

Appendix B Mode S Specific Services (MSSS)

Status – for Meeting # 6

RTCA Special Committee 209 Mode S Transponder
Working Paper SC209-WP06-04

Melbourne, FL

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**Federal Aviation
Administration**



Mode S Specific Services (MSSS) Status for Meeting # 6

- Mode S Transponder MOPS update considerations
- Mode S Specific Services (Objective)
- Appendix B to DO-181D (Mode S Transponder MOPS)
- Mode S Specific Services *Subnetwork* Architecture
- Mode S Specific Services Architecture
- MSSS Appendix B v1.4 - Requirements
- MSSS Appendix B v1.4 - Test Procedures

Mode S Transponder MOPS – Update Considerations

- RTCA SC-209 / EUROCAE WG-49 **Accord** – Update documents ED-73B and DO-181C to include:
 - 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)
 - Mode S Protocol Service (MSP)
 - Broadcast Service
 - Mode S Specific Services Test Procedures

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 B to DO-181D Mode S Transponder MOPS

- Incorporated new ICAO SARPs (Annex 10, Vol. III) requirements into Appendix B
- Mode S Specific Services Entity (SSE) Interface Requirements
- Added/Allocated GICB Registers, which are in-line with ICAO Doc. 9871 1st Edition
- Mode S Specific Services Architecture
- Transponder / AE Interface
- Mode S Specific Services Processing
 - MSP
 - Broadcast
 - Ground-Initiated Comm-B (GICB)

Appendix B - MSSS (Design/Implementation)

▪ **MSP Processing**

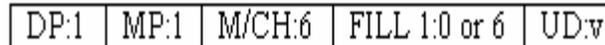
- Uplink (up to 151 bytes), Downlink (up to 159 bytes)
- Up to 63 application channels per aircraft
- Low overhead application messages
- No connection establishment required (peer – peer)
- No flow control, delivery not guaranteed to application
- Message order not guaranteed to application

▪ **Broadcast Processing**

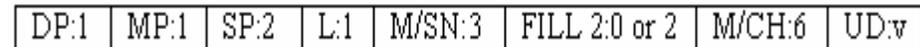
- Uplink to all aircraft (up to 10 bytes)
- Downlink to all Mode S ground stations within coverage map (up to 7 bytes)

▪ **MSP Packet Formats**

- Short Form MSP Packet →



- Long Form MSP Packet →



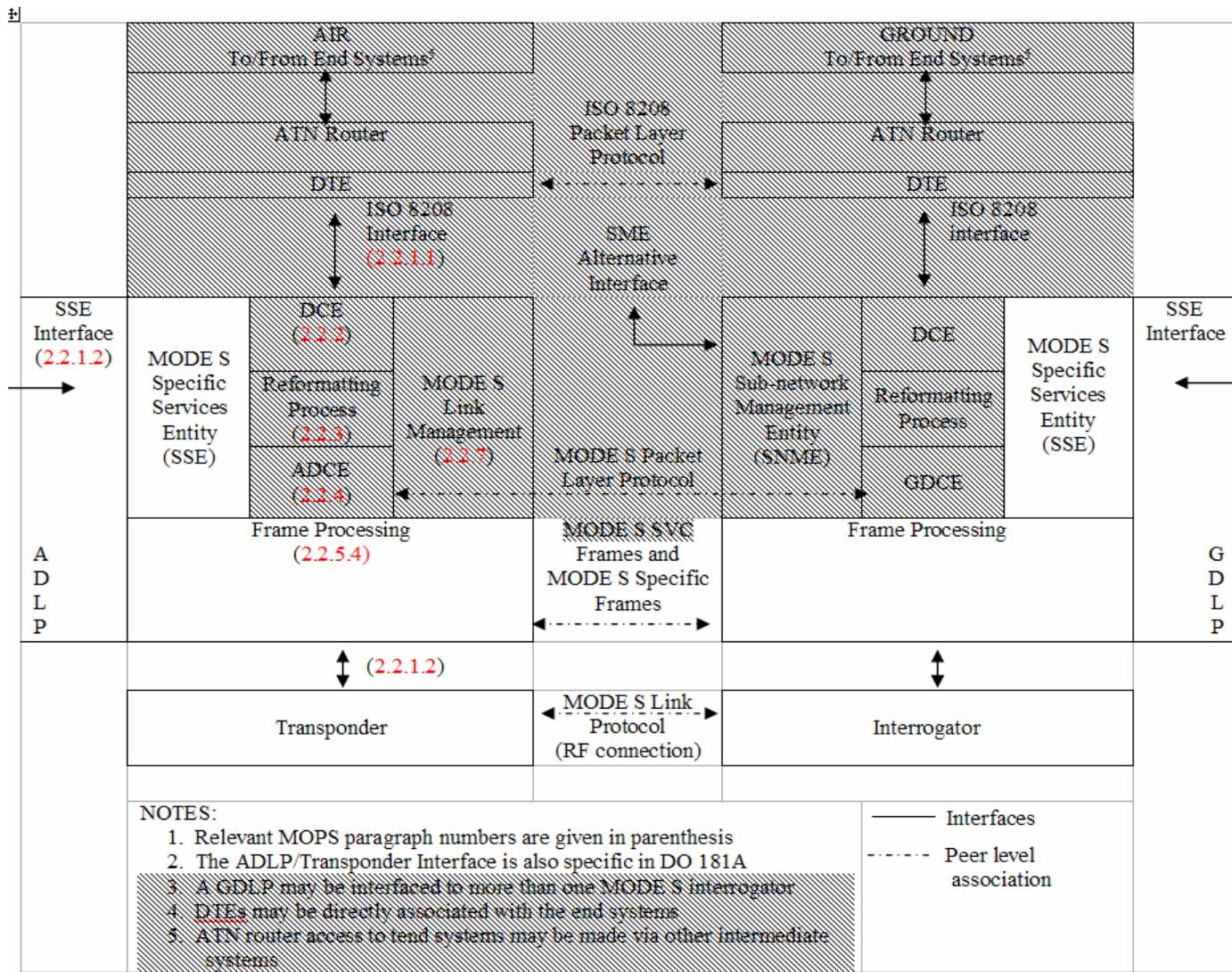
▪ **L-Bit Processing / Timer**

- Long form MSP Packets
- Tm = 120 sec (L-bit processing)

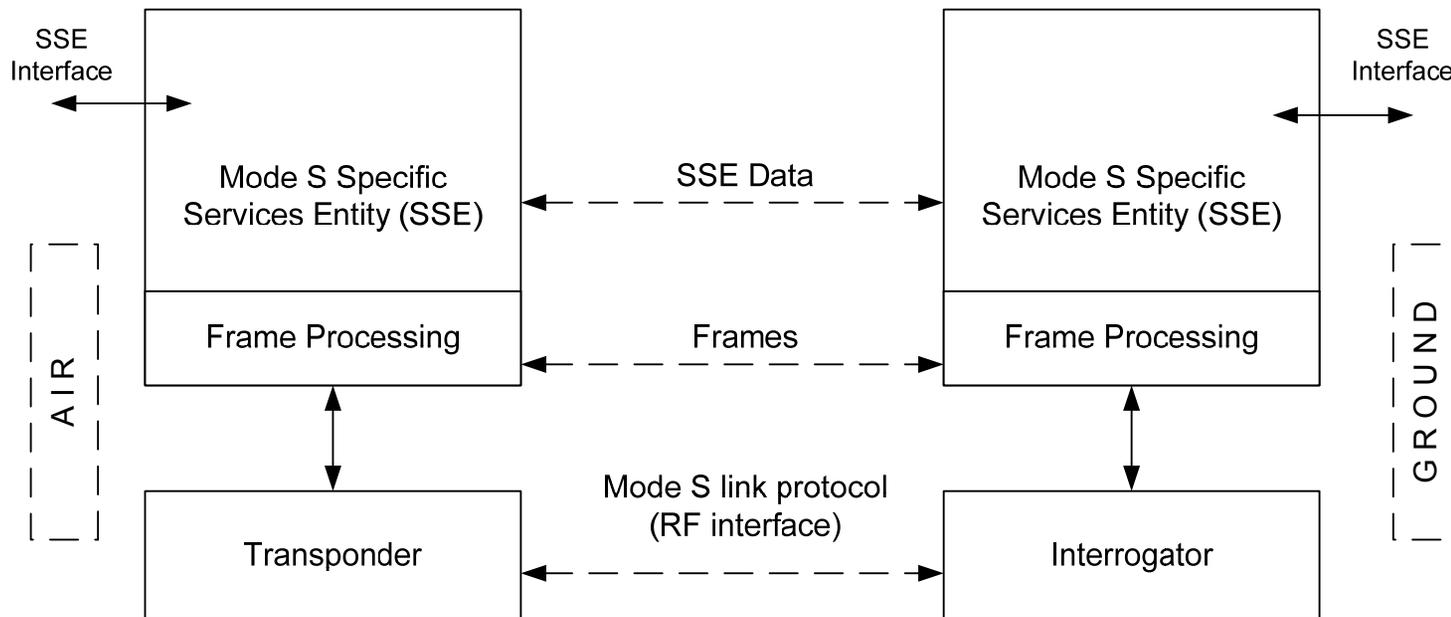
▪ **GICB Register formats**

- Set of 256 BDS Registers Allocated

Mode S Specific Services – Subnetwork Architecture



Mode S Specific Services (MSSS) Architecture



MSSS Appendix B v1.4 - Requirements

- Latest draft ([Appendix B, v1.4](#)) is stable enough for MSSS Test Procedures for the following major components:

- Mode S Specific Protocol (MSP) for Uplink and Downlink
- Broadcast Processing for Uplink and Downlink
- Frame Processing (linked sequences of Comm-A and Comm-B CDMs)
- MSSS Timers
 - L-Bit Delivery (Tm)
 - Interrogator Link (Tz)
 - Link Frame Cancellation (Tc)

Test procedures
extracted from
ADLP MOPS
(RTCA DO-218b),
and massaged

- GICB (Test Procedures are)



Not covered in this Appendix B

- Includes all accepted and resolved comments from [SC209 meeting #3 and #4](#)
- Updates to GICB registers allocation/tables

MSSS Test Procedures

- **MSP Processing (Uplink and Downlink)**
 - Long Form MSP Format
 - Short Form MSP Format
 - L-Bit Linking, Message Delivery Status
 - SLM and ELM Capability

- **Broadcast Processing (Uplink and Downlink)**
 - Broadcast Format
 - Interrogator Identifier (II)

- **Frame Processing (Uplink and Downlink)**
 - SLMs, ELMs
 - SD Field, LAS Coding
 - Single Segment SLMs, Multiple Segment SLMs
 - Frame Cancellation, Linking Protocol for Frames
 - Directing SLM and ELM Frames, Delivery Status
 - SLM and ELM Capability

- **Timers**
 - L-Bit Delivery (T_m)
 - Interrogator Link (T_z)
 - Link Frame Cancellation (T_c)