

*Summary of the One Hundred First Meeting*

**Special Committee 159**

**Minimum Operational Performance Standards for Airborne Navigation  
Equipment Using the Global Positioning System (GPS)**

The one hundred first meeting of SC-159 was held May 3, 2018 via telecon/WebEx. The attendees were the following:

Christopher Hegarty (Co-Chairman)	The MITRE Corporation
George Ligler (Co-Chairman)	Project Management Enterprises Inc.
Karan Hofmann (Program Director)	RTCA
Barbara Clark (DFO)	Federal Aviation Administration (FAA)
<b>NAME</b>	<b>COMPANY</b>
Hamza Abduselam	Federal Aviation Administration (FAA)
Ken Ashton	Nu-Approach Ltd
Laurent Azoulai	Airbus
John Barry	Federal Aviation Administration (FAA)
Jed Dennis	NAVTAC
Mark Dickinson	Federal Aviation Administration (FAA)
Daniel Domey	Esterline CMC Electronics
John Foley	Garmin Ltd.
Barry Irwin	The MITRE Corporation
Oliver Julien	Ecole Nationale de l'Aviation Civile
Sai Kalyanaraman	Rockwell Collins, Inc.
Vladimir Latev	Universal Avionics Systems Corp.
Tim Murphy	The Boeing Company
Ajay Parikh	Ligado Networks
Philippe Estival	Ecole Nationale de l'Aviation Civile
Andrew Roy	Aviation Spectrum Resources, Inc.
Sergey Silin	ZAO "KB NAVIS"
Geoff Stearn	Ligado Networks
John Studenny	Esterline CMC Electronics
Dale Swanson	The MITRE Corporation
Hans Trautenberg	European Aviation Safety Agency (EASA)
Joel Wichgers	Rockwell Collins, Inc.

The agenda for the meeting follows:

1. Introductory Remarks: DFO, RTCA and Co-Chairs
2. Approval of Summaries of Previous Meeting: One Hundredth Meeting held March 16, 2018 (RTCA Paper No. 075-18/SC159-1071)
3. Review of GNSS L1/L5 Antenna MOPS Final Review and Comment (FRAC) activities
4. Decision to approve release of GNSS L1/L5 Antenna MOPS for presentation to Program Management Committee for publication
5. GPS/Interference (WG-6): Update regarding taking draft DO-292 revision into Final Review and Comment (FRAC)
6. Discussion of Terms of Reference Updates
7. Action Item Review
8. Assignment/Review of Future Work
9. Other Business
10. Date and Place of Next Meeting
11. Adjourn

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In accordance with the Federal Aviation Advisory Committee Act, Barbara Clark, Federal Aviation Administration (FAA), was the Designated Federal Official for this meeting.  
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**Agenda Item 1. Chairman’s Introductory Remarks.**

- At the suggestion of Co-Chairman George Ligler, attendees introduced themselves.
- Barbara Clark read a statement indicating that this Advisory Committee meeting is open to the public, that notice of the meeting was published in the Federal Register and that members of the public may present written or oral statements with the permission of the committee chairmen and program director.
- Karan Hofman, Program Director of RTCA, discussed RTCA’s proprietary references policy and committee participation membership policy.
- All attendees were present via telecon/WebEx, as this was a special meeting for the primary purpose of reviewing for approval the L1/L5 antenna MOPS that was originally scheduled for review/approval in March. This document was not approved at the 100<sup>th</sup> SC-159 meeting in March because of the lack of consensus on one set of requirements regarding antenna selectivity.

**Agenda Item 2. Approval of Summaries of Previous Meetings.**

The summary for the 99<sup>th</sup> meeting, RTCA Paper No. 012-18/SC159- 1068, was approved with the incorporation of minor editorial comments from Chris Hegarty. The summary for the 100<sup>th</sup> meeting was not yet available, so will be reviewed for approval at the next SC-159 meeting.

**Agenda Item 3. Review of GNSS L1/L5 Antenna MOPS Final Review and Comment (FRAC) activities.**

WG-7 (Antennas) Co-Chair Sai Kalyanaraman gave a presentation on the status of the GNSS L1/L5 Antenna MOPS. In the short timeframe (less than 7 weeks) since the 100th SC-159 meeting, consensus has been reached on the antenna selectivity mask debate. A mask in-between the two candidate masks included in the FRAC document was agreed upon, which closes out the FRAC process. Overall, 173 comments were received and successfully resolved. SC-159 approval of the L1/L5 antenna MOPS was recommended by WG-7.

Daniel Domey raised concerns with radiofrequency compatibility between Iridium NEXT and DFMC GNSS airborne equipment, and possible implications on the L1/L5 antenna MOPS. Since information is not yet available on Iridium NEXT emissions, and many aircraft will have DO-301 GNSS antennas for a long time, the consensus of SC-159 was that Iridium NEXT installations will need to be designed to be compatible with DO-301 and L1/L5 MOPS GNSS antennas. Sai, George, and Chris will communicate with SC-222 (SATCOM) to ensure that this issue is being addressed.

**Agenda Item 4. Decision to approve release of GNSS L1/L5 Antenna MOPS for presentation to Program Management Committee for publication.**

The L1/L5 Antenna MOPS was approved with consensus by SC-159 and will go before the PMC on June 21.

**Agenda Item 5. GPS/Interference (WG-6): Update regarding taking draft DO-292 revision into Final Review and Comment (FRAC)**

WG-6 Chairman, Sai Kalyanaraman noted that DO-292 is still on schedule for completion by SC-159 by March 2019. A decision to take the document into FRAC can be taken up at the next SC-159 meeting.

**Agenda Item 6. Discussion of Terms of Reference Updates.**

SC-159 Co-Chair Chris Hegarty informed the group that the PMC had approved Version 10 of the SC-159 Terms of Reference (ToR) to change the DFO from Ken Alexander to Barbara Clark. Ken was thanked for his years of service as DFO.

Potential future ToR were then discussed.

- It is still anticipated that SC-159 and EUROCAE WG-62 will eventually produce a joint dual-frequency multiconstellation (DFMC) MOPS.
- Laurent Azoulai noted that the EUROCAE Technical Advisory Committee (TAC) has met the day earlier and there were discussions on classes of receiver for the DFMC MOPS with views expressed that the gamma class should not be included. This may be another issue for RTCA-EUROCAE coordination in addition to the schedule for the DFMC MOPS.
- Barbara Clark noted that the ICAO NSP agreed that SBAS SARPs cannot be validated until Galileo SARPs are complete. This may result in a schedule slip.

- WG-62 is currently pushing forward with an early DFMC MOPS version that they plan to complete in December 2018. Once this is complete, the time may be right for WG-62 and SC-159 to reach an agreement on future joint activities. The next WG-62 meeting will be in June in Toulouse.
- Laurent Azoulai noted a concern with the development of ARAIM. Thus far, ARAIM has primarily been developed by government and academia. Industry involvement is needed.
- SC-159 will revisit an update to ToR at an appropriate time, which is likely to be early next year.

**Agenda Items 7 and 8. Action Item Review and Assignment/Review of Future Work.**

The sole recorded action item from the meeting was for Sai, George, and Chris to coordinate with SC-222 on the GPS-Iridium issue (see summary of Agenda Item 3 discussion above).

Future work will proceed in accordance with the Version 10 SC-159 ToR.

**Agenda Item 9. Other Business**

Barbara Clark gave a presentation entitled “Potential Use of ADS-B to Support GNSS Status Monitoring and Data Analysis” and led a subsequent discussion:

- SC-159 has been briefed by the FAA’s GNSS Intentional Interference and Spoofing Study Team (GIISST) on GNSS threats.
- SC-159’s ToR includes the guidance: “New MOPS will address, to the extent practicable, the threats of intentional interference and spoofing.”
- The use of ADS-B data has been suggested as a valuable way of gaining insight into realtime status of GPS positioning (e.g., within the March 2018 RTCA TOC report), and FAA is now considering if/how to best use ADS-B data for this purpose.
- Some technical aspects of how aircraft GNSS equipment might disseminate status information to the ADS-B ground network were discussed, as well as concerns with the basic concept of gathering aircraft data through ADS-B.
- Barbara recommended an ad hoc within SC-159 to explore the concept further through the calendar year. This was agreed to.

**Agenda Items 10 and 11. Date and Place of Next Meeting; Adjourn**

The 102<sup>nd</sup> meeting will take place the week of October 1-5<sup>th</sup>, 2018. Working groups 2, 2C, 4, 6 and 7 plan to meet throughout the week beginning on Monday with the plenary session on Friday morning.

The 103<sup>rd</sup> meeting will take place the week of March 4-8<sup>th</sup>, 2019.

George Ligler adjourned the meeting.

CERTIFIED as a true and accurate summary of the meeting.

-S-  
Christopher Hegarty  
Co-chairman

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George Ligler  
Co-chairman