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# Developments in Navigation Systems, Frequency Spectrum Management and Surveillance Panels

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# OUTLINE

- Outcome of second Navigation Systems Panel
  - 1 to 11 December 2015
- Surveillance Panel (SP/1)
  - Aeronautical Surveillance Panel (ASP)
  - Airborne Surveillance Task Force (ASTAF)
  - Aeronautical Surveillance Working Group (ASWG) 11-14 April 2016.
- Frequency Spectrum Management Panel (FSMP)
  - FSMP-WG/2 (15 – 19 Feb 2016)
- Action by the meeting

# NAVIGATION SYSTEM PANEL

- Second meeting of the Navigation Systems Panel (NSP/2) (1 to 11 December 2015)
- The following NSP working groups were active during the course of the meeting:
  - GBAS Working Group (GWG)
  - Conventional Navaid and Testing Working Group (CNTWG)
  - GNSS SARPs Working Group (GSWG)
  - Navigation Operations Working Group (NOWG)
  - Spectrum Working Group (SWG)
  - Validation Working Group (VWG)

# NSP/2 CONTINUE

- **Strategy for rationalization of conventional navigation aids and evolution toward supporting PBN**
  - rationalization strategy, which will be included in Annex 10, Volume I, new Attachment H, (applicable November 2016).
  - Work ongoing to address the approach and landing aspects of the strategy, which are currently dealt with in the existing Attachment B to Annex 10. An update of the existing Attachment B material is underway.
- **New GNSS constellations**
  - developing SARPs for two new GNSS constellations that are currently being deployed (Galileo and BeiDou),
  - the evolution of the two GNSS constellations for which SARPs already exist (GPS and GLONASS).

# NSP/2 CONTINUE

- **GNSS augmentation systems**

The two main developments in this area are:

- Category II/III GBAS: the development of SARPs for this system is approaching finalization after over a decade of work. Substantial technical challenges have had to be overtaken to enable the completion of this substantial effort. There are some pending validation issues that will need to be addressed by the time of the final approval of the material by the panel (currently planned for the next full meeting of the panel, NSP/3, that will be held in December 2016; and
- Dual-frequency SBAS and GBAS: with the introduction of dual-frequency operation in the core GNSS constellations, augmentation systems will need to evolve accordingly, to support the augmentation of signals on both frequencies (e.g. L1/L5 for GPS). The NSP has undertaken initial work in preparation for the development of the related SARPs.

# NSP/2 CONTINUE

- **GNSS performance assessment**

- New guidance material identifying several categories of functions falling under the broad scope of GNSS monitoring (GNSS performance assessment, GNSS operational status monitoring, GNSS interference monitoring and GNSS data recording). The material focuses on providing guidance on the possible implementation for the GNSS performance assessment function, defined as a periodic offline activity that may be performed by a State or delegated entity to verify that GNSS performance parameters conform to the relevant Annex 10 Standards. Special consideration was given to ensuring that the new guidance provided did not create any additional regulatory burden. Monitoring provisions considered in the guidance range from basic (such as the use of public reports provided by GNSS service providers) to more advanced (such as dedicated regional or national monitoring networks).

- **ILS critical and sensitive areas**

- ILS critical and sensitive areas (CSA) are identified in Annex 10 for the purpose of ensuring protection of instrument landing system (ILS) signals from signal blockage and multipath interference caused by large reflecting objects located within the ILS coverage volume.



# FREQUENCY SPECTRUM MANAGEMENT PANEL

- Outcome of WRC-15
- Development of ICAO Position for WRC-19
- Updates to the ICAO Frequency Spectrum Policy (Doc 9718 Vol I, Chap. 7)
- Updates to the ICAO Frequency Spectrum Strategy
- Radio Altimeter issues
- Development of (planned) material for ITU-R Studies on:
  - FSS for UAS
  - GADSS
- 5 GHz Band Planning
  - AeroMACS status
  - Potential issues coming from RPAS Panel
  - Global UAS/RPAS channel plan
- Interference from non-aeronautical sources

# FSMP CONTINUE

- **Outcome of WRC-15**
  - It was indicated by some participants that the AI 1.5 outcome is being perceived both inside and outside aviation as questioning the need for aviation
- **Development of ICAO Position for WRC-19**
  - Appendix E provides the agreed outcome of the discussions.
- **Updates to the ICAO Frequency Spectrum Policy (Doc 9718 Vol 1, Chapter 7)**
  - “Handbook on Radio Frequency Spectrum Requirements for Civil Aviation” (Doc 9718) to align with WRC-15. also some additional changes.
- **Updates to the ICAO Frequency Spectrum Strategy**
  - proposed updates to the ICAO Frequency Spectrum Strategy in chapters 1, 4 and 8 of Volume I Doc 9718, following the premise that the overall goal for the future of aeronautical spectrum and aeronautical spectrum management is to ensure the perpetual availability of spectrum through continual improvement in practices and processes. To achieve this goal, the revised Strategy provided an ICAO spectrum vision that focuses on the future that the aviation sector wishes

# FSMP CONTINUE

- **Radio Altimeter Issues**

- draft reporting form for pilots to catalog harmful interference to aircraft radio altimeters. The meeting reviewed the content of the form and agreed it would provide a good first step in gathering data on actual radio altimeter interference cases through IATA
- requirement for ICAO provisions on adequately defining frequency characteristics and interference performance of both Radio Altimeters and Wireless Avionics Intra Communications (WAIC). SARPS for WAIC would likely be very short, but should address three points:
  - (1) that WAIC cannot cause interference to altimeters,
  - (2) that WAIC should have an interference mask specifying the amount of out-of-band (i.e., outside the 4200-4400 MHz band) interference it can tolerate as a function of offset frequency (the GNSS mask was noted as an example), and
  - (3) power limits to ensure WAIC operation on one aircraft would not interfere with WAIC and/or radio altimeter operations on another aircraft.

- **Development of (planned) material for ITU-R Studies**

- Fixed Satellite Service for UAS/RPAS
- GADSS

# FSMP CONTINUE

- The FG AC has now concluded its work with four agreed Deliverables:
  - Deliverable 1 - Existing and Emerging Technologies of Cloud Computing and Data Analytics;
  - Deliverable 2/3 - Use Cases and Requirements;
  - Deliverable 4 - Avionics and Aviation Communications Systems;
  - Deliverable 5 - Key findings, recommendations for next steps and future work.
- **5 GHz Band Planning**
  - AeroMACS Status : information regarding studies of the performance degradation caused by interference from existing radio services and future aeronautical communications in 5GHz Band.
  - In particular, the degradation characteristics of AeroMACS when receiving interference from either GSM signals or a Wireless Access System (WAS) used in Japan.
  - showed the specification of Aeronautical Mobile Telemetry (AMT) used in Brazil in preparation for future testing. These results will help facilitate establishment of mitigation criteria in 5 GHz band..
- **Interference from non-aeronautical sources**
  - discussed the role of ICAO FSMP in addressing radio frequency interference issues. While the job card FSMP.004.01 currently outlines the role of the ICAO FSMP in addressing the impacts of radio frequency interference on CNS systems, it does not address a similar need for other non-CNS avionics that may be critical for the safety of flight operations

# SURVEILLANCE PANEL (SP/1)

- **Third meeting of the Aeronautical Surveillance Working Group (ASWG/3), 11-14 April, 2016**
  - Aeronautical Surveillance Working Group (ASWG)
  - Technical Subgroup
  - Airborne Collision Subgroup
  - Strategic Advisory Subgroup
- B787 Avionics Issue
- Aireon Spaced Based ADS-B Implementation Status
- Draft Guidance Material relating to II Code Coordination Procedures
- Security Issues Associated with Surveillance Systems
- Clarification of Proposed Guidance Material regarding Security of Surveillance Systems

# SP/ CONT.

## AIREON SYSTEM STATUS

- Aireon space-based ADS-B system will comprise ADS-B receiver payloads on all satellites of the Iridium NEXT global constellation, along with ground-based processing and distribution infrastructure.
- Technical overview of the Aireon system was presented at the January 2015 meeting of the Technical Sub-Group (ASP TSG)
- First launch of ten Iridium NEXT satellites, carrying Aireon ADS-B payloads, is scheduled for 3rd Quarter 2016. ADS-B target data will become available approximately two months after launch, following completion of on-orbit test activities for each satellite. The full constellation is to be completed by the end of 2017, to support commencement of operational ADS-B services in 2018.

## SP/ CONT.

- Guidance material on the inter-regional IC allocation coordination to be inserted in Doc 9924 Appendix J, MODE S IMPLEMENTATION Note.— Guidance for planning criteria for SSR Mode S II Code is included in chapter 8 of this appendix
- Initially, coordination is carried out at the State civil aviation authority level, and includes all Mode S II codes users within a State, including military
- At the regional level, coordination is enacted through ICAO Regional Offices. The ICAO Regional coordination procedures, specific tools and mechanisms can vary depending on the regional needs and limitations.

## SP/ CONT.

- Amendments to Aeronautical Surveillance Manual (Doc9924) to include Security Issues Associated with the development of UAS detect and avoid capability is progressing in RTCA SC-228 and will publish a MOPs for larger UAS.
- Proposal of the Inclusion of the 24-bit Aircraft Address in Registration Certificate a recommendation to be added in ICAO Annex 7 for the inclusion of the aircraft address into the ICAO certificate of registration template in order to reduce the number of incorrect 24 bit aircraft addresses encountered on aircraft after re-registration

## ACTION BY THE MEETING

- The meeting is invited to:
  - Note the information provided in this presentation;
  - Take into consideration in the planning and implementation of CNS in the MID Region



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Thank You