ICAO RPAS Symposium Panel

RPAS-related Standards Development Activities

RTCA SC-228: Minimum Performance Standards for Uncrewed Aircraft Systems

November 9, 2022

Presented by Katie Edwards, PE
The Boeing Company
SC-228 Secretary

About RTCA

- RTCA is a private, not-for-profit association founded in 1935 as the Radio Technical Commission for Aeronautics, now referred to simply as “RTCA”.
- We are a Public-Private Partnership venue for developing consensus among diverse, competing interests on critical aviation modernization issues in an increasingly global aviation ecosystem.
- RTCA committees coordinate closely with the Federal Aviation Administration (FAA) as they are a key stakeholder with a unique relationship to standards development organization (SDO) work.

www.rtca.org

Special Committee 228 Leadership

SC-228: Minimum Performance Standards for Uncrewed Systems

628 Registered Members at Present

163 Organizations Represented

Committee Leadership

Co-Chair: **Jim Williams**, Aura Network Systems
Co-Chair: **Brandon Suarez,** Reliable Robotics
Gvt. Auth. Rep: **Steve Van Trees**, FAA
Secretary: **Katie Edwards,** Boeing

RTCA Program Director

Brandi Teel
Program Director
RTCA, Inc.

WG1 Detect and Avoid

Co-Chair: **Don Walker**, Airbus SV
Co-Chair: **Fabrice Kunzi**, Boeing
Secretary: VACANT

WG2 Command & Control

Co-Chair: **Amelia Mahan**, Amazon
Co-Chair: **Steve Van Trees**, FAA
Secretary: **Jennifer Ledford**, FAA

WG3 Lost Link

Co-Chair: **Randy Willis**, NG
Co-Chair: **Paul Albuquerque,** FAA
Secretary: **Kerry Bowers**, FAA

WG4 Navigation

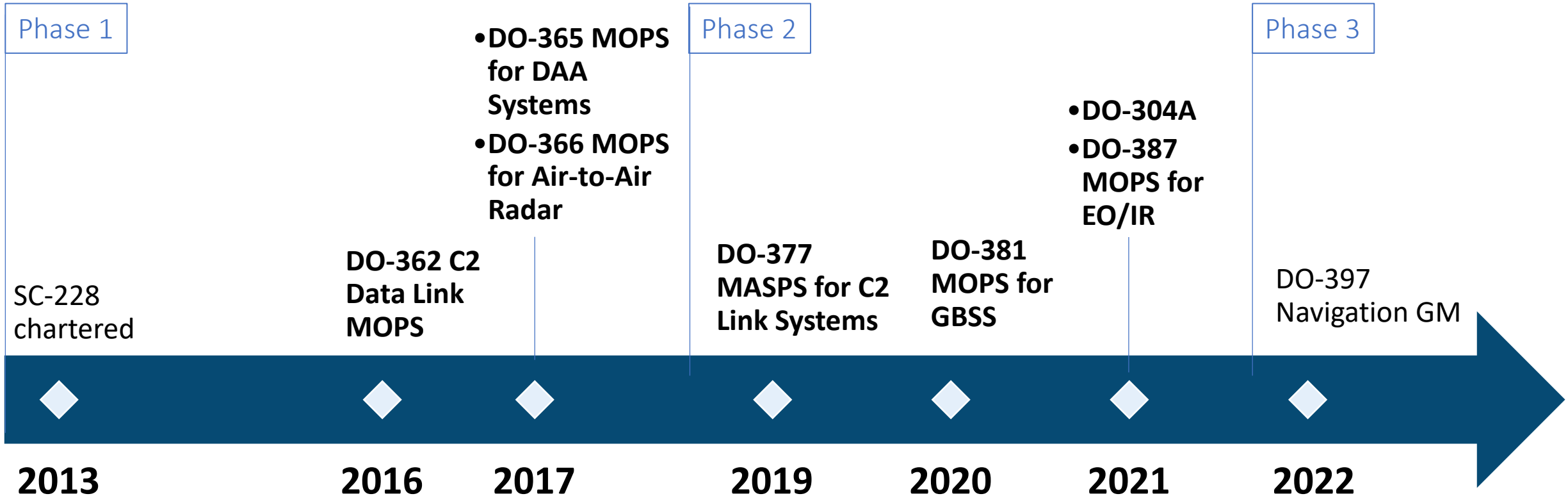
Co-Chair: **Joel Wichgers**, Collins
Co-Chair: **Matt Harris**, Boeing
Sec.: **Andrew Videmsek**, Reliable Robotics

Ad-Hoc WG Vehicle to Vehicle WP

Co-Chair: **Bryan Barmore**, NASA
Co-Chair: **Randy Jacobson**, Collins
Secretary: **Bob Lee,** GXA Consulting

RTCA UAS MOPS/MASPS Publication Timeline

Several topical White Papers, and document revisions have been published over the past decade by RTCA SC-228. This graphic shows the initial evolution of guidance materials and published standards.

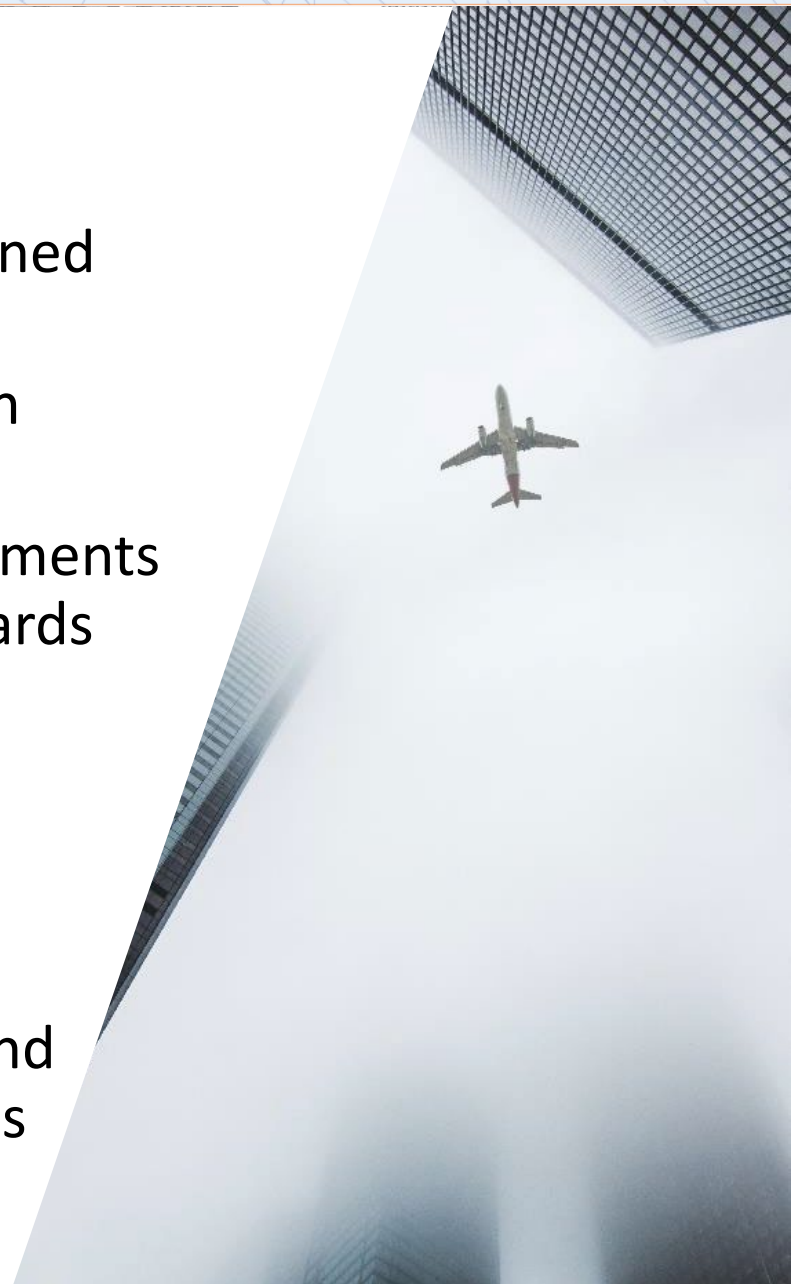


Key Completed Documents from SC-228

DO-362A	Command and Control (C2) Data Link Minimum Operational Performance Standards (MOPS) (Terrestrial)	Issued 09-22-16 Rev A 12-17-20
DO-366A	Minimum Operational Performance Standards (MOPS) for Air-to-Air Radar for Traffic Surveillance	Issued 05-31-17 Rev A 09-10-20
DO-365C	Minimum Operational Performance Standards (MOPS) for Detect and Avoid (DAA) Systems	Issued 05-31-17 Rev C 09-15-22
DO-377A	Minimum Aviation System Performance Standards for C2 Link Systems Supporting Operations of Unmanned Aircraft Systems in U.S. Airspace	Issued 03-21-19 Rev A 09-17-21
DO-381	Minimum Operational Performance Standards (MOPS) for Ground Based Surveillance Systems (GBSS) for Traffic Surveillance	Issued 03-26-20
DO-304A	Guidance Material and Considerations for Unmanned Aircraft Systems	Issued 06-17- 21
DO-387	Minimum Operational Performance Standards (MOPS) for Electro-Optical/Infrared (EO/IR) Sensors System for Traffic Surveillance	Issued 06-17-21
DO-397	Guidance Material: Navigation Gaps for Unmanned Aircraft Systems	Issued 09-15-22
DO-398	Operational Services and Environment Definition (OSED) for Unmanned Aircraft Systems Detect and Avoid Systems (DAA)	Issued 09-15-22

Accomplishments for UAS

- SC-203 / DO-304 – Lessons Learned and laying the groundwork.
  - DO-304 - Guidance Material and Considerations for Unmanned Aircraft Systems
  - DO-320 - Operational Services and Environmental Definition (OSED) for Unmanned Aircraft Systems
  - DO-344 Volume 1 & 2 - Operational and Functional Requirements and Safety Objectives for Unmanned Aircraft System Standards
- Standards accepted as Means of Compliance by FAA:
  - DO-365 → TSO-C211 Detect and Avoid (DAA) Systems
  - DO-366 → TSO-C212 Air-to-Air Radar (ATAR) for Traffic Surveillance
  - DO-362 → TSO-C213 Unmanned Aircraft Systems Control and Non-Payload Communications Terrestrial Link System Radios



Lessons Learned in UAS Standards Development

- Regulator involvement in development activities continues to be very important to RTCA.
- The FAA, or sometimes another US government organization, often provides a Government Authorized Representatives to sit on committees and serve as a voice from US Government perspective.
- In the technical standards environment, industry and academia have the opportunity to bring up conversations with regulators on perspectives related to technical acceptance of a standard, before it happens in the context of specific certification projects.
- RTCA supports the standards that industry and regulators need. We appreciate all voices in the conversation, as it makes a usable and thorough end product.

Planned Work for SC-228	Description	Date*
V2V White Paper	Recommendations for AAM Surveillance and Spectrum Considerations	Dec 2022
GBSS MOPS (DO-381A)	Revision to include a class of reduced performance consistent with en-route DWC requirements.	Q2 2023
GM for Lost C2 Link UAS Behavior	Guidance material that will regularize the lost link behavior of UAS operating in controlled airspace.	Q2 2023
C2 Link Systems MASPS (DO-377B)	Address safety risk and performance requirements for air taxi, surface operation at public use airports, and low altitude small package delivery.	Q4 2023
C2 Link MOPS for Cellular Networks	Create a joint standard with EUROCAE WG-105 for use of Cellular commercial networks for C2 Links used for type certificated UAS.	Q1 2024
UHF Band C2 Link System MOPS (DO-XXX)	Create a standard for use of UHF spectrum band for C2 Links used in type certificated UAS.	Q1 2024
DAA OSED (DO-398A)	Update DAA OSED to include ACAS Xr use cases and associated material.	Q1 2024
C2 Link MOPS (Terrestrial) (DO-362B)	Incorporate changes required to harmonize SATCOM compatibility with EUROCAE Standard. Updates required as a result on initial implementation of A revision.	Q4 2024
MASPS for DAA Supporting Taxi Operations (DO-XXX)	This document will capture guidance and requirements for DAA equipment to facilitate operations of UAS on the surface.	Q1 2025
DAA MOPS (DO- 365D)	Future revision of the DAA MOPS to add a class of equipment for ACAS Xr.	Q2 2025
MASPS: Navigation for Automatic Taxi (DO-XXX)	Define navigation performance requirements to support automatic taxi operations.	Q3 2025

* Dates indicate target completion and publication of standard or document, subject to change.

Thanks to all for your active participation and commitment to advancing the technical standards basis to support certification and integration of Uncrewed Aircraft Systems into the National Airspace System in a safe, timely and efficient manner.