

**CDTI subgroup meeting** (including some December 8 plenary notes)  
December 6-7, 2005

Sethu Rathinam	Rockwell Collins	Chairman
Michael Petri	FAA William J. Hughes Technical Center	Secretary
Ed Rafacz	ALPA (Delta)	
Taji Shafaat	Boeing	
Jim Walton	UPS	
Tom Eich	ACSS (L-3)	
Bob Manning	L-3	
John Morgan	Honeywell	
Ken Carpenter	Qinetiq	
Masoud Paydar	ICAO CNS	
Gary Livack	FAA	
John Dowdy	Garmin	
Michael Palmer	NASA Langley	
John Helleberg	MITRE	
Terry Abbott	Booz Allen Hamilton (for NASA Langley)	

**December 6, 2005**

**Review of TCAS-II display requirements (DO-285A) – implications for CDTI: Taji Shafaat**

It was agreed that the CDTI requirements (for shared TCAS display) must accommodate TCAS.

For alert latency, there was some concern about the requirement to display a correct TCAS alert within 1.5 seconds from the reply that causes the track to issue an alert. CDTI (and ASA) will have no control over when that information is presented to ASAS for display (that is, TCAS will have some delay prior to providing the data to ASAS). ASAS will likely only provide some specific delay from receipt of the data to display.

TCAS mandates a display range mode of 5 nm to the front and 2.5 nm behind for dedicated displays. John does not think that all TCAS displays accommodate this requirement. There may not be a rear-display requirement in the draft CDTI material.

Other issues:

Capability to display at least 3 simultaneous alerts (TA + RA)

Altitude filter width

Multi function display requirements: Review TCAS and reconcile

Heading mode option required during TA/RA

## **ACSS priorities for CDTI (spacing, sequencing and merging) – Tom Eich**

Tom presented a list of “holes” in the June 2001 CDTI MOPS draft and the ASA MASPS.

Ed was concerned that focusing on too small a display range (on the surface) might cause some problems, and suggested some sort of CD-like alerting on the ground to compensate for threats off-screen. No such application currently exists. He took an action to write this up.

De-cluttering: There was a suggestion that an appendix of suggestions be included with the MOPS. This might include ideas for decluttering.

For *Alerted* targets that are out of range: Is there a CDTI requirement (similar to TCAS) to show a half-target at the edge of the display? It appears this should be a requirement and we should have a discussion and create MOPS language for it.

### **Priorities from others:**

None identified

## **Holes between ASA MASPS and CDTI MOPS – Tom Eich**

Tom prepared a list if items missing from the old CDTI MOPS draft. (see file)

**Action for Michael** – 3.3.2.3.4.4 Alert zone selection? Should this be assured normal separation distance? An initial review of the ASA MASPS indicates that the only setting required by the pilot would be the ANSD (the desired normal spacing) for conflict avoidance CAZ use. However, the applications description also defines several different parameters that are set according to the airspace. This *could* refer to manual setting of the airspace environment (GA traffic pattern, radar terminal area, high-altitude en-route)

**Sethu and Tom will consolidate their lists, and this will result in action items, issue papers, etc, to be resolved prior to publication of the MOPS.**

## **ADS-B / TCAS position data during TA/RA – Taji, Ed, Jim**

Taji prepared a paper rationalizing the data source to be used for traffic under surveillance though both ADS-B and TCAS during a TA/RA. The paper only addresses position data, not directionality or target symbol.

Ken Carpenter feels that it is important to know if a target symbol position is based only on TCAS data to ensure that pilots don't maneuver based on TCAS surveillance data.

**Action: CDTI group should formally respond to Ken's SCRSPS paper on the use of ADS-B data for traffic display of TA/RA.**

Ken likes specifying that the best data should never be supplanted by TCAS data, and that would basically require ADS-B data be used all the time. He notes that this is likely to be controversial. Determining best track is an ASSAP issue. This idea currently conflicts with the FAA's advisory circular. Bill believes that the FAA position was intended only as a temporary measure until experience is gained with ADS-B.

Ken feels that if the symbol position data source changes, it should happen when the TA is issued, not when an RA is issued, since a position shift would draw attention to the display. Attention should be drawn to the traffic display during a TA, not an RA.

The group generally agreed with the ideas in the paper. Taji, Ed, and Jim are still refining the words. **They will send it out for review by the group after completion.**

### **December 7, 2005**

#### **Application Selection Paradigm (functions/applications)**

How applications fit together.

Sethu brought up the question of how additional applications can be added to the ASA system *if* they already meet the requirements of another application (i.e., the functionality and performance are already available in the CDTI). Is there a need for a new version of the ASA document, etc, before proceeding?

Steps involved:

- 1 – Application and requirements are fully developed
- 2 – Proper ACL is determined, and application is added to MASPS

ACL is included to allow the flight crew, other aircraft, and ground to know the equipment *and* flight crew capability.

Issues:

- 1 - Application subsets – how to handle?
- 2 - STP doesn't address ACL
- 3 - Adding applications – how to handle? (ACL assumes strictly hierarchical application grouping)
- 4 - Obsolete applications or replaced applications?
- 5 - Configuration problems for airline fleet.
- 6 – Training issues for operators/airlines (since ACL includes pilot capabilities as well as automation capabilities).

Potential solution:

On-condition message (or some other low rate message) could be used to broadcast a dedicated bit for each application (this will break the hierarchical requirement and provide significantly additional flexibility). Sethu suggested that an application set number could be used, for human factors purposes, like the ACL, to define the entire set.

7 - Is there a need to broadcast the basic applications separately (read together with above suggestion)? Probably not, because these applications were defined as those which no one else would have any need to know about. These are “optional” in the ASA MASPS, and the ACL for basic applications doesn’t specify the optional applications.

8 - Is there a need to broadcast all the other applications? (Those currently defined, such as ACM.) The ASA MASPS thinking is that the ACL and ADS-B squitter version number will identify the specific applications.

9 – There are concerns about the hierarchical structure of the current ACLs, and the requirements that Advanced 2, for example, includes all Advanced 1 and Intermediate applications.

This issue will be presented to the plenary.

John suggested that the ACLs include capabilities, rather than applications.

For instance:

Basic: basic traffic display

Intermediate: (enhanced visual acquisition) broadcast of application necessary, spacing tool, coupled/selected target

ACL 1: (ACM) long range surveillance, altering and resolution capability.

ACL 2: (ASIA and ICSPA) coupled targets, high accuracy and fast update.

In addition, each higher level may require higher criticality for the functions.

John and Taji will propose an alternative method of defining ACL-like levels based on functionality (such as above).

While the applications may be broken up into these functions, it must be remembered that the application still involves operational definitions, and may involve unique software and display.

### **Consolidated CDTI MOPS actions/positions**

The past discussions and actions of the subgroup were reviewed to consolidate positions and actions. See also Sethu’s notes. The actions/positions are identified by the meeting/telecon dates. “None” indicates that no specific actions or positions were developed at that meeting or telecon.

12/6/05 meeting

1 Concerns about application hierarchy vs. flat model.

2 Use of “best” data for TCAS/ADS-B target display, even during TA/RA. No separate TCAS data stream for display would be needed.

3 Degraded directionality: Required in MASPS, but not by any application

4 Agreed with consensus of Issue Paper (IP) 17 on use of directional symbol and velocity vector for TCAS RA. That is, the group will not recommend either

using or not using a directional symbol during a TCAS RA. The velocity vector SHOULD be removed during an RA. (Ignore May 2005 minutes discussion.)

5 The CDTI MOPS will only address installed equipment, and not Electronic Flight Bags explicitly. (EFBs can use the MOPS requirements if appropriate).

11/22/05 telecon - none

10/25/05 telecon - none

9/20/05 meeting

1 ASA MASPS section 3.3.3.1.3.1 notes that target filtering is expected, but that it could occur in either the CDTI or the ASSAP, and makes no recommendations. After some thought, the group agreed that there should be no reason to specify the interface between the CDTI and ASSAP, as it would dictate the system design. This is essentially the same conclusion as drawn by the ASA MASPS authors. Further discussion is needed (with ASSAP group) on this topic to get a framework of how to handle this issue.

*There is likely a need to reconcile the work on STIF and DTIF with the ASSAP-CDTI interface requirements. Michael Palmer will prepare a summary of the DTIF/CDTI issues.*

*Write a coordination memo to AEEC (ARINC 735A1 DTIF) about CDTI data element requirements. Action for Sethu and Michael Petri.*

2 Differentiating ground vehicles was considered desirable, as well as showing emergency vehicles differently from other vehicles. These were not considered a minimum requirement.

3 Example symbol sets will be provided in an appendix to the MOPS. These sets will be examples, not requirements.

9/8/05 telecon - none

7/26/05 meeting

1 Agreed to provide guidance on the number of colors for display.

7/7/05 telecon

1 Alerts from several applications (or several alerts from one application) could be present at the same time. It was agreed that some form of alert prioritization and consistency is needed for all applications and TCAS. This is likely to be an ASSAP function.

2 The MOPS should address application specific installation requirements and limitations. (Such as display location for guidance.)

5/24/05 meeting

1 Agreed that there should be some human interface (for maintenance, crew/flight crew) for setting up the ACL.

5/12/05 telecon - none

4/28/04 telecon - none

3/29/05 meeting

1 It was agreed that the ASSAP to CDTI interface data would include information to determine if the data is good, degraded, or invalid for each target. (some meeting, not necessarily this one.)

3/17/05 telecon - none

3/3/05 telecon - none

2/17/05 telecon - none

1/25/05 meeting - none

Sethu took the action to look through the prior minutes and complete the list.

Other issues:

1 Is there a need for differentiating between TCAS, ADS-B, and correlated target symbols?

### **Plenary/WG4B coordination items**

For plenary:

- What should we be doing about RFG applications?
- The current STP document does not include TQL - implications?
- Issues with ACL and adding applications.
- Degraded directionality display is required by the MASPS, but none of the applications use it. We've decided not to include it in the MOPS.
- Status of CDTI MOPS

For WG-4B

- Schedule
- Document draft/editing logistics between subgroups, especially for common (boilerplate) items

### **Upcoming telecons and meetings.**

Telecons:

Jan 31, 2006 2:00 PM eastern

Feb 28, 2006 2:00 PM eastern

Upcoming meeting to be scheduled soon.

**December 8, 2005 SC-186 Plenary 31<sup>st</sup> meeting**

WG1 – no activity

WG2 – no activity

WG3 – Tom Pagano is new secretary.

TSO C166A should be posted to the federal register soon. They are updating DO-260 to include changes in TSO C166 and C166A, as well as DO-260A. They plan to update both documents for both standards. There are some other nations interested in continuing with the DO-260 standard. They would like to publish this soon. (C166A will be based on DO260A and will remove references to DO-260).

Jonathan asked why this activity does not wait for changes necessary for STP. There are concerns about correcting a number of certification problems quickly. STP changes will not require a change to the MOPS.

WG-4B - CDTI subgroup

The plenary seemed insistent that we stay with the current course of development, using only the initial ASA applications. The first version of the MOPS will deal only with those applications currently included in the ASA MASPS. “Package 1” applications not currently included in the MASPS, but under developed in RFG, will not be included in the first version of the ASSAP MOPS.

Jonathan stated that the intent of the ACLs was to include functions that the applications would fit within, rather than application specific. That thinking would allow additional applications which meet the requirements of existing ACLs to be added to the appropriate ACL. Applications with more stringent requirements would require additional ACLs, and maintain the hierarchical structure of the ACLs. These can be added in later MASPS versions. Applications such as M&S may be implemented “locally” by UPS, but will not be included in the ASSAP MOPS.

WG-4B – STP subgroup

Plan to use best HPL source with some hysteresis.

Plan to provide Advisory Circular proposal to FAA.

NEXT SC-186 MEETING:

Ballot for STP MOPS will be delayed. As such, planned March meeting will be delayed.

March 13-16 (# of days?) RFG somewhere in Europe

April 17-21 (# of days?) SC-186 and WGs at MITRE?

June 12-15 -(# of days?) joint SC-186 / WG 51 plenary