2015 World Radiocommunication Conference Agenda Items

Overview from a NASA Perspective

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Committee On Radio Frequencies

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NASA Spectrum Office

Agenda

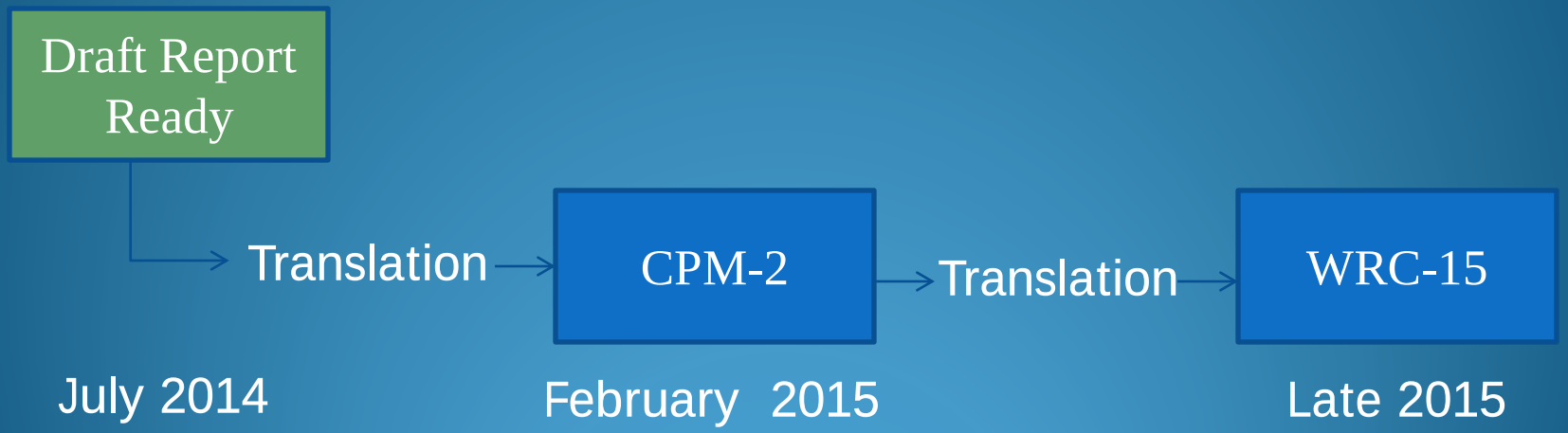
- Overview
- WRC-15 Issues of Primary Interest to NASA
  - Advocacy – initiated by NASA or its International Partners
- WRC-15 Issues of Primary Concern to NASA
  - Possible major impact to NASA operations
- WRC-15 Issues of Secondary Concern to NASA
  - Less probable minor impact to NASA operations
- Summary

Overview

- 2015 World Radiocommunication Conference (WRC-15) is expected to take place in late-2015. Venue: TBD
- Technical preparatory work done in the ITU Radiocommunication (ITU-R) Sector Study Groups
- Conference Preparatory Meeting (CPM) Report will contain agreed upon approaches for satisfying each agenda item (providing the basis for Administration proposals)
- U.S. Regulators oversee the U.S.A. conference preparations
  - Federal Government (NTIA)
  - private sector (FCC)
- Head of U.S. Delegation – TBD

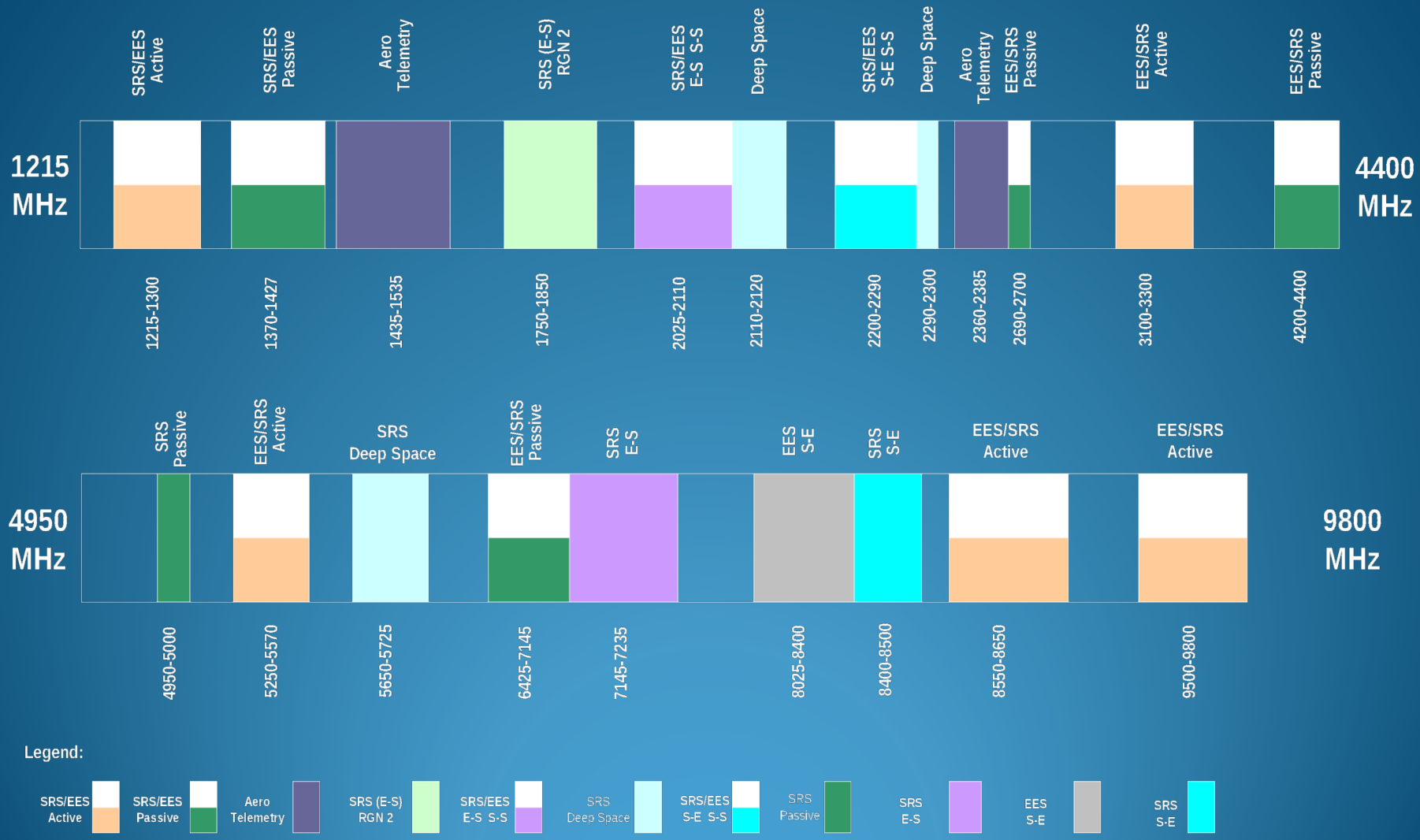
Overview (continued)

- Draft CPM Report for WRC-15 must be ready by July 2014, i.e. we have only 2 years to complete the studies and prepare the text. This is very critical!

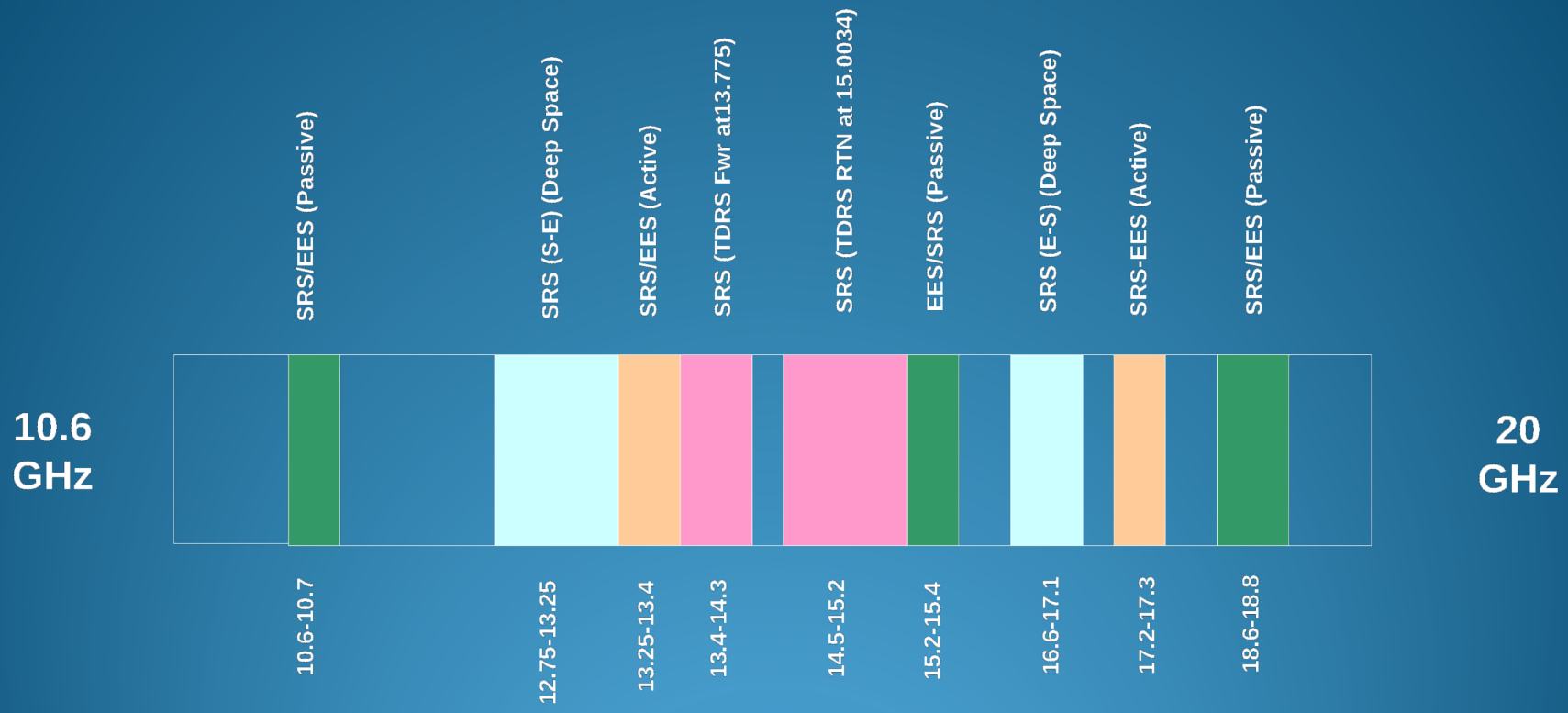


Current Work Plan Schedule

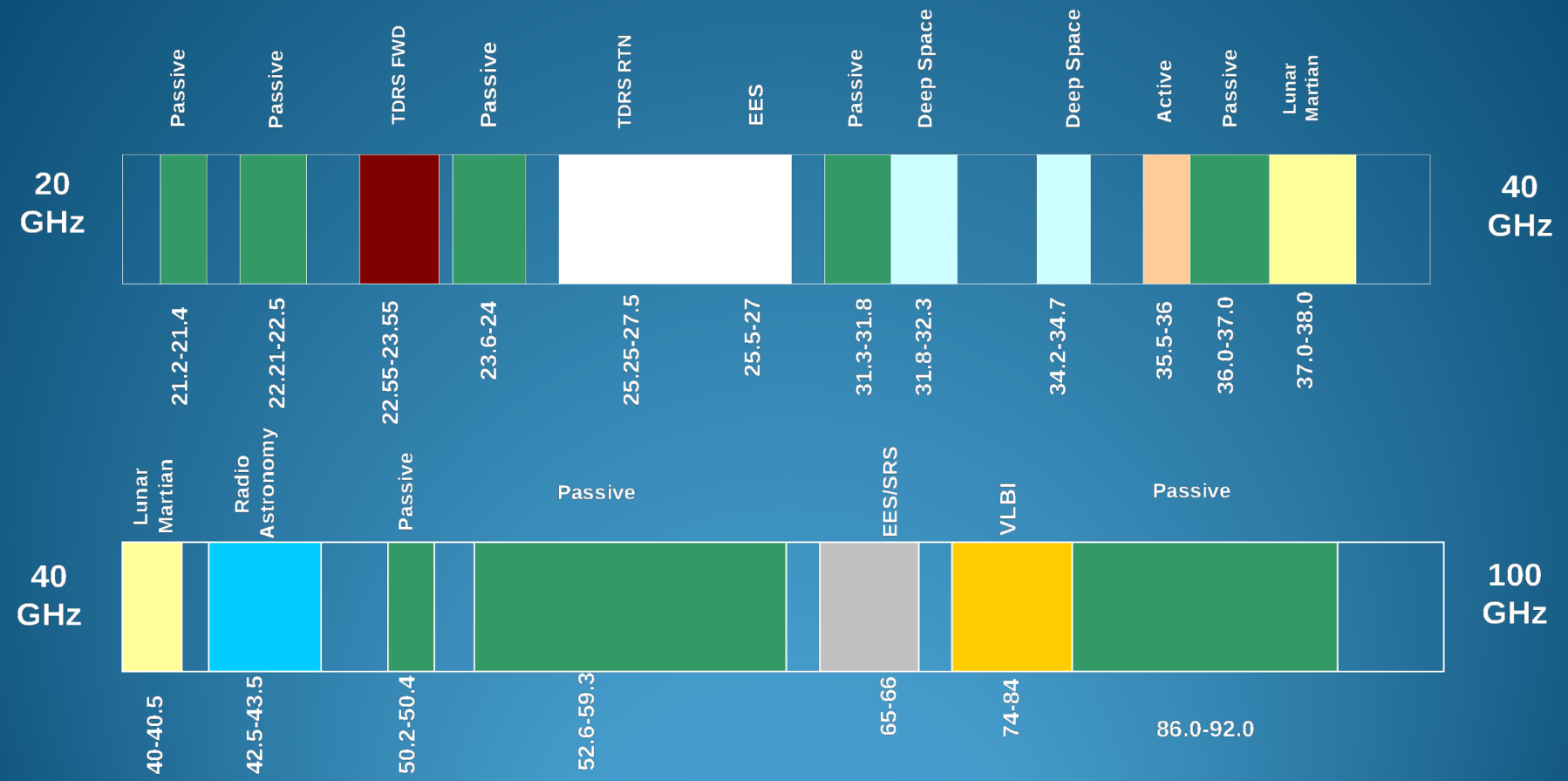
NASA Spectrum below 10.6 GHz



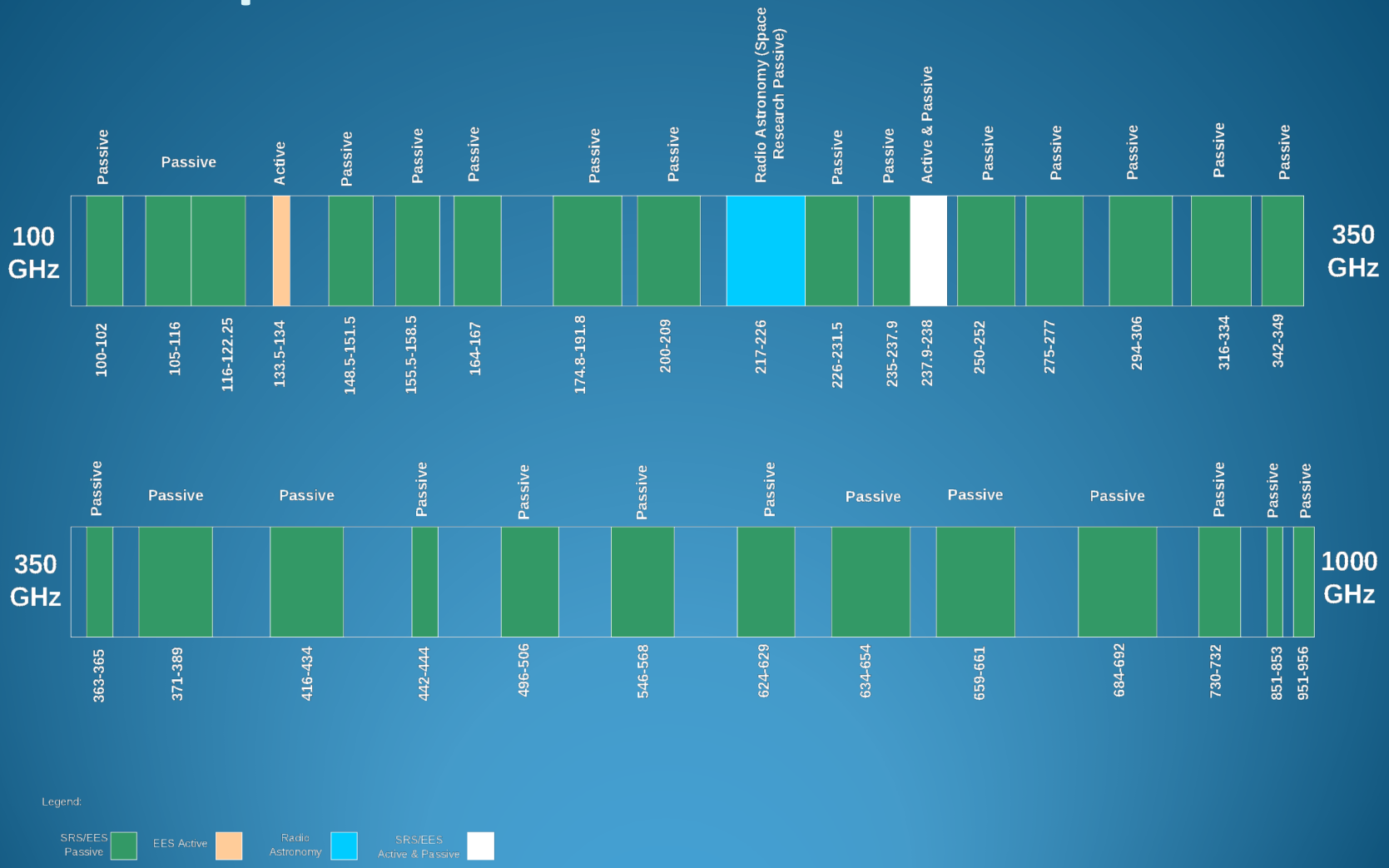
NASA Spectrum between 10.6 and 20 GHZ



NASA Spectrum between 20 and 100 GHz



NASA Spectrum above 100 GHz



WRC-15 Agenda Items of Interest to NASA

	Agenda Item	Description
Advocacy	1.11	EESS (E-s) telecommand operations in the 7-8 GHz to complement telemetry operations of EESS (s-E) in the 8 025-8 400 MHz band.
	1.12	Extension of the current worldwide allocation to the EESS (active) in the frequency band 9 300-9 900 MHz by up to 600 MHz on a primary and/or secondary basis, as appropriate, within the frequency range 8 700 9 300 MHz and/or 9 900-10 500 MHz
	1.13	Removal or relaxation of the 5 km distance limitation without modifying the current pfd limits and to allow more general use of the 410-420 MHz band for SRS (s-s) systems beyond extra-vehicular activities.
Primary	1.1	Additional mobile broadband spectrum requirements including IMT and the study of potential candidate frequency bands [dc to Daylight]
	1.6.1	Fixed-satellite service (E-s and s-E) of 250 MHz in the range between 10 GHz and 17 GHz
	1.6.2	Fixed-satellite service (E-s) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz
	1.9.1	Fixed-satellite service in the frequency bands 7 150-7 250 MHz (s-E) and 8 400-8 500 MHz (E-s)
	1.9.2	Maritime-mobile satellite service allocations in the bands 7 375-7 750 MHz and 8 025-8 400 MHz
	1.10	Mobile-satellite serviceallocations in the E-s and s-E directions within portions of the bands between 22 GHz and 26 GHz
	1.17	Aaeronautical allocations for wireless avionics intra-communications (WAIC) [dc to daylight]
	8.2	Future conference agenda items (advocacy and concern)
		• Possible Regulatory procedures for notifying nano- and picosatellites,
		• Review RR No. 5.458 for the range 6 425 to 7 250 MHz and enhance EESS (passive) allocation status
		• EESS (E-s) allocation to be associated with the EESS (s-E) allocation in 25.5-27 GHz
Secondary	1.5	Possible regulatory actions to support the use of FSS frequency bands for the Unmanned Aeronautical Systems
	1.8	Review provisions of Earth stations on vehicles which operate in the FSS in the uplink bands 5 925-6 425 MHz and 14-14.5 GHz

WRC-15 Issues of Primary Interest to NASA (Advocacy)

Agenda Item 1.11

- EESS (Earth-to-space) telecommand operations in the 7-8 GHz range to complement telemetry operations of EESS (space-to-Earth) in the 8 025-8 400 MHz band.
- Resolution **650** indicates that priority is given to the band 7 145-7 235 MHz. Potentially affected space science service bands are: 7145-7190 MHz SRS (deep space) (E-s); 7190-7235 MHz SRS (E-s). Noting that under Agenda Item 1.9.1 possible new allocations to the FSS (space-to-Earth) in the frequency bands 7 150-7 250 MHz are also being considered.

NASA Objective

- NASA supports the primary allocation to EESS (E-s) in the 7-8 GHz range provided that acceptable sharing criteria with the affected space science service are developed. However, NASA does not support allocation of EESS (E-s) in the 7145-7190 MHz SRS deep space band.

Agenda Item 1.12

- Consider possible extension of the current worldwide allocation to the EESS (active) in the frequency band 9 300-9 900 MHz by up to 600 MHz on a primary and/or secondary basis, as appropriate, within the frequency range 8 700-9 300 MHz and/or 9 900-10 500 MHz while ensuring protection of existing services and taking due account of the safety services allocated in the frequency band 9 000 to 9 300 MHz.
- Potentially affected space science service bands are: 8400-8450 MHz SRS (deep space) (s-E) and 8450-8500 MHz SR (s-E), both through OOBE.

NASA Objective

- NASA supports extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz provided that acceptable sharing criteria with the affected space science services are developed.

Agenda Item 1.13

- Consider modifying No. **5.268** to allow the removal or relaxation of the 5 km distance limitation without modifying the current pfd limits and to allow more general use of the 410-420 MHz band for SRS (space-to-space) systems beyond extra-vehicular activities/
  - SRS (space-to-space) systems communicating in proximity with orbiting manned space vehicles
  - Compatibility with systems operating in the fixed and mobile (except aeronautical mobile) services in the band 410-420 MHz.

NASA Objective

- NASA supports increasing (or removing all together) the 5 km distance limitation and allowing space research service (space-to-space) use for proximity operations by space vehicles communicating with an orbiting manned space vehicle.

WRC-15 Issues of Primary Concern to NASA

Agenda Item 1.1

- Additional mobile broadband spectrum requirements including IMT and the study of potential candidate frequency bands. The agenda item does not specify bands but studies will likely concentrate on bands below 6 GHz including:
  - 1215-1300 MHz EESS/SRS (active);
  - 1164-1300 MHz and 1559-1610 MHz GNSS allocations:
  - 1370-1400 MHz eess (passive) and 1400-1427 MHz EESS (passive);
  - bands restricting mobile per RR **No. 5.391**:
    - 2025-2110 MHz SOS/EESS/SRS (E-s, s-s) and
    - 2200-2290 MHz SOS/EESS/SRS (s-E, s-s); and,
    - 5250-5570 MHz EESS/SRS (active)

NASA Objective

- NASA supports the protection of existing space science service and GNSS allocations. No allocations of spectrum to support mobile broadband systems should be made in space science service bands unless acceptable sharing criteria are developed.

Agenda Item 1.6.1

- New primary allocations to the fixed-satellite service of 250 MHz in both directions in Region 1 (Russia) within the bands 10-17 GHz.
- Potentially affected space science service bands are: 10.6-10.7 GHz EESS (passive) SRS (passive); 13.25-13.75 GHz EESS (active) SRS (active); 14.5-15.35 GHz srs; 15.2-15.35 GHz eess (passive) srs (passive); 15.35-15.4 GHz EESS (passive) SRS (passive); 16.6-17.1 GHz srs (deep space) (Earth-to-space).

NASA Objective

- NASA supports the protection of existing space science service allocations. No additional allocation of spectrum to support FSS (E-s or s-E) should be made in space science service bands unless acceptable sharing criteria are developed. There is particular concern with the possible allocation of FSS (Earth-to-space) in the 13.25-13.75 GHz band allocated to EESS (active). Prior studies have shown incompatibility between these services.

Agenda Item 1.6.2

- New primary allocation to the fixed-satellite service in the Earth-to-space direction of 250 MHz in Region 2 and 300 MHz in Region 3 within the bands 13-17 GHz.
- Potentially affected space science service bands are: 13.25-13.75 GHz EESS (active) SRS (active); 14.5-15.35 GHz srs; 13.25-13.75 GHz EESS (active) SRS (active); 15.35-15.4 GHz EESS (passive) SRS (passive); 16.6-17.1 GHz srs (deep space) (Earth-to-space).

NASA Objective

- NASA supports the protection of existing space science service allocations. No additional allocation of spectrum to support FSS (E-s) should be made in space science service bands unless acceptable sharing criteria are developed. There is particular concern with the possible allocation of FSS (Earth-to-space) in the 13.25-13.75 GHz band allocated to EESS (active). Prior studies have shown incompatibility between these services.

Agenda Item 1.9.1

- Possible new allocations to the FSS in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space).
- Resolution **758** excludes small VSAT-like usage in the possible new allocations. Potentially affected space science service bands are: 7145-7190 MHz SRS (deep space) (E-s); 7190-7235 MHz SRS (E-s); 8400-8450 MHz SRS (deep space) (s-E); 8450-8500 MHz SRS (s-E). Also, noting that under Agenda Item 1.11, the 7145-7235 MHz band is to be considered for the addition of an EESS (E-s) allocation.

NASA Objective

- NASA supports the protection of existing space science service allocations. No new allocations to the FSS should be made unless acceptable sharing criteria are developed. Particular concern is noted with regard to the SRS (deep space) allocations. Sharing in these same bands with the mobile satellite service was found to be infeasible under WRC-12 AI 1.25. Many of the same conditions that made sharing with MSS infeasible also apply to sharing with FSS in these bands.

Agenda Item 1.9.2

- Possible new allocations to the maritime mobile-satellite service (MMSS) in the frequency bands 7375-7750 MHz (space-to-Earth) and 8025-8400 MHz (Earth-to-space)
- The potentially affected space science service bands are: 7450-7550 MHz MetSat (s-E, GSO); and 8025-8400 MHz EESS (s-E).

NASA Objective

- NASA supports the protection of existing space science service allocations. No new allocations to the MMSS should be made unless acceptable sharing criteria with EESS (s-E) in the 8025 8400 MHz band are developed. Particular concern is noted with regard to possible interference to EESS (s-E) operations at high latitudes from ships operating in proximity and out of band interference to the 8400-8450 MHz deep space band.

Agenda Item 1.10

- Additional allocations to the mobile-satellite service in the Earth-to-space and space-to-Earth directions, within portions of the bands between 22 GHz and 26 GHz
- Resolution **234 (WRC-12)** recognizes that unwanted emissions in the band 23.6-24 GHz will need to be limited to ensure protection of systems of the EESS (passive), SRS (passive) and radio astronomy services, Potentially affected space science service bands are: 22.21-22.5 GHz EESS (passive) SRS (passive); 22.55-23.15 GHz SRS (E-s); 22.55-23.55 GHz Inter-Satellite Service (ISS); 23.6-24 GHz EESS (passive) SRS (passive); 25.25-27.5 GHz ISS; 25.5-27 GHz EESS (s-E) SRS (s-E).

NASA Objective

- NASA supports the protection of existing space science service allocations. No new allocations to the MSS should be made unless acceptable sharing criteria with the affected space science service are developed.

Agenda Item 1.17

- Possible regulatory actions, including appropriate aeronautical allocations, to support the implementation of Wireless Avionic Intra-Communications (WAIC) systems. Frequency bands within existing **worldwide** aeronautical mobile service, aeronautical mobile (R) service and aeronautical radionavigation service allocations are to be considered; however, additional frequency bands above 15.7 GHz for aeronautical services are to be considered if spectrum requirements cannot be met in those existing frequency band allocations.
- Potentially affected space science service bands coinciding with "existing worldwide aeronautical mobile service, aeronautical mobile (R) service and aeronautical radionavigation service allocations" below 15.7 GHz are: 117.975-137 MHz metsat under No. **5.203** (This usage should be reviewed); 5350-5460 MHz EESS (active); and, 13.25-13.4 GHz EESS (active) and SRS (active) (both subject to No. **5.498A**).
- Additional potentially affected space science service bands below 15.7 GHz are: 30.005-30.01 MHz SRS; 39.986-40.02 MHz srs; 40.98-41.015 MHz srs; 143.65-144 MHz srs (s-E) Regions 2 & 3, and some countries of Region 1 by No. 5.210; 460-470 MHz metsat (s-E); 1 370-1 400 GHz eess (passive) by **No. 5.339**; 1.670-1.675 GHz metsat (s-E); 2.02-2.11 GHz EESS (E-s) (s-s) and SRS (E-s) (s-s); 2.11-2.12 GHz SRS (deep space) (E-s); 2.20-2.29 GHz EESS (s-E) (s-s) and SRS (s-E) (s-s); 7.145-7.235 GHz SRS (E-s); 8.175-8.215 GHz EESS (s-E) and metsat (E-s); 8.215-8.400 GHz EESS (s-E); 12.75-13.25 GHz srs (deep space) (space-too-Earth); and, 14.5-15.35 GHz srs.

NASA Objective

- NASA supports the protection of existing space science service allocations. No new allocations to WAIC systems should be made

Agenda Item 8.2

- Recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, taking into account Resolution **807 (WRC-12)**

- **Draft WRC-18 Agenda Item 2.2 - Nanosats**
- to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nano- and picosatellites, taking into account the short development time, short mission time and unique orbital characteristics.
  - ***NASA Objective***
  - SFCG believes any changes to satellite filing procedures to facilitate the unique mission lifecycle of nano or pico satellites should be in alignment with studies conducted in Working Party 7B and be carefully developed to ensure they apply only to missions which are clearly nano or pico satellites.
- **Other desired WRC-18 Agenda Items**
  - Review RR No. 5.458 for the range 6 425 to 7 250 MHz and enhance EESS (passive) allocation status
  - EESS (E-s) allocation to be associated with the EESS (s-E) allocation in 25.5-27 GHz

WRC-15 Issues of Secondary Concern to NASA

Agenda Item 1.5

- Possible regulatory actions to support the use of FSS frequency bands for the Unmanned Aircraft System (UAS) Control and Non Payload Communications (CNPC) links ensuring the safe operation of UAS CNPC links.
- The potentially affected space science service band is: 13.75-14 GHz SRS(s-s)

NASA Objective

- NASA supports the protection of existing space science service allocations while recognizing the practical requirement UAS CNPC links, in particular for beyond line of line operations (BLOS), in FSS bands. There is a primary SRS (s-s) allocation in the band 13.75-14 GHz. No changes to the FSS allocation in the 13.75-14 GHz band should be made unless acceptable sharing criteria are developed with the SRS(s-s).

Agenda Item 1.18

- Review and possible revision of the provisions relating to Earth Stations on Vessels (ESVs) which operate in the FSS in the uplink bands 5 925-6 425 MHz and 14-14.5 GHz and consider possible modifications to Resolution **902 (WRC-03)**.
- The potentially affected space science service band is: 14-14.3 GHz srs.
- ***NASA Objective***
- NASA supports the protection of existing space science service allocations. No revision to the provisions relating to ESVs should be made in 14-14.5 GHz band unless acceptable sharing criteria are developed.

Summary

- NASA and the space science community as a whole was very successful in achieving our objectives at WRC-12.
- WRC-15 has many agenda items of possible concern, so the battle begins anew!

Back Up

Acronym List

- **AM(R)S** – Aeronautical Mobile (Route) Service
- **AMSR-E** - Advanced Microwave Scanning Radiometer for EOS
- **APT** – Asia Pacific Telecommunity
- **ASMG** – Arab Spectrum Management Group
- **ATU** – African Telecommunications Union
- **CEPT** - European Conference of Postal and Telecommunications Administrations
- **CITEL** – Inter-American Telecommunication Commission
- **CRS** – Cognitive Radio Systems
- **EESS** – Earth exploration-satellite service
- **ENG** – Electronic News Gathering
- **FS** – Fixed service
- **HAPS** – High Altitude Platform Systems
- **IRAC** – Interdepartment Radio Advisory Committee
- **ISS** – International Space Station
- **ITU-R** - International Telecommunication Union – Radiocommunication Sector
- **MSS** – Mobile satellite service
- **RCC** - Regional Commonwealth in the Field of Communications
- **RR** – Radio Regulations
- **SDR** – Software Defined Radio
- **SFCG** – Space Frequency Coordination Group
- **SRD** – Short Range Device
- **SRS** – Space research service
- **TDRSS** – Tracking and Data Relay Satellite System
- **UAS** – unmanned aircraft systems
- **UWB** – Ultra-wideband
- **WAC** – (FCC) WRC-12 Advisory Committee
- **WAIC** – Wireless avionics intra-communications