



International Civil Aviation Organization

# WRC-19 – Agenda Items for Other Issues



Andrew Roy - ASRI

- 1.7 - Non-GSO satellites
- 1.8 - Global Maritime Distress Safety Systems (GMDSS)
- 1.9 – Maritime Automatic Identifications System (AIS) and VHF data exchange system (VDES)
- 1.11 - railway radiocommunication systems
- 1.12 - Intelligent Transport Systems (ITS)
- 1.13 – New IMT between 24.25 and 86 GHz
- 1.14 - High-altitude platform stations (HAPS)
- 1.16 - Radio local area networks 5150 MHz and 5925 MHz
- 9.1.3 - Non-geostationary-satellite orbit systems in C-band
- 9.1.6 - Wireless Power Transmission (WPT)

# Agenda Item 1.7

- To study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions
- Assess the suitability of existing allocations to the Space Operation Service (SOS)
- If necessary, to consider new SOS allocations
- Resolution 659 (WRC 15).

# Agenda Item 1.7 - Commentary

- WRC-19 studies will determine if existing SOS allocations are sufficient
  - If not, will consider new allocations within the frequency ranges 150.05-174 MHz and 400.15-420 MHz.
  - Studies need to conclude if Space-to-Earth transmission in the 150 MHz range will effect VDLM 2 CSC at 136.975
- Primary concern is an affect on COSPAS SARSAT (EPIRB) in 406.1 MHz
- Space planes may want to use SOS spectrum
  - Need to ensure flexibility for any space plane use of SOS spectrum

# Agenda Item 1.7 - Updates



- Draft CPM text available
  - Studies for adjacent channel interference from proposed NGSO SD satellite system to COSPAS-SARSAT would exceed threshold
    - Mitigation is to employ 100 kHz guard bands above 406.1 MHz and below 406 MHz for NGSO SD space-to-Earth transmissions
    - NGSO SD satellite earth stations would implement guard bands 1 MHz below 406 MHz and 900 kHz above 406.1 MHz to protect spaceborne receiver
- 2 Proposed Methods to satisfy agenda item
  - Method A
    - No Change
  - Method B
    - Allocate 403- 406 MHz to space operation service, limited to non-GSO satellite systems, in the lower end of the 403-406 MHz allocation (403 - 404 MHz)
    - Worst case is stated to be Earth-to-space direction with a separation of .938 MHz

# Agenda Item 1.7 - ICAO Position



- *To oppose any new allocations to the space operations service unless agreed ITU-R studies have proven sharing and compatibility with aviation systems. In particular, oppose consideration of possible allocation to the space operation service in the frequency range 405.9 – 406.2 MHz unless agreed ITU-R studies have proven aviation use of the EPIRBs operating in the frequency band 406 - 406.1 MHz is protected in accordance with Resolution 205 (rev. WRC-15) and RR No. 5.267.*
- *To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not preclude the use of SOS allocations for space planes if this service is deemed appropriate for such use.*

# Agenda Item 1.8

- Regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization
- To support the introduction of additional satellite systems into the GMDSS
- Resolution 359 (Rev.WRC 15)

# Agenda Item 1.8 - Commentary

- Search and rescue aircraft are an integral part of the global maritime distress and safety system
  - Need to ensure no adverse impact on the capability of search and rescue aircraft
- If AMS(R)S system which already carries such communications is identified to also carry GMDSS
  - Any AMS(R)S use must comply with priority requirements contained in ICAO SARPS

# Agenda Item 1.8 – CPM Text

- Issue A: GMDSS Modernization – Resolve 1 of Resolution **359 (Rev. WRC-15)** – WP 5B
  - Issue A CPM Text updated
    - Identify 500 kHz band for MF NAVDAT
    - Modify Appendix 17 to allows several frequency bands For HF NAVDAT
- Issue B: Additional satellites systems - Resolve 2 of Resolution **359 (Rev. WRC-15)** – WP 4C
  - No updates on Methods to satisfy A.I.

[WD to Draft CPM Text](#)

# Agenda Item 1.8 - ICAO Position



- *To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not adversely impact on the capability of search and rescue aircraft to effectively communicate with vessels during disaster relief operations.*
- *To ensure that any regulatory provisions in response to this agenda item do not adversely impact SARPS compliance of aeronautical mobile-satellite (route) service satellite systems.*

# Agenda Item 1.9 (incl 1.9.1 & 1.9.2)



- 1.9.1 - Regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and automatic identifications system (AIS)
  - Resolution 362 (WRC 15)
- 1.9.2 - Modifications of the Radio Regulations, including new spectrum allocations to the MMSS (E-s & s-E)
  - Preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18
  - Enable a new VHF Data Exchange System (VDES) satellite component
  - Do not degrade the current terrestrial VDES components or AIS
  - Resolution 360 (Rev.WRC 15)

# Agenda Item 1.9 - Commentary



- Search and rescue aircraft are an integral part of the global maritime distress and safety system
  - Need to ensure no adverse impact on the capability of search and rescue aircraft

# Agenda Item 1.9 - Updates

- 1.9.1 – Draft CPM text updated
  - Incorporate several methods to satisfy this agenda item
  - WD-PDR to identify maritime mobile service identity to the AMRD of Group A which could enhance the safety of navigation
- 1.9.2 – Draft CPM Text
  - Describes compatibility issue between VDES sat downlink with fixed and mobile service in the same frequency band and RAS in the adjacent band
  - Two alternative frequency plans for VDES sat uplink and downlink
  - 3 Methods to satisfy
    - New primary allocation for the maritime mobile-satellite service (MMSS)

# Agenda Item 1.9 - ICAO Position

- *To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not adversely impact aviation systems, including the capability of search and rescue aircraft to effectively communicate with vessels during disaster relief operations.*

# Agenda Item 1.11



- Railway radiocommunication systems between train and trackside
  - Actions to facilitate global or regional harmonized frequency bands within existing mobile service allocations
- Resolution 236 (WRC-15)

# Agenda Item 1.11 - Commentary



- Evolving rail operations requiring additional communications between train and trackside systems
  - Meeting the needs of a high-speed railway environment
  - New functions may not be supported by the current narrowband railway radiocommunication systems
- Existing railway communication bands include 140-150 MHz, 330 – 360 MHz, 410 – 420 MHz and 450 – 460 MHz
  - 328.6 – 335.4 MHz an ARNS allocation for ILS glide slope
- Aeronautical mobile service is a subset of the mobile service
  - Need to protect existing aviation allocations

# Agenda Item 1.11 - Updates

- Draft CPM Text available
  - Multiple Methods for Each frequency band
    - No Change, ITU-RM.[RSTT\_FRQ] enough for Harmonization
    - Suppress Res. 236 (WRC-15)
  - Method B
    - Propose new Resolution XYZ (WRC-19)

# Agenda Item 1.11 - ICAO Position

- *To ensure, on the basis of agreed ITU-R studies, that any regulatory actions within existing mobile-service bands do not impact existing aeronautical systems operating in accordance with the Radio Regulations.*

# Agenda Item 1.12



- Evolution of Intelligent Transport Systems (ITS)
  - Consider possible global or regional harmonized frequency bands for implementation
  - Use existing mobile-service allocations
- Resolution 237 (WRC 15).

# Agenda Item 1.12 - Commentary

- New technologies can be integrated in a vehicle system to provide Intelligent Transport Systems (ITS)
  - Improving traffic management and assisting safe driving
- Harmonization of existing frequency bands for ITS not worldwide
- Current frequencies being considered:
  - 5 855- 5 925 MHz (dedicated short range communications)
  - 63 – 64 GHz (integrated systems for ITS)
    - Close proximity communication
- Aeronautical mobile service is a subset of the mobile service
  - Need to protect existing aviation allocations

# Agenda Item 1.12 - Updates



- Draft CPM Available
  - Method A: No change to Radio Regulations, Suppress Res. 237 (WRC-15)
  - Method B1: Establish a new Resolution XXX (WRC-19) to include technical and operational aspects of evolving ITS, the globally and regionally harmonized frequency bands/ranges for evolving ITS application should refer to Recommendation ITU-R [ITS\_FRQ].
  - Method B1: Establish a new Resolution **XXX (WRC-19)** to include technical and operational aspects of evolving ITS, this Resolution includes globally and regionally harmonized frequency bands/ranges for evolving ITS application

# Agenda Item 1.12 - ICAO Position



- *To ensure, on the basis of agreed ITU-R studies, that any regulatory actions within existing mobile-service bands do not impact existing aeronautical systems operating in accordance with the Radio Regulations.*

# Agenda Item 1.13

- International Mobile Telecommunications (IMT) above 24 GHz
  - Requires identification of frequency bands for the future development
- Resolution 238 (WRC 15)
- Responsibility of TG 5/1
  - Last meeting concluded 1/30, no updates

# Agenda Item 1.13 – Commentary



- A number of frequency bands/ranges between 24.25 and 86 GHz have been identified for IMT (terrestrial)
- 8 bands already have a primary MS allocation
  - 24.25-27.5 GHz, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz
- 3 bands may require additional primary MS allocations
  - 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz
- 24.25-24.65 GHz & 31.8-33.4 GHz bands are identified for Airport Surface Detection Equipment (ASDE)
  - 31.8-33.4 GHz also used for embedded systems that generate navigation information/video for pilots

# Agenda Item 1.13 - Commentary Cont.



- 76-81 GHz is allocated to the radiolocation service
  - Planned for non safety-critical, advisory applications on the airport surface such as wing-tip radar
  - Band excluded from studies, but will need to be protected from adjacent band emissions either side
- 43.5-47 GHz and 66-71 GHz have allocations to the RNS and/or RNSS
  - No aeronautical systems have currently been identified as operating in those frequency bands
- Agenda Item work being developed in separate ITU-R Task Group 5/1
  - Meeting collocated with ITU Working Parties 5A, 5B & 5C

[CPM Text](#)

# Agenda Item 1.13 - ICAO Position

- *To oppose any identification of a frequency band for IMT that could impact aviation systems, within a new or existing allocation to the mobile service in the frequency range 24.25 GHz to 86 GHz, unless agreed ITU-R studies demonstrate no adverse impact to those systems.*

# Agenda Item 1.14

- Appropriate regulatory actions for high-altitude platform stations (HAPS)
  - Within existing fixed-service allocations.
- Resolution 160 (WRC 15)

# Agenda Item 1.14 - Commentary

- High altitude platform stations (HAPS) stations located on an object at an altitude of 20-50 km
  - Operate at a specified, nominal, fixed point relative to the Earth
- Reviewing current RR identifications for HAPS
  - 6 440-6 520 MHz, 6 560-6 640 MHz, 27.9-28.2 GHz, 31.0-31.3 GHz, 47.2-47.5 GHz and 47.9-48.2 GHz
- Additional spectrum possible in other FS bands
  - 38-39.5 GHz globally
  - 21.4-22 GHz and 24.25-27.5 GHz in Region 2

# Agenda Item 1.14 – Commentary Cont



- Future aviation may wish to incorporate the use of HAPS
  - Global air ground communication network
  - Alternative to VSAT ground networks
- Additional concerns regarding the platform on which the HAPS resides
  - Radio links used for the HAPS communications service function do not impact any radio links used for safe operation (e.g., command and control links or see-and-avoid) of those platforms

# Agenda Item 1.14 – Updates

- Working Party 5C meeting an extra 4 days to finalize CPM text
- Draft CPM text show no text for Sharing and compatibility studies

# Agenda Item 1.14 - ICAO Position



- *If agreed ITU-R studies demonstrate there is no adverse impact on aeronautical systems including those used for the safe operation of the platform on which the HAPS resides, then support the use of fixed service allocations for HAPS provided that any regulatory actions taken within the existing allocations to the fixed service noted in Resolution 160 (WRC-15) do not constrain the potential future use of those HAPS fixed links as part of aeronautical communication systems (e.g., VSAT enhancement).*

# Agenda Item 1.16

- Consider wireless access systems, including radio local area networks (WAS/RLAN)
  - 5 150 MHz and 5 925 MHz
- Take the appropriate regulatory actions, including additional spectrum allocations to the mobile service
- Resolution 239 (WRC 15)

# Agenda Item 1.16 - Commentary



- 5 150-5 250 MHz
  - Use of WAS/RLAN in this band is currently limited to indoor systems
  - Intent to show compatibility between incumbent services and outdoor WAS/RLAN systems
  - Allocated worldwide on a primary basis to the ARNS & FS
    - AMS allocation in Region 1 (some countries) and Brazil
  - possible UAS sense and avoid collision awareness systems
    - Designed to operate independently of Aircraft Collision Avoidance Systems (ACAS)
  - Frequency band below 5 150 MHz allocated for ARNS, AMS(R)S, and AM(R)S
    - Includes AeroMACS system

# Agenda Item 1.16 – Commentary Cont



- 5 350-5 470 MHz
  - Allocated worldwide on a primary basis to the ARNS
    - Airborne weather radars
    - Previous ITU-R studies indicated that sharing with WAS/RLAN was not feasible
  - Autonomous UAS sense and avoid system described for the 5 150-5 250 MHz band above, is also being designed to be capable of operating in this frequency band
- 5 850-5 925 MHz
  - Primary mobile allocation in all three regions
  - Some countries in Region 2 have an AMS allocation in 5925-6700 MHz
    - Does not preclude the use of this band by other mobile service applications
  - FSS usage (E-s) by VSATs for critical aeronautical and meteorological information

# Agenda Item 1.16 - Updates

- Little agreement on how to satisfy this Agenda Item
  - 4 Methods to satisfy Agenda Item, with each Method can be applied to 5 different frequencies
- Method **A** – No Change
- Method **B1** - *Table of Frequency Allocations (ToA)* - Make an allocation to under the MS on a primary basis in the Table of Frequency Allocations
- Method **B2** - *Footnote (FN)* - Make an allocation to the MS for use by RLANs on a primary basis in a footnote.
- Method **C** – To identify different technical conditions for RLANs under an existing MS allocation either in a new or existing footnote.

[CPM Text](#)

# Agenda Item 1.16 - ICAO Position

- *To ensure, on the basis of agreed ITU-R studies, that any new provisions, or changes to existing regulatory provisions, in the frequency bands/ranges 5 150 -5 250 MHz, 5 350 – 5 470 MHz and 5 850 – 5 925 MHz do not adversely impact aviation systems.*

# Agenda Item 9.1.3

- Study of technical and operational issues and regulatory provisions for non-geostationary-satellite orbit systems
  - Existing frequency bands allocated to the fixed-satellite service
  - 3 700 – 4 200 MHz, 4 500 -4 800 MHz, 5 925 – 6 425 MHz and 6 725 – 7 025 MHz
- Resolution 157 (WRC-15)

# Agenda Item 9.1.3 - Commentary

- 3 700 – 4 200 MHz and 5 925-6 425 MHz are the main bands for VSAT transmissions used for aeronautical ground-ground communications
  - Often used in remote areas
- Adjacent to ARNS and AM(R)S band 4 200 – 4 400 MHz
  - Both radio altimeter and Wireless Avionics Intra-Communication (WAIC) system

# Agenda Item 9.1.3 - Updates

- Draft CPM Text available
  - One study indicates that circular-orbit non-GSO FSS operations in the 6/4 GHz band could result in large exceedances of the GSO protection criteria
  - Another study suggested to envisage the establishment of aggregate epfd limits that would be verified through multilateral meetings.

## Agenda Item 9.1.3 - ICAO Position

- *To oppose any new or changes to existing regulatory provisions in Article 21 of the ITU Radio Regulations for the frequency bands 3 700 – 4 200 MHz and 5 925-6 425 MHz unless it has been demonstrated through agreed ITU-R studies that there will be no impact from the potential introduction of new non-geostationary-satellites on aviation use in those bands.*
- *To oppose introduction of new non-geostationary-satellites in frequency bands near to the frequency band 4 200 – 4 400 MHz unless aviation use of that band is ensured through agreed ITU-R studies.*

# Agenda Item 9.1.6

- Studies for Wireless Power Transmission (WPT) for electric vehicles
  - Preparation for WRC-19
- Resolution 958 (WRC-15)

# Agenda Item 9.1.6 - Commentary

- WPT being considered in ISM bands in the low and very low frequency ranges, as well as MF band
  - 19 – 21 kHz, 59 – 61 kHz, 79 – 90 kHz, 100 – 300 kHz, 6 765 – 6 795 kHz
  - Power limits of up to 100kW for charging electric vehicles
  - 100 – 300 kHz, 6 765 – 6 795 kHz used for mobile device charging
- Majority of work conducted externally to ITU-R standards organizations
- Broader bandwidth with more complex modulation mechanisms than existing WPT technology
  - Potentially leaking large amounts of power into adjacent band
  - HF bands at potential risk

# Agenda Item 9.1.6 - Updates



- Draft CPM text
  - Loran-C compatibility feasible with Electric Vehicle Wireless Power Transmission in 81.38-90 kHz



# Agenda Item 9.1.6 - ICAO Position

- *To ensure that the protection of aeronautical systems is appropriately taken into account during the studies called for in response to Resolution 958 (WRC-15).*

- Final ICAO WRC-19 position document (approved June 2017)
  - <https://www.icao.int/safety/FSMP/Documents>
  - See folder 'ITU-WRC19'
- ITU-R list of WRC-19 Agenda Items
  - <http://www.itu.int/en/ITU-R/study-groups/rcpm/Pages/wrc-19-studies.aspx>
  - Identifies lead ITU-R study group for each item
  - Links to latest study group work (requires ITU TIES account)



International Civil Aviation Organization

# Questions?

