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|  | International Civil Aviation Organization**INFORMATION PAPER** |

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 **FREQUENCY SPECTRUM MANGEMENT PANEL (FSMP)**

Second Meeting of the Working Group of FSMP (FSMP-WG/2)

Montreal, Canada, 15 – 19 February 2016

Agenda Item 7: Development of (planned) material for ITU-R Studies on FSS for UAS

TECHNICAL DATA REQUIREMENTS FOR RPAS BEYOND-LINE-OF-SIGHT SATELLITE COMMAND AND CONTROL

(Presented by Robert Kerczewski, National Aeronautics and Space Administration, USA)

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| **SUMMARY** |
| This information paper notes NASA activities supporting the development of RPAS C2 systems, and in particular NASA’s current investigation into technical data requirements for BLOS satellite C2 systems and invites the views of the meeting on technical data required to support efforts related to RPAS BLOS C2 system standards development. |

1. INTRODUCTION
	1. Development of standards (Minimum Operational Performance Standards) for remotely piloted aircraft systems (RPAS) line-of-sight (LOS) command and control links (C2) has progressed following aeronautical mobile (route) service (AM(R)S) allocation to the 5030-5091 MHz band by the 2012 World Radiocommunication Conference (WRC-12).
	2. Development of supporting technical data has been undertaken by the U.S. National Aeronautics and Space Administration (NASA), in the form of aeronautical channel measurement and modeling, development of prototype C2 radios, extensive flight testing of several versions of C2 radios in two frequency bands, development of large scale simulations of regional and national C2 LOS communication systems, and investigation of C2 link security requirements.
	3. For beyond-line-of-sight (BLOS) C2 satellite links, the 2015 World Radiocommunication Conference (WRC-15) approved ITU-R Resolution 155, allowing the use of the fixed-satellite service (FSS) frequency bands in the Ku-Band and Ka-Band ranges for RPAS BLOS C2 links. NASA supported this WRC-15 agenda item including development of sharing studies between RPAS and terrestrial services.
	4. NASA is now investigating what types of technical data development might be required for RPAS BLOS C2 satellite links.
2. DISCUSSION
	1. NASA issued the Request for Information (RFI) titled “Unmanned Aircraft SatCom Command and Control Communication System Development” in July 2015. Responses received to the RFI are now undergoing evaluation.
	2. The RFI requested information on the design and development of a SatCom Command and Control communication (C2) system prototype for unmanned aircraft in order to validate and verify draft performance requirements by collecting performance data in relevant laboratory and flight environments. A similar RFI for RPAS LOS C2 terrestrial communications system was issued prior to NASA establishing the project supporting the technical data development activities outlined in 1.2 above. However, it must be noted that NASA has not initiated a project for RPAS BLOS at this time.
	3. In investigating what types of technical data development might be required for RPAS BLOS C2 satellite links, NASA is considering the Ku-Band and Ka-Band allocations in ITU-R Resolution 155, as well as the AMS(R)S allocation in the 5030-5091 MHz band.
	4. NASA’s investigation of technical data requirements for RPAS BLOS satellite C2 links includes requirements that would support development of MASPS and MOPS, requirements resulting from ITU-R Resolution 155, and requirements supporting ICAO FSMP and RPAS Panel.
3. ACTION BY THE MEETING
	1. The meeting is invited to note the details of NASA’s investigation of technical data development requirements for RPAS BLOS satellite C2 communications and provide information and views on expected technical requirements supporting activities noted in 2.4 above.

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