

**Special Committee 147**

**MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR TRAFFIC ALERT AND  
COLLISION AVOIDANCE SYSTEMS AIRBORNE EQUIPMENT**

The 98<sup>th</sup> meeting of RTCA SC-147 and 67<sup>th</sup> meeting of EUROCAE WG-75 was held on 4 June 2020; this was a virtual (WebEx) Plenary hosted by RTCA.

The following Leadership was present:

J. Stuart Searight	Co-Chairman, Federal Aviation Administration
Ruy Brandao	Co-Chairman, Honeywell (WebEx)
Bill Booth	Co-Chairman, EUROCAE WG-75
Sheila Mariano	Government Authorized Representative
Donna Froehlich	Secretary, Aurora Innovations
Al Secen	Director RTCA
Alex Engel	Technical Programme Manager EUROCAE

**Agenda for Thursday, 4 June 2020**

1. Chairmen's Opening Remarks / Introductions (9:00am EDT)
2. Anti-Trust Statement & RTCA/EUROCAE Policies
3. Approval Of Minutes From 97th Meeting of SC-147/ 66th Meeting of WG-75(21 January 2020)
4. Approval Of Agenda
5. ACAS Xu MOPS
  - a. Review Of Comments and Resolutions from FRAC/OC
  - b. Decision whether to Approve and to refer to PMC
6. CAS Interoperability MASPS
  - a. Review Of Comments and Resolutions from FRAC/OC
  - b. Decision whether to Approve and to refer to PMC
7. Outbrief from SC-147/WG-75 Working Groups
  - a. SWG
  - b. TWG
  - c. CSG
  - d. sXu Status
8. Status of European V&V of ACAS Xa MOPS
9. Status of Joint US/European Regulatory efforts
  - a. Sheila Mariano
  - b. Kevin Hallworth
10. Change Proposal 01- Schedule for inclusion into DO-385/ED-256
11. Other Business – ACAS Xr (Collision Avoidance System for RotorCraft)
12. Future Meeting Scheduling
13. Action Items Summary
14. Close (12:00pm EDT)

1. Chairmen's Opening Remarks / Introductions (9:00am EDT)

Mr. Stu Searight welcomed everyone apologized for any inconvenience or disappointment with having to meet remotely. He noted it was unfortunate that the COVID-19 pandemic was keeping us from being able to meet in Seattle, WA as originally planned. Mr. Searight thanked the Working Group and other contributors for their hard work in preparing for this meeting and thanked everyone in advance for their participation and patience during these proceedings.

2. [Anti-Trust Statement & RTCA/EUROCAE Policies](#)

Mr. Al Secen presented RTCA Anti-Trust Policy and Proprietary Policy. Then Mr. Alex Engel reviewed the EUROCAE IPR Policy which is very similar to that of RTCA Proprietary Policy. Both, Mr. Secen and Mr. Engel, presented the RTCA and EUROCAE Membership policies indicating that at the RTCA Policy on attendance and participation of guests applies to attendance of this meeting. Finally, Mr. Al Secen reviewed some meeting tips to make a WebEx-based meeting flow a little more smoothly and then requested all participants to record their attendance; he provided everyone on the WebEx with the link to the meeting instance in the RTCA Calendar.

3. [Approval Of Minutes From 97th Meeting of SC-147/ 66th Meeting of WG-75](#) (12 March 2020)

Mr. Searight introduced the minutes from our March 2020 Plenary. There was a Motion to approve from Mr. Stacey Rowlan; Mr. Tom Hanrahan seconded. There was no objection or request for correction; the minutes were approved.

4. Approval Of [Plenary Agenda](#)

Mr. Stu Searight displayed the Plenary agenda and provided an opportunity for committee members to comment on and amend the agenda. As he reviewed the published agenda items, Mr. Searight stated that the Committee Leadership would like an opportunity to discuss scoping/timing of updates to DO-385; i.e., whether and how to incorporate CP-01 into an update of DO-385. Mr. Searight indicated he had received a request to address additional business, in particular ACAS Xr, this was added to the latter half of the agenda. There were no other amendments to the agenda which are presented as amended above.

5. ACAS Xu MOPS

a. Review Of Comments and Resolutions from FRAC/OC

Ms. Jessica Lopez began by summarizing the [FRAC comments resolution by the SWG team](#).

Ms. Lopez continued by reviewing a couple of the more significant themes to the comments and their resolutions: She first addressed that there were comments that refined correlation performance requirements and the addition of some new ownship monitoring requirements for DAA MOPS alignment. The next theme was comments that clarify STM / TRM behavior under degraded ownship and intruder conditions and ADD code updates to accommodate these off-nominal scenarios. Mr. Adam Panken contributed: this better defines which track gets sent to TRM based on the available surveillance; he added these comments also help to improve the robustness of IMM tracker; Mr. Panken also noted that some comments addressed some high elevation geometry behaviors and clarified when/whether it is acceptable to use geometric altitude in lieu of barometric altitude. Ms. Lopez described the final theme of comments as clean-up and clarifications overview sections and other STM portions of Volume 1, adding these comment resolutions will greatly contribute to the readability of the final document. Mr. Ruy Brandao noted one significant item getting "cleaned-up" is the rework of a table indicating which surveillance should be used depending on the data quality and sources

available. Mr. Brandao noted that this is a real joint effort in getting resolving all the comments, in addition to the Program Office there are 5 manufacturers involved and there are some really great contributions.

Mr. Leeper summarized TWG FRAC [MOPS Volume I comments](#) resolution; TWG started with 315 comments. Because of all the progress our working group has made this week and in the weeks prior, we have: 30 resolutions already incorporated into the working draft, 113 comment resolutions ready for incorporation and 172 comments with the status of in-process – where the approach has been approved by commenter, but actual words need to be developed and reviewed by the commenter. Mr. Charles Leeper continued indicating that there were several themes in the Volume I comments allocated to TWG. He summarized as follows:

- Introductory text on relationship with SC-228
- ARA fields
- Coordination bench tests
- RWC Broadcast – noting this is being worked jointly with SWG
- Maneuver performance
- Display and Controls – adding that Mr. Tom Teller is assigned to update the RA mapping table – Monitor Vertical Speeds and Clear of Conflict (CoC) are not alerted/announced
- TRM overview
- ACAS Xo and the need to clarify the optional feature and potential for incorporation

Mr. Leeper then summarized some of the [comments/topics on the Volume II ADD](#) that have required some focused discussion. Those topics are: horizontal update rate, surveillance source table, de-saturation, online cost, and interference limiting. The Interference Limiting (IL) comment was significant – almost decided not to address this within the algorithms’ design but to refer to the appropriate surveillance reference(s); however, TWG members decided plan to discuss IL during future TWG calls in order to address concern that these messages are being generated for a reason and they shouldn’t be completely suppressed.

Mr. Garfield Dean stressed importance of getting the WG consensus (& Committee-wide agreement) upon the transmission of RWC messages in Interference Limiting. Concern that RWC info is available to ANSPs. Mr. Ruy Brandao agreed saying: what is in the document is unacceptable due to interference limiting considerations; have we agreed we have to honor Interference Limiting and not hurt surveillance performance. He indicated: we (ACAS Xu) are going to have RA broadcast and there will be room to include RWC (broadcast). Mr. Brandao continued: there may be times where we can’t broadcast. We have agreed there might be room to compromise in this space. I think we will come to a good compromise where we transmit at least once. Perhaps we can provide some repetition during a long RWC; perhaps we can introduce “throttles” so open space/over ocean (ACAS Xu) can transmit more times. Mr. Dean: contributed: A monitoring mechanism is needed. This can be a contentious topic. He continued: I think that there should be at least one message for the start of RWC. Mr. Brandao concurred: I think we agree that (at least one message for the start of RWC) is the minimum; further discussion would be needed to determine if there are times we can broadcast RWC changes. Mr. Stu Searight contributed: We can agree that we don’t want to transmit RWC too much at the detriment of other necessary surveillance and communications. Mr. Dean interjected: Absolutely true, [systems] can broadcast too many times and affect communications. Mr. Brandao concluded the discussion by observing: This example (this Interference Limiting comment) demonstrates why the RTCA process works. We can talk through the comment and come to a measured resolution.

b. Decision whether to Approve and to refer to PMC

Mr. Searight presented a proposed schedule for ACAS Xu MOPS Completion

- June 4: Joint SC-147/WG75 Approval per all agreements reached in principle from FRAC/OC
- July 24 (Fri): All final language from comment resolutions submitted to Alan
- August 10 (Mon): Final MOPS document & Comment Matrices distributed to SC-147/WG75 (all PO MOPS products except Test Suite)
- August 25 (Tues): Virtual Plenary to ensure no issues with final comment resolutions Agreed (see open items below)
- August 31: Test Suite released
- September 11: Appendix F completed and incorporated into Volume I; 2.4.2.2 updated to reflect final Test Suite statistics/ metrics

Mr. Searight led the committee through a discussion of a few open items related to meeting the milestones just presented:

- Would the committee want a briefing on the Test Suite and Appendix F?  
If so, we may need to delay the SC-147 virtual Plenary until September 14. Mr. Searight asked for comment whether this would be necessary. The consensus was that it would be sufficient to use the Virtual Plenary to confirm the ACAS Xu MOPS acceptance. With that determination, there was agreement on scheduling the virtual Plenary for 25 August 2020; with a comment that we shouldn't need a virtual Plenary for resolution of the Vol II (ADD) comments. It was decided the Test Suite and Appendix F would not need or benefit from FRAC resolution review. Any substantive comments would come later and likely be handled in a Change Proposal or similar to ACAS Xa/Xo MOPS.
- Can we have ADD translation (LaTeX PDF product to Word) completed by September 11?  
Mr. Rowlan and Mr. Brandao agreed that we don't need an additional plenary to approve the Volume II  
Mr. Searight asked the membership if they were available and comfortable with August Plenary. No Objections, comment that the longer it waits, the less engagement more possibility of getting off track.
- Can/Should the committee request the PMC to meet virtually (to ballot this document) in late October?  
There is a concern that waiting until December 2020 to approve the ACAS Xu MOPS would be counter-productive to the staffing and other resource scheduling for the Program Office and possibly other stakeholders. If SC-147 wishes to request PMC to meet Out-of-Cycle with the intent of approving/publishing the ACAS Xu MOPS as soon as possible. The Committee leadership must start arranging for this now. The PMC will need a month to review the document – they should receive it in/before late September. Mr. Searight also noted that the committee should include make sure there is some slack in the schedule.  
Mr. Searight proposed that we request the Out-of-Cycle PMC session to be held Wed, October 28. Mr. Al Secen indicated we will have to justify the out-of-cycle review and approval in our request. He added that even with and Out-of-Cycle approval, the PMC will need 30 days to read/review the ACAS Xu MOPS (Volume I and II). Mr. Searight expressed the intention to have the MOPS to be ready September 11/Mid-September (no later than Sept 27<sup>th</sup>) so Mr. Al Secen may submit the document to the PMC members in sufficient time for the Out-of-Cycle ballot.

Mr. Searight then asked if there were any additional comments/concerns about the timeline of events to submit the document to the PMC/Council for publication approval. There were no further questions or comments regarding the timeline. Mr. Searight continued noting: All comments have been adjudicated and a proposed resolution recorded with assigned Point of Contact. Mr. Searight added that the Final Review and Comment spreadsheets are already posted on the workspace available for review by commenters and any other interested members. Mr. Searight asked if the committee was prepared to Approve in Principle. Meaning that the ACAS Xu MOPS is approved by the committee with the understanding that the implementation of resolutions would be consistent with the resolution recorded in the comments spreadsheets.

Mr. Charles Leeper made a Motion to Approve the ACAS Xu MOPS, Mr. Neal Suchy seconded. Mr. Searight asked if there were any comments, objections or dissent. There were none and the document was Approved; ACAS Xu MOPS may exit FRAC and the document is approved for preparation and delivery to RTCA PMC and EUROCAE Council.

Mr. Searight: In two years we went from approval of Xa/Xo to the approval of Xu. Phenomenal job. Al Secen and Alex Engel agreed and congratulated the committee on finalizing/closing FRAC on this MOPS.

6. Approval of CAS Interoperability MASPS

a. [Review Of Comments and Resolutions from FRAC/OC](#)

Mr. Garfield Dean began by summarizing the resolution of the FRAC/OC comments. There were 260 comments, 52 from EUROCAE and 208 from RTCA; this includes 32 duplicate submission. The CWG met multiple times a week and reached-out to commenters to participate at CWG meetings or via email to review, and comment on the CWG's proposed resolutions. The resolutions are stable, and is a more mature document than it was when it went out for the initial FRAC/OC. However, Mr. Dean noted, there are some changes that are noticeable: Some duplicate requirements were removed; some other requirements were split for clarity; there is one new requirement (it was previously implied, but is now spelled out as a requirement). Mr Dean added that there is new text describing an observation the team has made on Junior CAS; this provides better context and addresses at least one comment regarding Junior CAS.

Mr. Dean continued: the CWG request agreement by the committee to approve the MASPS for referral to PMC/Council in order to publish the MASPS. The CWG has incorporated all comment resolutions from the comments spreadsheet. The CWG would like an opportunity to perform a final scrub of tables, figures and other references prior to submitting to RTCA for PMC and plans to deliver the final proof/print ready of the MASPS in mid-June so the document may be presented To the EUROCAE Council and RTCA PMC in September.

b. Decision whether to Approve and to refer to PMC

Mr. Searight, I am very confident anyone interested in this MASPS is well informed; are there any questions/comments? Mr/ Alex Engel commented: It is very good to see the 2<sup>nd</sup> OC/FRAC process was taken as an opportunity to improve quality and coherence of the document; was taken as a challenge to see how the CWG/CSG could make the document better. Mr. Bill Booth added: This document is widely referenced by other efforts in Europe. It is a good and needed product.

Mr. Searight queried: Since there are no more questions or comments, is there a motion to approve? Mr. Wes Olson made a motion to approve which was seconded by Mr. Garfield Dean. Then Mr. Searight asked if there were any issue or any dissent? There were no dissenters, no further discussion and the Collision Avoidance System Interoperability MASPS were approved.

7. Outbrief from SC-147 Working Groups/WG-75 Sub-Groups

- a. Surveillance Working Group – Nothing significant to report beyond what was briefed earlier for FRAC close-out.
- b. Threat Working Group – Nothing significant to report beyond what was briefed earlier for FRAC close-out.

c. Coordination Working Group – Nothing significant to report beyond what was briefed earlier for FRAC close-out.

d. sXu Status

Mr. Walter Bender announced sXu will be meeting this afternoon and tomorrow morning.

Then Mr. Bender indicated the sXu team is getting organized and preparing for the ACAS sXu MOPS effort. Mr Bender indicated the team continues to coordinate with ASTM and SC-228 to leverage their expertise on small UAS.

Mr. Bender continued: Please join us if you can make the time. There will be several technical briefs this afternoon; Friday morning will focus on future work in SC-147 as the focus transitions to developing an ACAS sXu MOPS. The WebEx links and meeting schedule are included in this week’s [Agenda](#).

Regarding the scope of the ACAS sXu work, Mr. Stu Searight noted that TORs presentation to PMC was well received in April. Some comments/edits requested for TORs resubmission. Discussion at PMC included explanation why the sXu effort doesn’t require ISRA with SC-228. Formal approval will be at the June PMC, due to edits.

8. Status of European V&V of ACAS Xa MOPS (no slides)

Bill Booth summarized the status of the V&V of ACAS Xa/Xo for European airspace. Mr. Booth noted that some questions from the first analysis required a re-run; this activity is supposed to complete in November of 2020, Mr. Booth noted that for those in this group that are interested in the updated results which include DO-385 CP1, the team plans to have “ink wet” results at the end of calendar year 2020 with final results in the first quarter of calendar year 2021. Mr. Booth advised that SC-147 members shouldn’t expect a significant difference in results, but analysis must be done to be sure of the results.

8<sup>th</sup> May (rescheduled) OWG(?).

9. [Status of Joint US/European Regulatory efforts](#)

a. Sheila Mariano presented the status of the Aircraft Certification Products.

Activities	Schedule	Status
Publish TSO-C211a ACAS Xu	May 2021	Not Started
Publish ACAS Xa AC	Feb 2021	In Development. Next Milestone: FAA Review August 2020
Publish AC 20-151D	Dec 2021	Not Started
Publish revisions to ACAS X AC & DAA AC to add ACAS Xu	July 2022	Not Started
Publish TSO-CXX for ACAS sXu	TBD	Not Started

In order to address some of the disconnects with regulations referring to TCAS use, equipment, and version some rules will be changed. Under consideration for change are:

- o 91.221, TCAS equipment and use
- o 91.706, RVSM, Aircraft Approval
- o 91 Appendix G, Section 2, TCAS Compatibility
- o 121.356, TCAS

Ms. Mariano noted that the rulemaking proposal is with FAA Executive Planning for prioritization Ms. Mariano continued presenting information provided by Mr. Kevin Hallworth (slides 3-4), she described the European rulemaking constraints and the current schedule for passing those rules and

regulations. Ms. Mariano concluded by summarizing the FAA Response to delays in adopting ACAS Xa/Xo and noted that FAA executive will meet with EASA to raise the rule-making priority in order to better align with FAA and ICAO priorities.

10. Change Proposal 01- Schedule for inclusion into DO-385/ED-256 (no slides)

Mr. Stu Searight introduced the topic of potential changes to ACAS Xa/XO MOPS (DO-385/ED-256). He indicated that SC-147 has already issued Change Proposal 1, and decided to wait for feedback from testing and analysis results that indicates other changes are needed. Sc-147 has received some suggestions and we are tracking those items. We want to know whether there are any other proposed changes in draft for the Xa/Xo MOPS at this time. – We are trying to assess whether we need to plan for a Change 2 in the near future or whether we should wait for the European results and consider a Change 2 or a full-fledged revision to the document.

No one indicated that they or their organization has identified/started to draft changes against DO-385/ED-256. Mr. Suchy suggested: Based on EUROCONTROL briefing needing another year for their analysis; it doesn't make sense to do another revision of DO-385 until we get further feedback. Mr. Searight agreed that with the recommendation; with no other contributions to the discussion.

11. Other Business

Mr. Searight indicated that there was a request to address the potential committee effort on ACAS Xr at this time. Mr. DJ Winkel was recognized; Mr. Winkel indicated that he would like to gauge committee interest in an Collision Avoidance System for manned rotorcraft; would this be in the scope of ACAS Xr? Mr. Winkel indicated an interest in the committee member priorities on upcoming rotorcraft CAS work and what we (members) know about the timeline or scope for this effort.

Mr. Suchy responded to the CAS for rotorcraft questions. Mr. Suchy indicated that the TCAS/ACAS Program Office (PO) has a game plan that is just getting started for Xr, and the plan is to get to a standard for Xr. Mr. Suchy indicated the committee has included a reference for Xr in the TORs, so this can result in a Committee authored MOPS. Mr. Suchy continued the PO's (ACAS Xr) waterfall schedule for extends to 2024 where we want to pursue a formalization of a MOPS. He then stated that the schedule is based on leveraging products from sXu – But, like ACAS Xa/Xo and ACAS Xu, the MOPS would be more “hardened” to meet DO-178C software specifications. Mr. Suchy indicated that the PO recently received funding for the upcoming year in order to pursue this effort, with the PO moving forward as funding is received. Mr. Suchy revealed that the ACAS sXu Version 3 requirements and algorithm descriptions will be the starting point for ACAS Xr. Mr. Bender contributed that the workplan is on the agenda for this Friday

Mr. Ruy Brandao asked: Are you trying to gauge the current plan with your organization's needs for a standard. In response, Mr. Winkel observed that in an ideal situation we are looking at a document completing in 2022. He continued: The concern is that manned helicopters are starting to use TCAS II and asking for a new helicopter-designed product. Mr. Suchy responded that the PO has already started work on ACAS Xr already; we are working on it in parallel with ACAS sXu. Mr. Suchy concluded: It's just a bandwidth limitation with PO resources.

Mr. Winkel responded: Thanks for the committee considering my concerns/suggestion; it sounds like we have a plan in place. Mr. Ruy Brandao observed: This situation of demand driving the product is much better than not having anybody interested in the product. Mr. Searight agreed indicating appreciation of the demands and

concerns of the manufacturer, developer as well as the standards/regulatory representatives. Mr. Winkel responded: I understand a lot of work goes into all this, and I appreciate that work.

12. Future Meeting Scheduling

25 August 2020 (Tues) – Virtual Plenary to ensure no issues with final comment resolutions

14-17 September 2020 – RTCA Rooms reserved

8-10 December 2020 – RTCA Rooms reserved

16-18 March 2021 – RTCA Rooms reserved

13. Action Items Summary

Aug 25 virtual Plenary to confirm approval of Xu MOPS

Justification to PMC for an Out-of-Cycle review of ACAS Xu MOPS

Searight to Post final TORs in the Presentation folder for this meeting

14. Close (12:00pm EDT)

Brandao: congrats to committee and WGs, the whole team

Booth: well done everyone

Engel: congratulations

Searight: That closes our meeting, thanks for the hardwork, Hope you can join the sXu meeting at 1:00



ATTENDEES

Last, First	E-Mail
Alvarez, Luis	luis.alvarez@ll.mit.edu
Askar, Naiel	naiel.askar@ga.com
Bender, Walter	walter.r.bender@jhuapl.edu
Booth, Bill	bill.booth@eurocontrol.int
Borshchova, Iryna	iryna.borshchova@seamatica.ca
Brandao, Ruy	ruyjr.brandao@HONEYWELL.COM
Breeden, Kara	Kara.Breeden@ll.mit.edu
Burton, Roger	roger.a.burton.ctr@navy.mil
Campbell, Paul	Paul.Campbell@faa.gov
Carino, Joslin	joslin.carino@ll.mit.edu
Carpe, Ken	ken@ken.com
Cayton, David	david.cayton@collins.com
Chen, Vincent	vincent.chen@ll.mit.edu
Ciaran, Vincent	vincent@ll.mit.edu
Das, Anshu	anshu@ll.mit.edu
Dean, Garfield	garfield.dean@eurocontrol.int
Drumm, Ann	ann.drumm@ll.mit.edu
Edwards, Christy	christy.edwards@ll.mit.edu
Edwards, Mark	mark.edwards@ll.mit.edu
Engel, Alan	alan.engel@ll.mit.edu
Ferrel, Alan	alan.ferrel@ll.mit.edu
Foster, Alan	alan.foster@ll.mit.edu
Froehlich, David	dfroehlich@collins.com
Gjersvik, Adam	adam.gjersvik@ll.mit.edu
Gonzalez, Jose	jose.gonzalez@faa.gov
Grebe, Tim	Timothy.Grebe@ga-asi.com
Guendel, Randal	randal.guendel@ll.mit.edu
Hallworth, Kevin	kevin.hallworth@easa.europa.eu
Hanrahan, Tom	thomas.hanrahan@navy.mil
Hirt, Ruth	ruth.hirt@faa.gov
Huck, Volker	volker.huck@eurocontrol.int
Jacobson, Randy	randy.jacobson@collins.com

ATTENDEES Continued

Last, First	E-Mail
Janjua, Salim	<a href="mailto:sjanjua@constellation.aero">sjanjua@constellation.aero</a>
Klang, Pavel	pavel.klang@honeywell.com
Kobzik-Juul, Barbara	barbara.kobzik-juul@jhuapl.edu
Law, John	johnsimonlaw@icloud.com
Leeper, Charles	charles.leeper@jhuapl.edu
Lopez, Jessica	jessica.lopez@jhuapl.edu
Mackay, Justin	justin.mackay@nearearth.aero
Mariano, Sheila	sheila.mariano@faa.gov
Matuson, Michael	michael@rdrtec.com
Monk, Kevin	kevin.j.monk@jhuapl.edu
Monk, William	wmonk@jhuapl.edu
Conroy, William	wconroy@jhuapl.edu
Pank, Robert	pankr@jhuapl.edu
Picardi, Robert	picardi@jhuapl.edu
Raynes, Joseph	raynes@jhuapl.edu
Reed, Mark	reed@jhuapl.edu
Rowlan, Star	star@rowlanharris.com
Saunders, Robert	saunders@innovations.com
Seaton, Robert	seaton@jhuapl.edu
Schiffman, Robert	schiffman@jhuapl.edu
Sigmond, Alan	alan.sigmond@jhuapl.edu
Silberstein, Joshua	joshua.silberstein@jhuapl.edu
Smearched, Samantha	sam.smeared@jhuapl.edu
Theis, Sid	sidtheis@rdrtec.com
Thurling, Andrew	ATHurling@NUAIR.org
Ulm, Brian	brian.ulm@l3t.com
Walker, Donald	Don.walker@honeywell.com
Winkel, D.J.	doug.winkel@garmin.com
Wu, Gilbert	gilbert.wu@nasa.gov
Wu, Samuel	samuel.wu@ll.mit.edu
Zeitlin, Andy	azeitlin@mitre.org