



THE GOLD STANDARD FOR AVIATION SINCE 1935

Special Committee (SC) 206 Aeronautical Information and Meteorological Data Link Services

Friends and Partners in Aviation Weather

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SC-206 Organization and Activities

- Co-Chairs: Allan Hart (Honeywell) & Rocky Stone (United Airlines)
 - Designated Federal Official: Eldridge Frazier (ANG-C61 Aviation Research Branch)
 - Secretary: Tom Evans (NASA)
- Subgroups conduct focused document development
 - SG-1: Wake OSED [DO-339, 2012] (Ed Johnson (FAA) & Clark Lunsford (Mitre))
 - SG-2: ConUse [DO-340, 2012] (subgroup disbanded)
 - SG-3: Architecture [DO-349, 2014] (subgroup disbanded)
 - SG-4: EDR MOPS [DO-tbd, 2017] (Tammy Farrar (ANG-C64) & Bill Watts (Delta Airlines))
 - SG-5: FIS-B UAT MOPS [DO-358, 2015] (Paul Freeman (Harris) & John Ferrara (Consultant))
 - SG-6: MASPS [DO-tbd, 2016] (Bill Carson (MITRE) & Stephen Darr (Dynamic Aerospace, Inc.))
 - SG-7: Wind Guidance [DO-tbd, 2017] (Ernie Dash (AvMet) & Michael McPartland (MIT/LL))
- Other Documents
 - AIS/MET OSED [DO-308/ED-151, 2007]
 - AIS/MET SPR [DO-324/ED-175, 2010]
 - AUTOMET MIS [DO-252A, 2014]
 - DO-360, Standards Development Activities for using Near Real-Time Aircraft-Derived Data in Future Applications



SC-206 AIS/MET MASPS Document Outline

- 1. Purpose and Scope**
 1. Purpose of Document
 2. Introduction
 3. Scope
 4. Structure of the Document
 5. References
 6. Glossary
- 2. Approach and Methodology**
 1. Doc Development Process
 2. Methodology
 3. Key Terms
- 3. Performance Requirements**
 1. Introduction
 2. Operational and Safety Requirements
 3. Real Time, Aircraft Derived, Met Obs Svc System Requirements
- 4. Interop Requirements**
 1. Purpose of Interop Requirements
 2. Scope of Interop Requirements
 3. Interoperability Requirements and Recommendations
- 5. Performance Verification**
 1. Purpose
 2. Guidance for Dev of Perf Verification Methods Plan
 3. Process Methodology
 4. Verification of Requirements
- 6. Membership**
 - A. AIS/MET Data Link Services System Use Cases**
 1. Introduction
 2. Special Activity Airspace (SAA) Notification Service
 3. Eddy Dissipation Rate (EDR) Turbulence Service
 4. Weather Surveillance (WxS) Service
 - B. Operational Performance Assessment**
 1. Introduction
 2. Purpose and Scope
 3. Overall Approach
 4. Performance Parameters
 5. Summary Results
 6. Analysis and Results- SAA Notification Service
 7. Analysis and Results- EDR Turbulence Service
 8. Analysis and Results- Wx Surveillance Service
 - C. Operational Safety Assessment**
 1. Introduction
 2. Approach
 3. Summary Results
 4. Detailed Safety Analysis




Since 2016 FPAW Summer Meeting

- SC-206 MASPS FRAC Resolution completed in September with decision made to request RTCA PMC publication decision
 - Final edits made to document by RTCA and document sent to PMC
- MOPS for ADS-B and ATCRBS/Mode S transponders are open for revision
 - To speed progress towards implementation SC-206 approved SG-1 joining the MOPS revision activities, rather than develop its own MOPS for later handoff to SC-186 & SC-209
- Inter-Special Committee Requirements Agreements (ISRA) approved by SC-206 for action by SC-186 (ADS-B MOPS) and SC-209 (Transponder MOPS)
 - Establish requirements enabling air-to-air and air-to-ground transfer of Aircraft-based Observation (AbO) meteorological parameters contained in SC-206 MASPS within the MOPS for ADS-B and ATCRBS/MODE S Airborne Equipment.
 - SC-209 approved ISRA on 21 October; SC-186 to consider this week
- Coordination with Combined Surveillance Committee (SC-186 WG-3, EUROCAE WG-51 SG-1, SC-209 WG-1, EUROCAE WG-49) begun
 - Working group, to be led by Steve Darr, will representatives from the wake community, SC-209 leadership, EUROCAE, and avionics and aircraft manufacturers, was approved to define AbO requirements for implementation in Mode S hardware
- AbO was presented last week at EUROCAE-RTCA coordination meeting as a prime candidate for international collaboration



Next Steps

- RTCA PMC MASPS Publication decision in December
- Initiate and/or continue coordination
 - Weather community (FAA, NOAA/NWS, AMS, WMO)
 - International (EUROCAE, ICAO, other standards bodies)
- Determine broadcast vs. interrogation parameters
 - Work within CSC to implement requirements in ADS-B and Transponder MOPS
- DO-260 (ADS-B MOPS) and DO-181 (Transponder MOPS) revisions to be published in 2019



Near Real-Time Aircraft-based MET Observation (AbO) Service

- System Requirements and Recommendations
 - Data acquisition
 - Observation compilation
 - Transmittal timing
 - Configuration control
 - Message types
 - Operating modes
- Based on RTCA DO-339; ICAO; WMO; and AMDAR Requirements
- Within Section 3, Performance Requirements



Proposed Operating Modes

- Low Rate Broadcast
 - Continuous, low rate broadcast of observation messages in all phases of flight (OUT to IN)
- Low Rate/ High Rate Publish
 - Continuous, low rate/ high rate transmittal of observation messages for specific duration in any phase of flight in response to subscription
- High Rate Reply
 - Transmittal of observation message in any phase of flight in response to request



Input Data Ranges and Resolutions

Description	Unit	Resolution	Range
Aircraft ID	Character	N/A	N/A
Air/Ground Switch or Weight on Wheels	Discrete	N/A	N/A
Computed Airspeed	Knots	1	0 thru 800
Date Day	Day of Month	1	0 thru 31
UTC Hours	Hours	1	00 thru 23
UTC Minutes	Minutes	1	00 thru 59
UTC Seconds	Seconds	1	00 thru 59
Latitude	Degrees, Minutes, Seconds	1 Second	90 S thru 90 N
Longitude	Degrees, Minutes, Seconds	1 Second	180 E to 180 W
Pressure Altitude in ICAO Standard Atmosphere	Feet above Mean Sea Level	1	-1000 thru 50000
Static Air Temperature	Degrees Celsius	0.1	-99.9 thru +99.9
Static Pressure (Note 1)	Hectopascals (millibars)	1	900 thru 1050
Wind Direction (True)	Degrees	1	0 thru 359
Wind Speed	Knots	1	0 thru 800
Roll Angle	Degrees	1	-180 to 180
Pitch Angle	Degrees	1	-90 thru 90
Departure Station	Character	N/A	N/A
Destination Station	Character	N/A	N/A
Vertical Speed (Note 2)	Feet per Minute	1	-2000 thru 2000
Gross Weight (Note 3)	Kilogram	1	N/A
Vertical Acceleration	G	0.001	-3 thru +6
Water Vapor Data	Note 4		
Icing Status	Discrete	N/A	N/A
Anti-Ice	Discrete	N/A	N/A
Flap Position	Degrees	1	0 thru 50
Gear Position (Up/Down)	Discrete	N/A	N/A
GNSS Altitude	Feet	1	-1000 thru 50000
Groundspeed	Knots	1	0 thru 800
Track (True)	Degrees True	0.1	0.0 thru 359.9
Heading (True)	Degrees (True)	0.1	0.0 thru 359.9
True Airspeed	Knots	1	0 thru 800
Aircraft Type (ICAO or Emitter Category)	Character	N/A	N/A
Windshear Airspeed Change (Note 5)	Knots	1	-40 thru 40
Wingspan	Feet	0.1	0 thru 400

Reported Parameters Specification Table

Data Block	Reported Parameter	Unit	Range	Resolution	Reporting Requirement
Header	WxS MESSAGE VERSION	Discrete	NA	NA	Mandatory
Header	VALID PARAMETERS INDICATOR	String (See Note 5)	NA	NA	Mandatory
Header	UNIQUE AIRCRAFT IDENTIFIER	Discrete	NA	NA	Mandatory
Header	DATA COMPRESSION STATE	Discrete	NA	NA	Mandatory
1 (Note 1)	LATITUDE	Degrees, Minutes, Seconds	-90 to 90 (North positive)	1 Second	Mandatory
1 (Note 1)	LONGITUDE	Degrees, Minutes, Seconds	-180 to 180 (East positive)	1 Second	Mandatory
1 (Note 1)	PRESSURE ALTITUDE	Feet in ICAO standard atmosphere	-1000 thru 50175 (See Note 4)	25 or 100 (See Note 5)	Mandatory
1	DATE DAY	Day of Month	0 thru 31	1 Day	Mandatory
1	TIME	UTC HH:MM:SS	0 thru 23 hrs: 0 thru 59 mins: 0 thru 60 secs	1 Second	Mandatory
2	STATIC AIR PRESSURE	hPa (mbar)	100 thru 1051 (See Note 6)	1 hPa (mbar)	Mandatory
2	STATIC AIR TEMPERATURE	Degrees Celsius	-99 thru 99	0.1 Degree	Mandatory
2	WIND DIRECTION	Degrees True	0 thru 359	1 Degree	Mandatory
2	WIND SPEED	Knots	0 thru 400	1 Knot	Mandatory
2	ROLL ANGLE FLAG	Discrete	Per Roll Angle Flag Table	NA	Mandatory
2	MEAN EDR	EDR ^{1/3}	0.00 to 0.80	0.01	Required if Equipped
2	PEAK EDR	EDR ^{1/3}	0.00 to 0.80	0.01	Required if Equipped
2	WATER VAPOR	Mixing ratio kg/kg	0 to 38 g/kg	1x10 ⁻⁶ kg/kg	Required if Equipped
2	WINDSHEAR AIRSPEED CHANGE	Knots	-100 thru 100	1 Knot	Required if Equipped
3	TRUE AIRSPEED	Knots	0 thru 800	1 Knot	Recommended
3	AIRCRAFT TYPE	ICAO Type or Emitter Category	NA	NA	Recommended
3	GROSS WEIGHT (Note 2)	Pounds	0 thru 1415000	40 Pounds	Recommended
3	WINGSPAN	Feet	0 to 400	1 Foot	Recommended
3	FLAP POSITION	Degrees	0-50	1 Degree	Recommended
3	A/C CONFIGURATION	Discrete	Per Aircraft Configuration Indicator Table	NA	Recommended
3	TRUE HEADING	Degrees	0 thru 359	1 Degree	Recommended
4	ICING STATUS (Note 3)	Discrete	NA	NA	Optional
4	DEPARTURE AIRPORT	Character	NA	NA	Optional
4	ARRIVAL AIRPORT	Character	NA	NA	Optional
4	GNSS ALTITUDE	Feet in HAE	-1000 thru 50174 (See Note 4)	25 or 100 (See Note 5)	Optional
4	ANTI-ICE	Discrete	NA	NA	Optional



OTHER SC-206 EFFORTS



SC-206 SG-4

- Eddy Dissipation Rate MOPS
 - Define requirements as necessary for input parameters and computational methodologies to facilitate the calculation of EDR by various algorithms such that the outputs are operationally comparable.
- The EDR MOPS will be used to standardize the output of various EDR algorithms to provide accurate and operationally comparable results.
- Deliverable Due: September 2017



SC-206 SG-7

- Guidance for the Usage of Data Linked Forecast and Current Wind Information in Air Traffic Management (ATM) Operations
 - Provide guidance for the methodology of reporting and recommended quality of wind information necessary to support operations such as IM and 4D TBO
 - The Guidance for Data Link Services that provide forecast and current wind information will be useful to manufacturers of FMS and other equipment to minimize the impact of wind errors.
 - Downlink and crosslink of aircraft observed winds, temperature, and turbulence
 - Uplink of arrival wind updates
 - Maintain consistency with AIS/MET MASPS
- Schedule
 - Complete document in Q4-2016/Q1-2017
 - Conduct Final Review and Comment
 - Request SC-206 approval for publication decision mid-2017



DISCUSSION



BACKUP



RTCA Document Types

- **Operational Services and Environmental Definition (OSED)**

- Captures requirements that have been derived and/or validated as being necessary for a particular operational service and is used as the basis for assessing and establishing operational, safety, performance, and interoperability requirements for the related CNS/ATM system. It is often included as an attachment to a SPR.

- **Minimum Aviation System Performance Standards (MASPS)**

- Specify characteristics that are useful to designers, installers, manufacturers, service providers and users of systems intended for operational use within a defined airspace. Where the systems are global in nature, international applications are taken in to consideration.
- Describe the system (subsystems / functions) and provide information needed to understand the rationale for system characteristics, operational goals, requirements and typical applications. Definitions and assumptions essential to proper understanding of MASPS are provided as well as minimum system test procedures to verify system performance compliance (e.g., end-to-end performance verification).

- **Minimum Operational Performance Standards (MOPS)**

- Provide standards for specific equipment(s) useful to designers, manufacturers, installers and users of the equipment. The word "equipment" used in MOPS includes all components and units necessary for the system to properly perform its intended function(s).
- Provide the information needed to understand the rationale for equipment characteristics and requirements stated, describe typical equipment applications and operational goals, and establish the basis for required performance under the standard. Definitions and assumptions essential to proper understanding are provided as well as installed equipment tests and operational performance characteristics for equipment installations.

- **Safety and Performance Requirements (SPR)**

- Used to capture the operational, safety, and performance objectives and allocate requirements for different approval types. It is developed using an operational safety assessment (OSA) and an operational performance assessment (OPA) of the functions, performance expectations, and characteristics of operational environments needed to support the Air Traffic Service (ATS) identified in the OSED.

- **Interoperability Requirements (INTEROP)**

- Provides adequate assurance that the appropriate aspects of the relevant Communication Navigation Surveillance and Air Traffic Management (CNS/ATM) capabilities, when operating together, will perform their intended function in an acceptably safe manner for the defined operations.