

RTCA DO-242A ADS-B MASPS  
Ad Hoc Working Group  
Minutes of 2nd Meeting held at MITRE/CAASD  
January 22-24, 2001

The attendees included:

Tom Foster, Rockwell Collins, Inc.	John Gonda, HQUSAF / DOD	Chris Moody, Mitre/CAASD
J. Stuart Searight, FAA Tech. Center	Jonathan Hammer, Mitre/CAASD	Sethu Rathinam, Rockwell Collins, Inc
Jerry Anderson, FAA / AIR-130	Steve Heppe, ADSI	Christos Rekkas, Eurocontrol
Ned Bacon, Raytheon	Stan Jones, Mitre/CAASD	Rick Stead, ARINC, Inc.
Richard Barhydt, NASA Langley	Gary Livack, FAA / AFS-400	Tony Warren, Boeing
Dan Castlebury, Rockwell Collins, Inc.	James Maynard, UPS AT	Gene Wong, FAA
Cynthia Cyrus, Trios Assoc.		

**Monday January 22, 2001**

Tom Foster began the meeting with opening remarks and a review of our planned meeting dates. Due to room availability at RTCA the group agreed to shift its next meeting to begin on Monday, February 26. We will convene at Monday 1:00PM and adjourn Wednesday afternoon, February 28.

The minutes from the December meeting were accepted without comment.

Tony Warren and Richard Barhydt gave a briefing on the work of the Intent subgroup from WG4. (242A-WP-2-02.ppt)

- Objective: Develop Intent Revisions Suitable for Applications under Study and Development
  - Airborne Separation Management (En-route)
  - Airborne Collision Avoidance (En-route / Terminal)
  - Precision RNP and FMS Procedures (Terminal)
- Tony Warren gave overview of TCP Intent Issues:
  - Should MASPS include non TCP intent, e.g. Clearance Parameters?
    - *Selected Altitude & Heading (Recommend as Req't for Class A2, A3)*
    - *Selected Airspeed, Selected Vertical rate / slope (Recommend as Desirable, but not Req'd for Class A2, A3)*
  - How to Characterize Intent Validity ?
    - Currently Active and Armed Flight Modes
    - Guidance Validity bits for AP and FMS intent
    - Horizontal and Vertical RNP Capability and Nav Validity bits
  - MASPS turn definitions may need additional TCP Related Parameters; i.e.
    - Desired track To TCP, Desired track From TCP, Turn Radius
  - Does/Should TCP include airspeed changes ?
    - *Recommended for future class A4 equipage*
  - Should MASPS delineate the TCP type and trajectory segment type, e.g. 1090 MOPS "leg-types"?
    - Horizontal, Vertical TCP indicators Recommended for Class A2, A3
- Richard Barhydt gave briefing on Non-TCP Intent Information proposals.
  - It was asked if heading/trajectory information was really needed, since if TCPs and current location are broadcast, trajectory can be derived.

- One reason given was the ability to get intent information broadcast from aircraft not in FMS mode (and therefore not using TCPs)
- It was noted that the MASPS does not address the need for ADS-B to broadcast the fact that previously broadcast TCPs are no longer valid when this situation arises.
- Spoofing/Security issues were raised and after some discussion as to what level these issues should be addressed in the ASA and/or ADS-B MASPS, it was agreed that this needs to be brought to the attention of the plenary for guidance. **(AI 2-1)**
- Conclusions of Briefing were the following proposed MASPS changes (which are to be imported into 4 separate issue papers): **(AI 2-3)**
  1. Incorporate AP / MCP Selected Intent Parameters:
    - Selected Altitude, Heading/Trk Min Req't for Classes A2, A3
    - Use FMI Indicator to Clarify Active AP/FMS Modes (H /V)
    - Broadcast Horizontal and Vertical Guidance Validity Bits
  2. Augment TCP Reporting:
    - TCP Indicator Type
    - Segment Data (Desired Track to/ from TCP, Turn Radius)
    - Additional TCP's and TCP Req'ts
  3. Broadcast RNP Capability & Nav Validity Bits (Class A3)
    - Horizontal RNP containment and Vertical Window Restrictions
  4. Incorporate Desirable ADS-B Parameters (Not Min Req't for A3)
    - Reusable Message Slots Available Per ADS-B Report Type (SV,MS,OC):
    - Current Airspeed, Mag/True Heading (SV)
    - Selected Airspeed, Vertical Rate/ Slope (MS)
    - Airspeed TCP, Time/Speed Restrictions (OC)
- The discussion after the briefing began with it being suggested that none of the applications using intent are currently at a mature enough level to include most of the intent proposals in DO-242A.
- Everyone agreed that each of WG4's proposals should be considered separately
- Everybody agreed that WG3 went beyond the MASPS with their "leg type" definitions, and we should not feel boxed in by that published paradigm.
- Request WG1 to address Ops Concept on the use of Intent information. **(AI 2-2)**
- It was agreed that the ad hoc group should evaluate needed clarifications on TCP definitions.
- It was requested of WG3 to provide analysis on which 1.7s TCP update rate was based. **(AI 2-4)**

## **Tuesday January 23, 2001**

Tom Foster began the second day of the DO-242A meeting by introducing Christos Rekkas from EUROCONTROL.

Christos then gave his briefing on the EUROCONTROL ADS Program as it relates to our MASPS development. (242A-WP-2-03.ppt)

- A discussion took place on the "Future Surveillance Environment". All agreed that ADS-B cannot be developed in a vacuum without consideration of other surveillance sources, how information from these various sources will be integrated, and how this information will enable the applications which will use the available surveillance technologies.
- It was noted that the MASPS purposefully did very little with ground-air communications, since it was deemed outside of RTCA's purview. It was recommended that our group ask if this still holds, or if we should more completely consider ground-air concerns and requirements.

- Christos believed that there is a reasonably mature concept of operations developed for some ground-air applications utilizing intent information (ex. Flight Plan Consistency). Tom suggested those documents might be useful references in our deliberations on whether the planned use of intent information is mature enough for inclusion in DO-242A.
- Europe ADS program has completed its phase 0 (initialization phase) and is targeting mid-2001 for completion of phase 1.
  - Phase 1 will include ADS Strategy, Concept, Requirements, and Architecture documents.
- It was requested by Tony Warren that during our meeting in Brussels, our ad hoc group be given a briefing on the ODIAC work and their plans. It was agreed that – if possible – this will be on the agenda for Brussels.
- Christos will collect any con ops written that define uses of more than two TCPs. Depending on the result of this effort, an Issue Paper might be produced.
- Agenda items for Brussels: EUROCONTROL position on number of needed TCPs and expansion of look-ahead time, and requirements for Controller Access Parameters (CAPs).

In response to **Action Item 2-2**, Tom reported that he had discussions with Bob Hilb, co-chair of WG#1.

- Bob indicated that it did not appear that WG1 would be able to produce any Operations Concept for TCPs and the use of intent information in the near-future. This probably means that increasing the use of TCPs will not be addressed in DO-242A.
- Bob Hilb also stated that it was his position that WG1 would not call for more stringent requirements on flight path accuracy.
  - Tony Warren stated his concern that at least the 1090MHz implementation of ADS-B might very well need to take a step back if we don't address the TCP issue now.
- All agreed that - at a minimum - TCPs needed clarification in the MOPS.
  - Tom proposed that perhaps we could add some flexibility by having increased TCPs optional in the MASPS.
- The discussion then focused on what can we do to best clarify TCPs and their possible future uses and requirements, while informing the reader more work is needed in this area if we can not fully address these issues in DO-242A.
  - It was proposed that perhaps non-TCP, or short-term intent (selected heading, selected altitude, speed changes, etc.) could be included, with a note warning that TCP intent information is likely to change in future revisions of the MASPS.
- It was agreed that it be proposed to SC-186 that air-to-ground applications be included in the MASPS.

Continued discussion lead to the confusion and apparent ambiguity about the language in 3.4.3.1 regarding State Vector Reports, in particular the information required in the Air Reference State Vector. Jim Maynard agreed to write an issue paper requesting clarification on this material. **(AI 2-4)**

### **Wednesday January 24, 2001**

Tom began the day's meeting by asking for any feedback on the web site. It was agreed that briefings and other working papers would be made available in their native format unless requested otherwise by the author. Issue Papers will continue to be available only in PDF format.

The group agreed to extend the Brussels meeting another day due to the amount of requested briefings already on the agenda.

After some discussion on the scope of the MASPS, Tom agreed that this issue needs to be brought to plenary for guidance. Tom stated his position that the MASPS must be dedicated to Traffic Surveillance Services for aircraft both in the air and on the ground. While doing this, it must be remembered that some of the potential ADS-B data links are capable of providing other services as well. While the MASPS

must not put roadblocks up to inhibit those other potential services, it should stay dedicated to addressing issues directly related to Traffic Surveillance Services.

Jim Maynard gave a briefing on his initial assessment on selecting which proposed changes are to be considered for DO-242A (242A-WP-2-01).

The following table summarizes the groups initial disposition on the proposed changes already received, where IP# is the issue paper on which these items are addressed, JM# is the item number in the matrix provided by WG3 and used by Jim Maynard for his briefing, and AI# is the action item numbers assigned as a result of the groups discussion of the topic.

IP#	JM#	Comment	AI#
4a	1	<u>Make/Model</u> : Due to lack of completeness or maturity of current Operations Concept, it was agreed by the ad hoc group that IP4a should be deferred for consideration in a later version of DO-242.	
4b	2	<u>Heading at Vstop</u> : It was agreed that this issue should be considered for resolution in DO-242A. It was hypothesized that the resolution might be a clarification of the current MASPS. <b>AI</b> : Jim Maynard will propose a MASPS change to resolve this issue.	2-7
14	3	<u>Center of Navigation</u> : This issue is to be folded into similar Issue Paper 14 which is also on center of navigation. (See JM# 19 & 20)	2-23
4c	4	<u>Brake position</u> : It was agreed that this item will remain open for consideration in DO-242A. <b>AI</b> : Gary Livack will provide further detail on information sources and specific requirements to better focus this issue.	2-11
5	5	<u>Anonymity</u> : Consider for consideration in DO-242A. <b>AI</b> : Dan Castleberry will review and assess if section 2.1.2.1.2 of the MASPS needs clarification.	2-12
6.1	6	<u>Obstacles &amp; Obstructions</u> : This clarification of Table 3-9 will be addressed in DO-242A. <b>AI</b> : Gary Livack will propose editorial clarifications for Table 3-9.	2-13
6.2	7	<u>Obstacle Depictions</u> : This item will be considered as a potential clarification in DO-242A pending further inputs from Gary Livack that would persuade the group this is not a Nav database / NOTAMS issue. <b>AI</b> : Gary Livack will provide more specific proposal on what clarifications or changes in requirements is needed in the MASPS.	2-14
7	8 9	<u>Shared services on link</u> : This IP is to be rejected, though it was agreed that a new issue paper was needed regarding the protection of ADS-B services when implemented on a data link shared with other services. (FIS, TIS, etc.)	2-15
8	10 11 12	<u>Accuracy &amp; Integrity</u> : Agreed that this is to be included in DO-242A. Issues such as backwards compatibility need to be addressed. Stan Jones mentioned his desire to possibly see reduction in the number of NIC and NAC levels. <b>AI</b> : Jim Maynard, Tony Warren and Jonathan Hammer will propose specific MASPS changes to split Integrity and Accuracy into separate components.	2-17
9	13	<u>Velocity Subtypes 3&amp;4</u> : Agreed that this issue should be addressed in DO-242A. It is uncertain at this time whether a clarification and/or new requirements for certain equipage classes are needed. <b>AI</b> : Jim Maynard will provide initial recommendations on this issue for the next meeting. Christos will address this issue in his briefing at the Brussels meeting.	2-18
	14	<u>Trajectory "Leg Types"</u> : To be considered for inclusion in DO-242A. This topic is covered by the Intent Subgroup's work and might be superceded by Issue Paper's generated by Tony Warren (see action item 2-3). <b>AI</b> : Tony Warren will do some preliminary work on this topic with the Intent subgroup and then set up a teleconference on 2/14 for the purposes of briefing the ad hoc group.	2-19
11	15	<u>TCP Validity Bit</u> :	
12	16	<u>TCAS RA Information</u> : It was agreed that more specificity on items such as update rate, and reception probability are needed from Bob Hilb. <b>AI</b> : Jerry Anderson will contact Bob Hilb and request the needed information.	2-20
12	17	<u>TCAS &amp; CDTI Capability</u> : It was agreed that more specificity on items such as update rate, and reception probability are needed from Bob Hilb. <b>AI</b> : Jerry Anderson will contact Bob Hilb and request the needed information.	2-20
13	18	<u>Low/High Update Rates when on ground</u> : This issue will be clarified in Do-242A. <b>AI</b> : Steve Heppe will propose language that clarifies this issue.	2-22

IP#	JM#	Comment	AI#
14	19 20	<u>Center of Navigation</u> : It was noted that “certified center of navigation” is cited in a non-informative appendix (J). This issue will remain open for consideration in DO-242A. WG#4 will be asked if they foresee their work on the ASA MASPS requiring us to change or expand the information currently in the MASPS. SC-193 and the Military also might comment on the need for this issue to be addressed in DO-242A. <b>AI</b> : John Gonda will report back on the military’s perspective on this issue. <b>AI</b> : Gary Livack will report back from SC-193 on their perspective on this issue. <b>AI</b> : Tony Warren will bring this topic up on the upcoming WG4 telcon and report back the results of that discussion. <b>AI</b> : Stuart Searight will combine Gary Livack’s comments on certified navigation center into this IP.	2-8 2-9 2-10 2-23
	21	<u>Velocity subtype encoding</u> : No longer MASPS issue (corresponding MOPS text deleted)	
	22	<u>Velocity subtype verification</u> : No longer MASPS issue (corresponding MOPS text deleted)	
10	23	<u>Data Source Requirements</u> : <b>This Issue Paper will be rejected as an issue paper and its content will be folded into IP 8 on NIC/NAC. AI: Stuart Searight will move information from IP 10 into IP 8.</b>	
7	24	<u>Backup Nav System</u> : This item will be rejected for inclusion in DO-242, however we will write a response that puts this issue in a broader context which will be presented to WG#4 as a proposal for inclusion in the ASA MASPS. AI: Dan Castleberry will write ad hoc group’s response.	2-16
7	25	<u>Souls on Board</u> : Reject this issue as out of scope of the MASPS.	
1	IP-01	<u>Turn Indication</u> : This IP will be considered for inclusion in DO-242A. <b>AI</b> : Christos Rekkas will confer with colleagues to determine if there are strong feelings on this subject in Europe.	2-25
2	IP-02	<u>Altitude Rate</u> : This IP will be considered for inclusion in DO-242A. <b>AI</b> : Christos Rekkas will confer with colleagues to determine if there are strong feelings on this subject in Europe. <b>AI</b> : Jonathan Hammer will be asked to contribute his expertise to this discussion.	2-25 2-26
3	IP-03	<u>Received Reporting Rates</u> : This IP will be considered for inclusion in DO-242A. <b>AI</b> : Tony Warren will communicate this proposed requirement to WG4.	2-27

Tom’s report to Plenary:

- Criteria for selecting change items included in DO-242A;
- Metrics developed (issue papers and tracking matrix);
- Web site;
- Sources of requirements for the links which are non-traffic driven;
- Status of intent information and TCPs (definitions, TCP types, short-term intent, backward compatibility);
- Brief statistics on submitted issues;
- Time-line. Should we stay with 6-9 month schedule, or go longer to be in synch with ASA MASPS development?;
- Security/spoofing issues (to what level should they be addressed in the MASPS??);

Upcoming Meetings:

1:00PM Monday February 26 – 3:00 Wednesday February 28: RTCA, Inc., Washington D.C.

Tentative Agenda Items:

- Proposals from Jim Maynard, Tony Warren and Jonathan Hammer on specific MASPS changes that would separate integrity and accuracy (NIC/NAC) from current NUC.
- Initial assessment and recommendations on IP9 from Jim Maynard.
- Briefing by John Gonda on military applications.

9:00AM Tuesday April 3 – 3:00 Friday April 6:

EUROCONTROL HQ, Brussels, Belgium

Tentative Agenda Items:

- Briefing from SC-193 on surface mapping
- Briefing from ODIAC on intent based ATM
- Briefing from EUROCONTROL on expanding number of TCPs and look-ahead times and requirements for Controller Access Parameters (CAPs).
- Briefing from EUROCONTROL on surveillance activities such as ARTAS and Surveillance Networks.

Action Number	Action Item Description	Assigned to	Status
1-1	Develop template for "Issue Paper" form to be used for submitted issues to be addressed by MASPS	Steve Heppe	Draft completed
1-2	Transcribe all submitted issues into our Issue Tracking Matrix and Change Issue Forms (where necessary)	Stuart Searight	Issue Papers: Done. Tracking Matrix: Pending
1-3	Give a preliminary evaluation on submitted comments as to whether those comments should be included in DO-242A or be deferred to later revisions of the MASPS.	Jim Maynard	Distributed 1/16/01
2-1	Ask plenary for guidance regarding to what degree the ASA and/or ADS-B MASPS needs to address security /spoofing issues.	Tom Foster	
2-2	Request WG1 to address Ops Concept on the use of Intent information. <b>Result:</b> WG1 Chair reported he did not foresee this activity in near-term.	Tom Foster	Completed.
2-3	Produce Issue Papers that address four major conclusion of Intent briefing. (242A-WP-2-02)	Tony Warren	
2-4	Ask WG#3 to provide analysis for which 1.7 sec TCP update rate was based.	Stuart Searight	Received feedback from WG#3 at their meeting in Melbourne Fl. 2/1/01.
2-5	Produce an Issue Paper proposing specific clarifications on the material in Section 3.4.3.1 regarding the Air Reference State Vector and required information in the SV	Jim Maynard	
2-6	Break Issue Paper #4 into four separate Issue Papers	Stuart Searight	
2-7	Propose MASPS Change to address IP 4b	Jim Maynard	
2-8	Report on the military's stance on IP 14 (center of navigation)	John Gonda	
2-9	Report on SC-193's stance on IP 14 (center of navigation)	Gary Livack	
2-10	Bring IP 14 up during WG4 telcon on 1/29 and report back to our group on that discussion (center of navigation)	Tony Warren	
2-11	Provide further detail on information sources and specific requirements to better focus IP 4c.	Gary Livack	
2-12	Review and assess if section 2.1.2.1.2 of the MASPS needs clarification. (IP 5)	Dan Castleberry	
2-13	Propose editorial clarifications for Table 3-9.	Gary Livack	
2-14	Provide specific proposal on what clarifications or changes in requirements is needed in the MASPS to address item #2 of IP 6. (centenary and other continuous obstacles)	Gary Livack	
2-15	Produce IP on protecting ADS-B services from other services provided by a shared data link	Dan Castleberry	
2-16	Write ad hoc group's response to issue #3 of IP7 that will put issue in broader context and serve as proposal to WG#4 for consideration in the ASA MASPS.	Dan Castleberry	
2-17	Write proposals specific MASPS changes to split Integrity and Accuracy into separate components.	Jim Maynard, Tony Warren, Jonathan Hammer	To be presented at Feb. meeting
2-18	Draft initial recommendations on IP9.	Jim Maynard Christos Rekkas	
2-19	Prepare briefing on trajectory leg types for ad hoc group consideration	Tony Warren	To be presented on 2/14 tel-con
2-20	Request more specificity from Capt. Hilb on IP 12	Jerry Anderson	
2-21	Write and Issue Paper on items 11 and 12 from Table 3-6 of DO-242	Dan Castleberry	

Action Number	Action Item Description	Assigned to	Status
2-22	Propose language that clarifies MAPS regarding update rates and stationary/movement thresholds. (IP13)	Steve Heppe	
2-23	Combine Gary Livack's comments on certified navigation center into IP 14.	Stuart Searight	
2-24	Move information from IP 10 into IP 8.	Stuart Searight	
2-25	Determine if there are strong feelings in Europe about having Turn Indicators (IP 1) and altitude rate (IP 2) as required message elements.	Christos Rekkas	
2-26	Provide expertise/thoughts/concerns regarding the necessity of requiring altitude rate as message elements.	Jonathan Hammer	
2-27	Communicate newly proposed requirement specified in IP3 to WG4.	Tony Warren	

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Handouts from  
DO-242A ADS-B MASPS  
Ad Hoc Working Group Meeting  
22-24 January 2001

1. Agenda
2. 242A-WP-2-01: Jim Maynard's initial assessment of submitted MASPS change issues
3. 242A-WP-2-02: Tony Warren and Richard Barhydt's briefing on the intent subgroup's activities on TCPs and non-TCP intent information
4. 242A-WP-2-03: Christos Rekkas' briefing on the EUROCONTROL ADS program and how it affects DO-242.
5. 242A-WP-2-04: Tony Warren's briefing on NIC/NACs.