

Mode S Transponder  
Working Paper SC209-WP02-03  
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RTCA Special Committee 209  
Transponder MOPS  
Meeting #2

**Mode S Specific Services - STATUS**

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## Current Work Effort

- ❑ Mode S Transponder MOPS update considerations
- ❑ Mode S Specific Services (Objective)
- ❑ Appendix A to DO-181D (Mode S Transponder MOPS)
- ❑ Mode S Specific Services *Subnetwork* Architecture
- ❑ Mode S Specific Services Architecture
- ❑ Next Steps



# Mode S Transponder MOPS – Update Considerations

- ❑ RTCA SC-209 / EUROCAE WG-49 Accord – Update documents ED-73B and DO-181C to **include**:
  - ❑ Updated ICAO requirements for Mode S Specific Services
  - ❑ European Elementary Surveillance (ELS) functions
  - ❑ European Enhanced Surveillance (EHS) functions
  - ❑ References to 1090 MHz ADS-B MOPS for requirements on extended squitter registers
  
- ❑ Extract Mode S Specific Services requirements from the ADLP MOPS (DO-218B), consisting of the following:
  - Ground Initiated Comm-B (GICB)
  - Uplink Mode S Protocol Service (MSP)
  - Downlink MSP
  - Uplink Broadcast Service
  - Downlink Broadcast Service



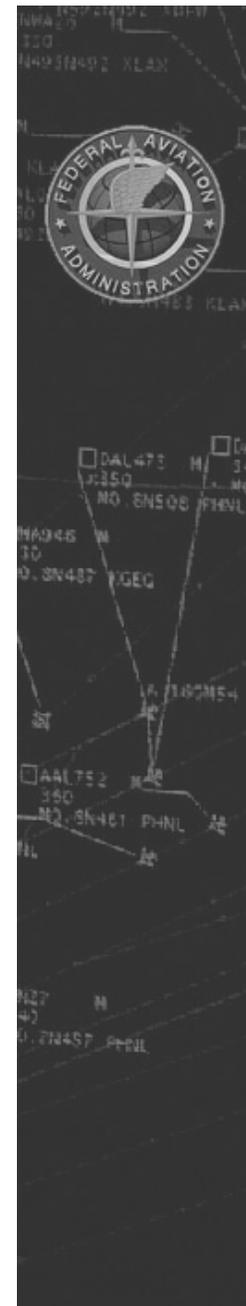
# Mode S Specific Services – Objective

- Provide a draft Appendix, which captures the necessary requirements of the Mode S Specific Services for inclusion into the revised Mode S Transponder MOPS (RTCA DO-181). The update to RTCA DO-181 will be harmonized with EUROCAE ED-73.



# Appendix A to DO-181D Mode S Transponder MOPS

- Incorporated new ICAO SARPs (Annex 10, Vol. III) requirements into Appendix A
- Mode S Specific Services Entity (SSE) Interface Requirements
- Updated GICB Register Number Assignment Table from ICAO Doc. NNNN Draft 9.0
- Added GICB Registers from ICAO Doc. NNNN Draft 9.0
- Mode S Specific Services Architecture
- Transponder / AE Interface
- Mode S Specific Services *Processing*
- MSP *Processing*
- Broadcast *Processing*
- Ground-Initiated Comm-B (GICB) *Processing*



# Appendix A to DO-181D Mode S Services (Design/Implementation)

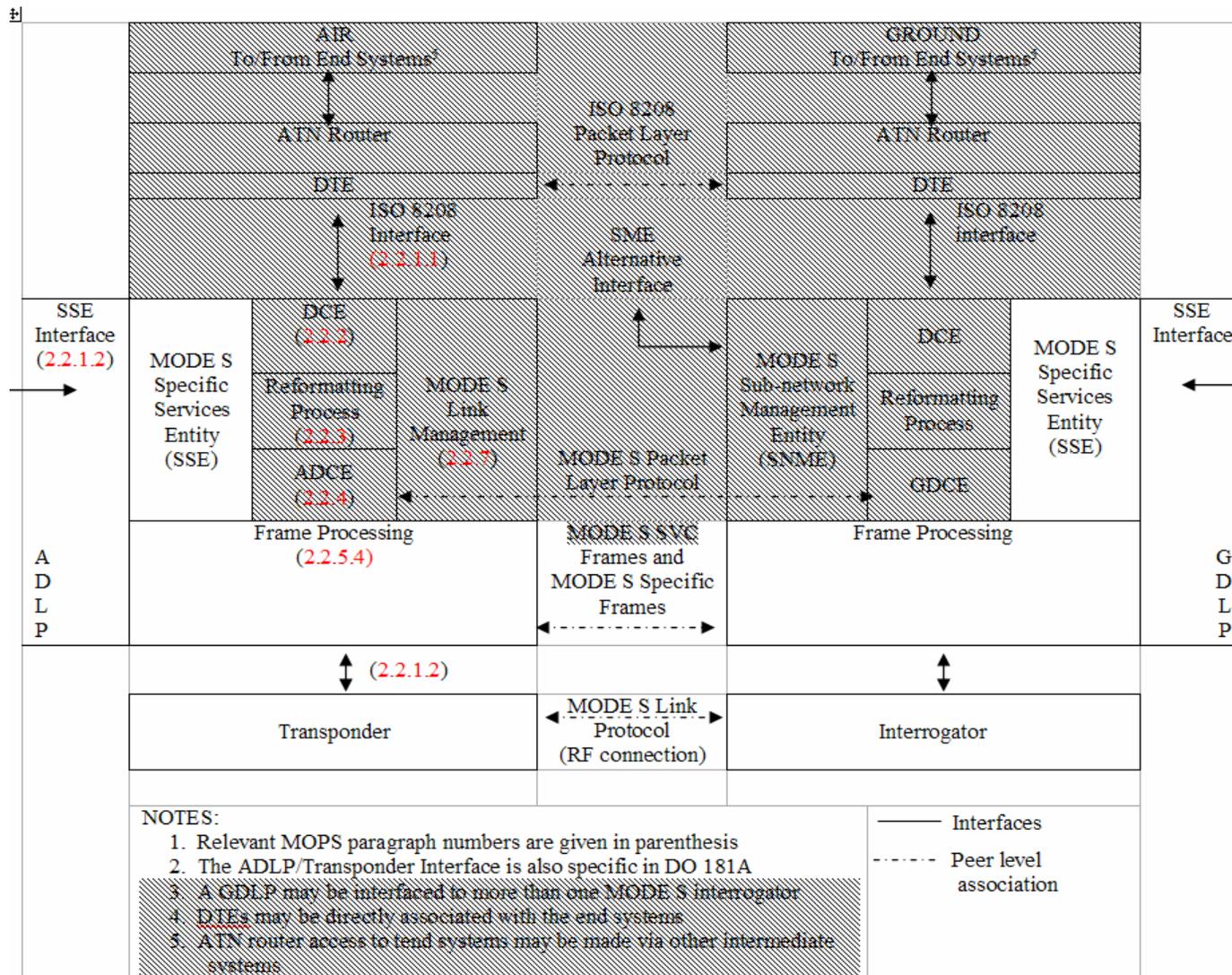
- **MSP Processing**
  - Uplink (up to 151 bytes)
  - Downlink (up to 159 bytes)
  - Up to 63 application channels per aircraft
  - Low overhead application messages
  - No connection establishment required (peer – peer)
  - **No flow control**
  - **Delivery not guaranteed to application**
  - **Message order not guaranteed to application**
- **Broadcast Processing**
  - Uplink to all aircraft (up to 10 bytes)
  - Downlink to all Mode S ground stations within coverage map (up to 7 bytes)
- **MSP Packet Formats**
  - Short Form MSP Packet → 

DP:1	MP:1	M/CH:6	FILL 1:0 or 6	UD:v
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  - Long Form MSP Packet → 

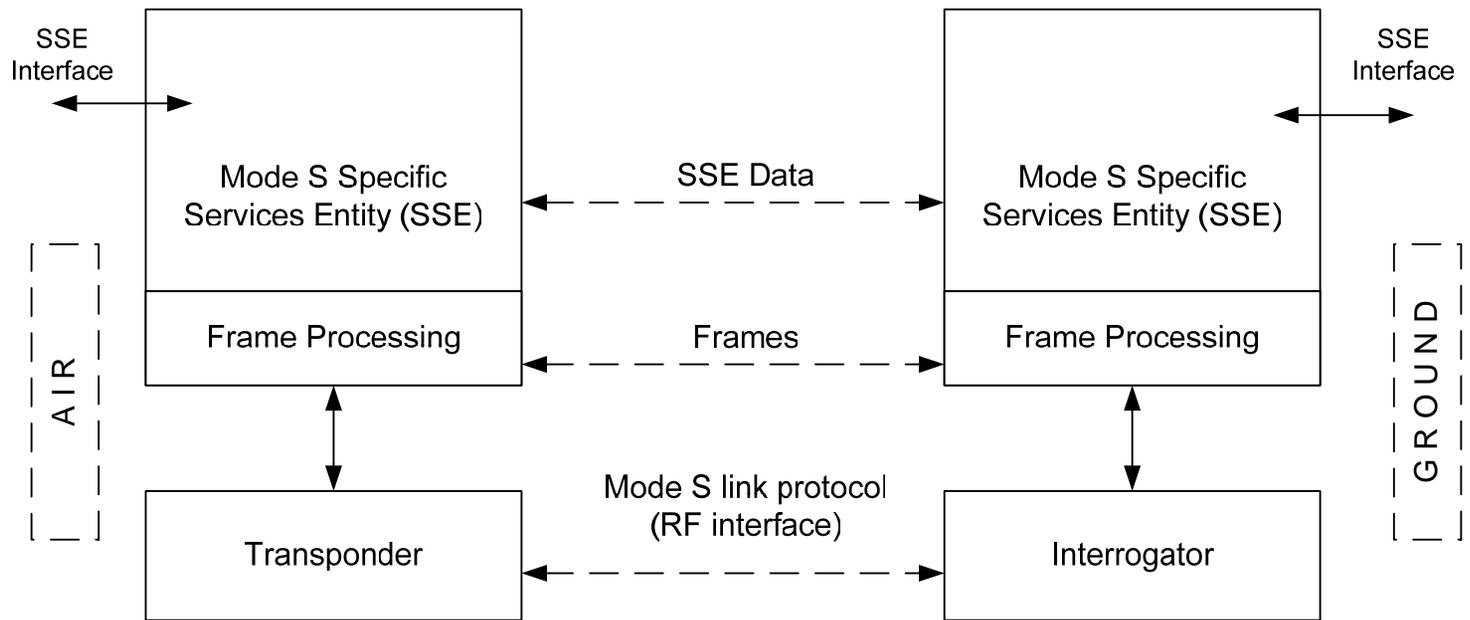
DP:1	MP:1	SP:2	L:1	M/SN:3	FILL 2:0 or 2	M/CH:6	UD:v
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- **L-Bit Processing**
  - Long form MSP Packets
- **System Timers**
  - $T_m = 120 \text{ sec}$  (L-bit processing)
- **GICB Register formats (latest SARPs)**
  - Set of 256 BDS Registers (in each Mode S Txp.)



# Mode S Specific Services (MSSS) – Subnetwork Architecture



# Mode S Specific Services (MSSS) Architecture



# Next Steps

- ❑ Finalize MSSS Requirements (Appendix A)
  - Include (accepted) RTCA SC-209 Comments
  - Include (accepted) EUROCAE WG-49 Comments
  - European Elementary Surveillance (ELS) functions
  - European Enhanced Surveillance (EHS) functions
  
- ❑ MSSS Test Procedures
  - Existing DO-218B MSSS Procedures (MSPs, etc.)
  - New Test Procedures / GICB Registers
  
- ❑ BDS Registers
  - Populate Appendix with other registers as they become mature within ICAO SARPs ([defer to working group for inclusion of all registers !!!](#))

