Caribbean Telecommunications Union

HARMONISED CARIBBEAN SPECTRUM PLANNING & MANAGEMENT

MEETING OF THE
CARIBBEAN SPECTRUM MANAGEMENT TASK FORCE

18th and 19th July 2019
Hyatt Regency, Port of Spain, Trinidad and Tobago

WRC-19 Satellite Services

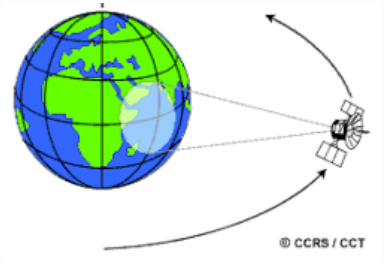
Mehtap Dufour

Space Services Department

Radiocommunication Bureau

International Telecommunication Union

Satellite issues
(WRC-19 agenda items 1.4, 1.5, 1.6 & 7)



Consider results of studies on review, and possible revision if necessary, of RR App. **30** Annex 7 **limitations**, **incl. orbital position limitations**

► **Res. 557 (WRC-15)**

Studies to consider the **use of the bands 17.7-19.7 GHz (s-E) and 27.5 29.5 GHz (E-s)** by **earth stations in motion** communicating with GSO space stations **in the FSS** and take appropriate action ► **Res. 158 (WRC-15)**

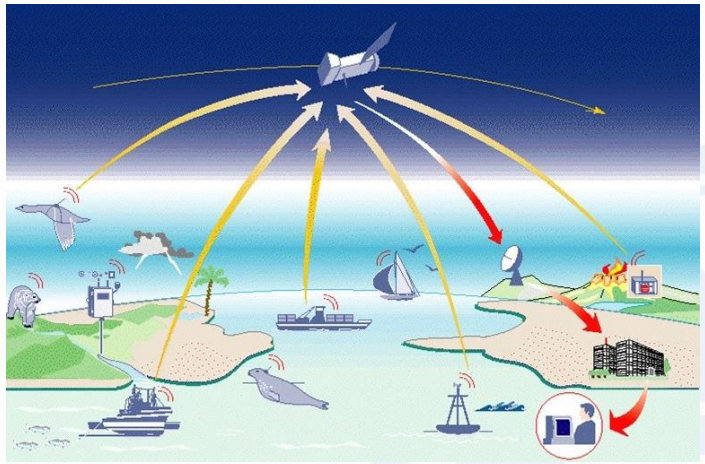
Studies on development of a **regulatory framework for non-GSO FSS systems** that may operate in the bands **37.5-39.5 GHz (s-E), 39.5-42.5 GHz (s-E), 47.2-50.2 GHz (E-s) and 50.4-51.4 GHz (E-s)**

► **Res. 159 (WRC-15)**

Satellite Regulatory issues

► **Res. 86 (Rev.WRC-07)**

Science issues
(WRC-19 agenda items 1.2, 1.3 and 1.7)



Studies to consider **in-band power limits** for earth stations in **MetSat & EESS** @ **401-403 MHz** for DCS* and in the **MSS** @ **399.9-400.05 MHz**

► **Res. 765 (WRC-15)**

Studies to consider possible upgrading of the **2ndary MetSat (s-E)** allocation **to 1mary** status & a possible **1mary EESS (s-E)** allocation @ **460-470 MHz** for DCS

► **Res. 766 (WRC-15)**

Study spectrum needs for **TT&C in the SOS** for non-GSO satellites with short duration missions & consider, if necessary, new SOS allocations

► **Res. 659 (WRC-15)**

* Data Collection Systems (DCS) are used to monitor and predict climate change, monitor oceans, weather and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security

THANK YOU

More Details on WRC-19 Satellite Issues

SATELLITE SERVICES
AI 1.4

- to consider the results of studies in accordance with Resolution **557 (WRC-15)**, and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix **30 (Rev. WRC-15)**, while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks

SATELLITE SERVICES
Methods to satisfy AI 1.4

- Method A: NOC, no change to Annex 7 to RR Appendix **30** and suppression of Resolution **557**
- Method B: removes certain orbital limitations from Annex 7 of RR Appendix **30**. The removal of limitations A1a) and A2a) is based on a compromise regulatory framework under which the Bureau would examine the coordination threshold with FSS pfd masks of Annex 4 of RR Appendix **30**, at the BSS test points, for FSS and BSS orbital separations of less than 4.2 degrees, and at the BSS service area, for orbital separations greater than or equal to 4.2 degrees.
- Such compromise solution has no impact on Region 3.
- Views were expressed that the orbital separation, **4.2 degrees, should be larger to ensure the new Region 2 FSS is not negatively impacted,**
- while others expressed the view that the orbital separation should be smaller to provide new Region 1 BSS more flexibility.
- However, it was agreed to propose the 4.2 degree as a very delicate compromise between 2 and 10.57 degrees of FSS/BSS orbital separations.

SATELLITE SERVICES
Agenda Item 1.5 - Earth Stations in Motion (ESIM) in 17.7-19.7 and 27.5-29.5 GHz

- to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution **158 (WRC-15)**

Methods to satisfy AI 1.5

- **Method A**: NOC, SUP Resolution 158 (WRC-15).
- **Method B**:
- ADD: RR 5.A15 The operation of earth stations in motion communicating with geostationary FSS space stations in the frequency bands 17.7-19.7 GHz and 27.5- 29.5 GHz shall be subject to draft new Resolution [A15] (WRC-19). (WRC-19)
- ADD: Draft new Resolution [A15] (WRC-19) “Use of the frequency bands 17.7- 19.7 GHz and 27.5-29.5 GHz by earth stations in motion (ESIM) communicating with geostationary space stations in the fixed-satellite service”.
- MOD: Table A of the Annex 2 to RR Appendix 4 “General characteristics of the satellite network, earth station or radio astronomy station”.
- SUP: Resolution 557 (WRC-15).

SATELLITE SERVICES
Agenda Item 1.6 - Regulatory framework for non-GSO fixed satellite systems operating in bands between 37.5 and 51.4 GHz

- to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5 42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with Resolution **159 (WRC-15)**

Methods to satisfy AI 1.6

- Two methods are proposed to address WRC-19 agenda item 1.6. These methods are described below.
- There are two issues within WRC-19 agenda item 1.6:
- **Issue 1:** Developing a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space). There are two methods to address this issue.
- One method proposes to add footnotes to RR Article **5** that subjects non-GSO FSS and MSS systems to coordination provisions, add provisions to RR Article **22** in order to protect GSO satellite networks, and establishes a consultation group to coordinate aggregate interference in order to protect GSO satellite networks.
- The other method is to carry forward the studies to ensure the protection of GSO satellite networks under WRC-19 agenda item 1.6 to a new WRC-23 agenda item towards the development of epfd limits.

Methods to satisfy AI 1.6

- **Issue 2: Modifying Resolution 750 (Rev.WRC-15)**
- For the method that proposes to revise Resolution **750 (Rev.WRC-15)** for the protection of EESS (passive) in the band 50.2-50.4 GHz, 2 general options are considered (see end of section 5):
- – OPTION A: Revision of limits for non-GSO systems only;
- – OPTION B: Revision of limits for both GSO networks and non-GSO systems
- An appropriate time-frame for these revisions to become effective would need to be determined. Additional options have been proposed to this effect. Techniques for non-GSO systems aside from an input power limit could also be considered to protect passive sensing while ensuring efficient use of the spectrum.
- Some administrations are of the view that modifications to Resolution **750 (Rev.WRC-15)** for GSO networks are not within the scope of this agenda item, since Resolution **159 (WRC-15)** calls for studies of technical operational issues and regulatory provisions on non-GSO FSS systems.

SATELLITE SERVICES
Agenda Item 7 - Satellite coordination procedures and processes

- to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)**, in order to facilitate rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary satellite orbit

AI 7 ISSUE A Bringing into use of frequency assignments to non-GSO systems

- Options relating to the continuous period for confirming BIU

Options	Descriptions
A	A continuous period of at least 90 days in a notified orbital plane of a satellite with the capability of transmitting or receiving the frequency assignments. Applicable to some non-GSO systems based on RoP on RR No. 11.44 (Ed. of 2017).
B	A continuous period of X (one day to 90 days) of deployment in a notified orbital plane of a satellite with the capability of transmitting or receiving the frequency assignments may be sufficient. The 90-day duration may not be required for the non-GSO administration/operator to determine that a space station with the capability has been deployed in a notified orbital plane.
C	No fixed period. Administration informs the Bureau of BIU once it confirms deployment of a space station with the capability of transmitting/receiving the frequency assignments into one of the notified orbital planes[1].

[1] The studies have shown that for some services, e.g., the RNSS, no fixed period is required. Instead, the administration/operator requires only as long as it takes to confirm the deployment into a notified orbital plane of a satellite with the capability of transmitting or receiving the frequency assignments. This can vary from system to system, but will not require 90 or more continuous days of deployment. For this reason, no fixed continuous period is required for these particular systems.

AI 7

- Unplanned coordination:
  - Issue B – Coordination arc for MSS in Ka-band
  - Issue D – Identification of specific satellite systems under RR Nos. 9.12, 9.12A and 9.13
- Appendix 4:
  - Issue H – Items to be provided for non-GSO systems not subject to coordination
  - Issue I – Additional items for non-GSO systems with multiple orbital planes
  - Issue L – Update to data elements required for epfd verification after revision of Rec. ITU-R S.1503
- Appendices 30 and 30A:
  - Issue G – Updating of the reference situation (Regions 1 and 3) when provisionally recorded assignments are converted into definitive recorded assignments
  - Issue J – Pfd limit in Section 1, Annex 1 of RR Appendix 30
  - Issue K – Part B examinations under § 4.1.12 or 4.2.16 of RR Appendices 30 and 30A
- Appendix 30B:
  - Issue E – Resolution related to RR Appendix 30B
  - Issue F – Measures to facilitate entering new assignments into the RR Appendix 30B List
  - Issue K – Part B examinations under § 6.21 c) of RR Appendix 30B
- Consensual issues:
  - Issue C – Issues for which consensus was achieved in ITU-R and a single method has been identified

AI 7

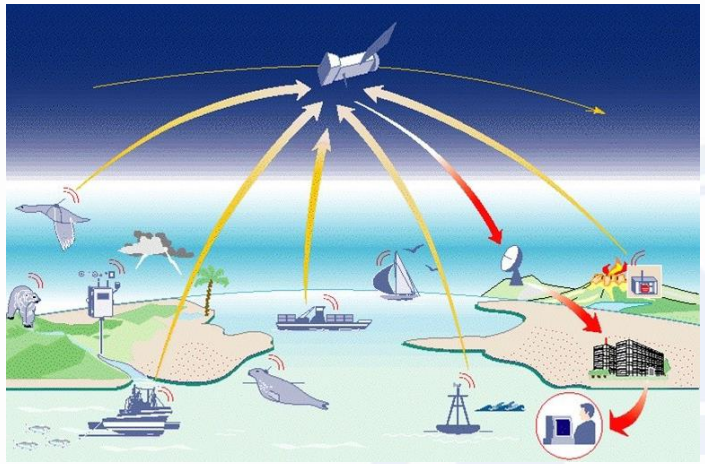
- **Issue M** – Simplified regulatory regime for non-GSO satellite systems with short duration missions:

- A need to streamline international regulatory procedures for small satellites?
  - short development cycle
  - short lifetimes

- Many of these non-GSO satellite systems are being developed by academic institutions, amateur satellite organizations, or by developing countries that are using these satellites to build their expertise in space capability.

- A draft new WRC Resolution, together with an associated regulatory regime for non-GSO satellite systems with short-duration missions, has been developed to address this issue:
  - Total number of satellites shall not exceed [10] satellites
  - Maximum period of validity shall not exceed 3 years without any possibility of extension
  - Single launch date associated with the first launch (in the case of systems with multiple launches)
  - Launch date: date on which the first satellite is placed into its notified orbital plane
  - No notification before bringing into use (No. 11.47)
  - No suspension (No. 11.49)
  - Additional modifications to the regulatory process

Science issues
(WRC-19 agenda items 1.2, 1.3 and 1.7)



Studies to consider **in-band power limits** for earth stations in **MetSat & EESS** @ **401-403 MHz** for DCS* and in the **MSS** @ **399.9-400.05 MHz**

► **Res. 765 (WRC-15)**

Studies to consider possible upgrading of the **2ndary MetSat (s-E)** allocation **to 1mary** status & a possible **1mary EESS (s-E)** allocation @ **460-470 MHz** for DCS

► **Res. 766 (WRC-15)**

Study spectrum needs for **TT&C in the SOS** for non-GSO satellites with short duration missions & consider, if necessary, new SOS allocations

► **Res. 659 (WRC-15)**

* Data Collection Systems (DCS) are used to monitor and predict climate change, monitor oceans, weather and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security

SCIENTIFIC USE OF SPECTRUM
WRC-19 Agenda Item 1.2

to consider in-band power limits for earth stations operating in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz, in accordance with Resolution 765 (WRC-15)

- The aim of this AI is to ensure the operation of existing and future systems that usually implement low or moderate output powers such as Data Collection Platforms (DCP) where other systems ae using the bands for high power telecommands.
- Methods A, B, C, D are proposed for the band 399.9 –400.05 MHz
- Methods E, F, G are proposed for the band 401 –403 MHz

SCIENTIFIC USE OF SPECTRUM
AI 1.2
Band 399.9 –400.05 MHz

- **Method A NOC**
- **Method B** To include in the RR the relevant e.i.r.p. limits by adding a new footnote for the bands 399.9-400.03 MHz and a grandfathering period up to 22 November 2024 for some systems operating in the MSS.
- **Method C** To include in the RR the relevant e.i.r.p. limits by adding a new footnote for the band 399.9-400.05 MHz and a grandfathering period up to 22 November 2024 for some systems operating in the MSS.
- **Method D** To include in the RR the relevant e.i.r.p. limits by adding a new footnote for the bands 399.9-400.03 MHz and a grandfathering period up to 22 November 2029 for some systems operating in the MSS.

AI 1.2
Band 401 –403 MHz

- **Method E** To include in the RR the relevant e.i.r.p. limits by adding a new footnote for the band 401-403 MHz and a grandfathering period up to 22 November 2024 or 2029 for telecommand systems.
- **Method F** To include in the RR the relevant e.i.r.p. limits by adding a new footnote for the bands 401-403 MHz and this method proposes specific measures for Telecommand to ensure protection of EESS and MetSat.
- **Method G** To include in the RR the relevant e.i.r.p. limits by adding a new footnote for the bands 401-403 MHz and a grandfathering period up to 22 November 2029 for telecommand systems.

In the band 401.7-402.85 MHz an e.i.r.p. density limit is proposed for telecommand operations.

AI 1.3

to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution **766 (WRC-15)**;

- In the band 460-470 MHz this AI aims at :
- upgrading the secondary meteorological-satellite service (MetSat) (space-to-Earth) allocation to primary status; • adding a primary Earth exploration satellite-service (EESS) (space-to-Earth) allocation.
- In addition, a resultant power flux-density (pfd) mask to be no less restrictive than −152 dBW/m2 /4 kHz is proposed.

SCIENTIFIC USE OF SPECTRUM
AI 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, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution 659 (WRC-15)

- An harmonized frequency band for small satellites TTC?
- The recent surge of small satellites highlighted the need for frequency bands for TTC carriers
- Small satellite technology tends to make them use bands below 1 GHz.
- Domestically, some internationally allocated frequency bands may not be available to commercial users.
- A possible solution could be to identify new specific bands for TTC of small satellites.
- ITU-R studies on spectrum requirements:
- Telemetry (downlink): 625-2500 kHz
- Telecommand (uplink): 682-938 kHz
- Bands proposed in draft CPM text: 137-138 MHz, 148-149.9 MHz, 403-404 MHz, 404-405 MHz.

SCIENTIFIC USE OF SPECTRUM
AI 1.7

- Typical non-GSO Short Duration (less than 3 years) TT&C technical parameters were developed for use in the studies.
- Below 1 GHz the amount of spectrum required for non-GSO SD systems is 0.682 MHz to 0.938 MHz uplink and 0.625 MHz to 2.5 MHz for non-GSO SD satellite downlink.
- Sharing studies were performed in bands below 1 GHz and resulted in 4 different methods for SOS allocation.

SCIENTIFIC USE OF SPECTRUM
AI 1.7

- Method A no change to the Radio Regulations;
- Method B: An allocation of 1 MHz to the SOS in the Earth-space direction, limited to non-GSO SD satellite systems, in either 403-404 MHz or 404-405 MHz
- not subject to coordination under Section II of Article **9** of the Radio Regulations.
- Method C: This method (refer section 4/1.7/3.3.1) proposes to use the existing SOS allocation in the frequency bands 137-138 MHz for downlink and 148-149.9 MHz for uplink and to provide appropriate associated regulatory provisions in the Radio Regulations for telecommand links of non-GSO SD satellites.
- remove the reference to RR No. **9.21** in RR No. **5.218** and to not apply RR No. **9.11A** in the frequency band 148-149.9 MHz

Topics on the WRC-19 Agenda

17 specific & 6 standing items, Res.809 (WRC-15)

ITUWRC SHARM EL-SHEIKH2019
28 October - 22 November
Sharm El-Sheikh, Egypt

1.13
1.14
1.15
1.16

Fix. & Mob. BB Apps (24.25 < IMT < 86 GHz, HAPS, Apps.Id>275 GHz, WAS/RLAN @ 5 GHz)

Maritime (GMDSS modernization (+Sat.), use of radio devices, VDES Sat component)

1.8
1.9.1
1.9.2

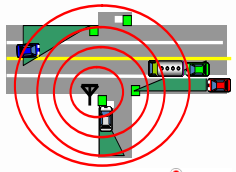
1.1

Amateur in R1 @ 50-54 MHz (4WW allocation)

WRC 2019

Aeronautical (GADSS needs)

1.10



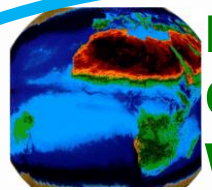
New Transport systems (harmonized bands for railways, ITS)

1.11
1.12

Satellite issues (BSS/FSS @12 GHz, ESIM, regul. for N-GSO FSS @ 37.5 to 51.4 GHz)

1.4, 1.5, 1.6

1.2
1.3
1.7



Earth resources & Climate monitoring Weather forecast, DCS improvement, TT&C for N-GSO Sat. of short duration

Regulatory issues (Sat. regulations, harmonization of spectrum use, etc.)

7
8

➢ See additional information in the slides attached to this presentation

Note: WRC-19 agenda item numbers indicated in italic