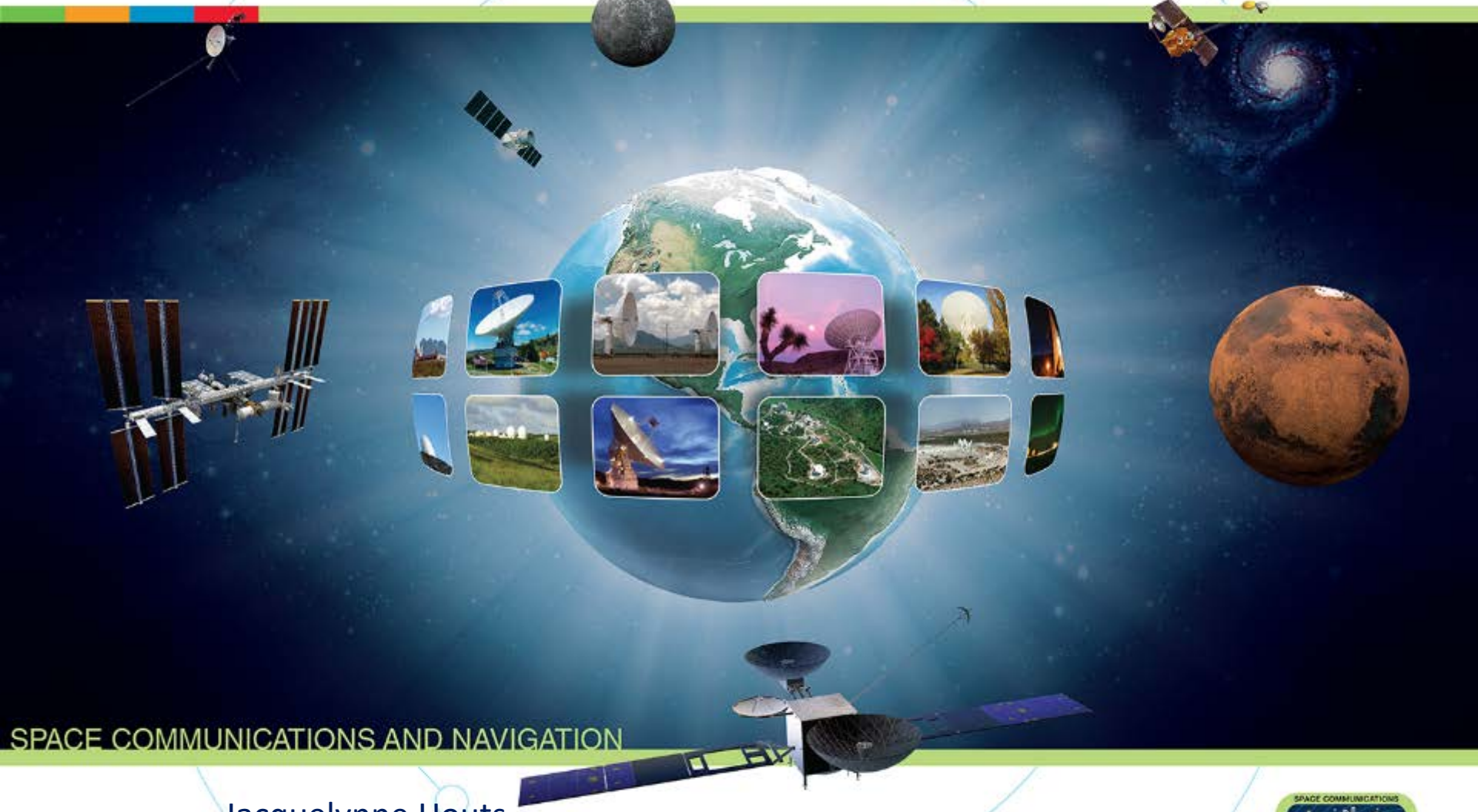
2019 World Radiocommunication Conference Preparations

National Aeronautics and Space Administration



Jacquelynne Houts
Deputy International Spectrum Program Manager
CORF Meeting May 16, 2019

www.nasa.gov

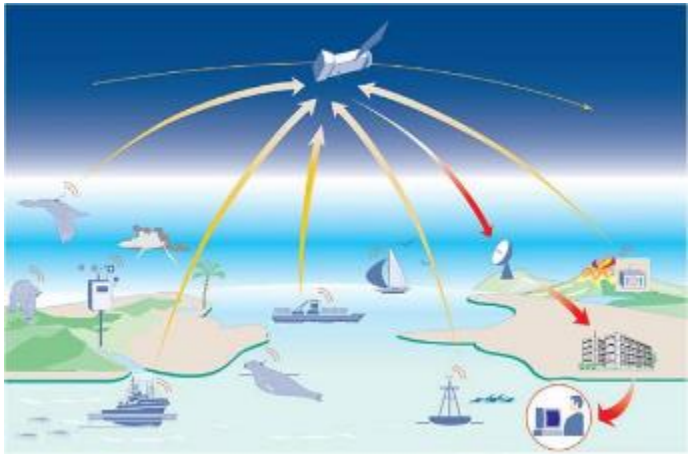
WRC-19 Overview

- 2019 World Radiocommunication Conference (WRC-19) will take place in Sharm el-Sheikh, Egypt, 28 October-22 November 2019
  - Over 160 International Telecommunication Union members participated in treaty-based modifications to the ITU Radio Regulations
- Technical preparatory work done in the ITU Radiocommunication Sector Study Groups
- Conference Preparatory Meeting (CPM) report contained approaches (Methods) for satisfying each agenda item (technical basis upon which Administration proposals are made)
- US Regulators oversee conference preparations by Federal Government (NTIA) and private sector (FCC)
- U.S. Delegation to WRC-19 lead by Ambassador to be appointed by POTUS

Interest to NASA - Advocacy

AI 1.2 Power Limits for MSS/MetSat/EESS Earth Stations around 400 MHz

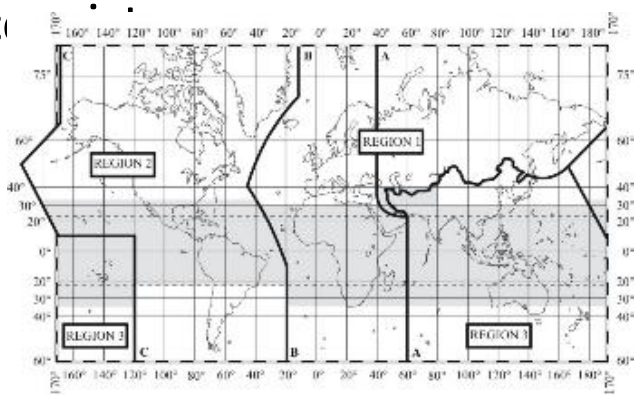
- Issue: The band 399.9-400.05 MHz is allocated to EESS and MetSat ↑ and 401-403 MHz is allocated to MSS ↑
  - These bands have traditionally been used for Data Collection Systems (DCS)
    - Weather stations, ocean buoys, atmospheric monitors
    - Transmitters are typically low/medium power
  - New satellite operators want to use the band for TT&C
    - Much higher power
    - Large constellations of satellites
- NASA Objective: Ensure DCS systems have regulatory certainty that they can continue to operate
- Status:
  - Draft CPM text contains four possible Methods for 399.9-400.05 MHz and three possible Methods for 401-403 MHz
  - Agreed US position to impose e.i.r.p. limits for all active services in both bands.
- Next Step(s):
  - U.S. proposal submitted to CITEL



Interest to NASA - Advocacy

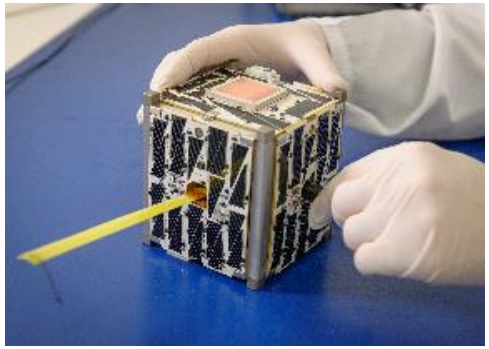
AI 1.3 MetSat upgrade / EESS allocation (space-to-Earth) at 460-470 MHz

- Issue: The band 460-470 MHz is used for DCS ↓ under a secondary MetSat allocation
  - Some countries observe it as a primary allocation
  - EESS may use the band on a sub-secondary level, and many small satellites have an EESS function
  - The band 450-470 MHz is identified for IMT, and Administrations are adopting pfd limits for their protection
- NASA Objective: Upgrade EESS allocation to primary in order to facilitate small satellite missions
  - Ensure DCS systems have regulatory c
- Status:
  - U.S. proposal for upgraded MetSat and new primary EESS allocation
- Next Step(s): Advocate US proposal at CITEL



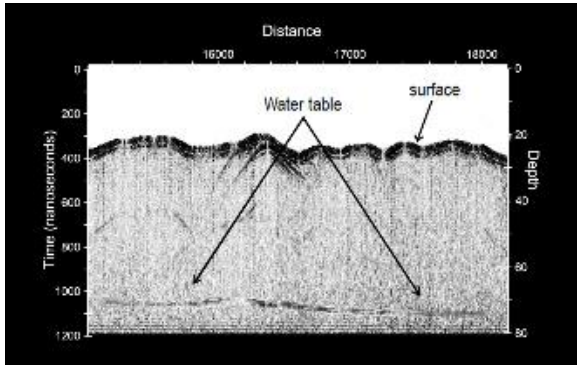
Interest to NASA - Advocacy
AI 1.7 Short Duration Missions

- Issue: Small satellites (which typically have short mission durations) are being increasingly used
  - First time satellite operators do not understand their spectrum responsibilities
  - Very quick development, deployment and mission lifecycle in comparison to the regulatory process(es)
  - Radio Regulations do not differentiate between big/small short/long duration missions
  - Agenda Item calls for review of spectrum requirements Space operations service allocations < 1 GHz for TT&C.
- NASA Objective:
  - Facilitate studies of compatibility;
  - NASA does not have specific spectrum requirements.
- Status:
  - U.S. proposal is for "No Change" to the Radio Regulations; no co-signers yet.
  - Various CPM methods for "No Change" as well as SOS allocations in 403-405 MHz ↑, 137-138 MHz↓, and 148-149.9 MHz ↑
  - Already discussion of rolling this item to WRC-23
- Next Step(s):
  - Obtain support for No Change in CITEL



Interest to NASA - Advocacy
WRC-23 AI 2.2 EESS (active) in the range 40-50 MHz

- Issue: NASA seeks an allocation in the band 40-50 MHz for space based radar observations below the Earth's surface
  - Subsurface Desertic Water tables
  - Glacier/bedrock interfaces
- NASA Objective:
  - Conduct studies in WP 7C to evaluate sharing with incumbent terrestrial services
  - Obtain agreement for a WRC-23 Agenda Item
- Status:
  - Initial technical studies are complete
  - NASA pressing to send proposal to CITEL; future WRC agenda item proposal usually come as a batch and others are still under consideration
  - RCS proposal still tied up in the WAC
- Next Step(s): Reconcile a U.S. proposal to with WAC for CITEL



Interest to NASA - Advocacy
Other WRC-23 Agenda Items

- Space Weather
  - NASA Objective: To consider a mechanism to recognize and protect space weather sensors
  - Status: NTIA rejected this even though it 1) Was a US proposal to WRC-15 and 2) is already contained in the draft WRC-23 Agenda
- RFI Reporting Mechanisms for Passive Sensors
  - NASA Objective: To develop a mechanism so reports of interference to passive sensors can be submitted to the ITU
  - Status: Non-Federal advisory committee to FCC provided acceptable markups to joint NASA/NOAA/NSF authored proposal…then FCC objected.
- Sub-orbital vehicles
  - NASA Objective: To consider regulatory provisions to facilitate communications with sub-orbital vehicles
  - Status: Been working with FAA and FCC to reconcile something to go to CITEL
- Inter-satellite links for FSS and MSS
  - Evaluating as part of consideration of using more commercial services

WRC-19 Agenda Items of Concern to NASA

AI 1.6 – Regulatory Framework for non-GSO FSS at 37.5-39.5 GHz (↓) & 47.2-50.2 GHz (↑)

AI 1.13 – International Mobile Telecommunications (IMT) studies between 24.25-86 GHz

AI 1.14 – High Altitude Platform Systems (HAPS)

AI 1.15 – Land Mobile and Fixed services footnote between 275-450 GHz

AI 1.16 – RLANs studies at 5150-5925 MHz

AI 7 – Resolution 86: Satellite Regulatory Procedures

AI 9.1.9 – FSS (↑) studies at 51.4-52.4 GHz

Concern to NASA

AI 1.6 – Regulatory Framework for non-GSO FSS at 37.5-39.5 GHz (↓) & 47.2-50.2 GHz (↑)

- Issue: FSS is seeking framework for NGSO constellations
  - 50.2-50.4 GHz Band is used by EESS passive services
  - 36-37 GHz Band is used by EESS passive services
- NASA Objective: NASA seeks to place regulatory out-of-bands limits to protect the EESS passive operations.
- Status:
  - GSOs currently allowed; looking at regulatory framework for non-GSOs
  - Highly controversial as current protection levels from GSOs are insufficient to protect EESS
  - CPM text contains two Methods with multiple sub-options
  - U.S. has since proposed that both GSO and non-GSO limits are needed, but required protection levels are "[TBD]"
- Next Step(s):
  - Meeting with FSS industry representatives
  - Finalize levels required to protect EESS from GSOs and non-GSOs
  - Probably no values to replace "TBD" by CITEL meeting

Concern to NASA

AI 1.13 – International Mobile Telecommunications (IMT) studies between 24.25-86 GHz

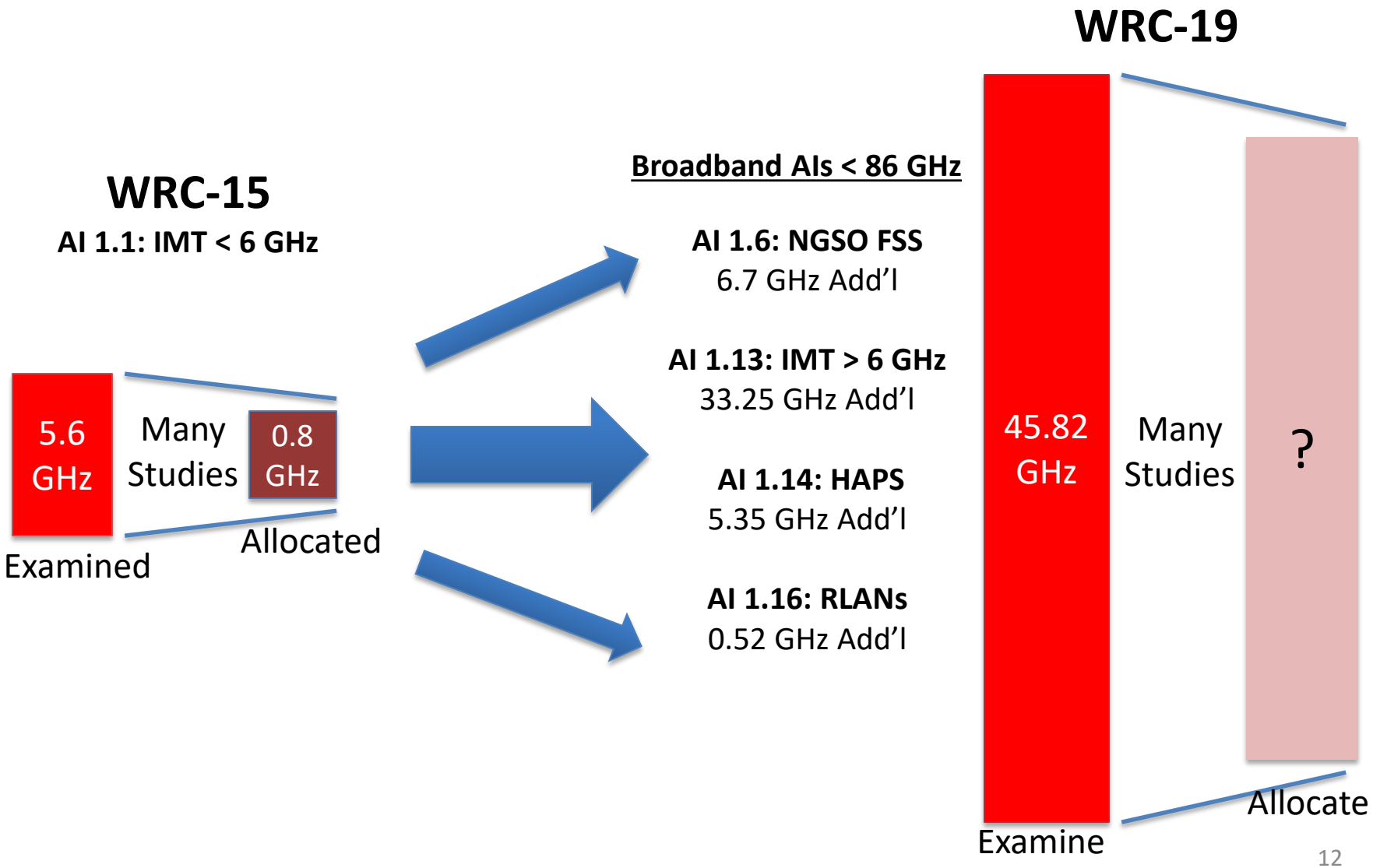
- Issue: Future mobile broadband applications
- Status:
  - Bands studied: 24.25-27.5 GHz, 31.8-33.4, 37-43.5 GHz, 45.5-47 GHz, 47-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz
  - Protection levels for passive sensors still being debated
  - CPM text is 174 pages
  - U.S. proposals starting to be reconciled.

Concern to NASA

AI 1.13 – International Mobile Telecommunications (IMT) studies between 24.25-86 GHz

- NASA Objectives
  - Protection of existing space science services
    - 24.25-27.5 GHz:
      - The adjacent band (23.6-24 GHz) is an EESS/SRS passive band allocation which is protected under RR No. **5.340**.
      - 25.25-27.5 GHz is allocated to inter-satellite service (ISS) on primary basis and is used for data relay satellite return links.
    - 31.8-33.4 GHz: The adjacent 31.3-31.8 GHz band is an EESS/SRS passive band.
    - 37-40.5 GHz: The adjacent 36-37 GHz band is an EESS/SRS passive band. 37-38 GHz is an SRS (space-to-Earth) band, while 40-40.5 GHz is an EESS/SRS (Earth-to-space) band.
    - 47.2-50.2 GHz: The adjacent band (50.2-50.4 GHz) is an EESS/SRS passive band allocation which is protected under RR No. **5.340**.
    - 50.4-52.6 GHz: The adjacent band (50.2-50.4 GHz) is an EESS/SRS passive band allocation which is protected under RR No. **5.340**.
    - 81-86 GHz: The adjacent band (86-92 GHz) is an EESS/SRS passive band allocation which is protected under RR No. **5.340**.
  - Frequency overlaps with other WRC-19 AI's (1.14 and 1.6) need to be taken into account.
  - No consideration of any band not identified in Resolution **238**
- Next Step(s):
  - Finalize studies for protection levels to passive sensors in various bands
  - Consolidate U.S. proposals to take to CITEL as batch

Broadband a Growing Concern



Concern to NASA

AI 1.14 – High Altitude Platform Systems (HAPS)

- Issue: Systems operating at very high altitudes (e.g., the stratosphere) at relatively fixed points operate in the Fixed Service
  - Plans to provide broadband services with global coverage using up, down and intra-HAPS links
  - Studies included 21.4-22 GHz and 24.25-27.5 GHz in Region 2 (the Americas), and 31-31.3 GHz and 38-39.5 GHz globally
  - 21.2-21.4 GHz is used by passive services
  - 25.25-27.5 GHz is used by SRS & ESS space-to-space links
  - 25.5-27 GHz is used by SRS & EESS downlinks (including DSN)
  - 31.3-31.8 GHz is exclusively passive
  - 37-38 GHz is planned for use by future lunar missions
- NASA Objective: Protect the existing users, taking into account anticipated expansion of these uses by space science in the future.
- Status:
  - Issue has been highly controversial
  - U.S. proposals all favourable to NASA, but received little initial support at CITEL
- Next Step(s):
  - Generate support for U.S. proposals at CITEL
  - [Make a plan B if support still not achieved.]

Concern to NASA

AI 1.15 – Land Mobile and Fixed services footnote between 275-450 GHz

- Issue:
  - Radio Regulation No. **5.565** has many bands between 275-1000 GHz "identified for use" by passive services.
    - Not an allocation
    - Does not preclude active services
  - Fixed and mobile services would like similar identifications over the range 275-450 GHz
- NASA Objective:
  - Ensure passive service operations are taken into account if bands are identified for active service use.
  - No allocations to either active or passive services
- Status:
  - Bands suitable for active services identified in studies
  - CPM text has seven Methods to satisfy Agenda Item
    - What frequency ranges to identify
    - Modify RR No. 5.565 or make a new footnote
    - How, if at all, to take into account existing passive operations
  - U.S. proposals similar to proposals as Mexico
  - Canada also has a separate proposal
- Next Step(s):
  - Work within CITEL to consolidate U.S. and Mexican proposals
  - Develop support from other CITEL Administrations

Concern to NASA

AI 1.16 – RLANs studies at 5150-5925 MHz

- Issue: Spectrum identification for WiFi routers around 5-6 GHz
  - RLANs (a.k.a. WiFi routers) operate in the bands 5150-5350 MHz and 5470-5725 MHz (as well as 5725-5850 MHz in some countries)
  - EESS (active) is allocated in 5250-5570
    - Missions are primarily using 5250-5470 MHz
    - EESS (active) in 5250-5350 MHz already receives RFI from RLANs
- NASA Objective: Ensure the sharing conditions for EESS (active) get no worse
- Status:
  - CPM text only has "No Change" methods for 5250-5350 MHz and 5350-5470 MHz
  - Full Inter-American Proposals for "No Change" for 5250-5350 MHz and 5350-5470 MHz
- Next Step(s):
  - Work is essentially complete.
  - Advocate for No Change internationally beyond CITEL-

Concern to NASA

AI 7 – Resolution 86: Satellite Regulatory Procedures

- Issue: Each WRC reviews the procedures for filing satellites internationally with the aim to:
  - Improve efficiency
  - Take into account new satellite technologies
  - Close loopholes where Administration may try to “game” the system.
- NASA Objective:
  - Issue A: Definition of non-GSO bringing into use a concern if it is applied to space science
  - Issue H: Support additional elements to Appendix 4 for NGSO systems
  - Issue I: Filings for short duration missions
- Status:
  - Issue A: U.S. proposal is acceptable to NASA as it contains carve outs to exclude space science from unnecessary regulatory burdens; no other signatories in CITEL yet.
  - Issues H, I, and M: Not controversial in U.S.; CPM text agreed, but no proposals yet.
- Next Step(s):
  - Get support in CITEL for Issue A
  - Finalize U.S. proposals for Issues H and I; probably not in time for CITEL.

Concern to NASA
AI 9.1.9 – FSS (↑) studies at 51.4-52.4 GHz

- Issue: Fixed satellite service is targeting the band 51.4-52.4 GHz for an uplink allocation to support broadband service delivery from space
  - NASA has passive service operations in 52.6-54.25 GHz which under RR No. **5.340**, "all emissions are prohibited."
- NASA Objective:
  - No allocations unless studies determine EESS (passive) is protected.
  - Revision to Resolution **750** may be required.
- Status:
  - Issue proponent is Boeing Corp.
  - Two Reports in development in WP 4A
  - Draft proposal sent over from the WAC was unacceptable
    - Created allocations
    - Requires a modification to Article 1
    - Reserves orbital slots
- Next Step(s): Continue reconciliation between RCS and WAC; probably nothing for CITEL in April