



RTCA Paper No. 016-21/SC222-089
 EUR Reference No 23-21 / WG82-87

Washington, 22 January 2021
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**Minutes of EUROCAE
 WORKING GROUP 82 (WG-82) (Meeting #45) and RTCA SPECIAL COMMITTEE 222
 (SC-222) (Meeting #40)
 “New Air-Ground Data Link Technologies”
 related to SATCOM**

Date	13th and 14th January 2021
Place	Virtual Meeting
Venue	EUROCAE – Webex
Hosted by	EUROCAE

Participants:

Name	Company	13 th	14 th
Adam Sarhage	GARMIN	X	X
Ajay Parikh	LIGADO	X	X
Alan Schuster Bruce	INMARSAT	X	X
Alden Fuchs	IRIDIUM	X	X
Ana Mirsayar	INMARSAT	X	
Andrew Roy	Aviation Spectrum Resources, Inc	X	
Andy Morin	IRIDIUM		X
Angelo Rossi	MITRE	X	X
Ann Heinke	Stellar Solutions	X	X
Anna Guegan	EUROCAE	X	X
Antonio Correas	EUROCONTROL	X	X
Armin Schlereth	DFS	X	X
Ayaz NEMAT	THALES	X	X
Ben Huang	IRIDIUM	X	X
Brandon Hinton	The Wiley Law Group, LLP	X	X
Chuck LaBerge	LaBerge Engineering	X	X
Darrell Andregg	Collins Aerospace	X	X
David Green	Collins Aerospace	X	X
Duncan Mobley	Satcom Direct	X	X
Florin Grafu	ROMATSA	X	X
Gary Dent	THALES	X	X

Geoff Stearn	Ligado Networks	X	X
Gonzalo Prieto	ESSP	X	X
Hans Trautenberg	EASA	X	X
Hiroshi Okochi JRANSA	JRANSA	X	X
Jeff Bull	IRIDIUM	X	X
Jeff Knickelbein	COBHAM		X
Jila Rainer Koll	Stellar Solutions	X	X
Joe Darden	IRIDIUM	X	X
Joel Wichgers	Collins Aerospace	X	X
Johan Gericke	COBHAM	X	X
Jose Godoy	ARINC Incorporated	X	X
Karan Hofmann	RTCA	X	X
Les Westbrook	THALES	X	
Luke Sienkiewicz	IRIDIUM	X	X
Lynne Montgomery	Wilkinson Barker Knauer, LLP	X	X
Maqbool Aliani	Ligado Networks	X	X
Mark Insley	LATITUDE-TECH	X	X
Mark Settle	Wilkinson Barker Knauer, LLP	X	X
Michael Hooper	IRIDIUM	X	X
Neil Surti	FAA	X	X
Ravi Jain	FAA	X	X
Richard Tapp	HONEYWELL	X	X
Sachin Chhibber	Ligado Networks	X	X
Sai Kalyanaraman	Collins Aerospace	X	X
Santanu Dutta	Ligado Networks	X	X
Stefano Caizzone	DLR	X	

DOCUMENTS

Agenda Item	Title	File name
1	Calling Notice and Agenda	222WP330_SC-222 (40) and WG-82 (45) Calling Notice Meeting.pdf
2	Meeting Minutes of last Meeting	222_39_WG-82_Meeting_42_final_summary.pdf
4a	SC-222 Working Paper 317B: Proposal to SC-159 on GLONASS L1 Operations	WP317B Coordination letter on GLONASS-FINAL 102920.pdf
4c	Estimation of Interference from Ligado Networks 1627.5 – 1637.5 MHz UL band	Ligado Interference 20210112 SC-222 WP-331.pdf
4c	Analysis of Ligado Interference to Iridium AMS(R)S	WP332_Analysis of Ligado Interference to Iridium01.13.2021.pdf
4c	Expected below-horizon antenna gain for Certus antennas	222WP333_Cobham below the horizon antenna data.pdf
4c	EXCEL Sheet to compare interference scenarios from WP331 and WP332	222WP334_Interference Scenarios ver1 Schlereth.pdf
5	Iridium MASPS	DO-343D_ED-242C MSAPS FRAC OC.pdf

5	EXCEL Frac MASPS Comments Sheet	Certus MASP Working Comments sheet 013121.xlsx
5	Text proposal for section 3.4.3 on Ligado interference	222WP335A Accepted Ligado Iridium text for MASPS_210114 ver1.pdf
7	Iridium MOPS	DO-262F_ED243C MOPS FRAC OC.pdf
7	EXCEL Frac MOPS Comments Sheet	FRAC_IridiumCompile_Bulk_Comments DO-262F_ED-243C.xlsx

Documents related to IRIDIUM are available on the RTCA SC-222 Workspace.

PRESENTATIONS

Agenda Item	Title	File name

There were no presentations given at the meeting.

Welcome, Introductions, Administrative Remarks by Special Committee Leadership

Chuck LaBerge (chair SC-222) welcomed the group. He led through whole remaining meeting.

Karan Hofmann and Anna Guégan informed about the anti-trust policy, IPR policy, and call and participation membership policies for RTCA Special Committees (SC) and EUROCAE Working Groups.

1. APPROVAL OF THE AGENDA

After a round table, Chuck LaBerge introduced the proposed agenda of the RTCA SC-222/ EUROCAE WG-82 Plenary meeting. The final agreed agenda looked as follows:

AGENDA

13-14 January 2021 (9:00 am – 5:00 pm ET) – (15:00 – 23:00 pm CEST)

Welcome, Introductions, Administrative Remarks by Special Committee Leadership

- Government Authorized Representative (GAR): Stephen Van Trees
- Chair RTCA SC-222: Dr. Chuck LaBerge, LaBerge Engineering
- Chair EUROCAE WG-82: Dr. Armin Schlereth, DFS

1. Review Agenda
2. Review Minutes and Actions
3. Review of activities in related groups (ICAO, ARINC, etc.)
4. Review of Working Papers & Outstanding Issues

- a. a. Iridium vs. GLONASS (WP317A) (defer to comments)
- b. b. Voice Specification and Environment (resolved in November)
- c. c. Ligado vs. Iridium
- d. d. GPS on same aircraft (defer to comments)
- 5. Review/Resolution of SATCOM MASPS DO-343D/ED-242C Iridium-specific Final Review and Comment / Open Consultation (FRAC / OC) Comments
- 6. Decision to approve release and presentation of DO-343D/ED-242C TO PMC and Council
- 7. Review/Resolution of SATCOM MOPS DO-262F/ED-243C Iridium-specific FRAC / OC Comments
- 8. Decision to approve release and presentation of DO-262F/ED-243C to PMC and Council
- 9. Other Discussion as needed
- 10. Agreement on Actions
- 11. Agreement on Meeting Schedule
- 12. Adjourn

2. Review Minutes and Actions

The minutes of the last meeting have been reviewed and approved. The action item list has been reviewed focusing on the open actions and their status has been updated. The updated action item list is outlined at the end of the present minutes.

3. Review of activities in related groups (ICAO, ARINC, etc.)

There were not presentations or input provided at the meeting.

4. Review of Working Papers & Outstanding Issues

The set of working papers have been reviewed and related issues discussed. One remaining issue is about the GPS isolation on same aircraft way of calculating the antenna isolation. See also information provided by Ravi Jain (FAA) on this item. The issue is mainly on the way transmission power is calculated, either peak or average value. Further discussion is required on this subject at the next Plenary meeting.

a. Iridium vs. GLONASS (WP317B):

Chuck LaBerge reported that for SC222/WP317B so far only Collins has responded. A discussion with Kalyanaraman (Chair SC-159, WG-6) took place. Plan now is to again contact chairs of SC-159 to indicate that it is expected to get response on the GLONASS interference material in the context of our FRAC/OC process until 1st February. In case not possible also e-mail input to himself until 8th February is offered. Anna Guegan also offered to contact EUROCAE WG-62 accordingly (see also action item list).

b. Voice Specification and Environment

No further discussion on this subject took place. What is still open are the input from manufacturer on the proposed delay value of 150 msec. It is expected to get input on this matter at the next Plenary in February.

c. Ligado vs. Iridium

Two working papers have been presented on this item. SC-222/WP331 from THALES/IRIDIUM presented by Ayaz Nemat and SC-222/WP332 from Ligado presented by Sachin Chhibber outlining an analysis of expected interference from Ligado user terminals on IRIDIUM onboard installation. Common in both WPs is the considered Ligado transmission

channel, which is in the band 1627,5 – 1637,5 MHz using FDD as Ligado Uplink channel and scenarios considering Gate and EnRoute interference situations for IRIDIUM equipped aircraft. In that context Johan Gericke from COBHAM presented SC-222/WP333 providing material on antenna gain below horizon values used by COBHAM.

During the discussion of WP331 and WP332 it turned out that no agreement between IRIDIUM and Ligado could be reached on the assumption made, which were quite different (e.g. consideration of power control, assumptions related to building loss). On the second day of the meeting the discussion continued starting with SC-222/WP334 from Armin Schlereth. He tried to compare assumptions made in WP331 and WP332 with the goal to work out a common scenario for further consideration. Ligado was supportive of Armin's suggestion of working out the model with common assumptions but Iridium objected to this approach citing the urgency to close out the MASPS documents. Since there was no consensus reached on a common analytical approach, the group agreed on new text in MASPS section 3.4.3 outlining the common and different findings of both papers. This text has been drafted by Chuck LaBerge and was discussed with the final version outlined in SC-222/WP335A.

d. Iridium Related GPS Isolation Issues

Ravi Jain from FAA brought up an issue related to the way isolation required for GPS onboard the aircraft is calculated. His main concern was about the way transmission power is handled, either peak or average power values. Ravi Jain also pointed out that he expects some kind of safety margin being introduced, which was not done in the past. Chuck explained that since decades the average power value has been used and a safety margin has not been taken into account. Finally, the committee decided to keep calculations as they are. Ravi accepted the decision of the committee.

5. Review of updates to DO-343D/ED-242C Iridium-specific MASPS (formal comment tracking required)

Mike Hooper from Iridium led the meeting through a discussion of comments on MASPS material. All comments have been covered so far and the non-concur on section 3.4. related to Ligado interference could be closed.

For the outcome of the discussion see the updated EXCEL Comments Sheet on the RTCA SC-222 repository.

6. Approve release of DO-343D/ED-242C for Final Review and Comment / Open Consultation (FRAC/OC)

This agenda item is finally deferred to the upcoming Plenary session in February.

7. Review of updates to DO-262F/ED-243C Iridium-specific MOPS (formal comment tracking required)

Luke Sienkiewicz from Iridium led the meeting through a discussion of comments on MOPS material. All comments have been covered so far and only a few are open from Armin Schlereth, which are not major ones and related to the explaining sections of the MOPS.

For the outcome of the discussion see the updated EXCEL Comments Sheet on the RTCA SC-222 repository.

8. Approve release of DO-262F/ED-243C for FRAC/OC

This agenda item is finally deferred to the upcoming Plenary session in February.

9. Other Discussion as needed

No other subjects have been discussed at the meeting.

10. Agreement on Actions

Chuck and Armin went through the action items of the meeting. The final version is attached to the minutes.

11. Agreement on Meeting Schedule (ref. 222WP316C)

Changes to the original agreed schedule only affects the additional Plenary now scheduled for 9th and 11th February 2021. Cleaned/formatted versions of MASPS and MOPS need to be available for PMC members not later than 18th February 2021.

12. Adjourn

Chuck and Armin thanked the group for the discussion.

13. Establish Agenda, Date and Place for next meeting

RTCA SC-222 and EUROCAE WG-82 have agreed on the following next meetings:

WEBEX's:

- **9.02.2021 and 11.02.2021 WG-82/RTCA SC-222: Plenary WEBEX from 3pm to 11pm CET** (WEBEX will be organized by RTCA)

Note: This WEBEX is intended as the final resolution meeting of the FRAC/Review process. It is intended to hand over the final material to Anna Guegan and Karan Hofmann on the 18 February 2021.

Physical Meetings:

- **No physical meeting(s) are planned.**

12. Adjourn – Plenary meeting

Action items

RTCA-SC222 / EUROCAE WG-82 30th meeting: 6.02.2018 and 7.02.2018

Action#	Content	Responsible	Deadline	Status
A30-09	<p>Review of SC-228 slides and material (ITU M.2127) to provide feedback on the following items:</p> <ol style="list-style-type: none"> 1) Support of 2000 UA 2) 10 – 100 kbps per UA (Peak!) 3) Voice latency of 390 millisecond maximum 4) Use of protected spectrum (L-Band) <p>Discussion at WG-82#31: Chuck LaBerge will provide a response on it asap.</p> <p>Discussion at WG-82/#32: Values might change in the MASPS for UAS. MASPS are available end of the year. So no activities required by WG-82/SC-222 until availability of MASPS.</p> <p>Discussion at WG-82/#33: MASPS on C2 link support by SATCOM expected Q1/2019.</p> <p>Discussion at WG-82/#34: Status unchanged.</p> <p>Discussion at Plenary June 2019: Status unchanged.</p> <p>Discussion at Plenary July 2019: Current priority on MASPS and MOPS actual documents. Status unchanged.</p> <p>Status Plenary Sept 2019: Status unchanged. Current publication schedule has higher approval.</p> <p>Status Plenary Nov 2019/Jan 2020: Status unchanged. Current publication schedule has higher approval</p> <p>Discussion at Plenary June 2020: Status unchanged.</p> <p>Discussion at Plenary Nov 2020: Early 2021 SC-228 finishing RPAS MASPS. Restart coordination then.</p> <p>Discussion at Plenary Jan 2021: Early 2021 SC-228 finishing RPAS MASPS. Restart coordination then.</p>	Chuck LaBerge	asap	Open

RTCA-SC222 / EUROCAE WG-82 31st meeting: 26.06.2018 and 28.06.2018

Action#	Content	Responsible	Deadline	Status
A31-03	<p>Contact EUROCAE WG-105 (RPAS) to ask for requirements on SATCOM Performance Class A</p> <p>Discussion at WG-82/#34: Still open. Armin Schlereth to take care of it soon.</p> <p>Discussion at WG-82/#35: Still open.</p> <p>Discussion at Plenary June 2019: Status unchanged.</p> <p>Discussion at Plenary July 2019: Current priority on MASPS and MOPS actual documents. Status unchanged.</p> <p>Status Plenary Sept 2019: Status unchanged.</p> <p>Status Plenary Sept 2019/Jan 2020: Status unchanged. Current publication schedule has higher approval.</p> <p>Discussion at Plenary June 2020: Status unchanged.</p> <p>Discussion at Plenary Nov 2020: Early 2021 SC-228 finishing RPAS MASPS. Restart coordination then.</p>	Armin Schlereth	asap	Open

RTCA SC-222/EUROCAE WG-82 meeting: 12.06. and 13.06.2019

Action#	Content	Responsible	Deadline	Status
A36-04	<p>Distribute Draft ICAO SATCOM SARPS to Armin Schlereth and Chuck LaBerge for further distribution within SC-222 and WG-82. Review by both groups appreciated.</p> <p>Status Plenary July 2019: Armin Schlereth to ask Nikos on this matter.</p> <p>Status Plenary Sept 2019: ICAO PT-S plans to provide the draft SARPs for EUROCAE/RTCA review and comments in January 2020.</p> <p>Discussion at Plenary Nov 2020: See presentation and information from Nikos.</p>	Nikos Fistas	End January 2021	Closed

RTCA SC-222/EUROCAE WG-82 meeting: 19.09. and 20.09.2019

Action#	Content	Responsible	Deadline	Status
A38-01	<p>Consider Ligado potential interference issue on the Iridium MOPS in the Iridium Working Group session</p> <p>Plenary SC-222 and WG-82 Nov 2019: IRIDIUM wants to have it part of the Plenary discussion.</p> <p>Make a new AI out of it. Closed this one!</p> <p>Plenary June 2020: Decided to keep it for more discussion at next meeting.</p> <p>Discussion at Plenary Nov 2020: See discussion during meeting!</p> <p>Discussion at Plenary Jan 2021: See discussion during meeting!</p>	Chuck Laberge	October Meeting of SC-222	Closed

RTCA SC-222/EUROCAE WG-82 meeting: 23.06. and 24.06.2020

Action#	Content	Responsible	Deadline	Status
A41-01	<p>Write a White Paper summarizing the relevant bodies, which may provide requirements input to the work of RTCA SC-222 and EUROCAE WG-82 on Future SATCOM.</p> <p>Discussion at Plenary Nov 2020: Ravi and Armin to coordinate offline how to proceed.</p> <p>Discussion at Plenary Jan 2021: Considered to no longer relevant.</p>	Ravi Jain supported by Armin Schlereth (European bodies)	18.July 2020	Withdrawn
A41-02	<p>Clarify on future harmonized work program of RTCA SC-222 and EUROCAE WG-82.</p> <p>Organize a meeting with Karan Hofmann, Ann Guégan, Chuck LaBerge and Armin Schlereth</p>	Armin Schlereth	1.July 2020	Closed
A41-03	<p>Write a Paper on justification of C1 low/high gain maximum level of white band noise (-114.6 dBm and -120.5 dBm). Also power loop control management to be covered clarifying not inducing multi aircraft interference.</p>	IRIDIUM (Mike Hooper, Luke Sienkiewicz?)	18.July 2020	Closed
A41-04	<p>Provide a White Paper to Chuck LaBerge on GLONASS interference subject. Chuck LaBerge then to coordinate with RTCA SC-159</p>	Mike Hooper, Chuck LaBerge	11.July 2020	Closed

RTCA SC-222/EUROCAE WG-82 Plenary meeting: 10.11. and 12.11.2020

Action#	Content	Responsible	Deadline	Status
A42-01	Ligado/IRIDIUM to provide detailed material about interference between Ligado and IRIDIUM to become part of the MASPS.	Michael/Sachin	1 week ahead of FRAC/OC resolution meeting	Closed
A42-02	Clarify on trade mark usage on MASPS/MOPS cover page with Karan. Jan 2021: Remain open, resolve before publication	Chuck	12.11.2020	Open
A42-03	Update IRIDIUM MASPS document according discussion and forward it to RTCA program manager for FRAC/preparation	Luke / Michael	17.11.2020	Closed
A42-04	Iridium to provide the excel spreadsheet to Chuck for assigning it a working paper number and attaching it to the MOPS	Luke	12.11.2020	Closed
A42-05	Manufacturer to clarify calculation proposed in paper from A42-04 is correct during FRAC/OC process	Darrell Andregg/ Richard Tapp / Johan Gericke	FRAC/OC resolution meeting	Closed
A42-06	Manufacturer to test 150ms Voice Latency requirement during FRAC. Present results at FRAC resolution meeting	Darrell	FRAC/OC resolution meeting	Open
A42-07	Update IRIDIUM MOPS document according discussion and forward it to RTCA program manager for FRAC/preparation	Luke	17.11.2020	Closed
A42-08	Facilitate feedback from GLONASS WP Remark: See new action item A45-02	Chuck	asap	Closed

RTCA SC-222/EUROCAE WG-82 Plenary meeting: 13.01. and 14.01.2021

Action#	Content	Responsible	Deadline	Status
A45-01	Clarify open items (e.g. Table 8-F) on MOPS between Luke and Armin offline.	Luke/Armin	22.01.2021	Open
A45-02	Chuck to facilitate comments on WP317B if any with SC-159. In case not possible within FRAC/OC deadline on 1 st February e-mail exchange until 8 th February proposed.	Chuck	22.01.2021	Open
A45-03	Anny Guegan to contact WG-62 on the GLONASS interference issue outlined in WP317B (refer to action item A45-02)	Anna	22.01.2021	Open