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RTCA Paper No. 227-24/SC230-085
 8/23/2024

RTCA SC-230 Plenary #38 Meeting Minutes (July 23-25, 2024)

Attendance list:

July 23rd	
Name	Company
Karan Hofmann	RTCA
Moin Abulhosn	FAA
Jean-Baptiste Berthier	Airbus
Mohammed Ahmed	Boeing
Dawn Gidner	Boeing
Jeff Finley	Collins
Marius Irimia	Collins
Ven Sishtla	Collins
Mark Smith	Collins
Mariusz Starzec	Garmin
Jan Lukáš	Honeywell
Yahya Golestani	Honeywell
Matt Wiebold	Honeywell
Rockee Zhang	OU
Bob Avjian	Mitre
Moustaph Soumare	DGAC
Rebecca Lawler	United
Ed Hahn	ALPA

July 24th	
Name	Company
Karan Hofmann	RTCA
Rebecca Morrison	RTICA
Moin Abulhosn	FAA
Mohammed Ahmed	Boeing
Timothy Rahmes	Boeing
Jeff Finley	Collins
Mark Billsberry	Collins
Marius Irimia	Collins
Ven Sishtla	Collins
Sai Kalyanaraman	Collins
Mariusz Starzec	Garmin
Dawn Gidner	Honeywell
Yahya Golestani	Honeywell
Stephan Enzone	Honeywell
Bob Avjian	Mitre
Donny Morrow	ALPA
Ed Hahn	ALPA
Jean-Baptiste Berthier	Airbus
Rockee Zhang	OU
Andy Roy	ISRA
Moustaph Soumare	DGAC

July 25th	
Name	Company
Karan Hofmann	RTCA
Moin Abulhosn	FAA
Jean-Baptiste Berthier	Airbus
Mohammed Ahmed	Boeing
Dawn Gidner	Boeing
Louis Bailey	Boeing
Jeff Finley	Collins
Ven Sishtla	Collins
Marius Irimia	Collins
Mariusz Starzec	Garmin
Yahya Golestani	Honeywell
Seth Frick	Honeywell
Matt Wiebold	Honeywell
Matthew Lug	USAF
Ed Hahn	ALPA
Moustaph Soumare	DGAC
Bob Avjian	Mitre
Rockee Zhang	OU
Wes Googe	AA



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7/23/24 – 7/25/24 SC230 WG-12 Plenary #38 – In Person & Virtual

Action items – Day 1

[Committee] On Radar manufacturers to take a deeper dive at how many further cases would be needed and see if we missed anything.

Action items – Day 2 & Day 3

[Radar M.] Action for all radar manufacturer to check with their legal if test data can be shared by special committee members under existing NDA.

[Moin] To check with FAA if there is anyone on government side to support non-advocate review

[Rebecca] To do same with NTIA.

[Mark B.] to provide waveforms from 5G for us to look at it.

[Group] Fact sheet to be send to Andy and Ed and copy Karan.

[RTCA/FAA] To reach out to investigate who would do the audit.



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High-level summary of effort and major discussion points:

- Day 1
 - Started with Introductions
 - Discussed the Spectrum Whitepaper
 - There was a request from DGAC to present the in band and out of band whitepaper.
 - VEN asked Yahya if he can go through schedule to give an overview of where things sit.
 - Yahya showed schedule and milestone envisioned. He said there will be changes, if we go through in/out of band by August, whitepaper, FRAC resolution will be end of the year. Honeywell decision to push RFS to next year.
 - There was an overall risk identified from the committee to aviation with weather radar, especially those who do not have well defined transceiver characteristics. If it isn't defined then sooner we can get it registered, sooner we can get approved through ICAO, etc. He emphasized we saw this risk for LRRR, but still collecting data. LRRR data wasn't really available till 6 months after. FCC have not played any active part in these discussion on what needs to be done after 2028. Whatever work can be done now is better to help define the boundaries. Three bands will need to satisfy for 6G spectrum, none of them are particularly close to 9.3-9.4.
 - Jeff shared his reason why we are focusing on X band radars. Ed Hahn from ALPA mentioned if there is a way to share information available certainly towards the forth quarter of this quarter. Dawn asked if there is any value to inform that we are doing something and not share results will that be helpful. Ed said anything would be helpful, but initially it will be a long process we did it for wireless industry then we can influence the decision. Yahya said to capture this and state this very clearly for management perspective. Don't want us to be in similar situation as 5G LRRR.
 - Ven indicated to Soumare if he can share the whitepaper which Soumare did. Ven asked if Soumare can highlight key items from the whitepaper instead of us reviewing it during the meeting.
 - Karan mentioned if Ed shared slides along with dates.
 - Ven went over TOR (terms of reference). He went over schedule and stated it may change based on recent events which transpired. RFI ready by end of this year and availability of out of band testing is hard to come by. Performing testing and completing it by end of year is sporty. There was bigger question on how do we characterize the RFI?
 - Ed asked if the methodology is to start at 8GHz. Ed confirmed as long as we have already raised that then we are good. Bandwidth assumption - are there any talk in the wireless channels if 100 MHz with Andy tomorrow?
 - There was greater discussion on testing methodology (CFR 121.189.D.2), and testing methods for weather radar that cannot mimic 5G LRRR because that had different scope and criteria.



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- Soumare shared the paper. Ven asked are there any expectation for something to come out of the analysis? Soumare replied he did like to see as many characteristics as possible. He specified analysis within the vicinity of airports would be really helpful. He agreed that whitepaper was going in correct direction, he assured along the way if anything comes he will bring it up to committee's attention to be included in the scope.
- Mariusz asked if ship equipped radars need to be part of the scope in addition to group based airborne radars. Soumare stated ship equipped radars are an issue but questioned if this committee is broad enough to include this part of the scope. Honeywell doesn't develop seaborne radars, and it was later confirmed by Yahya.
- Honeywell cannot start till next year. Collins have gathered all the equipped that was need to be procured and Garmin is also in the same boat. Mariusz stated would it be good to talk about it? There was some discussion on testing methodology, more from the perspective of 1E-3 signal loss.
- It was stipulated among the committee that once we have all this data, we will need a third party entity to make a determination if radar breaks. Ven brought this up and asked who can be the third party entity who can formulate data in a presentable form and can be reviewed by the committee for concurrence. Dawn agreed to take on the responsibility to operate as 3rd party entity. Ed suggested that MITRE have operated in the capacity before and that should not be of concern but okay with Dawn operating in the capacity only if she is willing to do it. Ven asked if there is a process to proceed in selection of 3rd party, Ed talked about AVSI and how their expertise was used and relied upon from 5G perspective. Dawn suggested if we can formulize a team for this task where committee can rely on Boeing/Airbus/Dawn happy to support. We did get agreement from all the parties.
- Rockee Zhang was able to join SC-230 - Mariusz brought up on the machanism of testing including waveform setting. Rockee stated 6G is fairly new and he mentioned about the waveform generator which can channel into frequencies and do play back. We don't know much about 6G and shared his perspective.
- There was greater discussion on pass/fail criteria, verification scheme. Ven stated that we should start with the worst case with red pixels on the display. Jean-Baptiste suggested good to involve pilots input.
- False alarm - Images generating varying levels, RFI power, see something jump on radar display, solicit feedback from pilot community, depending on the range is select. Take that image convert that to usability as a threshold for infinity. Variable ranges with respect to performance index ... two or three range should provide good coverage. It was agreed that different range would look slightly differently. Use of turbulence along with three scenarios, weather only, turb only, and finally combination of both.
- Yahya discussed about the lab test - super imposed over weather. He questioned if any information can be shared with industry, it was agreed there isn't anything proprietary in that sense so shouldn't be an issue to share. Question was raised how can we simulate



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weather? 3D or 2D integration. Mariusz asked what is the justification for the threshold we chose and why? What is considered as pass/fail in some of these scenarios. Regardless of the output of our testing, detection percentage, how much weather do we see or not see, missing red cell for which decisions need to be nailed down.

- Mariusz agreed to work towards developing the test cases.
- There was some discussion when we did Ice Crystal Icing work, in regards to that, what rationale was used (DO-220B) to make it work. We did review DO-220B and couldn't come up with good rationale.
- Karan talked about updating TOR and setting up 30 minutes for review on Day 2.
- Bigger action, on radar manufacturer to take a deeper dive at how many further cases would be needed and see if we missed anything.

- DAY 2

- Tim Rahmes from Boeing and Donny Morrow from ALPA were available and in attendance on day 2.
- It was discussed that TOR will not be presented today, but will be available later this afternoon for review.
- Finally, we did go over TOR
- Requestor changes were made
- We discussed the background, it was implied that we didn't need to include history in the TOR. Moin stated he like the background, but Karan stated it is NOT allowed in the template anymore. Dawn shared the same sentiments.
- We discussed the deliverables – it was agreed that the correct thing is the RTCA paper. This date and FRAC completion date and the date when it needs to be presented to PMC was discussed. We talked about the test and how we are going to be handling that data. It needs to be indicated clearly in the TOR. Karan asked should we attack the date or scope? Dawn brought up with Yahya what is being done to bring up the SOW up the chain with Honeywell leadership. Ven said we will have better idea about the scope later in the afternoon after talking with RF experts.
- There was good debate on assemble, anonymize and summarize the resulting test data for inclusion in the report. The anonymization will be carried out by committee members who are not radar manufacturers.
- There was much discussion on how data need to be shared with the non radar manufacturers (OEMs).
- ACTION for all radar manufacturer to check with their legal if test data can be shared by special committee members under existing NDA.



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- Simulated type data and how it would be included in the actual report was also discussed. It was implied that committee need to check with Andy Roy to figure out what the need dates will be so we can update TOR accordingly.
- ACTION for Moin - to check with FAA if there is anyone on government side to support non-advocate review
- ACTION for Rebecca to follow up with NTIA in relation to weather radar and 6G RF spectrum study.
- RFI Characteristics were discussed with RF experts.
- ACTION for Mark B. to provide waveforms from 5G for us to look at it. This will provide good starting point.
- It was implied that getting RF setup is pretty straightforward, power amplifier, RF filtering, pass/fail criteria on radar and work those out.
- Power level - use AWGN and adjust power level.
- Ven asked if we overload the receiver what happens? Physical damage or loss of function? MAX power will be defined, for transmitter, we decided to use 65 for urban 65 for rural. Ven asked Mark, even with 20 dBm we will need specialized equipment. Mark confirmed yes. Ven asked how did we do 5G testing. Mark replied 5G doesn't have 30 dB gain antenna. 0 dBm = 100 Watts. Ven suggested starting with 0dBm and slowly incrementing to see the effects.
- Dawn asked if the particulars of the characteristics are laid out so she has something to be include in the report.
- Yahya asked Stephan if we are okay to move forward with simulation? Stephan said yes.
- Karen suggested in regards to TOR, leave the date as is for PMC discussion for December 2024. For actual report will it be June (FRAC completion and September of 2025 for publication. It was echoed by the committee that we will try to beat that. For anonymization, we decided to have independent entity/agency hence decided to keep it in there till we figure it out details.
- Next Plenary was decided to held at September 30, 6am PST / 10 EST
- We agreed to meet every week as part of WG.
- There was much discussion that took place with aviation spectrum resources Inc (ICAO spectrum committee Chair) - Andrew Roy
- For radio altimeter, success criteria was bit different. For Weather Radar, we will see an image paint on display, any guidance on how to handle this condition. Failure signature is consistent with respect to pass/fail. Ven explained on how would pilot behave when they see excessive clutter on the ND and how would pilot react to it.
- It was discussed on how far and how wide spectrum range would consist?
- In order to consider industry input for the current spectrum allocation activities, the ITU requires that data be submitted before the end of this year. If we wait until after that, we run the risk that any airborne weather radar concerns or considerations will be ignored. In



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order to submit this data, it needs to be made available by the meeting of the 5G group in November (18-29). The process for submitting information to the ITU is complicated, and needs to start in August.

- SC-230 recognizes that it will not be realistic to complete the radar manufacturer testing by then, due to equipment and resource limitations. Therefore, we plan to release a preliminary report based on analysis and simulation, to explain the expected effects of this interference on modern weather radars.
 - If this report is accepted, we will request an extension for submitting the actual test data. We don't yet know the date of the longest extension that may be granted, but the best guess is that the final report will need to be released by early Q2 of 2025.
 - If there is any hope of meeting this timeline, it is imperative that testing begin as soon as possible. Other manufacturers that have started testing report there is a long timeline for obtaining the equipment needed for testing with the appropriate frequencies/power levels. It will also take some time to anonymize and compile the results prior to release of the final report.
 - If we do not perform this testing and provide the data in a timely matter, then we will not have any platform for complaining if the spectrum allocation activities result in interference with radar frequencies (or radar intermediate frequencies) that could result in physical damage to radar hardware, unacceptable display artifacts, missed PWS alerts, etc.
- DAY 3
 - Day 3 started with discussion with Matt Wiebold
 - It was made clear that RTCA is not recognized by ITU. It was recommended that committee to come up with unified response, RTCA cannot initiate, working together as a team creating the material and get to them through correct channel. Some company will have to take an action to proceed.
 - Ven asked from Mariusz, timeline once testing would start how long will it take, etc.?
Mariusz said is it something that will be discussed on Friday 7/26?
 - Ven shared ITU-R WP 5D document
 - Following references were used and shared during day 3:
 - https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.1461-0-200005-S!!PDF-E.pdf
 - https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.1461-2-201801-!!PDF-E.pdf
 - [https://www.icao.int/safety/FSMP/Documents/Doc9718/Doc.9718%20Vol.%20I%20\(AdvancedUneditedVersion%202021\).pdf](https://www.icao.int/safety/FSMP/Documents/Doc9718/Doc.9718%20Vol.%20I%20(AdvancedUneditedVersion%202021).pdf)
 - ACTION was taken to send fact sheet to Andy and Ed with Karan on copy.
 - ACTION for RTCA and FAA to reach out to whoever and find out who would do the audit.



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Next plenary

The next meeting is virtual – September 30th, 9:00 am – 5:00 pm ET

CERTIFIED as a true and accurate summary of the meeting.

Mohammed Ahmed, SC-230 Secretary

Venkata Sishtla, SC-230 Co-chair

Dawn Gidner, SC-230 Co-chair