

Future Meetings

The next meeting for SC-186 was set April 17 - 19 at RTCA headquarters in Washington DC. A plenary session for SC-186 is scheduled for April 20.

WG-4B will meet again March 7 - 9 at RTCA in Washington DC to conduct a final review of the “fast track” ASAS MOPS. The meeting after that is slated for April 17 - 19 at RTCA, which precedes the April 20, 2006 SC-186 plenary session.

Notes from December 2005 Meeting

SC-186 WG-4B STP SG met at 9 AM on December 5, 2005 at RTCA, Washington DC. Jonathan Hammer (MITRE/CAASD) was the Chairman. Bruce Paul (Mulkerin Associates Inc.) is the STP SG Secretary. The attendees were:

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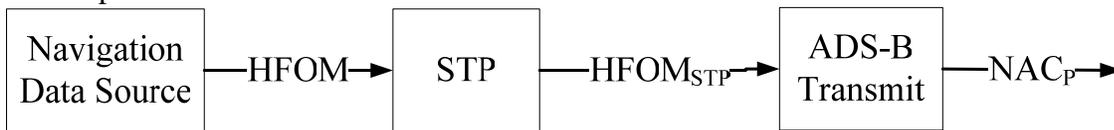
Agenda:

- An end-to-end review of the STP “fast track” ASAS MOPS draft
- A discussion of test procedure development and writing assignments
- A review of material that will be included in the proposed FAA AC

- A review of the SG schedules (including an all-day teleconference) meeting dates and deadlines for deliverables.

STP MOPS Review. A complete review of the STP “fast track” ASAS MOPS draft took place. SG members found ways to structure the document and address all of their concerns. The agreement allows the group to move forward and finish the test procedures section of the document. Some of the decisions and discussions included:

- Tony Warren wanted to include the NRA and RAD applications in §2.2.2.1.1. The group agreed.
- The hardware and software sections of "Design Assurance" in Section §2.2.2.2 were combined to reflect the assurance of the STP functions, rather than the hardware/software split (it is expected by the vendors that this will likely be implemented by software in an integrated link product).
- There was some discussion of whether availability is a system level value or a "box"-level value. Don felt that the availability number should apply to the end-to-end system, not the STP "box".
- Bob S. amended the horizontal position accuracy section (§2.2.4.1) to allow for test points to check the scaling and limiting functions to output HFOMSTP. HFOM is a possible value that will be ingested by the STP function from a GNSS source. However, the link MOPS accept HFOM as well. Bob showed a diagram of what he considered the process to be for this flow:



*HEPU_{UL} = HFOM modified by STP (possibly scaled, see Table 2-1 in STP MOPS)
 HFOM_{STP} = HEPU_{UL} after limiting by STP (see Section 2.2.4.1.1.3)*

- Tony commented that Figure 2-3 used the words "tightly-coupled" while the text from the notes used the words "synchronized."
- Tony proposed a new philosophy for how to limit HEPU – based on velocity rather than airborne/on-ground indication. Bob and Don concurred and said that there were various air-ground switches on aircraft and it would not be a trivial thing to configure that feedback to STP. Tony's proposal was therefore accepted, which limits to NAC_P of 7 when above 60 knots groundspeed and NAC_P of 9 when less than 60 knots.
- Navigation and other data source selection was a topic that generated a great deal of discussion and took up most of the 6th and 7th. The main issue was the way in which horizontal position and navigational data sources will be selected. The ASA MASPS has a requirement that the source will be based on the quality of the data, but isn't specific about how to do that. The draft of this section coming into this meeting was that the sources are ranked, basically: #1 choice would be a GNSS source, #2 would be any backup GNSS, #3 is an FMS, and then #4 would be any “other” source. Then there was a requirement after that list that said that if the HPL of the source being used becomes greater (HPL is a containment radius at 10⁻⁵, so getting bigger is bad) then the source

should switch. This requirement, if done as written, would have required monitoring the HPL of all the sources anyway, ranked list or not.

- The discussion on source selection spread across two days. Bob Saffell pointed out that the control loop was difficult to test if switched dynamically across all the permutations. In addition, the link MOPS claim some of this responsibility, so there would be multiple control signals flying around, from the pilot selection, from the data links, and from the STP function. In the end, dynamic switching of navigation sources based on the output HPL from the sources was accepted (smaller HPL being better than big), with two small amendments to prevent toggling or frequent switching of the source: there must be at least a 0.05 NM difference (decrease) in HPL to enact switching, and once a source is switched in, it must provide persist for at least 10 seconds before switching again. Another important note which was captured in this section was something Bob Saffell mentioned, that once a position source has gone bad (or no position information), the STP function should not accept any of that sources data.
- The vendors present agreed that they would implement the STP functions in an integrated box, which would remove some of the difficulty in testing that is manifest in things like source selection in a non-integrated STP. Ultimately, these requirements may go back into the link MOPS.
- Bob said that if source selection is automatic (which it was agreed to be), then if an aircraft drops off the display because of the quality of data it was broadcasting, then the equipment will have to record/log events (such as switching) for diagnostic/pathology purposes, which would entail a lot of problems in the field. Don concurred with this point for his equipment. Bob wanted to make the pilot responsible for source selection (selecting his navigation source).
- The STP group has previously determined that the difference between the SPRP (surveillance processing reference point – the geographic point processed in STP) and the SRP (surveillance reference point – where the GPS antenna is actually located) is operationally insignificant, and can be compensated for in the implementation, if necessary, by adjusting the length/width fields in the link.
- An attempt to solve the source selection issue was made based on availability numbers of GPS. Enroute separation (5 NM) requirements from Stan’s CAP model require 10^{-5} availability at a 2.0 NM containment radius (RNP-1.0). Don felt that the availability of non-augmented GPS might be a problem. He has seen simulations for positions in Germany that average 5 “RAIM holes” per day with the maximum length up to 45 minutes. Jonathan and Tony questioned the numbers, which lead to an Action below. Tony stated that Boeing would not be open to mandating augmented GPS.
- Vertical rate selection spawned a large discussion, in which it was discovered that the link MOPS and the ADS-B MASPS do not agree [(a) there is a note in the ADS-B MASPS that says when no vertical rate is available, that the horizontal rate can be used to generate a NAC_v, and (b) vertical rate based on a barometric rate will lead to NAC_v = 0]. An action was captured to generate an issue paper for the next go-around in the ADS-B MASPS. Ultimately, a priority scheme based on the best data available was decided on and put into the document in real-time.

STP MOPS Test Procedures. Bob Saffell (Rockwell Collins) briefed the other STP SG members on where he was in the development of test procedures. Bob has begun preliminary development but needed the STP “fast track ASAS MOPS to stop changing before he could proceed. Since an accord has been reached on the STP ASAS MOPS draft, Bob will be able to proceed with the test procedures section. Bob will receive assistance with test procedures from Jeff Weeldreyer (ACSS), Don Walker (Honeywell) and others. Bob has several industry commitments in the weeks ahead, but stated he would be able to complete the test procedures section and have it ready for SG review by “mid to late January.” An “all day” telecom is slated February 14, 2006 to review the test procedure section so that revisions can be mailed out by February 28 prior to the March 7 - 9 2006 meeting. The March meeting will focus on a final end-to-end review prior to plenary balloting.

FAA ADS-B AC revisited. For the past several months, Jonathan Hammer and other SG members have asked appropriate FAA officials to support STP “fast track” ASAS MOPS development with the creation of an AC that would provide guidance on ADS-B installation. The SG has compiled a list of what the AC needed to contain and FAA officials have responded with potential draft material that could become the framework for the proposed AC.

Key section material for the proposed AC draft includes:

- *Guidance on antenna placement.* Mike Castle (John Hopkins) volunteered to provide some text on assumptions embedded in the ADS-B MASPS and link MOPS about RF antennas that will transmit and receive Messages.
- *Design assurance requirements.* Equipment must be designed to the appropriate levels based on intended application and aircraft class in which installed.
- *Acceptable navigation sensor inputs.* The proposed AC would include a list of acceptable GNSS systems. It would also list any Required Navigational Performance (RNP) Flight Management System (FMS) that can meet the requirements set forth in the STP “fast track” ASAS MOPS.
- *Other considerations.* STP SG members have determined that the state vector data source used by the ADS-B transmit system should be the same source ASSAP uses to do own ship processing to assure consistency of own ship and recipient ADS-B surveillance data.

STP SG members will continue to provide material for the proposed AC. This work will be concurrent with the completion of the STP “fast track” ASAS MOPS.

Roadmap to completion. Once the test procedures are completed (mid to late January 06) and the final draft of STP “fast track” ASAS MOPS is constructed (February 06), the SG will meet at RTCA (March 06) to perform a final end-to-end review of the document. Any last-minute revisions must be complete before March 21, 2006 to meet the 30-day plenary review requirement that precedes the April 20, 2006 SC-186 plenary meeting. Plenary approval is necessary to advance a document to the Program Management Committee (PMC). The PMC is the final review authority. Approval from the PMC is necessary for document publication.

Future Telecoms and Meetings. The STP SG will hold an “all day” telecom February 14, 2004, beginning at 10 a.m. EST to discuss the test procedures section of the STP “fast track” ASAS MOPS. The STP SG will meet again on March 7 - 9 at RTCA in Washington DC. This meeting will be an end-to-end review of the STP “fast track” ASAS MOPS.

STP Action Items. STP SG members received the following Action Items (AI) at the meeting:

- Don Walker (Honeywell) will investigate whether or not 0.9995 availability is possible for a single box for STP.
- Bob Saffell will update a diagram created by Joel Wichgers to ensure the referenced sections (which were renumbered during editing) are correct.
- Joel Wichgers (Rockwell Collins) will revise Table 2-X HPL VPL Note 3
- All authors will provide an original copy of any figure or table to Jonathan Hammer and Bruce Paul in order to archive the material.
- Jonathan Hammer (MITRE) will have appropriate MITRE/CAASD personnel contact Honeywell personnel (and Karen Van Dyke at VOLPE) to recheck the Receiver Autonomous Integrity Monitoring (RAIM) figures regarding availability.
- Jeff Weeldreyer (ACSS) will get together with Chuck Manberg (ACSS) to address ARINC 718 priority for selection of vertical rate data and make sure that the selection of label 365 will depend on whether it is on the Inertial Reference System (IRS) or the FMS/GNSS bus.
- Tony Warren will draft an issue paper against DO-260A regarding the use of velocity information for the calculation of NAC_v to de-conflict the link MOPS & ADS-B MASPS.
- Bob Saffell (Rockwell Collins) will complete the test procedures section for the STP “fast track” ASAS MOPS with help from Don Walker (Honeywell), Jeff Weeldreyer (ACSS), Dave Thomas (FAA) and others.
- Sheila Mariano (FAA AIR-130) will provide a template (boiler-plate) material for the proposed AC that is intended to provide ADS-B installation guidance.
- Sheila Mariano (FAA AIR-100) Jeff Weeldreyer (ACSS) will research the TSO/DO references contained in the Input/Installation section of the proposed AC to ensure the most-recent documents are listed.
- Mike Castle (John Hopkins) will write the section in the proposed AC that deals with RF antenna assumptions.

STP Adjournment. Members of the STP SG adjourned from their three-day meeting on Wednesday afternoon (December 8) .
