

**Summary of Meeting #11, of RTCA SC-186, Working Group 5  
For the Development of a MOPS for UAT**  
<http://adsb.tc.faa.gov/ADS-B/186-subf.htm>

The meeting was held 4 – 7 March 2002, in the Neptune Conference Room at the Eurocontrol Headquarters in Brussels Belgium, hosted by Nikos Fistas. The meeting was called to order at 9 a.m. on 4 March 2002 by Co-Chairman George Ligler. George welcomed all attendees and asked that each one introduce themselves and their organization. The attendees included:

Larry Bachman – JHU – APL	Richard Jennings FAA (AIR-130)	Bob Saffell – Rockwell Collins
Mike Biggs – FAA – ASR-200	Stan Jones – Mitre CAASD	Bernald Smith – SSA and FAI
Mike Castle – JHU – APL	George Ligler – PMEI	Bill Thedford – Titan (USAF Hanscom AFB)
John Doughty – Garmin International	Chris Moody – Mitre CAASD	David Thomas – Titan - FAATC –ACT-350
Nikos Fistas – Eurocontrol	Tom Mosher – UPS Aviation Technologies	Ed Valovage – Sensis Corp.
Gary Furr – Titan Corp - FAATC – ACT-350	Vincent Nguyen – FAA (AND-510)	Tom Wright – JSC / IITRI
Carl Gleason – Advancia – FAA/NISC	Tom Pagano – FAA Tech Ctr – ACT-350	

The following known regrets to attendance to this meeting were received prior to, or during the meeting:

- Warren Wilson, Mitre
  - Bob Manning, USAF, Pentagon
1. George Ligler read from an email that summarized the agreement reached during the RTCA SC-186 Leadership teleconference held on Wednesday, 27 February 2002 with respect to the TSR/TCR requirements in the ADS-B MASPS DO-242A. The SC-186 leadership team will urge the plenary to accept TSR/TCR requirements in the ADS-B MASPS, while at the same time instructing WGs 3 & 5 not to include TC reports in the link MOPS currently being developed. Each link MOPS will also be asked to contain an appendix showing how they plan on accommodating the TCRs in the future and will be asked to perform and report on analysis showing the performance of the respective data link with TCRs implemented.
  2. The Working Group was asked to review and approve the Minutes to Meeting #10. Hearing no comment or request for change, the Minutes to Meeting #10 were accepted as published.
  3. Mike Biggs discussed the report of Stage 3 Certification by NTIA of the UAT frequency.
  4. The Working Group discussed future meeting dates and locations. The following table indicates the currently agreed upon meeting dates and places for meetings of RTCA SC-186 Working Group #5.

Dates/Time	Meeting Place
9am Monday, 8 April to noon Friday, 12 April	To be held in conjunction with the SC-186 Plenary at the new RTCA facilities at 1828 L Street NW, Suite 805 (202-833-9339), MacIntosh Conference Room. Plenary on Wednesday & Thursday, 10-11 April. Travel info and lodging details are available on the ADS-B/UAT web site
9am Monday, 29 April to 4pm Friday, 3 May	Hosted at the offices of Titan Systems in Mays Landing NJ, near the William J Hughes FAA Technical Center in Atlantic City NJ Travel info and lodging details are available on the ADS-B/UAT web site

Dates/Time	Meeting Place
9am Monday, 17 June to 4pm Friday, 21 June	To be held in conjunction with the SC-186 Plenary at the new RTCA facilities at: 1828 L Street NW, Suite 805 (202-833-9339) WG-5 to meet Mon, Tues & Wed with Plenary on Thurs & Fri Travel info and lodging details are available on the ADS-B/UAT web site
Tentatively scheduled: 16 – 20 Sept 2002, but, will probably be changed to 23 – 26 Sept.	Fall 2002 RTCA SC-186 Plenary <u>tentatively</u> scheduled for Wednesday & Thursday, 18-19 September. Current SC-186 inclination is to plan for a Joint Eurocontrol/RTCA Plenary at Eurocontrol to discuss DO-242B requirements. Eurocae is known to have other meetings scheduled for this week and further discussion of this meeting will happen in April meeting.

5. The Working Group continued with the presentation of Working Paper WP-11-15 by Larry Bachman and Mike Castle, partially in response to Action Items 9-13, 10-1 and 10-2. This Working Paper provided Multi-Aircraft UAT Simulation Results for LA Basin using the LA2020 scenario.
6. Continuing in response to Action Items 9-13, 10-1 and 10-2, Larry Bachman continued by presenting Working Paper WP-11-16, the Multi-Aircraft UAT Simulation Results in Core Europe for Current and 2015 interference environments in both a nominal position over Brussels and in the Worst-Case position with respect to DME interference. As review of WP-11-16 continued, Larry accepted **Action Items 11-01, 11-02 and 11-03** to perform further simulation runs.
7. Larry Bachman continued by presenting Working Paper WP-11-17 in response to Action Item 10-6. WP-11-17 summarizes the analysis of Aircraft Track Acquisition and at what ranges.
8. The Working Group continued by beginning the review of Working Paper WP-11-03 which represents the 9<sup>th</sup> draft of the UAT MOPS Section 2.2. Review of Section 2.2 (WP-11-03) continued throughout most of the remainder of the meeting, with several interruptions for other business. A version of WP-11-03 will be posted on the ADS-B/UAT web site as UAT-WP-11-03B, which will represent the state of Section 2.2 at the end of Meeting 11.
9. The Working Group was pleased to suspend the review of Section 2.2 to recognize Nick McFarlane of Helios Technology who has performed simulation analysis on the UAT system, on behalf of Eurocontrol, based on a starting point of about one year ago with the source code from JHU-APL of the Multi-Aircraft UAT Simulator. The presentation that Nick gave to the Working Group was given a Working Paper number **UAT-WP-11-22** and will be posted on the ADS-B/UAT web site.
10. Following the presentation of WP-11-22, Tom Mosher of UPS Aviation Technologies asked that the Working Group listen to and consider a request from UPS-AT. Tom indicated that it is the position of UPS-AT that they prefer not to allow the introduction of the TSR requirements into the ADS-B MASPS (DO-242A)/UAT MOPS if in fact that introduction will potentially delay the completion of the UAT MOPS document, because of MOPS workload and/or potential controversy on TSR requirements during the MASPS review at the

April Plenary at RTCA. The Working Group discussed this position and agreed to retain the TSR in the UAT MOPS and to further complete the test procedures associated with the TSR.

11. The Working Group continued with the review of Section 2.2 and WP-11-03, but halted that review and reviewed Working Paper WP-11-18, which had been produced by Mike Castle in response to Action Item 10-8 and related to the UAT Receiver Loading Analysis required to complete section 2.2.10.2.
12. The Working Group continued with the review of Section 2.2 and WP-11-03, but halted that review and reviewed Working Paper WP-11-12, which had been produced by Warren Wilson, but, in Warren’s absence, was presented by Stan Jones in an effort to resolve requirements in section 2.2.12.1.
13. Upon completion of the review of Section 2.2 and WP-11-03, the Working Group began a brief review of the Test Procedures Matrix in Working Paper WP-11-08 and the actual test procedures in Draft 1 of Section 2.4 in Working Paper WP-11-09.
14. Because of insufficient time to complete the review of Section 2.4, it was agreed by the Working Group to set up two (2) teleconferences between now and the next meeting at RTCA. The first teleconference was set for 1pm EST, Monday, 18 March 2002 and is scheduled for a 3 hour duration. The second teleconference was scheduled for 1pm EST, Monday, 25 March 2002 and is scheduled for a 3 hour duration. The prime objective of these teleconferences is to complete any and all open items in Section 2.2, and to review in detail the test procedures in Section 2.4. Other objectives would be to review any Appendices as required.
15. The Working Group used the remaining time of the meeting to briefly review Section 2.1 in Working Paper WP-11-07.
16. The following **Action Items** were identified during the course of this and previous meetings. The asterisk (\*) beside a name or organization indicates that they are the lead for the resolution of that Action Item. Actions shown here are those **Action Items** that remain OPEN, in total or in part, after the end of the Meeting being report on in these Minutes.

Action Number	Action Description	Assigned to	Status
6-6	Draft Appendix B.2 on FIS-B MASPS compliance.	George Ligler Mike Castle	Assess at Meeting 12
9-9	Scale down aircraft equipage in the current European environment to assess what level can be supported while meeting requirements. Alternatively assess what subset of requirements can be met in the presence of existing 978 MHz DMEs.	Larry Bachman	
10-4	Simulate the reception of different aircraft on approach (2000 feet) by A0 on the ground.	Mike Castle Larry Bachman	Assess at Meeting 12
10-5	Insert a short paragraph into Section 1 concerning Appendix M and the potential importance of its conclusions.	George Ligler	Assess at Meeting 12
10-7	Update Table 2.2.8.2.3	George Cooley	By 18 March telecon

Action Number	Action Description	Assigned to	Status
11-01	Run Core Europe 2015 (No co-located TACAN Ground Station) simulation with sectorized ground antennas, using the performance cited in WP-11-21. See if that solves the problem. If not, then make recommendations on power level adjustments for A0 and A1 equipment classes to ensure performance.	Larry Bachman Ed Valovage Stan Jones	
11-02	If further performance enhancements are necessary to those defined in Action Item 11-01 to accommodate air-ground applications, then in the presence of co-located 979 MHz TACAN/DME Ground Stations, consider the impact of using the 0.8MHz filter on a co-located UAT Ground Station. Provide specific examples of UAT site location near 979 MHz DME/TACANs that support claimed performance.	Larry Bachman Ed Valovage Stan Jones	
11-03	Evaluate aircraft-to-aircraft performance on the surface in the presence of a co-located 979 MHz DME Ground Station. For aircraft on approach in Core Europe reception of ground vehicles, add a column indicating performance in the presence of a 979 MHz 10KW TACAN transmitter at the airport that is being approached. The aircraft on the surface are separated by 5 miles.  For LA 2020, evaluate aircraft to aircraft performance on the surface in the presence of a co-located 980 MHz DME Ground Station.	Larry Bachman	
11-04	Run the Current Core Europe scenario with 150 UAT equipped aircraft, and on-channel DMEs	Mike Castle	
11-05	Re-run Aircraft Track Acquisition for a 99 percentile for range acquisition, originally presented as WP-11-17 in response to Action Item 10-6. Must be available for 29 April meeting at FAA Tech Center.	Larry Bachman	
11-06	Develop comments and suggested solutions to DO-242A Plenary draft and submit to Gary for consolidation for official Working Group 5 submission. (A) Section 2.1.2.5 – Stan Jones, (B) Section 3.3.3.1.4 – Gary to translate (C) Section 3.4.4.10.1 - Bob Saffell: (D) Section 3.4.4.10.3 – Chris Moody and Carl Gleason	Stan Jones Gary Furr Bob Saffell Chris Moody Carl Gleason	
11-07	Include in Appendix D more stringent signal rejection requirements than those in 2.2.8.2.3	Ed Valovage Larry Bachman	
11-08	Draft the requirement for limiting pulse stretching for 2.2.8.2.4 for the first teleconference on 18 March	Tom Pagano	
11-09	Distribute recommended final numbers for Table 2.2.10.1 in advance of the Teleconference on 18 March	Stan Jones	

17. The **Working Papers** shown in the following table are specifically for the Meeting being reported in these Meeting Minutes. Working Papers for all WG-5 Meetings, as well as the Meeting Agendas, Meeting Minutes, Meeting Schedules and files leading to the production of a UAT MOPS are posted on the ADS-B UAT web site at: <http://adsb.tc.faa.gov/ADS-B/186-subf.htm>

Working Paper	Size	Description	Introduced At:
UAT-WP-11-01R1	31KB	Draft 3 of Appendix M: UAT Error Detection and Correction Performance, presented by Warren Wilson	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-02R1	73KB	Draft 3 of Appendix H: UAT Synchronization Issues, presented by Warren Wilson	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-03	305KB	Draft 9 of Section 2.2, presented by Chris Moody	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-03B	2,258KB	<b>Revised</b> Draft 9 of Section 2.2, presented by Chris Moody <b>with Table of Contents, Table of Figures and Table of Tables with hyperlinks to the respective sections</b>	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-04	211KB	Draft 4 of Appendix G: Standard Interference Environment, presented by Mike Biggs	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-05	113KB	Draft 3 of Appendix C: Example ADS-B Message Encoding, presented by Ei Mon Phyu and John Barrows	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-06	16KB	Draft 3 of Appendix J: Reference Upper-Layer Report Format, presented by John Doughty and Tom Mosher	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-07	22KB	Draft 4 of Section 2.1: General Requirements, presented by Tom Mosher	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-08	65KB	Draft 1 of the Test Procedure Matrix, presented by Gary Furr	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-09	454KB	Draft 1 of the UAT MOPS Test Procedures in Section 2.4, presented by the Test Procedure Team	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-09B	2,768KB	<b>Revised</b> Draft 1 of the UAT MOPS Test Procedures in Section 2.4, presented by the Test Procedure Team <b>with Table of Contents, Table of Figures and Table of Tables with hyperlinks to the respective sections</b>	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-10	199KB	Draft 1 of Appendix E: Aircraft Antenna Characteristics, presented by George Cooley	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-11	123KB	Draft 1 of Section 3: Installed Equipment Performance, presented by Greg Kuehl	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-12	19KB	Issues Related to the Potential Use of a Suppression Bus for UAT, presented by Warren Wilson	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-13	17KB	Draft 1 of Appendix F: Link Budgets and Scenario Dependent Ranges, presented by Stan Jones	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-14	21KB	Terminology Proposed for Use in ADS-B Documents, presented by James Maynard	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-15	104KB	Multi-Aircraft UAT Simulation Results for LA Basin using the LA2020 Scenario, presented by Larry Bachman and Mike Castle in response to Action Items 9-13, 10-1 and 10-2	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-16	253KB	Multi-Aircraft UAT Simulation Results in Core Europe for current and 2015 interference environments in both a nominal position over Brussels and in the Worst-Case position with respect to DME interference, presented by Larry Bachman and Mike Castle in response to Action Items 9-13, 10-1 and 10-2	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-17	20KB	Aircraft Track Acquisition, presented by Larry Bachman in response to Action Item 10-6	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-18	40KB	UAT Receiver Loading Analysis, presented by Mike Castle in response to Action Item 10-8	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-19	471KB	UAT Message Success Rate Bench Test Data, presented by Tom Wright	Meeting #11, 3/4/02 Brussels, Belgium

<b>Working Paper</b>	<b>Size</b>	<b>Description</b>	<b>Introduced At:</b>
UAT-WP-11-20	39KB	JSC Bench Tests and JHU-APL Model Comparisons, presented by Tom Pagano	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-21	20KB	Proposal for Sectorized Antenna, presented by Ed Valovage	Meeting #11, 3/4/02 Brussels, Belgium
UAT-WP-11-22	49KB	ADS-B Data Link Analysis: UAT in the 2015 Core Europe Scenario, presented by Nick McFarlane	Meeting #11, 3/4/02 Brussels, Belgium