IPS Proposed Architecture

AEEC IPS Subcommittee
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Setting the context for the architecture, protocol, and security provisions proposed by Rockwell Collins

Rockwell Collins

Building trust every day

Setting the Context

- Rockwell Collins volunteered to write Appendix A of the IPS document, describing the ground components.

- In order to create that material, RC engineers from Cedar Rapids, Toulouse, and Annapolis collaborated to develop an architecture, protocol, and security framework to address what RC perceives as the key IPS requirements:

  - Interoperability

  - Media independence

  - Strong security

- In the end, RC developed a proposed detailed Interface Document to scope the work for Appendix A.

- Nothing proprietary here - we want to share the concepts and ICD with the committee for their consideration and use

Requirements - Interoperability

- New IPS aircraft operating in a region where the ANSP has a deployed ATN/OSI system

- New IPS aircraft purchased by airline still using legacy ARINC 620 back-office systems

- Legacy ATN/OSI aircraft operating in a region where the ANSP has upgraded to an IPS system

- Legacy FANS aircraft communicating with an end system that has upgraded to an IPS system

- *Given the large base of legacy avionics and ground systems, this overlap period may persist for decades.*

Requirements – Media Independence

- Must support *at least* the following media:
    - Inmarsat satellite
    - Iridium satellite
    - Other satellite
    - Aeromacs airport wi-fi
    - VDL Mode 2 VHF
    - Upcoming high-speed VHF offerings
    - Upcoming high-speed HF offerings
    - And…??

- *Design must strive for a structure that can support any approved media*

Requirements – Strong Security

- Communications must be secure and encrypted at each link, air/ground and ground/ground

- Mutual authentication of the aircraft and ground provider

- Potential service providers must establish a trust network to allow for easy aircraft roaming

- Management of keys on aircraft must not impose undue cost on airline operators

- *We must all recognize that IP and the interconnected nature of the aviation community permit new threat vectors*

Proposed Architecture – Provider Ground Gateway

- In order to provide for Interoperability and Media Independence, the concept of a Provider Ground Gateway is proposed.

- At a minimum, Ground Gateways must:

  - Interconnect IPS aircraft to IPS end systems, ARINC 620 end systems, and ATN/OSI end systems

  - Interconnect ATN/OSI aircraft to IPS end systems

  - Interface with other trusted service provider ground gateways to exchange aircraft data to support roaming

  - Interface with trust authority to validate customer security keys

  - Manage protocols for media supported by that provider

  - Create message copies and unique routing to address customer needs

Proposed Architecture
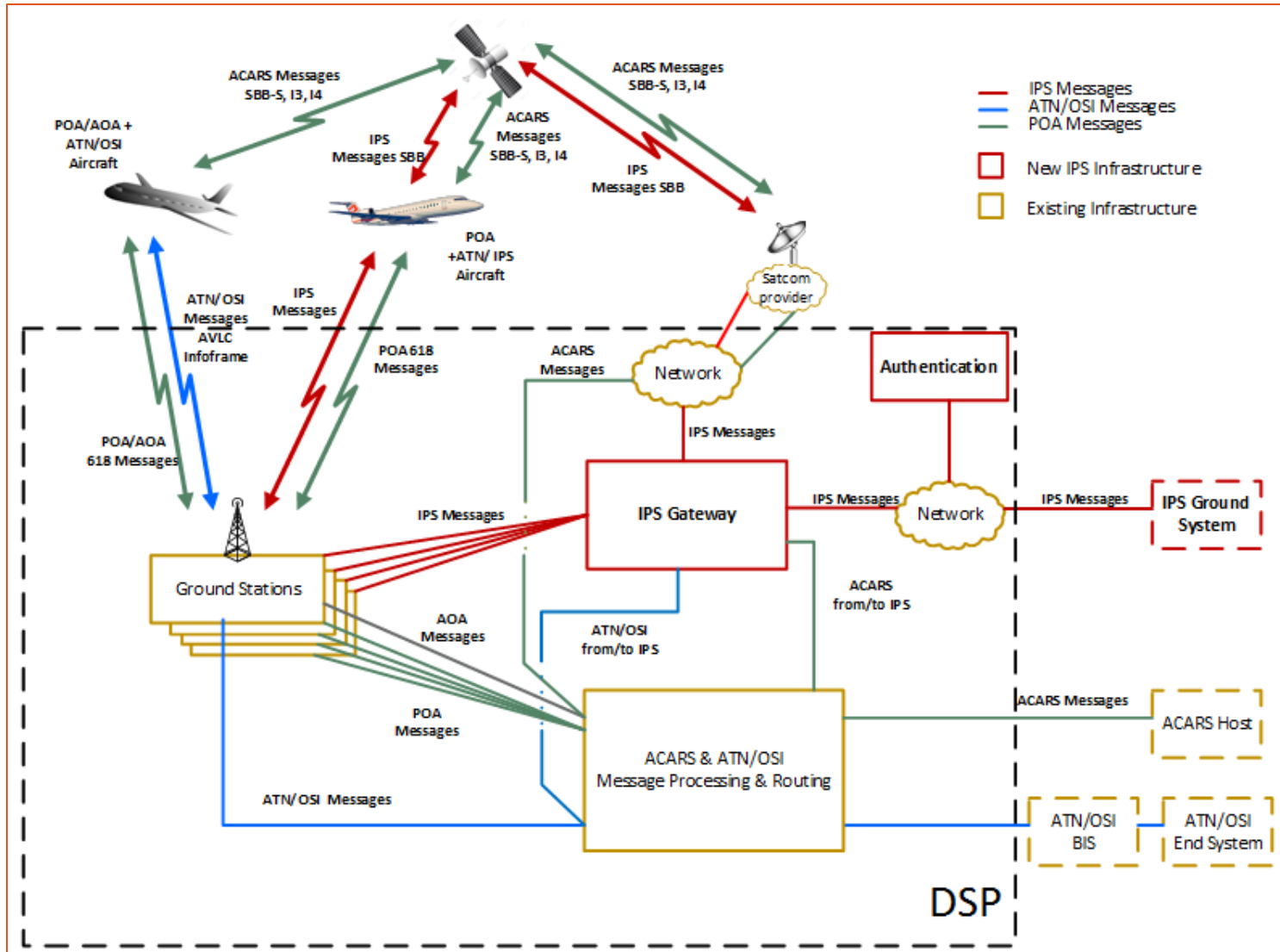
What's Ahead this Week?

- RC wishes to present material explaining the proposed Interface Document:
  - Overall air/ground message protocol
  - Mutual authentication approach
  - Message encryption and security
  - Message compression
  - Details of VDL-specific protocol layer (others to follow, but because we gave that a lot of thought, it leads)