

ASSAP MOPS Industry Meeting Minutes (SC-187 WG4)
 April 26/27, 2006 at MITRE

Agenda:

Date	
April 26, 2006	ASSAP Overview - Roxaneh Chamlou / MITRE
	ASSAP WG Goals and Objectives
	Series of Cross Briefings
	ASSAP MOPS Presentation - Tom Eich / ACSS
April 27, 2006	Series of Cross Briefings Cont'd
	ASSAP MOPS Presentation (continued)
	TCAS Issue Presentation - Ken Carpenter / Garfield Dean
	Schedule for MOPS
	Outline of MOPS
	Schedule for Future Meetings

Attendance:

Last Name	First Name	Organization
Adelmann	Joseph	USAF - GATS/NT -Surveillance
Andrews	Sounder	Airforce - GATS/NT -Surveillance
Anello	Domenic	DoD International AIMS PO
Branch	Allan	AIR-130
Bushman	Frank	DCS Corporation (rep. NAVAIR CNS/ATM Program)
Calkins	Franklin	DCS Corporation (rep. NAVAIR CNS/ATM Program)
Chamlou	Roxaneh	MITRE/CAASD
Carpenter	Ken	ATC Qinetiq
Cocklin	Tom	USAF - Flight Standards Agency (Nav System Div)
Conway	Sheila	NASA Langley Research Center (Aviation Op & Eval
Doerr	Jay	ACSS
Duffer	Robert	FAA AIR-130
Eich	Tom	ACSS
Fisher	John	USAF - GATS/NT -Surveillance
Hammer	Jonathan	MITRE/CAASD
Hunsicker	Victor	DoD International AIMS PO
Johnson	Dave	ACSS
Kilbourne	Todd	FAA Safe Flight 21/JIL
Landrum	Forrest	DoD International AIMS PO
Livack	Garret	FAA
Lindberg	Lars	AVTECH Swedn AB
Manning	Robert	L-3 GSI (support USAF)
Mosher	Tom	Garmin
Rasch	Blane	USAF - Flight Standards Agency (Nav System Div)
Samanant	Paul	Honeywell
Seereiter	John	DoD International AIMS PO
Theford	William	USAF - GATS/NT -Surveillance
Thomas	David	L-3 Titan / FAA
Walker	Don	Honeywell
Wang	Ganghuai	MITRE/CAASD
Wichgers	Joel	RockwellCollins
Weed	John	Honeywell

Introductions:

The ASSAP MOPS meeting began with introductions by the attendees.

Overview:

An Overview of ASSAP was presented by Roxaneh Chamlou. The contents of the overview was provided in advance of the meeting and is contained in Agenda 26-27.ppt. During the presentation, it was requested to define the scope of the ASSAP MOPS. It was the consensus of the attendees to limit the ASSAP MOPS to the surveillance processing, applications processing and the five “core” applications; EV Acquisition, Conflict Detection (CD), ASSA, FAROA, and EV Approach.

A question was raised relating to the qualification of crew members as it relates to ACL and how it maps into the ASSAP MOPS. The discussion that followed indicated that; TQL and ACL are not contained within the Link MOPS (DO-260A), even though bits have been reserved for this purpose. ACL and TQL may be considered in a future release as the “core” applications are not immediately affected.

A question was raised relating to the location of the control panel input requirements if entered from a common source, such as the CDTI. Expanding on this question it was asked where the location for pilot inputs are located. The discussion that followed indicated that the inputs, control panel and pilot, are defined on a dedicated bus and falls outside the ASA boundary. Further discussion revealed that the human interface (control panel, pilot) was assumed/agreed to be within the CDTI interface. However, during the STP MOPS development, the STP was separated from the ASAS MOPS to be contained within its own document. Further discussion of this topic may now need to be continued in the CDTI group.

Another objective was requested and involved the identification of missing skill sets that should be represented in future ASSAP MOPS meetings.

Additionally, a request was made to try to align the scheduling of the STP, CDTI, and ASSAP meeting dates with the plenary (June 15/16).

A desire to maintain a FAA Tech Center Web site to collect and maintain issue papers with a defined process such as a standard form for issue papers was discussed. This discussion failed to identify an individual to maintain the site.

ACSS ASSAP MOPS Presentation:

Interest in the MASS certification was expressed during the ACSS section of the presentation.

The topic of databases was raised in association with Figure 2-4 of the MASPS. Within the presentation, database inputs are classified as “Other Inputs” in relation to Figure 2-4. It is not intended that they will be defined within the ASSAP section of the MOPS.

Slide 14

A brief discussion occurred during the presentation of Slide 14 (Track deletion) which was centered on data retention for ground vehicles. It was suggested to consider a foot note for data storage of track data for ground vehicles.

Slide 15

Issue – Where do we draw the line for defining minimum requirements for the ASSAP application processing?

The option of presenting the MOPS from an interface perspective was suggested. This would include Surveillance Processing and common requirements related to the interface with ASA applications including latency requirements. It was decided that the MOPS would contain these items and requirements for the five “core” applications.

The mechanism to represent the requirements for the applications was discussed.

- Performance specifications, probabilities, etc.
- Provide algorithms within the MOPS

Performance type requirements would allow the manufacture flexibility in their design.

During the discussion it was brought up that all applications are not equal. Coupled applications would have to contain a high degree of agreement between aircraft. A high desire to provide the algorithm for this type was expressed.

Concerns raised were how performance specifications are to be written to be testable on an embedded system.

If an algorithm is supplied in the MOPS, the manufacturer would be responsible for proof of compliance.

It was the decision of the group that the MOPS would define performance requirements for applications and/or algorithms where applicable (based on the application). The MOPS would provide test cases for execution on the real time system to verify algorithms are implemented correctly. In addition the MOPS may contain validation of the algorithm itself (Monte Carlo analysis was mentioned).

A small discussion on application selection began and revolved around if the information to support applications is available an application may be invoked without pilot selection (automatic selection). The selection was also considered to be part of the “Other Inputs” as the condition to select the application would need to be introduced from an external source.

It was also mentioned that it will be the responsibility of the manufacturer to ensure that their design is expandable (for example, coupled applications). However, the MOPS should give a clear indication (to the extent possible) of future requirements.

Slide 16

The ASSAP diagram was presented.

Discussion began related to the location of “Track Selection” and if this function belongs in Surveillance Processing or Applications Processing. For the purpose of the presentation it is best suited in surveillance processing, no explicit requirements were made.

Slide 18

The discussion from slide 16 was again reiterated in regards to “Best Track Selection”.

It was requested that “Own-ship Navigation Management” be renamed to “Own-ship Position Management” to reduce confusion on the purpose of the function. This was agreed upon.

The subject of database(s)/surface map input was again raised. The concern related to databases is where this input will be captured. SC 206 is providing requirements for the map. However, location of the database or map is not focused on in DO-272A, DO-257, OSCD, or ASAS MASPS. Which working group has owner ship of databases/maps? Garrett Livack has an action to bring this up with the CDTI working group.

Slide 19

Question on how track quality is represented during the estimation. The co-variance from the degenerate Kalman Filter will increase with each estimation. The NAC values may be extracted from the co-variance. NIC/SIL values are to be retained from the measurement.

Discussion points related to the use of TCAS tracks within the system are listed below:

- Display of Best Track (ADS-B, TIS-B, and TCAS) on the CDTI will occur. TCAS is tagged only for correlation and display on the CDTI. ACSS has an action to verify the use and origin (ASSAP/CDTI) of the tag / cross reference flag with the CDTI group.
- Applications will receive the Best Tracks for the specific application
- Ken Carpenter will present paper on April 27. The paper indicates that the pilot will have the ability to select what is shown (ACAS/ASAS).
- TCAS will not be used for integrity checks of ASAS tracks
- Stability of targets (ACAS/ASAS) may also be considered in which track (position) is displayed.

Slide 20

A discussion of if the MITRE degenerate filter is to be required or provided as a recommendation in the MOPS. No decision was reached at this point in the discussion and it remains an open issue.

Slide 21

Issue: Each ICAO address received on 1090 MHz is assumed to be unique within the operational domain per DO-260A, DO-181C, ED 73B, and ICAO Annex 10 Volume IV. Currently DO-260A relies on the reception of unambiguous addresses to assemble state reports. Data elements within the report are received on multiple squitter messages. If ambiguous addresses are encountered, the validity of the state report would be in question.

The presentation utilizes an association window (provided by MITRE) as a reasonability check. Discussions took place on if this was required if unique participant addresses are required by the airspace. The reasonability check was agreed to be beneficial.

Issue: What is the tracking capacity? The ASA MASPS contains some requirements to support 90nm. The ASA MASPS contains some future traffic density estimates.

When determining the tracking capacity (minimum number of tracks to support) the prioritization of the tracks based on the active application must be considered. Other considerations are the LA Basin analysis contained within the MASPS.

An action was assigned to ACSS to consult Mike Castle (APL) or Larry Bauchman (APL) (neither in attendance) to develop/discuss filtering constraints (e.g., number aircraft, range, altitude, vertical height) as relate to the LA Basin 2020 scenario and projected traffic densities.

Issue: What is the minimum number of tracks sent to the CDTI? The ASA MASPS says a minimum of 30, based on supporting the minimum for TCAS. Is 30 based on clutter or TCAS surveillance range?

The MASPS specifies that a minimum of 30 traffic symbols (R3.270) will be supported by the CDTI. The question was asked if it is desired to standardize where the filtering/limiting of the tracks is to occur, in ASSAP or CDTI. The interface traffic would be reduced if filtering occurs in ASSAP. However, the possibility exists for the CDTI could perform this filtering. The group position was to allow ASSAP to perform the filtering. ACSS has an action to determine the minimum number of tracks ASSAP will be required to send to the CDTI.

Slide 22

The uniqueness of the participant address was discussed in relation to TIS-B/TIS-B association. We must assume the addresses are unique for 1090 reports to be correctly assembled.

Best track selection based on the spatial correlation of tracks from different surveillance sources is to be based on either NAC or NIC/SIL. This detail will need to be worked out in the algorithm.

Slide 23

Issue: Correlate TIS-B with an ADS-B and/or TCAS track based solely upon spatial correlation when the TIS-B track is NOT designated with an ICAO address. (from MITRE's ASSAP implementation).

This approach was acceptable to the group. Additionally, it was confirmed that when the TIS-B Report is designated as ICAO by the Address Qualifier, it will match that of the aircraft (Mode S Address).

Slide 24

Comment: The presentation assumes "Best Track Selection" is conducted in surveillance processing.

Continued discussion on the utilization of TCAS tracks within ASSAP. Best Track Selection will not send TCAS tracks to the ASA applications. TCAS tracks are to be utilized for situational awareness where the CDTI would use the TCAS tag for display purposes/determination.

Discussion: The TCAS track is to be displayed when a TCAS track and ADS-B track with correlating participant address are received but falls outside the "Hybrid Surveillance" validation window.

This scenario implies that the TCAS track is used as an integrity check of the ASAS track essentially validating the ADS-B data. Previous discussions indicated that TCAS will not be used for integrity checks.

The same scenario was discussed except that both the TCAS track and the ADS-B track would be displayed. A concern was brought up that if both tracks are displayed at different altitudes, a TCAS resolution advisory could indicate a climb/descend into the ADS-B track causing confusion for the crew.

TIS-B validation would be based solely on spatial correlation unless the ICAO address was specified in the report.

It was clarified that Best Track Selection is intended to provide multiple best track outputs, providing each application with the tracks that meet its selection criteria. A best track(s) is provided to each the individual ASA applications (as specified by the ASA application) and the best track(s) is provided to the display (as determined by ASSAP).

ACSS has an action to provide a white paper discussing options related to the priority selection between tracks (e.g., ADS-B displayed. TCAS displayed, ASA application receives ASAS tracks if validation fails, ASA application does not receive track if validity fails).

Slide 25

Issue: The range, bearing, and altitude window may have to be modified for TIS-B tracks to account for latency.

Discussion that followed indicated that NAC is not affected by latency. However, the position estimation will adjust the NAC value based on the co-variance. The NAC may exceed the limit specified by the application. The concern was if ADS-B and TIS-B tracks were both present for the same aircraft and the TIS-B track was of higher quality the TIS-B track would be selected until the estimation inflated its NAC to a value unsuitable for the application. This would cause a switch to ADS-B from TIS-B at a relatively periodic rate.

Further discussions indicated that maintaining a TIS-B and ADS-B track for the same aircraft is a low probability. Additionally the ADS-B track will most probably be the highest quality track.

The mention of latency began another conversation concerning the latency of a TIS-B message. The TIS-B time of measurement to transmission was said to be less than 3.25 seconds. The question was raised about what the uncertainty in the latency time is and if we are concerned with latency or report time error.

The priority order of how a track is selected based on the SIL and NAC was discussed. Performance will need to be quantified for any other application other than EV Acq. Joel Wichgers has an action to assemble a proposal/straw man to be available at the next ASSAP meeting in June.

Slide 27-29

Discussion began again related to ACL/TQL. The traceability from DO-282, DO-260A, TSO-C154A and the ASAS MOPS is in question. Currently DO-260A does not define ACL but has Service Level subfield reserved and set to all ZEROS (Service Level is contained within the CC field of the message). DO-260A states as a note: "When Service Levels are defined in the ASA MASP, future versions of these MOPS will define values other than zero for this CC code subfield."

It was expressed that the group clearly understand the TQL/ACL levels from ground to air. The concern is that the 1090 Link MOPS, UAT MOPS, and the ASA MASPS are not consistent in the definition of the parameters.

Any inconsistencies and/or traceability problems between documents sources should be identified as soon as possible.

Multiple sources of an A/V report were discussed. The MASPS identifies the source of reports as 1090 ES, UAT, and VDL-4. The presentation does not nor do the reports differentiate between sources. The question is where the function is to be incorporated, STP or ASSAP processing. Two separate sources may not identify the same TQL.

Where the report consolidation/selection is to occur when a system has the ability to receive an A/V report from multiple mediums (1090ES, UAT, VDL-4) is to be determined.

Slide 31

Issue: Track/Alert priority.

The following track priority scheme was proposed by Tom Eich.

- RA
- TA
- ASA Alerts
- Coupled Targets
- Selected Target

Followed by

- ADS-B Tracks
- TIS-B Tracks
- TCAS Tracks

Or

- Non-alert/Selected Tracks based on range.

It was mentioned that TCAS alerts are inhibited for certain altitude levels (1000+/100).

The proposed priority scheme would support the core applications.

CD is the only defined application w/ alerts in the scope of the MOPS. SCRSP suggests shutting down ASA application in the event of an RA.

Discussion occurred related to ASSAP providing alert inhibit logic. However, ASSAP is not part of TCAS and should/will not control or suppress TCAS in any fashion.

The group accepted proposed alert prioritization. The detailed selection of tracks with no alert status is application specific and will require more discussion.

Slide 32

Issue: How many tracks should be sent to the display? ASA MASPS currently says that the CDTI shall support a minimum of 30.

An example was given where 44 aircraft were observed on the ground waiting for take off (30 may not be adequate).

The 30 most applicable targets based on active application, on-ground status, coupled application, etc. Questions related to “applicable targets” are; How the most appropriate 30 targets selected? How will this selection is to be validated for the selected application (e.g., human factors assessment). It was agreed that an algorithm would need to be provided in the MOPS for the selection.

ACSS has an action to determine the appropriate number of tracks to send to the display.

Slide 33

Issue: Propose to perform source selection based on the STP MOPS which is based on HPL (measurement of containment). This will keep the transmit and receive data sources similar.

The group agreed to the above proposal.

Slide 34

Two separate outputs labeled Own-ship State Report are identified in the slide. It was clarified that Own-ship Position Information was to be provided to the ASA applications, ASSAP surveillance processing, and possibly the CDTI.

Slide 35

Due to time limitations the group has an action to review the following concerns by the next ASSAP meeting in June.

Issue: Latency/Performance Issues

- Latency for the combination of ASSAP and the CDTI shall (R3.210) be less than 400 ms for targets that are used by coupled applications, targets against which there is an alert, and the 10 highest priority targets.
- Latency for the combination of ASSAP and the CDTI shall (R3.210) be less than 1 second for targets which are not intended for coupled applications, have no active alerts, and are not included in the highest 10 priority targets.
- Track estimation shall (R3.188) extrapolate all established tracks to a common time within one-second of delivery to ASA applications or the CDTI interface.
- The tracking function shall (R3.178) terminate a track when the maximum coast interval has been exceeded for all of the applications for which the track is potentially being used.
- The maximum latency of the navigation data outputs to the ASA system will be less than 2 seconds (ASA MASPS, Page 144)
- Selected App, Selected Target, flight crew selections, etc. performance?
- TCAS availability when ASSAP is failed?

Additional items mentioned were addressing the uncertainty in the track delivery (TOA) taking into account the computer platform, communication protocols, etc.

In a side discussion it was mentioned that architecture guidance for ASSAP may be provided in the following documents:

DO-297 Integrated Modular Avionics, IMA; Development Guidance and Certification Considerations

ACR MASPS DO-255 Requirements Specification for Avionics Computer Resources (ACR)

Additionally it was mentioned that the terminology for ASSAP should be verified as other working groups have referred to it as Airborne Surveillance and Separation

Assistance Processing and not the MASPS definition of Airborne Surveillance and Separation Assurance Processing

ASSAP MOPS Development Schedule

The ASSAP MOPS schedule was presented by Roxaneh Chamlou. The schedule was provided in ASSAP MOPS schedule.mpp. The schedule was updated as items were discussed and produced a completion date of September 2007.

Discussion items that occurred during the review of the schedule included the following questions:

Does the ASSAP MOPS group need to review the STP before release? The opinion of the group that is it will be covered at an individual level and not at a group level. The concern/question was raised as the implementation may affect the ACL definition and possible affect the implementation of the ASSAP intermediate application.

Will MITRE/NASA provide validation of development requirements? Sheila volunteered to obtain input from NASA's involvement.

What level of validation will be provided with requirements? DO-249 may provide guidelines for the validation process.

Roxaneh Chamlou has an action to send out the revised schedule.

ASAS MOPS Outline:

ASA MOPS.doc was presented and modified during the discussion to obtain the general layout of the document.

Roxaneh Chamlou has an action to send out the revised outline. Additionally, the group has an action to review the revised outline.

10:00 am SCRSP, Discussion on April 26 version WP A10-bbb traffic displays.doc. Presented by Ken Carpenter.

- Document Abbreviations
 - S – ICAO SARPS
 - M – Manual (Guidance)
 - C – Comments (Temporary)
- This is not an agreed SCRSP or ICAO position and is intended to generate feedback.
- M1.2 The 10⁶ originates from C1.2, (Numbers are up for discussion).
- M1.5 addresses the issue of multiple addresses in the same area. There is a probability that the ICAO addresses are incorrect and a duplicate address may be recorded.
- S1.5 is indicated as a “shall”; The flight crew should not use ACAS tracks to maintain separation. ACAS is for visual acquisition.

- Comment: RA and ASAS information displayed. If ASAS is removed the probability of continuing the ASAS application is reduced.
- Questions:
 - Operation concept, a safety and performance analysis was not conducted in preparation of this paper.
 - Question: Will the specifications require all equipment to be Level B, and require SIL of 3? 10^6 is not intended to be based on integrity of data (SIL). An analysis to be performed, consequences to be evaluated. A discussion on safety analysis. If numbers are correct this will have consequences on the design of the equipment. The bases of the numbers is contained in the paper. Suggested to determine what the numbers should be, make no assumption of what the flight crew is doing with the ASAS track. The paper is based on ACAS not ASAS. Pilot may improperly utilize ACAS tracks. (Collins).
 - Conclusion of working panel (SCRSP) may want to write standards related to the paper. Refer paper to OPS panel for recommendation.
 - SCRPS – Technical
 - OPS Panel – Flight
 - SARPS for ASAS equipment? No provisions to work on ASAS requirements. Operational procedures were created for ACAS.
 - ADS-B Out not considered to be part of ASAS and should be covered w/ technical requirement. (This does not include the reception).