

RTCA- 228
Summary of Plenary #24- RTCA Paper No. 197-20/SC228-072
VIRTUAL
1:01 PM EST, July 23, 2020

The twenty-fourth plenary of RTCA Special Committee 228 was called to order by SC-228 Co-Chair, John Moore at 1:01 PM (EST) on July 23, 2020, using WebEx audio and web conferencing only due to COVID-19 stay at home orders.

1. Agenda Item #1- Call to Order: Welcome
 - 1.1. John Moore, co-chair welcomed everyone to the Plenary and stated the purpose of the meeting was to approve two documents to the PMC and review status of working groups.
2. Agenda Item #2- Review RTCA meeting guidelines
 - 2.1. Al Secen started by thanking everyone for making this week's virtual meetings a success.
 - 2.2. Al reviewed the Anti-Trust Policy, the Proprietary Policy and the RTCA Committee Participation Membership Policy
 - 2.3. Al also briefed some meeting tips to ensure a successful virtual meeting
 - 2.4. Al then briefed self-rostering feature online at <https://workspace.rtca.org/kws>.
Thank you to all who self-roster!
 - 2.5. Roll Call- the list of session participants is listed in Appendix A
3. Agenda Item #3- Opening remarks/ introductions
 - 3.1. This committee currently has 640 registered members from 142 organizations
 - 3.2. Ad Hoc WG first meeting is tomorrow (7/24)
 - 3.3. Introduced Randy Willis, WG3 Lost Link Co-Chair, with Northrup Grumman as a Senior Policy Advisor. Special thanks for Randy volunteering, especially with his strong background in the Navy and FAA
 - 3.3.1. All who are interested in participating, join via Workspace
 - 3.4. Introduced Joel Wichgers, WG4 Navigation, with Collins who has worked many standards in Navigation and ADS-B
 - 3.4.1. All who are interested in participating, please join via Workspace
4. Agenda Item #4- Approve meeting minutes from Plenary Meeting #23
 - 4.1. Christina Westover stated she received no responses for updates/clarifications.
 - 4.2. Christina asked for Acceptance of plenary #23 minutes; no objections. Minutes unanimously approved.

5. Agenda Item #5 Exit FRAC: Air-to-Air Radar MOPS, DO-366A -- Approval to Submit to PMC

5.1.1. FRAC opened on May 14th, closed on June 15th. WG1 received 174 comments from 17 commenters, and most comments were resolved while FRAC was ongoing

5.1.1.1. Post FRAC MOPS and resolution spreadsheet put on the RTCA Workspace on July 9th

5.1.1.2. All comments and resolutions were coordinated and accepted

5.1.1.3. Remaining editorial comments being incorporated by Jonas Trego and Shelly O'Leary

5.1.2. Coordinated with ACAS Xu team to ensure consistency between ACAS Xu MOPS and DO-366A

5.1.2.1. Received 19 new comments post FRAC resolution, incorporated what was helpful and easy to incorporate

5.1.2.2. Comments made against post-FRAC version of MOPS; Committee leadership decided to allow comments for possible inclusion

| | Number | Not Started | In Process | Complete |
|------------|--------|-------------|------------|----------|
| Non-Concur | 1 | 0 | 0 | 1 |
| High | 12 | 0 | 1 | 11 |
| Medium | 32 | 0 | 1 | 31 |
| Low | 35 | 0 | 2 | 33 |
| Editorial | 94 | 0 | 30 | 64 |
| Total | 174 | 0 | 34 | 140 |

5.1.3. Plenary is asked to approve document to PMC. John Moore asked for a motion to approve. Al Secen made a motion to approve, Don Walker seconded. No hands were raised in opposition. The motion passes unanimously.

5.1.4. Don Walker stated there is no plan to update DO-366A in the near future; however issues could arise that will require an update.

6. Agenda Item #6- C2 Link MOPS (Terrestrial) DO-362A Enter FRAC- Approval to Submit to PMC

6.1. DO-362A progress presented by Tyler Barney, Jim Williams and Steve Van Trees

6.1.1. Working group recommends entering FRAC on August 31st, 2020

6.1.2. Final two technical sections in progress:

6.1.2.1. Channel model for RX performance (2.2.1.12) normative requirements

6.1.2.2. MOPS validation using flight test data (appendix S)

6.1.3. Four other sections have significant work remaining, largely editorial

6.1.4. Comment resolution from last RAC remains to be completed

- 6.1.5. Recently, NASA testing uncovered a previously undetected technical issue resulting in poor performance of the system during ground operations (taxi, takeoff, landing)
 - 6.1.6. Industry believes there are no obvious issues w/ physics involved preventing a solution from being developed
 - 6.1.6.1. SME Input on proposed solution
 - 6.1.6.2. Simulation validation possible before FRAC exit
 - 6.1.7. Schedule
 - 6.1.7.1. RAC & Tech Writing 7/27 thru 8/14
 - 6.1.7.2. Internal Review 8/17 thru 8/28
 - 6.1.7.3. Enter FRAC around August 31st
 - 6.1.8. John Moore made a motion to enter FRAC. Andy Thurling seconded. John called for any objections, no hands were raised. Motion passes to Enter FRAC at Plenary #25 in August.
7. Agenda Item #7 WG1 (DAA) Status Report
- 7.1. DO-365B Status provide by Fabrice Kunzi
 - 7.1.1. RAC-ready document released later than expected (delays included late delivery of some sections and medical leave of Tech Editor)
 - 7.1.2. RAC period scheduled for July 27 – August 14
 - 7.1.3. Propose an off-cycle plenary (#25) on September 3rd for Approval to Enter DO-365B FRAC
 - 7.1.3.1. Discussion on moving out of cycle plenary (#25) to August 28th
 - 7.1.4. The following Plenary (#26) on October 16th to remain for Approval to Submit to DO-365B to PMC
 - 7.2. EO/IR SCHEDULE
 - 7.2.1.1. Internal RAC: July 24 – Aug 24, 2020
 - 7.2.1.2. FRAC: Approval at October Plenary # 26
 - 7.2.2. Contributing People: <10 active contributors but very efficient.
 - 7.2.3. Issues: Limited contribution from EO/IR manufacturers other than SAFRAN. Nevertheless sponsors exists within SAFRAN and will increase in 2021 with EU projects. A request was made for any member organizations in this space to participate.
 - 7.2.4. Way Forward/ Next Steps
 - 7.2.4.1. EO/IR MOPS for phase 2 internal review & comment to be ready for entering FRAC in October
 - 7.2.4.2. SAFRAN ready to support low swap effort in phase 3
 - 7.2.5. Initial discussion within FAA and industry partners for non-cooperative sensors for conflict resolution which would reduce the range of the sensors.
 - 7.2.6. No questions were called for WG1.
8. Agenda Item #8- WG2 (C2) Status Report
- 8.1. Jim Williams presented
 - 8.2. Virtual Quarterly Meetings held 7/20 to 7/23; Agenda included:

- 8.2.1. Complete review of DO-362A in preparation for entry into FRAC
- 8.2.2. Reviewed comment resolution to latest RAC of DO-377A
- 8.2.3. Discussed CSMAC Survey Response chartered by the FCC
- 8.2.4. Discussed comments on 3GPP airborne service standard and feedback WG will provide
- 8.2.5. Discussed proposed response to latest FAA request for comment on their Section 374 Report to Congress, led by Ian Atkins. WG2 will complete their response and provide to FAA in the coming weeks.
- 8.3. Compatibility between DO-362A and AeroMACS briefed by Al Malaga
 - 8.3.1. SC-228 WG2 evaluated compatibility between DO-362A and current DO-346 MOPS for AeroMACS.
 - 8.3.2. AeroMACS Systems are protected from out-of-band spurious emissions from DO-362A
 - 8.3.2.1. The DO-362A MOPS includes specific out-of-band spurious emission levels into the adjacent Band used by AeroMACS Systems
 - 8.3.2.2. An appendix describes the rationale for the requirements and include guidance for the design and characteristics of filtering devices that ensure protection of the frequency bands used by AeroMACS
 - 8.3.3. However, the spurious emissions requirements in the AeroMACS DO-346 MOPS and FCC spurious emissions limits in NPRM FCC 19-53 for Part §87.606 *are not adequate to protect DO-362A Systems*
 - 8.3.4. The actual spurious emissions levels achieved by AeroMACS deployed at several US airports are adequate to protect CNPC Systems
 - 8.3.5. *SC-228 WG2 Requests that RTCA SC-223 initiate a project to update the AeroMACS MOPS Spurious domain emissions* (Documented in an ISRA). There is also a compliance issue with the SARPs.
 - 8.3.5.1. This needs to go to the PMC for approval and assignment to the appropriate committee, SC-223 TOR for this update. 228 will provide a list of options to the PMC on September 10th.
 - 8.3.5.1.1. Al Secen suggests 228 members join 223 to work these updates. Steve Van Trees acknowledged FAA has resources on 223 to support. Al Malaga has ability to provide a short (~1 page) update. Al Secen took the action to see if this update could be provided and incorporated.
- 8.4. Compatibility between DO-362A and EUROCAE ED-265, presented by Michael Neale
 - 8.4.1. EUROCAE WG-105 has developed a draft MOPS describing a geostationary satellite based C2 Link operating in the, 5030-5091MHz, C Band
 - 8.4.2. RTCA has non-concurred on the draft ED-265 document because of its incompatibility with DO-362

- 8.4.3. Different TDD frame times cause cross interference between the two systems unless they are separated by many tens of km from each other (Ref: ICAO RPAS Panel Paper)
 - 8.4.4. Currently neither MOPS provides any protection to the other physical separation, frequency separation, emission and susceptibility levels
 - 8.4.5. Improvements to ED-265 have been discussed with WG 105 but they do not remove the fundamental incompatibility between the TDD frame times and hence the potential for cross interference
 - 8.4.6. Even with these improvements, issues remain to be resolved:
 - 8.4.6.1. For UA equipped with both systems
 - 8.4.6.2. At airports during surface and takeoff and landing operations
 - 8.4.6.3. During loss of separation conditions between 2 UA could cause the loss of both C2 Links - negating the ability of both RP to maneuver to remain well clear
 - 8.4.7. RTCA scheduled meeting with EUROCAE to discuss resolution of the issues between the link systems
 - 8.4.7.1. WG2 prefers EUROCAE update their unpublished standard, as theirs is incompatible with FAA published TSO standard
 - 8.4.7.2. Steve Van Trees stated the FAA (Chris Swider) has an open query to EASA on this issue, but has not received a response. Chris stated this has not been an issue for JARUS.
9. Agenda Item #9- New Business
- 9.1. Coordination with Working Group #105
 - 9.1.1. Call between SC-228 and WG-105 leadership on July 10, 2020
 - 9.1.1.1. SC-228 reviewed Phase 3 TOR as approved and discussed the current schedule status.
 - 9.1.1.2. WG-105 is comparing RPAS DAA OSEDs from RTCA and EUROCAE, due September / October 2020
 - 9.1.1.3. WG-105 is engaged with ACJA on collaboration for LTE MOPS. Interest is very strong. A new task will be proposed to the EUROCAE TAC, aiming at a joint document with RTCA SC-228
 - 9.1.1.4. WG-105 may be tasked on ACAS sXu MOPS, in liaison with SC-147 & WG-75. This would complement the activity already planned on DAA for UAS in VLL. It is still under analysis
 - 9.1.2. Call between RTCA & EUROCAE leadership
 - 9.1.2.1. Future documents (especially C2 LTE) can be worked as joint documents, even without fully joint committee structure.
 - 9.1.2.2. Michael Neale and Don Walker agreed ICAO should not be the ones to work these documents
 - 9.1.2.3. Alain Vallee and Sergiu Marzac were invited to attend our plenary, but time zone difference did not support their availability. Issues include:

- 9.1.2.3.1. Alignment of the 2 standards with action to WG-105 to resolve
- 9.1.2.3.2. Separation between C-Band nodes
- 9.2. Future Plenary Meetings
 - 9.2.1. **28 August- 25th Plenary**
 - 9.2.2. Out of Cycle at 1PM EST- DO-365B Enter FRAC
 - 9.2.3. **16 October- 26th Plenary**
 - 9.2.3.1. DO-365B Exit FRAC
 - 9.2.3.2. C2 Link MOPS (Terrestrial) DO-362A Exit FRAC
 - 9.2.3.3. EO/IR MOPS Enter FRAC
 - 9.2.4. **28 January 2021 - 27th Plenary**
 - 9.2.4.1. EO/IR MOPS Exit FRAC
 - 9.2.4.2. DO-377A Enter FRAC
 - 9.2.4.3. DO-304A Enter FRAC (*first document of Phase 3*)
 - 9.2.5. **15 April 2021 - 28th Plenary**
 - 9.2.6. DO-377A Exit FRAC
 - 9.2.7. DO-304A Exit FRAC
- 9.3. Phase 3 Proposed FRAC Approval Dates
 - 9.3.1.1. AD Hoc Documents
 - 9.3.1.1.1. 28th Plenary: GM for UAS, DO-304A
 - 9.3.1.2. WG1 Documents
 - 9.3.1.2.1. 28th Plenary: GBSS MOPS, DO-381A
 - 9.3.1.2.2. 34thPlenary: DAA MOPS, DO-365, Rev C
 - 9.3.1.3. WG2 Documents
 - 9.3.1.3.1. 33nd Plenary: C2 Data Link MOPS, DO-362, Rev B
 - 9.3.1.3.2. 35th Plenary: C2 Data Link MOPS (LTE)
 - 9.3.1.3.3. 36th Plenary: C2 Link System MASPS, DO-377, Rev B
 - 9.3.1.4. WG3 Documents
 - 9.3.1.4.1. 32nd Plenary: GM for UAS Lost Link Behavior
 - 9.3.1.5. WG4 Documents
 - 9.3.1.5.1. 32nd Plenary: GM for UAS Navigation Systems
- 9.4. Call for new business, Chris Swider
 - 9.4.1. ICAO RPAS request to the Frequency Management panel requested. RTCA and EUROCAE already have documents that could fulfill their request. Chris proposed an RTCA/ICAO/EUROCAE joint effort. Don Nellis stated: The effort is Frequency band, UAS Systems and DAA System descriptions in 2204 report update.
 - 9.4.2. Andy Thurling stated ASTM F3442-20 DAA Performance Standard should also be included.
- 10. Agenda Item #10- Adjourn
 - 10.1. Marvin Hammond called a motion to adjourn and Andy Thurling seconded.
 - 10.2. Al Secen adjourned the plenary at 3:28 PM EST.

Respectfully Submitted by,
 Christina Westover
 Secretary, RTCA SC-228
christina.m.westover@boeing.com
 July 24, 2020

CERTIFIED as a true and accurate summary of the meeting by John Moore, Steve Van Trees, Joel Wichgers and Jim Williams.

Appendix A- List of SC-228 Plenary Participants

| | | |
|--------------------|--|---|
| John Moore | SC-228 Co-Chair | Collins Aerospace |
| Brandon Suarez | SC 228 Co-Chair | General Atomics Aeronautical Systems, Inc |
| Don Walker | SC-228 WG1 for DAA, Co-Group Lead | A3 by Airbus |
| Fabrice Kunzi | SC-228 WG1 for DAA, Co-Group Lead | General Atomics Aeronautical Systems, Inc. |
| Jonas Trego | SC-228 WG1 for DAA, Secretary | General Atomics Aeronautical Systems, Inc |
| Steve Van Trees | SC-228 GAR, WG2 for C2, Co-Group Lead | FAA, AIR-130 |
| Jim Williams | SC-228 WG2 for C2, Co-Group Lead | Unmanned Solutions |
| Lee Nguyen | SC-228 WG2 for C2, Secretary | FAA |
| Al Secen | SC-228 Program Director | RTCA |
| Christina Westover | SC-228 Secretary | Boeing |

ATTENDEES

| Company | Name |
|---|---------------------------------|
| A3 by Airbus | Don Walker |
| ACES, Inc. | Alfonso Malaga Michael Neale |
| Adaptive Aerospace Group | Keith Hoffler |
| ALPA | |
| Aircraft Owners & Pilots Association (AOPA) | Christopher Cooper |
| Archangel Aero | Rose Mooney |

| Company | Name |
|--|--|
| ARCON Corporation | Dennis Colbert Siva Sivananthan |
| BAE Systems | |
| Bihrl Applied Research, Inc. | |
| The Boeing Company | Cesar Suarez Christina Westover Lisa Fern John Vian Matt Moser |
| Calhoun Analytics | |
| Calhoun Systems Inc. | |
| Capital Sciences, LLC | Dave Stewart |
| Cavan Solutions | |
| Cobham Aerospace Communications | Jeff Knickelbein |
| Collins Aerospace | Joel Wichgers John Moore Tyler Barney |
| COMAC | Mingwei Wang |
| Constellation Aviation Solutions, LLC | Salim Janjua |
| Electronics & Navigation Research Institute (ENRI) | Naruto Yonemoto |
| Federal Aviation Administration (FAA) | Art Hinaman Deepak Chauhan Don Nellis Chris Swider Francisco Capristan Lee Nguyen Kevin Van Uden Matt Haskin Paul Campbell Peter Georgiou Ravi Jain Ray Mei Rose Merchant- Bennett Ruth Hirt Shelia Mariano Steve Van Trees Thomas Farrier Tony Long Vic Patel |
| FirebirdSe LLC | Bruce Eckstein |
| Garmin LTD. | Ben Peetz |
| GE Aviation | Ted Lester |
| General Atomics Aeronautical Systems, Inc | Fabrice Kunzi JJ Lu Jonas Trego Jose Fuentes Naiel Askar |

| Company | Name |
|--|--|
| | Tim Grebe TojumiOluwa Adegbyega |
| Honeywell International, Inc. | Jan Prokopec Sara Bauman |
| INMARSAT | Kristen Mineck |
| Iridium | Joseph Darden |
| Japan Radio Air Navigation Systems Association | |
| JHW Unmanned Solutions, LLC. | Jim Williams |
| The Johns Hopkins University | Charles Leeper |
| Korea Advanced Institute of Science | |
| L3Harris | Jessica Sager Michael Nathanson Rudy Johnson |
| Ligado Networks | Samuel Weich |
| MIT Lincoln Laboratory | Maria Picardi Kuffner Matt Edwards Randal Guendel Wesley Olson |
| The MITRE Corporation | Frank Box Joe Boyd |
| Mitsubishi Research Institute | Takeshi Tomoda |
| Mosaic ATM, Inc | Todd Kilbourne |
| NASA | Aaron Dutle Christopher Nassif Clint St. John Conrad Rorie Donna Clements Doug Wada Elliot Lewis Gaudy Bezos-O'Connor Gilbert Wu Jay Shively Kurt Swieringa Lee Seungman Michael Cauley Mohamad Refai Summer Brandt William Johnson Yamira Santiago-Espada |
| NextNav | Ashu Pande |
| Northeast UAS Airspace Integration Research Alliance (NUAIR) | Andrew Thurling |
| Northern Plains UAS Test Site | Erin Roesler |
| Northrup Grumman Corp | Lance King Randy Willis Robert Hughes William Walker |

| Company | Name |
|--------------------------------------|--|
| Raytheon | |
| RDRTec, Inc. | |
| Regulus Group | Bill Benner Shelly O'Leary Tom Pagano |
| Reliable Robotics | |
| RTCA | Al Secen |
| Sagem Avionics, Inc. | |
| SAIC | |
| San Jose State University Foundation | |
| Square Peg | |
| S-Tec | |
| Thales Group | |
| Technology Providers, Inc. | Marvin Hammond |
| | |
| Transport Canada | Craig Bloch-Hansen Tom Hastie |
| uAvionx | |
| US Air Force | |
| US Navy | Roger Burton |
| Washington Cord | |
| Unknown Affiliation/ Not Active | Brian Frantz Charlie Morris Dan Young Mauricio Rivas Melanie Turner Peter Trachtenberg Steven Bretmersky William Bishop |