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Command and Control (C2)

Data Link

White Paper Phase 2

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FOREWORD

This document was prepared by Special Committee 228 (SC-228) and approved by the RTCA Program Management Committee (PMC) on September 21, 2017.

RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal Advisory Committee and develops consensus-based recommendations on contemporary aviation issues. RTCA's objectives include, but are not limited to:

- Coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;

- Analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;

- Developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of Minimum Operational Performance Standards (MOPS) for electronic systems and equipment that support aviation; and

- Assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization (ICAO) and the International Telecommunication Union (ITU) and other appropriate international organizations can be based.

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1 PURPOSE AND SCOPE

1.1 Background/Terms of Reference Overview

RTCA Inc. established Special Committee 228 (SC-228)[1] "Minimum Performance Standards for Unmanned Aircraft Systems" in 2013. SC-228 was formed at the request of the Federal Aviation Administration (FAA) Unmanned Aircraft System (UAS) Integration Office to establish minimum performance standards for two key UAS technologies:

- Detect and Avoid (DAA), focus of Working Group 1 (WG-1)
- Command and Control (C2), focus of Working Group 2 (WG-2)

This White Paper is concerned with the activities and product deliverables of WG-2.

The International Telecommunication Union (ITU) has identified multiple spectrum bands as candidates for use by Control and Non-Payload Communication (CNPC) systems for UAS. Such systems would support sending information to allow the pilot to safely control, monitor and manage an Unmanned Aircraft (UA). The CNPC system may also provide for sending and receiving one or more of the following types of information: Air Traffic Controller voice and data relay, DAA, weather radar and/or video.

The original Terms of Reference (TOR) characterized a two-phase approach for such developments. These are summarized below.

1.1.1 Phase 1 Activities Overview

Phase 1 scope was entirely focused on terrestrial CNPC Link architectures and did not contain requirements for Satellite[2] Communications (SATCOM). Furthermore, Phase 1 was limited to UA radio line-of-sight (RLOS) operations.

Phase 1 of the WG-2 work program culminated in the RTCA Program Management Committee's (PMC) approval and release of RTCA DO-362 "Command & Control Data Link Minimum Operating Performance Standards (Terrestrial)," September 22, 2016. This standard:

- Is limited to spectrum allocations approved from various World Radio Conferences (WRC), specifically 960 – 1164 Megahertz (MHz) (L Band) and 5030 – 5091 MHz (C Band).
- Focuses on electromagnetic compatibility between systems and not interoperability; the standards address internal connections within a UAS not interconnected with another UAS.
- Focuses on point-to-point connectivity architectures.
- Provides a set of baseline CNPC Link System requirements which included details to fully characterize one instantiation of a CNPC Link.
- Provides an alternate set of Manufacturer-Specific CNPC Link System requirements that provides a path for qualification of implementations other than the baseline CNPC Link System.

[1] See Appendix A for explanations of the acronyms and terminology of terms.
[2] The word satellite is used within this paper as meaning (per ITU definitions) a space station with one or more transponders.

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