RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS

Meeting #10

Draft 2 of UAT MOPS Appendix J: Reference Upper-layer Report Format

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SUMMARY
The purpose of this appendix is to define a reference implementation of those layers above the physical layer for byte-wise transmission of messages that may be received by a UAT, as well as ownship message transmissions. In this 2nd draft, the text has been expanded with some further background material, and the report format now applies to both ADS-B and TIS-B traffic reports, among other changes.

UAT MOPS Appendix J
Reference Upper-layer Report Format

J.1 Background

The purpose of this appendix is to provide a reference report format for the UAT equipment. This appendix does not specify a physical layer interface, but instead defines a reference implementation of those layers above the physical layer for byte-wise transmission of messages over a serial interface. This reference interface provides for reporting of received ADS-B and TIS-B traffic, ADS-B ownship position, and FIS-B uplinks.

J.2 Scope

The report function is implemented as a "pipeline" for communication of messages received via the UAT radio. There is no intelligent processing involved, such as track file management functions. This preserves the role of the UAT as a data communication medium, rather than as a traffic management entity.

The Time of Applicability (TOA) and Time of Reception (TOR) fields are added to the traffic report by the receiving UAT. Determining the TOA value necessitates that the receiving UAT look inside message at the NIC and NAC fields to determine whether the message was transmitted with 1 Hz or 200 msec time registration. TOA has resolution of fractional seconds, and sufficient span to resolve the time reference for the received message. Absolute time is not necessary, if one assumes that the end system has access to its own absolute time reference.

The TOR value is the high-accuracy time measurement within the current second, which is used solely by an external application for range measurement and validation.

Note that the UAT receiver cannot shorten the received Uplink payload below its maximum length of 432 bytes, as it has no knowledge of the uplink Application Data packing format.

J.3 Serial Data Format Description

Table J-1: Data Packet Format

# Bytes	Content
1	ASCII STX (start of text) byte (02_{16}).
1	Packet type (types defined in Table J-2 below)
1	Time of applicability (units of 1/10 seconds since UTC midnight modulo 25.6 seconds)
3	Time of message reception (hundreds of nanoseconds after UTC tick)
Variable	Message payload (see Table J-2 below)
1	Checksum (see note 4)
1	ASCII ETX (end of text) byte (03_{16}).

Notes:

1. *Fields are listed in order of transmission.*
2. *Multi-byte fields are transmitted MS byte first.*
3. *In cases where the STX or ETX byte appears in the data stream, that byte should be preceded by a DLE (data link escape) byte (10_{16}). The DLE byte can appear in the data by sending two consecutive DLE bytes. This allows a for variable length packets without requiring an explicit Length field.*
4. *Checksum is the exclusive-OR of all bytes exclusive of the STX, Checksum, and ETX.*

Table J-2: Packet Types

Packet Type #	Packet Type	Content
0	Status	Periodic status report of UAT performance.
1	Traffic message (received) (see Note 1)	18 or 34 bytes. Data defined in Tables [2.2.4.1-A/B] (short message) and [2.2.4.2-A/B] (long message).
2	Ownship ADS-B message	18 or 34 bytes. Data defined in Table [2.2.4.1-A/B] (short message) and [2.2.4.2-A/B] (long message).
3	Uplink Message	432 bytes (depending on Application Data payload). Data defined in Table [2.2.3.2.2].
4	Uplink Header (see Note 2)	First 8 bytes of Uplink Message. Provides uplink fields necessary for airborne processing of received TIS-B reports. Data defined in Table [2.2.3.2.2]
TBD		

Notes:

1. *Traffic messages include both ADS-B and TIS-B.*
2. *End system may use Packet Type 4 instead of Packet Type 3, if end system has no need for full content of Uplink Application Data. This can be via either an equipment option, a configuration parameter, or a run-time request.*