

**RTCA Special Committee 186, Working Group 3**

**ADS-B 1090 MOPS, Revision A**

**Meeting #5**

**Action Item 4-5**

**Implementation of Proposal Agreed to in 1090-WP-4-01**

**Presented by Gary Furr  
Titan Corporation  
FAA Technical Center**

**SUMMARY**

**In Meeting #4, Working Paper 1090-WP-4-01 was presented to propose the answer to the question of which Aircraft Classes should explicitly transmit the Aircraft Operational Status Message, which contains the new Version Number. During Working Group discussions, it was agreed that the Aircraft Operational Status Message should be transmitted by all Class A Aircraft, as well as Class B1 Aircraft. It was additionally agreed that a note be added to Table 2-4 indicating that if the formats for Class B2 and B3 Aircraft changed in the future, then they would be required to transmit the Message containing the Version Number. This Working Paper shows the implementation of those agreements.**

**Table 2-3: ADS-B CLASS A TRANSMITTER EQUIPMENT TO MESSAGE COVERAGE**

TRANSMITTER CLASS	MINIMUM RANGE / MINIMUM TRANSMIT POWER (AT ANTENNA PORT)	OPERATION	MASPS REQUIREMENT (RTCA/DO-242)	MINIMUM MESSAGE CAPABILITY REQUIRED (FROM Table 2-2))
A <sub>0</sub> (Minimum)	10 nmi / 70 W	<ul style="list-style-type: none"> <li>Aid to Visual Acquisition</li> <li>Conflict Avoidance</li> </ul>	SV MS-P <sub>VFR</sub>	Airborne Position A/C Identification & Type Airborne Velocity <u>A/C Operational Status</u>
A <sub>0</sub> (Minimum)	10 nmi / 70 W	<ul style="list-style-type: none"> <li>Airport Surface</li> </ul>	SV-P MS-P <sub>VFR</sub>	Surface Position A/C Identification & Type <u>A/C Operational Status</u>
A <sub>1</sub> (Basic)	20 nmi / 125 W	<ul style="list-style-type: none"> <li>Aid to Visual Acquisition</li> <li>Conflict Avoidance</li> <li>Simultaneous Approaches</li> </ul>	SV MS-P <sub>IFR</sub>	Airborne Position A/C Identification & Type Airborne Velocity A/C Operational Status Extended Squitter A/C Status
A <sub>1</sub> (Basic)	20 nmi / 125W	<ul style="list-style-type: none"> <li>Airport Surface</li> </ul>	SV-P MS-P <sub>IFR</sub>	Surface Position A/C Identification & Type <u>A/C Operational Status</u>
A <sub>2</sub> (Enhanced)	40 nmi / 125 W	<ul style="list-style-type: none"> <li>Aid to Visual Acquisition</li> <li>Conflict Avoidance</li> <li>Separation Assurance and Sequencing</li> <li>Flight Path Deconfliction Planning</li> <li>Simultaneous Approaches</li> </ul>	SV MS	Airborne Position A/C Identification & Type Airborne Velocity A/C Operational Status Extended Squitter A/C Status A/C Trajectory Intent (TCP) A/C Operational Coordination
A <sub>2</sub> (Enhanced)	40 nmi / 125 W	<ul style="list-style-type: none"> <li>Airport Surface</li> </ul>	SV-P MS	Surface Position A/C Identification & Type <u>A/C Operational Status</u>
A <sub>3</sub> (Extended)	90 nmi / 125 W	<ul style="list-style-type: none"> <li>Aid to Visual Acquisition</li> <li>Conflict Avoidance</li> <li>Separation Assurance and Sequencing</li> <li>Flight Path Deconfliction Planning</li> <li>Simultaneous Approaches</li> </ul>	SV MS OC	Airborne Position A/C Identification & Type Airborne Velocity A/C Operational Status Extended Squitter A/C Status A/C Trajectory Intent (TCP) A/C Operational Coordination A/C Trajectory Intent (TCP+1) Event Driven
A <sub>3</sub> (Extended)	90 nmi / 125 W	<ul style="list-style-type: none"> <li>Airport Surface</li> </ul>	SV-P MS	Surface Position A/C Identification & Type <u>A/C Operational Status</u>

**Table 2-4: ADS-B Class B Transmitter Equipment To Message Coverage**

TRANSMITTER CLASS	MINIMUM RANGE / MINIMUM TRANSMIT POWER (AT ANTENNA PORT)	OPERATION	MASPS REQUIREMENT (RTCA/DO-242)	MINIMUM MESSAGE CAPABILITY REQUIRED (FROM Table 2-2)
B <sub>1</sub> (Aircraft)	10 nmi / 70 W <sup>1</sup>	<ul style="list-style-type: none"> <li>• Aid to Visual Acquisition</li> <li>• Conflict Avoidance</li> </ul>	SV <sub>B1</sub> MS-P <sub>B1 AIR</sub>	Airborne Position A/C Identification & Type Airborne Velocity A/C Operational Status
B <sub>1</sub> (Aircraft)	10 nmi / 70 W <sup>1</sup>	<ul style="list-style-type: none"> <li>• Airport Surface</li> </ul>	SV <sub>B1</sub> MS-P <sub>B1 GND</sub>	Surface Position A/C Identification & Type <a href="#">A/C Operational Status</a>
B <sub>2</sub> (Ground Vehicle)	10 nmi / 70 W <sup>1</sup>	<ul style="list-style-type: none"> <li>• Aid to Visual Acquisition</li> <li>• Conflict Avoidance</li> </ul>	SV <sub>B2</sub> MS-P <sub>B2</sub>	Surface Position A/C Identification & Type <a href="#">(see Note 14)</a>
B <sub>2</sub> (Ground Vehicle)	10 nmi / 70 W <sup>1</sup>	<ul style="list-style-type: none"> <li>• Airport Surface</li> </ul>	SV <sub>B2</sub> MS-P <sub>B2/B3</sub>	Surface Position A/C Identification & Type <a href="#">(See Note 14)</a>
B <sub>3</sub> (Fixed Obstruction)	10 nmi / 70 W <sup>1</sup>	<ul style="list-style-type: none"> <li>• Aid to Visual Acquisition</li> <li>• Conflict Avoidance</li> </ul>	SV <sub>B3</sub> MS-P <sub>B2/B3</sub>	Airborne Position A/C Identification & Type <a href="#">(See Note 14)</a>
B <sub>3</sub> (Fixed Obstruction)	10 nmi / 70 W <sup>1</sup>	<ul style="list-style-type: none"> <li>• Airport Surface</li> </ul>	SV <sub>B3</sub> MS-P <sub>B2/B3</sub>	Airborne Position A/C Identification & Type <a href="#">(See Note 14)</a>

<sup>1</sup> – May be increased based upon application specific needs.

**Notes:** ( Tables 2-3 and 2-4):

1. SV = State Vector, SV-P = Partial State Vector, MS = Mode Status, MS-P<sub>IFR</sub> = Partial Mode Status for IFR Aircraft , MS-P<sub>VFR</sub> = Partial Mode Status for VFR Aircraft , OC = On-Condition
2. SV elements are as follows:
  - Address (the ICAO 24 Bit Address)
  - Latitude and Longitude
  - Altitude, Geometric
  - Position Component of Navigation Uncertainty Category (NUC<sub>P</sub>)
  - Geometric Position Valid (Horizontal/Vertical)
  - N and E Velocity
  - Vertical Rate
  - Velocity Component of Navigation Uncertainty Category (NUC<sub>V</sub>)
  - Barometric Pressure Altitude
  - Barometric Pressure Altitude Rate
  - Airspeed (True or Indicated)
  - Ground Speed, Ground Track (True or Magnetic Heading)
  - Turn Indication

3. *SV-P elements are as follows:*
  - *Address (the ICAO 24 Bit Address)*
  - *Latitude*
  - *Longitude*
  - *Position Component of Navigation Uncertainty Category (NUC<sub>P</sub>)*
  - *Geometric Position Valid (Horizontal/Vertical)*
  - *N Velocity*
  - *E Velocity*
  - *Velocity Component of Navigation Uncertainty Category (NUC<sub>V</sub>)*
  - *Ground Speed, Ground Track (True or Magnetic Heading)*
4. *MS elements are as follows:*
  - *Address (the ICAO 24 Bit Address)*
  - *Call Sign (Up to 8 Alpha-numeric Characters)*
  - *Participant Category*
  - *Surveillance Support Code*
  - *Emergency/Priority Status*
  - *Class Codes*
  - *TCP (Trajectory Change Point) Latitude*
  - *TCP (Trajectory Change Point) Longitude*
  - *TCP Altitude (Baro Alt or Flight Level)*
  - *TTG (Time to Go)*
  - *Operational Mode Specific Data*
5. *MS-P<sub>IFR</sub> elements are as follows:*
  - *Address (the ICAO 24 Bit Address)*
  - *Call Sign (Up to 8 Alpha-numeric Characters)*
  - *Participant Category*
  - *Surveillance Support Code*
  - *Emergency/Priority Status*
  - *Class Codes*
6. *MS-P<sub>VFR</sub> elements are as follows:*
  - *Address (the ICAO 24 Bit Address)*
  - *Call Sign (Up to 8 Alpha-numeric Characters)*
  - *Participant Category*
  - *Surveillance Support Code*
7. *OC elements are as follows:*
  - *Address (the ICAO 24 Bit Address)*
  - *TCP+1 (Latitude)*
  - *TCP+1 (Longitude)*
  - *TCP+1 Altitude (Barometric or Flight Level)*
  - *TCP+1 TTG*
8. *SV<sub>BI</sub> elements are as follows:*
  - *Address (the ICAO 24 Bit Address)*
  - *Latitude*
  - *Longitude*
  - *Altitude, Geometric*
  - *Position Component of Navigation Uncertainty Category (NUC<sub>P</sub>)*

- *Geometric Position Valid (Horizontal/Vertical)*
  - *N Velocity*
  - *E Velocity*
  - *Vertical Rate*
9. *SV<sub>B2</sub> elements are as follows:*
- *Address (the ICAO 24 Bit Address)*
  - *Latitude*
  - *Longitude*
  - *Position Component of Navigation Uncertainty Category (NUC<sub>P</sub>)*
  - *N Velocity*
  - *E Velocity*
10. *MS-P<sub>B1-AIR</sub> elements are as follows:*
- *Address (the ICAO 24 Bit Address)*
  - *Call Sign (Up to 8 Alpha-numeric Characters)*
  - *Participant Category*
  - *Surveillance Support Code*
  - *Class Codes*
11. *MS-P<sub>B1-GND</sub> elements are as follows:*
- *Address (the ICAO 24 Bit Address)*
  - *Participant Category*
  - *Surveillance Support Code*
  - *Class Codes*
12. *MS-P<sub>B2-B3</sub> elements are as follows:*
- *Address (the ICAO 24 Bit Address)*
  - *Participant Category*
  - *Surveillance Support Code*
13. *SV<sub>B3</sub> elements are as follows:*
- *Address (the ICAO 24 Bit Address)*
  - *Latitude*
  - *Longitude*
  - *Altitude, Geometric*
  - *Position Component of Navigation Uncertainty Category (NUC<sub>P</sub>)*
  - *Geometric Position Valid (Horizontal/Vertical)*
14. *If the formats for these categories are changed in the future, then they will be required to transmit the message that contains the Version Number.*

### 2.1.11.2 Receiving Subsystem

An ADS-B receiving subsystem is classified by the sensitivity and the set of parameters that it is capable of formatting into reports. Manufacturers should take into consideration the equipment's intended operation when determining the minimum set of reports that the unit will be required to develop (refer to Table 2-5 and Table 2-6).