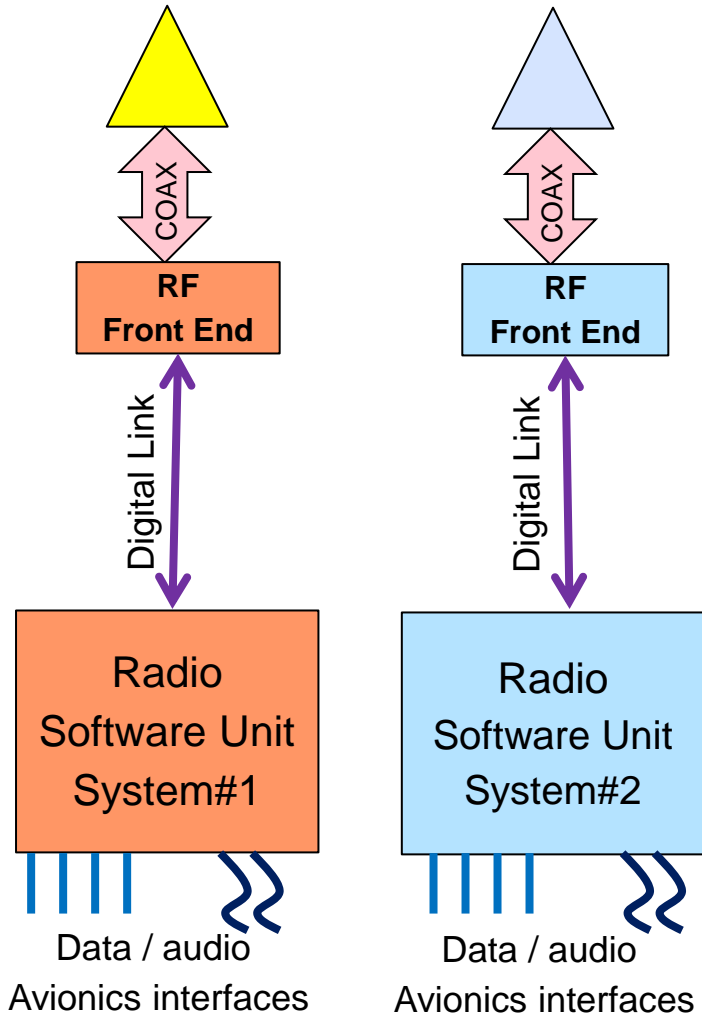
Which digital link technologies ?

Possible genericity of processing platforms ?

Legacy radio architecture options

New distributed architecture options (not exhaustive)

# From “Vertical” distribution to “horizontal” concentration of radio components

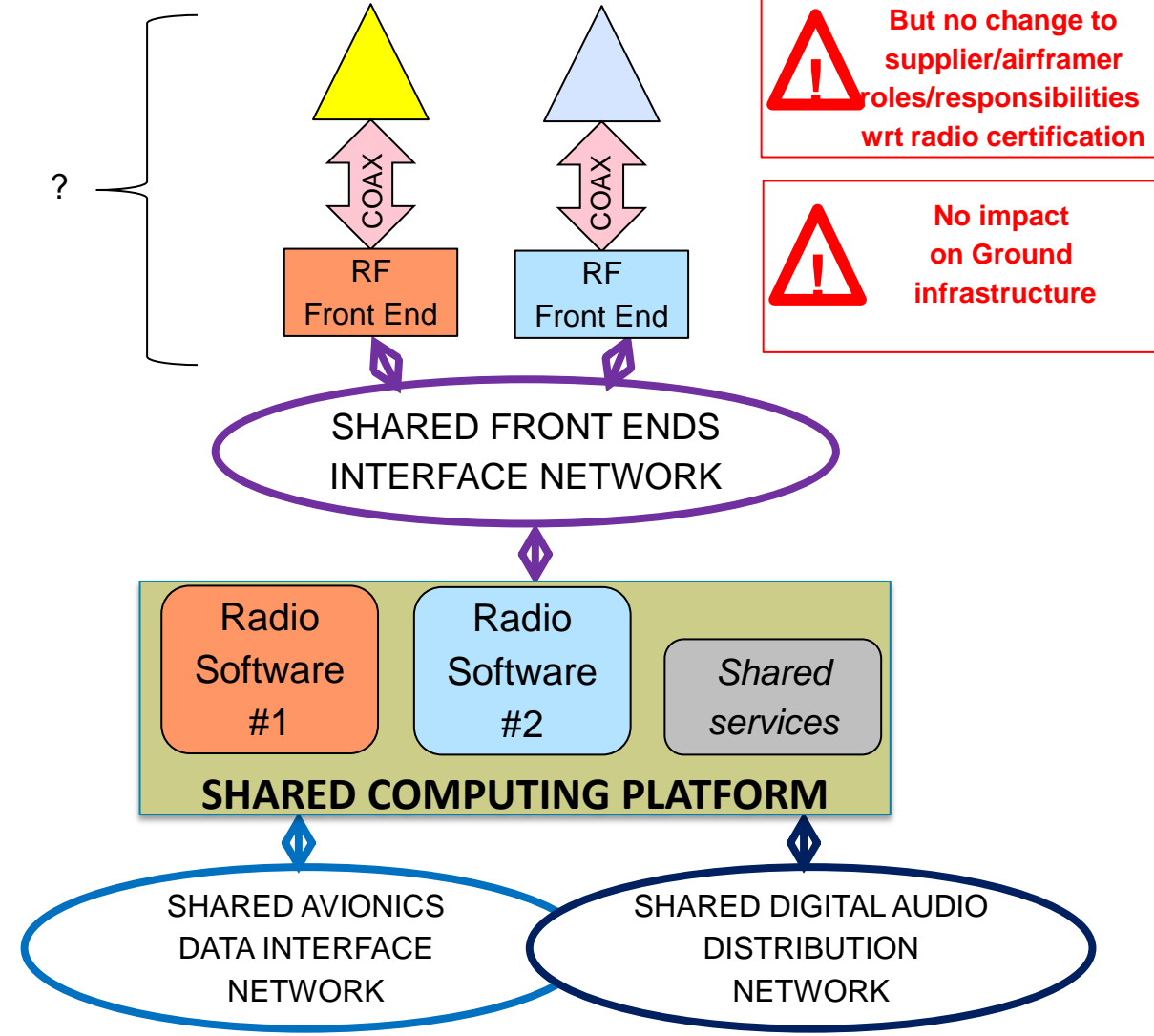


Possible horizontal concentration of some antennas and RF Front Ends ?- even across CNS domains

Horizontal concentration of the digital links

Horizontal concentration of the radio software units

Horizontal concentration of the radio interfaces



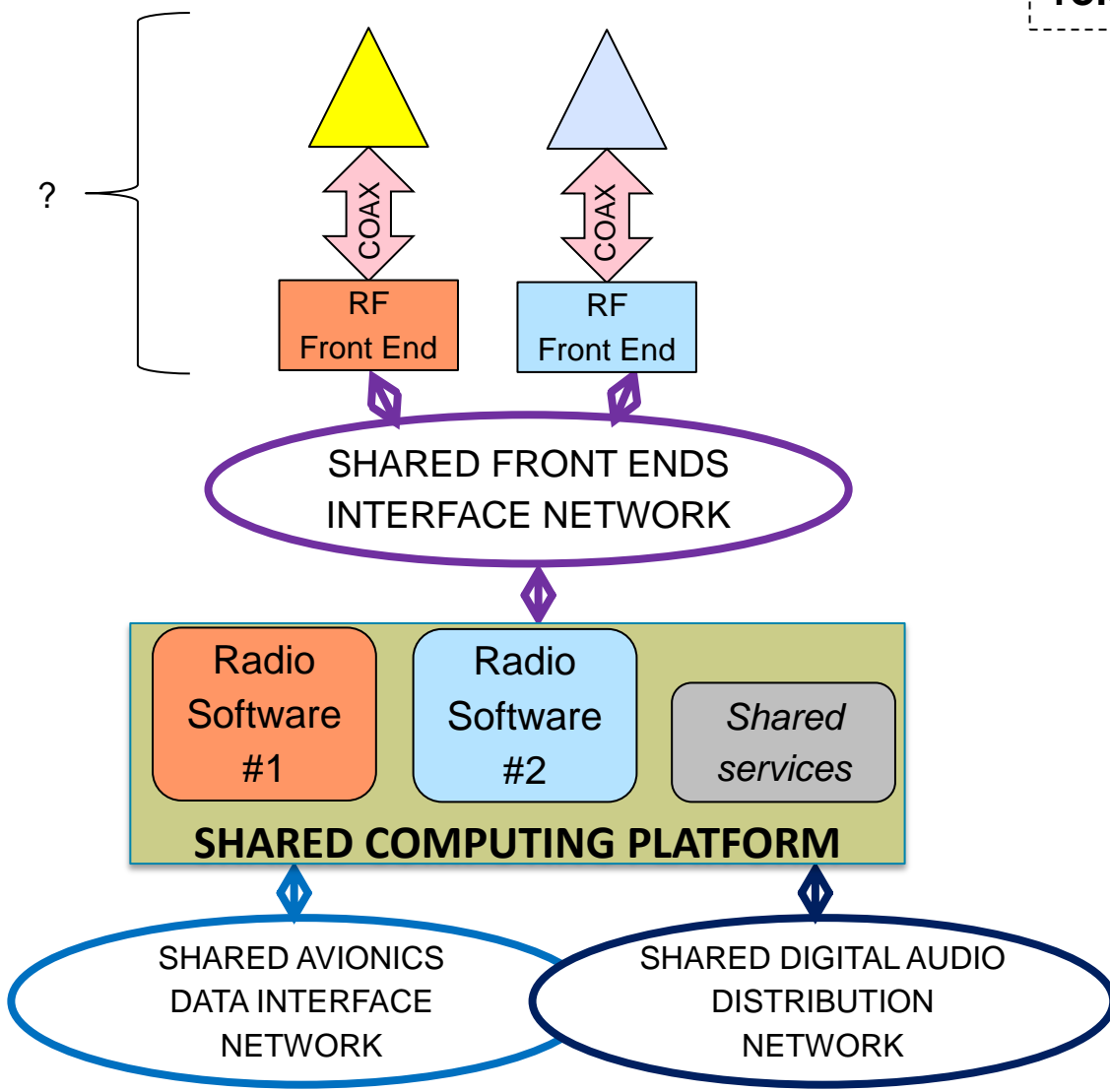
# “... which bring additional questions

Possible horizontal concentration of some antennas and RF Front Ends ?- even across CNS domains

Horizontal concentration of the digital links

Horizontal concentration of the radio software units

Horizontal concentration of the radio interfaces



roles/responsibilities in certification impacted ?

Feasability ?

Security ?

Safety ?

Which standards should be planned ?  
Which groups should be involved

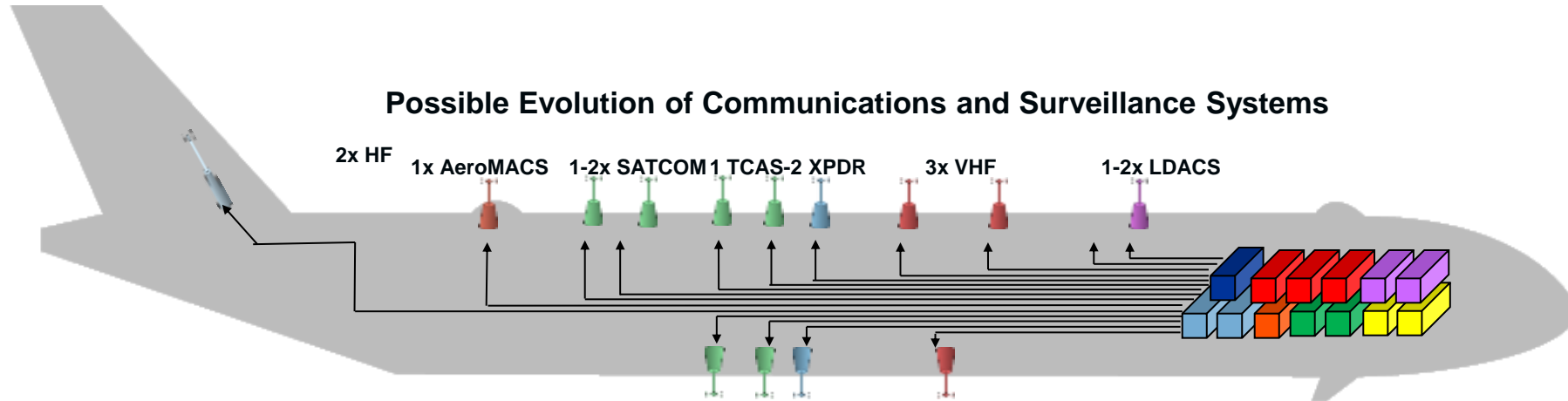
Characteristics required from shared components ?

Preferred orientations for solutions ?

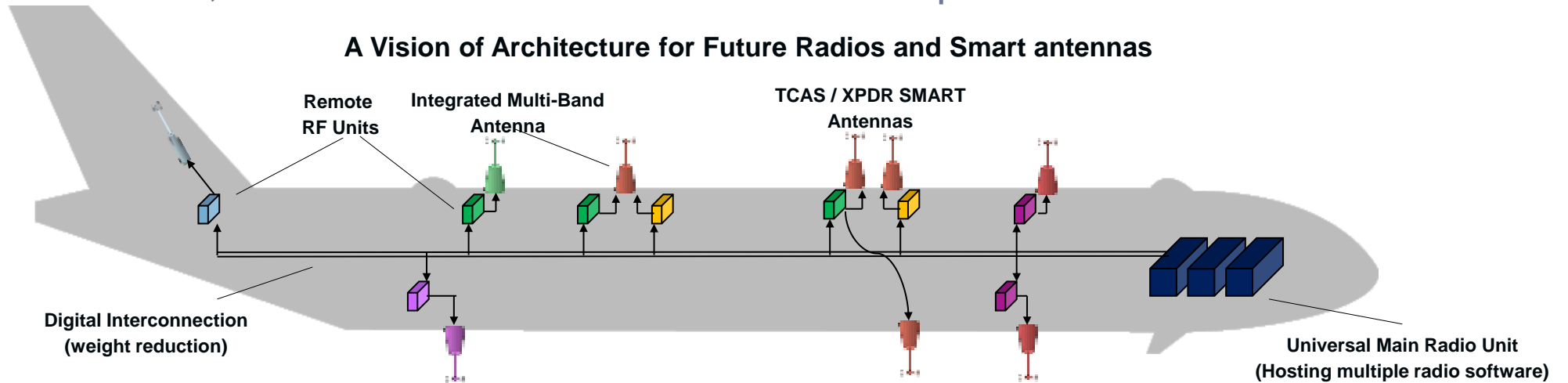
Can we find consensus ?

# Example of the vision of a future globally distributed radio architecture

From the legacy, federated architecture



Toward a distributed, flexible architecture with smaller footprint



***APIM proposal***  
***Future radios architecture***  
***framework***

## The need for standardization (1/3)

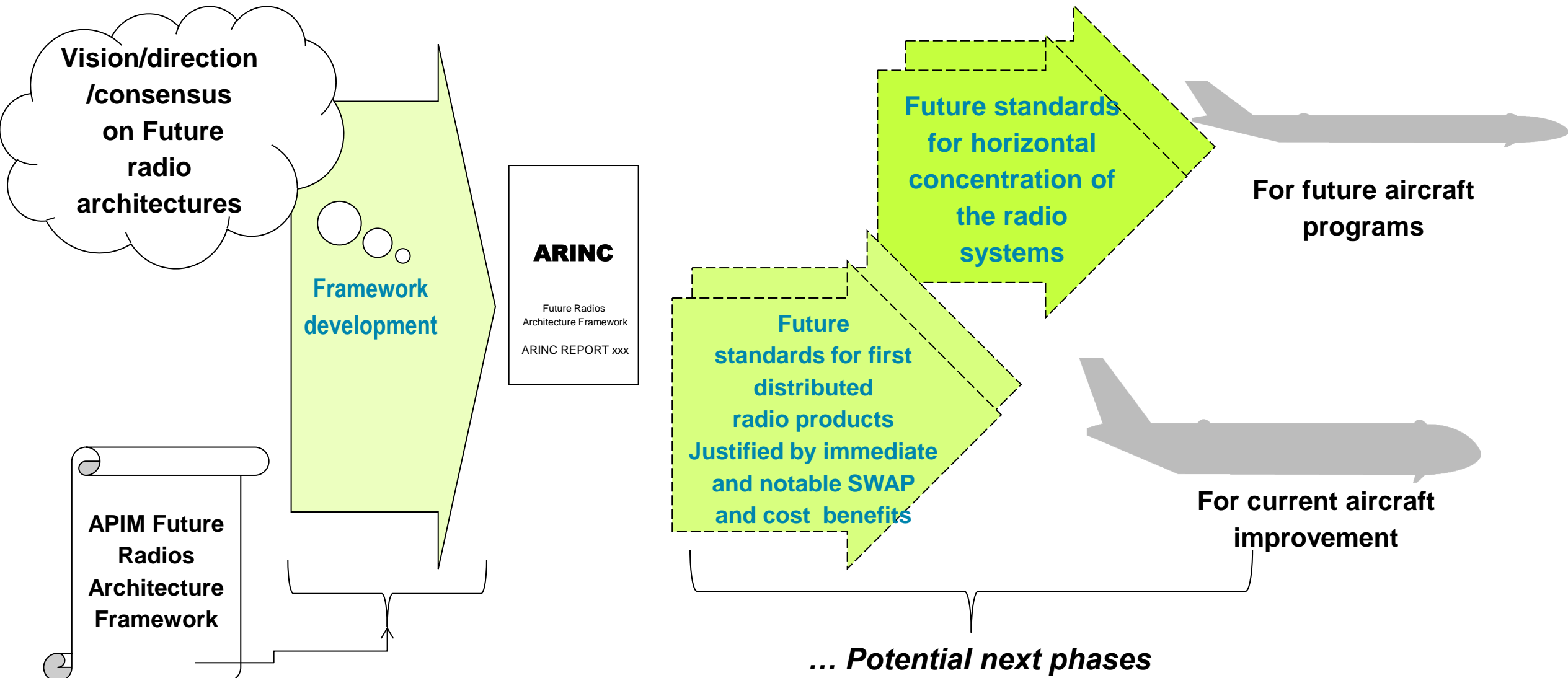
**Distributed architectures concepts for radio systems are emerging and show promising benefits**

**Supplier proposals for first distributed radio products are “on the radar”**

**Risk:** disparate supplier proposals may lead to a variety of supplier specific solutions, detrimental to:

- Products interchangeability and open suppliers competition
- Supplier market size, NRC amortization, and resulting costs for Airframers and Airlines
- Consistency of the overall A/C systems architecture
- Airlines trust in these new products
- Certification processes simplification

# The need for standardization (2/3)



# The need for standardization (3/3)

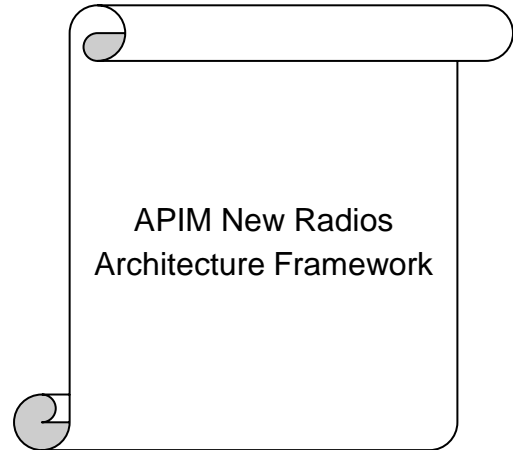
## APIM proposal: Framework document for future distributed radio systems architectures

Develop and ARINC Report,

⇒ An “overarching standard”, ahead of future individual CNS radio equipment standards to establish an industry consensus on common elements of these architectures

⇒ Which would define:

- A typology/classification of radio architectures
- An assessment of the best architecture option(s) for each CNS radio in the future
- Potential targets for “horizontal” combination/integration of CNS radio components
- Constraints for RF Front Ends installation and identification of Fit/Forms solutions
- Requirements on the digital interfaces to RF Front Ends
- Requirements on future avionics interfaces for the radio systems (data/audio)
- Characterization of the radio computing platforms
- Identification of potential opportunities for the factorization/rationalisation of common services for the radios
- (Data) Security of the architectures, and approaches for isolation of the aircraft systems from attacks through RF interfaces
- Safety considerations on the architectures



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Thank you