PRELIMINARY VIEWS FOR WRC-19
Output document of the 29th Meeting of the PCC.II
(Item on the Agenda: 3.1)

/Documents submitted by the Coordinators
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AGENDA ITEM 1.1
PRELIMINARY VIEWS FOR WRC-19
(Item on the Agenda: 3.1 (SGT2))
(Document submitted by the Rapporteur)

SGT 2 A - Radiolocation, Amateurs, Maritime, Aeronautical

Coordinator: Michael Razi (CAN).
Alternate Coordinator: Thomas vonDeak (USA)
Rapporteur of the Agenda Item: Flávio A. B. Archangelo (B).
Alternate Rapporteur Agenda Item: Jonathan Siverling (USA)
**Agenda Item 1.1:** to consider an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with Resolution 658 (WRC-15)

**BACKGROUND**

The 50 – 54 MHz frequency band is currently allocated to the amateur service on a primary basis in Regions 2 and 3. In Region 1, the band is currently allocated to only the Broadcasting Service on a primary basis. However, No. 5.169 of the Radio Regulations provides for an alternate allocation to the amateur service on a primary basis to a number of countries in Region 1, and No. 5.165 provides an alternate fixed and mobile, except aeronautical mobile, allocation on a primary basis to a number of countries in Region 1.

WRC-15 decided to study the sharing between the amateur service and incumbent services in Region 1 towards a primary allocation that would facilitate further worldwide harmonisation and international operability. The opportunity provided by Agenda Item 1.1 to achieve global harmonisation would provide the means to introduce new and innovative systems, as well as harmonizing existing amateur service usage in the range 50 - 54 MHz.

The frequency range 30 - 80 MHz marks the transition area between ionospheric and non-ionospheric propagation modes, which makes it particularly interesting for experimentation and study within the amateur service.

The technical and operational characteristics of systems used in the amateur service for the purpose of performing sharing studies can be found in ITU-R Recommendation M.1732.

Radio amateurs utilise allocations to the amateur service to engage in scientific and technical investigation and experimentation, provide communication in the wake of natural disasters, provide non-commercial public service communications, and conduct other activities to advance technical education, develop radio operating technique, and enhance international goodwill.

**PRELIMINARY VIEW:**

**Canada, USA**

WRC-19 Agenda Item 1.1 is a Region 1 issue. Any changes made to the Radio Regulations under WRC-19 Agenda Item 1.1 must not impact the existing allocation to the amateur service in 50 – 54 MHz in Region 2, nor subject Region 2 to any changed procedural or regulatory provisions.
AGENDA ITEM 1.2
PRELIMINARY VIEWS FOR WRC-19

(Item on the agenda: 3.1 (SGT2B))

(Document submitted by the Coordinator)

SGT 2B – Science services

Coordinator: Thomas vonDeak (USA)

Alternate Coordinator: Michael Razi (CAN)

Rapporteur Agenda Item: James Mentzer (USA)

Alternate Rapporteur Agenda Item:
**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)

Resolution 765 (WRC-15) – Establishment of in-band power limits for earth stations operating in mobile-satellite service, the meteorological-satellite service and the Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9 400.05 MHz, calls for the necessary technical, operational and regulatory consideration of the possibility of establishing in-band power limits for earth stations in the EESS and MetSat services in the frequency bands 401-403 MHz and in the MSS frequency band 399.9-400.05 MHz.

**BACKGROUND**

The bands 401-403 MHz and 399.9-400.5 MHz are used for uplink transmission by the Data Collection System (DCS) under the EESS, MetSat and MSS allocations. The DCS is a network of sensors measuring temperature, pressure, humidity, sea level, and tracking animal migration, located in areas difficult to reach. These measurements indispensable for monitoring and predicting climate change; monitoring oceans, weather, and water resources. Additionally, these systems assist in protecting biodiversity, and improve maritime safety, and security. The data is transmitted to GSO and non-GSO satellite networks using the non-GSO MSS allocation in the band 399.9-400.5 MHz or the meteorological satellite allocation in the band 401-403 MHz. These systems usually operate most efficiently together by using moderate to low e.i.r.p. levels, resulting in small link margins.

These frequency bands are used by satellites for telecommand purposes under the EESS, MetSat service, or MSS allocations and a growing number of these satellites are planned. The output power levels of the earth stations at the antenna port of these telecommand links (Earth-to-space) can be much higher than the moderate to low power levels used for the DCS service links, leading to potential harmful interference to DCS satellite receivers.

Recommendation ITU-R SA.2045 provides information on the performance and interference criteria for relevant geostationary-satellite orbit (GSO) and non-geostationary satellite (non-GSO) DCS in the frequency band 401-403 MHz. Recommendation ITU-R SA.2044 provides information on the current and future usage of non-GSO DCS in the frequency band 401-403 MHz, and the portioning of the frequency band to allow all DCS equal access to the spectrum. Recommendation ITU-R M.2046 provides a description, and the corresponding protection criteria for broadband noise and narrowband interference, of one MSS system that uses the frequency band 399.9-400.05 MHz (Earth-to-space).

**ISSUES**

- The bands 401-403 MHz and 399.9-400.05 MHz are used by the data collection system (DCS) for transmitting information from low-power sensors to satellites.
- A growing number of satellites are planned to use these frequency bands for telecommand, which uses higher power than the DCS sensors.
- The agenda item considers implementing uplink power limits to protect DCS operations, but that could limit the use of these bands for telecommand applications.
It is necessary to have stable regulatory certainty in order to be able to provide long-term continuity for the operation of data collection systems (DCS). DCS represents long-term efforts and significant investments. The establishment of in-band power limits for earth stations operating in the EESS, MetSat service, and MSS would bring confidence for DCS operators using the frequency bands 401-403 MHz and 399.9-400.05 MHz.

PRELIMINARY VIEW:

Canada, USA

CITEL supports conducting and completing the necessary technical, operational, and regulatory studies on the possibility of establishing in-band power limits for earth stations in the EESS and MetSat service in the frequency band 401-403 MHz and the MSS in the frequency band 399.9-400.05 MHz.
AGENDA ITEM 1.3
PRELIMINARY VIEWS FOR WRC-19
(Item on the agenda: 3.1)
(Document submitted by the Coordinator)

SGT 2B – Science services
Coordinator: Thomas vonDeak (USA)
Alternate Coordinator: Michael Razi (CAN)
Rapporteur Agenda Item: James Mentzer (USA)
Alternate Rapporteur Agenda Item:
Agenda item 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)

BACKGROUND

The band 460-470 MHz has primary allocations to the fixed and mobile service, and a secondary allocation to the meteorological-satellite service in the space-to-earth direction, upgraded to primary allocation in a few countries of Regions 1 and 3 per No. 5.290. The operation of EESS applications is also permitted via RR No. 5.289 on a no-interference, no-protection basis.

The meteorological-satellite service is used by the data collection system (DCS). The DCS is a network of sensors measuring temperature, pressure, humidity, sea level, tracking animal migration and sailboats, located in areas difficult to reach. The data is transmitted to GSO and non-GSO satellite networks. Most DCS are using the band 460-470 MHz for data downlinks to transmit the information collected by the DCS sensors.

The band 460-470 MHz is identified for use by IMT as per No. 5.286AA. However, the band may not generally be available for use by broadband systems (e.g., IMT) due to the extensive use by conventional and trunked mobile radio systems in some countries. Additionally, channels in the range 467.525-467.825 MHz can be used for maritime on-board communications as per No. 5.287 and No. 5.288.

In order to provide regulatory certainty, MetSat and EESS stakeholders are seeking to upgrade the meteorological-satellite allocation to primary status and to include a primary EESS allocation in the band 460-470 MHz while providing protection and not imposing additional constraints on existing primary services. This would bring confidence for administrations and space agencies involved in DCS and for the public sector funding the development and operation of such systems. In order to protect systems of the terrestrial service, the United States have already adopted a pfd limit imposed on space stations.

ISSUES

- An upgrade of the Metsat and EESS allocation to primary status would provide regulatory certainty for data collection systems.
- Measures need to be taken to ensure protection of and that no constraints are put on, fixed and mobile services, including the use of the band for IMT.
AGENDA ITEM 1.4
PRELIMINARY VIEW FOR WRC-19
(Item on the Agenda: 3.1 (SGT-3))
(Document submitted by the Coordinator)

SGT-3 – Satellite services

Coordinator:

Co- Coordinator: Brandon MITCHELL – USA

Rapporteur Agenda Item:

Alternate Rapporteur Agenda Item:
**Agenda Item 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-12), 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;

**BACKGROUND:**

Appendix 30 contains provisions for use of the broadcasting-satellite service (BSS) Plans and Regions 1 and 3 List, as well as for modifying the Plan (in the case of Region 2) or the List (in the case of Regions 1 and 3). It is a self-contained Appendix, including provisions for modifying the Plan or List (Article 4), notifying Plan or List assignments (Article 5) and for coordinating other services in the frequency bands vis-a-vis the Plan and List (Articles 6 and 7).

Appendix 30 also contains detailed criteria for sharing between the Plan/List and other services. Specifically, Annex 1 to Appendix 30 provides criteria for determining whether the assignments of an administration are affected by a proposed modification to the Region 2 Plan or by a proposed new or modified assignment in the Regions 1 and 3 List; Annex 4 to Appendix 30 provides criteria to determine the need to coordinate the fixed-satellite service (FSS) (or BSS not subject to a Plan) with the assignments of the Plans; and finally Annex 7 to Appendix 30 contains orbital position limitations on modifications to the BSS Plan or List.

The Ku-band frequencies are not globally harmonized; so, for example, the range 11.7-12.2 GHz is BSS in Region 1 and FSS in Region 2, the range 12.5-12.7 GHz is FSS in Region 1 and BSS in Region 2, and the range 12.2-12.5 GHz is BSS in both Regions 1 and 2. The Annex 7 orbital position limitations on modifications to the BSS Plan or List were designed to facilitate BSS sharing with the FSS in the shared part of the orbital arc between Regions 1 and 2, and are specifically applicable to Region 2 BSS in 12.2-12.7 GHz and to Region 1 BSS in 11.7-12.2 GHz.

The Annex 7 orbital position limitations were maintained at WRC-2000 (the most recent BSS Planning conference, which focused on Regions 1 and 3) for the reason that during a Planning conference, many new BSS slots could be adopted at once, which could significantly limit the future access of FSS to the shared portion of the orbital arc. Some of the criteria of Annex 1 and Annex 4 to Appendix 30 were updated at WRC-2003. Since then there has been considerable experience in working with the Plans and the criteria of Annexes 1 and 4 to Appendix 30.

On-going ITU R studies reported that the provisions for Region 1 BSS in Annex 7 to Appendix 30 may no longer be required, and in consequence WRC-15 adopted Agenda Item 1.4 to consider the results of studies in accordance with Resolution 557 (WRC-15) to review the limitations mentioned in Annex 7 to Appendix 30 and see if they could be removed or modified to provide additional access to this valuable spectrum resource. It is envisioned that studies will assess each portion of the orbital position limitations in Annex 7 (including, e.g., the orbital positions in Section A2 applicable to Region 2 BSS) to determine whether each could individually be removed or modified.
Preliminary View:

CAN, USA

With respect to Agenda Item 1.4, the United States and Canada support the studies in accordance with Resolution 557 (WRC-15). Based upon successful conclusion of these activities, the United States and Canada support the review and revision, as necessary, of the limitations of Annex 7 to Appendix 30 (Rev.WRC-12), while ensuring the protection of existing assignments in the Plan and the List and the future development of BSS service within the Plan, and existing and planned fixed-satellite service networks.
AGENDA ITEM 1.5
PRELIMINARY VIEW FOR WRC-19

(Item on the Agenda: 3.1 (SGT-3))

(Document submitted by the Coordinator)

SGT-3 – Satellite regulatory

Coordinator:

Co-Coordinator: Brandon MITCHELL - USA

Rapporteur Agenda Item:

Alternate Rapporteur Agenda Item: Gustavo VARGAS - COL
Agenda Item 1.5: 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);

BACKGROUND:

The topic of earth station in motion (ESIMs) communicating with geostationary (GSO) space stations in the fixed-satellite service (FSS) was addressed at WRC-15. Specifically, the Conference addressed ESIM operations in the frequency bands 29.5-30.0 GHz (Earth-to-space) and 19.7-20.2 GHz (space-to-Earth) and adopted footnote No. 5.527A and Resolution 156, which establish a framework for operation of ESIM globally with GSO FSS satellites in these bands.

Recognizing the increasing need for communications on the move, including the availability of global broadband satellite services, WRC-15 adopted Agenda Item 1.5 for WRC-19 to consider the operation of ESIMs in the 27.5-29.5 GHz (Earth-to-space) and 17.7-19.7 GHz (space-to-Earth) FSS frequency bands by GSO space stations. In addition to being adjacent to the frequency bands where FSS ESIM operations are allowed, GSO FSS satellites are operating in these bands.

ESIMs serve a wide range of applications on-board aircraft and ships as well as on land and the number of users and data requirements are growing. ESIM-delivered services are key to government users and enterprise users in many sectors including maritime shipping, media and energy customers who often have to operate in remote parts of the world. The expectation of the user is to be able to be connected anywhere and broadband global satellite service is a key component on how to meet that need. As an example of how demand for ESIM type services is growing, the in-flight connectivity market is expected to reach USD 5.80 Billion by 2020. This market segment is geared toward providing air travelers enhanced on-demand entertainment options as well as allowing them to create a virtual office on the aircraft.

Considering that the growing demand for broadband communications includes requirements for users on vessels, aircraft and vehicles at fixed locations and while in motion, Resolution 158 (WRC-15) invites ITU-R to study the technical and operational characteristics and user requirements of different types of earth stations in motion that operate or plan to operate within geostationary FSS allocations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, or portions thereof. This includes the use of spectrum to provide the envisioned services to various types of earth station in motion and the degree to which flexible access to spectrum can facilitate sharing with other services allocated in these bands. The Resolution also calls for sharing and compatibility studies between earth stations in motion operating with geostationary FSS networks and current and planned stations of existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to ensure protection of, and not impose undue constraints on, services allocated in these frequency bands.

ISSUES:

The frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, or portions thereof, are allocated to the fixed and mobile services on a primary basis in Region 2. In the 17.7-19.7 GHz range, some Region 2 administrations have widely deployed fixed services, consisting mostly of point-to-point applications in both urban and rural areas. In the 27.5-29.5 GHz range, there are currently some fixed deployments by some Region 2 administrations, but rapid growth and wide-scale deployments of mobile systems
deployments are expected/planned by some administrations in the 27.5-28.35 GHz portion of the frequency band.

Considering the significant amount of existing and/or potential fixed and mobile system deployments in the frequency bands 17.7-19.7/27.5-29.5 GHz, appropriate sharing and compatibility studies between earth stations in motion operating with geostationary FSS networks and fixed and mobile service systems are necessary to ensure protection of, and not impose undue constraints on the fixed and mobile services. These studies are also necessary to provide administrations with technical information related to sharing between these services (see recognizing further k of Resolution 158).

It should be noted that resolution of technical issues related to assessing the impact of time-varying ESIMs interference on operation of non-geostationary satellite orbit (NGSO) MSS feeder links in the 19.3-19.7 GHz (space-to-Earth) and 29.1-29.5 GHz (Earth-to-space) bands, and to developing appropriate methodologies to carry out such analysis would be essential to ensure protection of existing and planned services provided by such systems. (See recognizing further g) and h) of Resolution 158).

B, CAN

Portions of the 17.7-19.7 GHz and 27.5-29.5 GHz “Ka-band” are widely used by certain administrations in Region 2 for the provision of satellite communication services. Very significant investments have been made to deploy satellite networks in these bands that are delivering important services in Region 2 and around the world. Ka-band is the most likely spectrum for operators to expand their existing satellite fleet as well as the spectrum where new comers to the satellite market will deploy their networks. Sharing and compatibility studies between earth stations in motion operating with geostationary FSS networks, and current and planned stations of existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz are necessary to ensure protection of, and not impose undue constraints on, services allocated in these frequency bands.

It should be noted that resolution of technical issues related to assessing the impact of time-varying ESIMs interference on operation of non-geostationary satellite orbit (NGSO) FSS in the 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) bands, and to developing appropriate methodologies to carry out such analysis would be essential to ensure protection of existing and planned services provided by such systems. (See recognizing further f) of Resolution 158).

PRELIMINARY VIEWS:

CAN

The Canadian Administration support studies under the terms of Resolution 158 (WRC-15). Studies are necessary to determine compatibility of ESIMs with services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz. Sharing and compatibility studies between ESIM and FSS networks should include consideration of both geostationary and non-geostationary satellite systems, including non-GSO MSS feeder links, to ensure their protection.
B, USA
Support studies under the terms of Resolution 158 (WRC-15) on sharing and compatibility between ESIMs and current and planned stations of existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, while ensuring protection and not imposing undue constraints on these allocated services, and to take appropriate action based on the results of these studies.

Before identifying use of the frequency bands, or portions thereof, for ESIM operation, studies should address each operational type of earth stations in motion to include the appropriate technical and regulatory provisions necessary to ensure protection of existing and planned allocated services.
AGENDA ITEM 1.6
PRELIMINARY VIEWS FOR WRC-19
(Item on the Agenda: 3.1 (SGT-3))
(Document submitted by the Co-Coordinator)

SGT-3 – Satellite services

Coordinator:

Co-Coordinator: Brandon MITCHELL – USA

Rapporteur Agenda Item: Marcella OST - CAN

Alternate Rapporteur Agenda Item: Carolina DAZA – COL
**Agenda item 1.6: 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)**

**BACKGROUND**

Article 22 of the Radio Regulations contains provisions to ensure compatibility of non-GSO FSS operations with GSO networks for the 14/11 GHz and 30/20 GHz bands. Among these provisions are uplink and downlink equivalent power flux density (epfd↑ and epfd↓) limits to protect GSO networks from unacceptable interference pursuant to RR No. 22.2. These measures contribute to provide a well-defined regulatory framework for non-GSO systems operating in the 14/11 and 30/20 GHz frequency bands. There are currently no regulatory provisions for sharing between non-GSO systems and GSO networks in the 50/40 GHz frequency bands.

To address these issues, WRC-15 established agenda item 1.6 and associated Resolution 159 (WRC-15) for WRC-19: “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)” which invites the ITU-R membership to contribute to “Studies of technical, operational issues and regulatory provisions for non-GSO fixed-satellite services satellite systems 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).”

Resolution 159 (WRC-15) discusses the development of new technologies in the Fixed Satellite Service (FSS) in frequency bands above 30 GHz that would allow for the provision of high-capacity and low-cost communications in all parts of the world, especially in remote and isolated areas. This Resolution considers that satellite constellations in both geostationary-satellite orbits (GSO) and non-geostationary-satellite orbits (NGSO) would allow for the implementation of these new technologies in the FSS bands and that the Radio Regulations should enable the introduction of such technologies to ensure efficient use of the radio spectrum.

Resolution 159 (WRC-15) resolves to invite the ITU-R to conduct and complete in time for WRC-19 studies on the regulatory provisions to enable the operation of NGSO FSS satellite systems in the above mentioned frequency bands, including sharing studies with GSO, EESS, and RAS:

Non-GSO FSS systems in the 50/40 GHz band can be utilized to unlock a new and promising source of global broadband communications. Recent advances in satellite design, launch service capabilities and user terminal technology make it feasible to provide global satellite broadband services. Thanks to these recent technological advances, next-generation non-GSO satellite systems are currently being developed. These systems can greatly enhance the efficient use of existing FSS spectrum by using next-generation satellite and earth station technology. The benefits of such non-GSO satellite systems include providing worldwide connectivity and high-quality communication services to users in all geographic settings, be they urban, rural or remote, and offer tools for definitively addressing the longstanding broadband gap. Developing a regulatory framework in the 50/40 GHz band will provide regulatory certainty to allow non-GSO satellite systems to efficiently operate in these existing FSS frequency bands, while protecting GSO and other existing services.
ISSUES

- What are the appropriate epfd limits and regulatory provisions to be adopted to ensure the protection of GSO FSS space and Earth stations?
- What is the appropriate regulatory approach to be adopted to address sharing between NGSO FSS space stations?
- Should Resolution 750 (Rev. WRC-15) be modified to include limits or recommended maximum levels for unwanted emissions to protect EESS (passive) in the bands 36-37 GHz and 50.2-50.4 GHz from the NGSO FSS system operating in the adjacent bands?
- What approach should be retained to ensure the protection of RAS stations in the frequency bands 42.5-43.5 GHz, 48.94-49.04 GHz and 51.4-54.25 GHz from NGSO FSS operating in the adjacent bands?

Preliminary results of studies on the protection of EESS (passive) systems in the 36-37 GHz and 50.2-50.4 GHz frequency bands

Preliminary studies, in accordance with Resolution 159 (WRC-15) have been submitted to WP4A on the compatibility between non-GSO FSS systems operating in the 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).

For the bands, 37.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) studies were carried out between non-GSO FSS systems and EESS (passive) systems operating in the frequency bands 36-37 GHz and 50.2-50.4 GHz. Studies were also undertaken for EESS (passive) systems operating in the 50.2-50.4 GHz frequency band.

A number of ITU-R Recommendations and Reports have been considered in these studies as they provide details on technical and operational characteristics of EESS (passive) sensors, bands of operation and protection criteria. In particular, ITU-R Recommendation RS.1861 and ITU-R Recommendation RS.2017 provide technical and operational characteristics of EESS (passive) services and interference criteria for satellite passive remote sensing in various bands, respectively. As well, Table 1-1 of Resolution 750 (REV.WRC-15) provides limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band 50.2-50.4 GHz.

One study undertaken for EESS (passive) systems operating in the 36-37 GHz frequency band has shown that the protection criteria for these systems are not exceeded for various deployment scenarios of LEO and MEO non-GSO FSS systems.

More studies will be carried out within WP4A to better ascertain the sharing conditions for various types of non-GSO FSS systems. In addition, mitigation measures could be studied to ascertain whether compatibility can be achieved between EESS (passive) and non-GSO FSS systems in the 50 GHz range.

Preliminary studies on compatibility between non-GSO FSS and GSO FSS systems

Preliminary studies have been submitted to WP4A on the compatibility between non-GSO FSS and GSO FSS systems operating in the bands under consideration for this agenda item. These studies consider the impact of non-GSO with regards to GSO protection criteria. In these initial studies that have been
submitted to WP4A regarding this topic, it was found that the operation of non-GSO systems does not exceed the protection requirements of GSO FSS networks.

PRELIMINARY VIEW

CAN

Canada supports the studies under Resolution 159 (WRC-15) to develop a regulatory framework for new non-GSO FSS satellite systems.

For the band 36-37 GHz: Canada is of the view that based on the results of studies, EESS (passive) systems operating in the 36-37 GHz band and non-GSO FSS systems are compatible and no regulatory measures are required to address the compatibility between these two services.

For the band 50.2-50.4 GHz: Canada is of the view that based on the results of studies, mitigation techniques and/or regulatory measures may be required to ensure compatibility between EESS (passive) systems operating in the band 50.2-50.4 GHz and non-GSO FSS systems.

USA

The United States supports studies under WRC-19 Agenda Item 1.6 regarding the development of a regulatory framework for non-GSO satellite systems in the existing FSS allocations in the 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) frequency bands under the terms of Resolution 159 (WRC-15) and to take appropriate action based on the results of these studies.
AGENDA ITEM 1.7
PRELIMINARY VIEWS FOR WRC-19
(Item on the agenda: 3.1)
(Document submitted by the Coordinator)

SGT 2B – Science services
Coordinator: Thomas vonDeak (USA)
Alternate Coordinator: Michael Razi (CAN)
Rapporteur Agenda Item:
Alternate Rapporteur Agenda Item: Roberto Lafertte
**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, 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)

**Background**

Satellites for short duration missions are used for a wide range of applications, including Earth observation, space research and mobile-satellite communication. These satellites typically use commercial off-the-shelf components to reduce cost and design complexity, and are constrained in terms of low on-board power and low antenna gains. A short duration mission refers to a mission having a limited period of validity of not more than typically three years.

Since the number of these satellites is growing, there is an increasing demand for suitable allocations in the space operation service below 1 GHz to cope with the attendant pressure on the requirements for telemetry, tracking and command. Even though the frequency bands 144-146 MHz and 435-438 MHz are allocated to the amateur satellite service, some non-amateur satellites with short duration missions have used these bands for telemetry, tracking and command.

ITU-R Working Party 7B (WP 7B) is the responsible working party for this agenda item and is tasked with studying the spectrum requirements for telemetry, tracking and command in the space operation service for the growing number of non-GSO satellites with short duration missions; assessing the suitability of existing allocations to the space operation service in the frequency range below 1 GHz; and, if necessary, conducting sharing and compatibility studies to consider possible new allocations or an upgrade of the existing allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz.

WP 7B is working on three new reports related to agenda item 1.7, which respectively provide typical technical characteristics of satellites with short duration missions, study the spectrum requirements in the space operations service and provides sharing studies on possible new and/or upgraded allocations.

The preliminary conclusions with regards to the spectrum requirements for SOS for satellites with short duration mission is that between 0.625 MHz to 2.5 MHz is required for downlinks and between 0.682 MHz and 0.938 MHz is required for uplinks.

**Issues**

- To determine the spectrum requirements for telemetry, tracking and command for satellites with short duration missions and assess the suitability of existing allocations below 1 GHz to meet such requirements.
- To upgrade the existing allocations or identify new allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz in order to accommodate such missions.
- To ensure that, if a new allocation to space operation service were added, incumbent services both in-band as well as in adjacent bands would be protected from potential harmful interference.
PRELIMINARY VIEW

Canada

Subject to the outcome of the compatibility studies, Canada will consider supporting new allocations and an upgrade of the existing allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz. Canada is of the view that frequency bands subject to No. 9.21 are not suitable for space operation service for satellites with small duration missions.
AGENDA ITEM 1.8
PRELIMINARY VIEWS FOR WRC-19
(Item on the Agenda: 3.1 (SGT2A))
(Document submitted by the Coordinator)

SGT2A – Radiolocation, Amateurs, Maritime & Aeronautical

Coordinator: Michael Razi (CAN)
Alternate Coordinator: Thomas vonDeak (USA)
Rapporteur Agenda Item: Donald Jansky (USA)
Alternate Rapporteur Agenda Item: Christopher Casarrubias (MEX)
**Agenda item 1.8:** to consider possible regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution 359 (Rev.WRC-15);

**BACKGROUND**

Resolution 359 (Rev. WRC-15) takes into consideration the activities of the International Maritime Organization (IMO) related to the GMDSS modernization (See Resolves 1) and the introduction of additional satellite systems into the Global Maritime Distress and Safety System (GMDSS) (See Resolves 2), and the consequential regulatory actions that may need to be considered in relation to these Resolves.

IMO has been advancing its studies on modernization of GMDSS and this information would be considered by ITU-R in development of any regulatory modifications that may be necessary in this regard.

This includes the activities of the IMO related to the introduction of additional satellite systems into the GMDSS, recognizing that IMO has received an application to recognize an existing satellite system as part of the GMDSS. Further, resolves 2 of Resolution 359 (Rev.WRC-15) invites ITU-R to conduct studies, including consideration of the mobile-satellite service (MSS) allocations used and the potential impact of possible modifications to the provisions of the Radio Regulations on sharing and compatibility with other services and systems in the frequency band and adjacent frequency bands.

To date, only one mobile satellite system has been recognized by IMO for use in the GMDSS “system of systems”. Advances in communications technology, the maturity of commercial satellite operations, the introduction of competition into the satellite sector, and the deployment of non-geostationary satellite constellations have led the IMO to identify recognition of additional satellite systems to the GMDSS as an urgent work item.

IMO’s Maritime Safety Committee (MSC), at its ninety-second session (MSC 92), from 12 to 21 June 2013, considered the notification by the United States of the application of the Iridium mobile-satellite system for recognition and use in the GMDSS. The Committee, having noted that, in principle, there were no objections, agreed to refer the matter to the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) for evaluation. Following discussion at NCSR 1 (held from 30 June to 4 July 2014), MSC 94 (held from 17 to 21 November 2014) agreed that the International Mobile Satellite Organization (IMSO) should undertake the technical and operational assessment of the Iridium mobile satellite system and provide a technical and operational assessment report for consideration by the NCSR Sub-Committee.

IMSO submitted its report on the technical and operational assessment for consideration at NCSR 3 (held from 29 February to 4 March 2016). This Sub-Committee agreed that Iridium could be incorporated into the GMDSS subject to compliance with outstanding issues. The NCSR Sub-Committee invited the MSC to endorse this view, with the understanding that it, based on the evaluation reports from IMSO, would advise the Committee on final recognition, when the issues identified in the “comprehensive list of conditions” have been complied with. MSC 96 held in May 2016 has endorsed the list of conditions to be complied with by Iridium. This concluded a first stage review of Iridium's GMDSS application, IMO stating that approval ("recognition") can be granted pending completion of certain conditions. Iridium is currently in the process of completing those remaining conditions, which include:

- Integration of Iridium system with RCCs and MSI providers;
• ship earth station terminals made available for demonstration of ship-to-shore, shore-to-ship, and ship-to-ship GMDSS communications in compliance with the comprehensive list of outstanding items;

• Complete demonstration of compliance with all outstanding items of the comprehensive list in Fall of 2017

In addition to the above activities at the IMO, ITU is required to study potential impact of the regulatory provisions of the Radio Regulations. For example, considering that Appendix 15 (Rev. WRC-12) of the Radio Regulations lists the frequency bands identified for provision of GMDSS, introduction of an additional satellite systems to provide GMDSS would require that frequency bands used by that system (e.g. 1616 – 1626.5 MHz used on the Iridium satellite system) are included in Appendix 15 (Rev. WRC-12).

In addition, the Resolution invites the WRC-19 to consider the studies undertaken as part of this agenda item and to take action in time for WRC-19. ITU-R WP 5B (WP 5B) and ITU-R WP 4C (WP 4C) have been involved in conducting such studies in support of Agenda Item 1.8.

ITU-R WP5B is the responsible working party for this agenda item and Working Parties 4C and 7D were designated as concerned groups for the work, and Working Parties 1A and 3M were identified as interested groups. WP 4C is tasked to provide appropriate CPM text including characteristics of mobile-satellite and aeronautical mobile-satellite (R) service systems operating in the frequency bands identified by WP 5B, and any applicable Reports and Recommendations.

Work on this matter is progressing in ITU-R WP 4C and 5B. The April 2017 meeting of WP 4C received a number of contributions on study of the above items, and outcome of these studies and discussions are captured in the Working Document towards Preliminary Draft New Report [GMDSS-SATREG]. Following Working Document are being developed:

• Working Document towards Preliminary Draft New Report [GMDSS-SATREG], addressing regulatory matters related to the identification of an additional satellite provider in the GMDSS (see, Document 4C/192 Annex 14);

• Working Document towards Preliminary Draft New Report [RAS-COMPAT], addressing protection of radio astronomy was carried further for development at future WP 4C meetings (see, Document 4C/192 Annex 15); and

• Working document towards preliminary draft CPM text for WRC-19 agenda item 1.8 (see, Document 4C/192 Annex 17).

It is important to note that identification of an additional GMDSS service provider would bring forward the following benefits to the maritime community:

• Covering the entire globe – including the critical Arctic and Antarctic (Polar) regions, which makes up Sea Area A4, where there is currently no GMDSS mobile satellite services available;

• Is an “always on” system as individual satellites pass overhead approximately every five to eight minutes depending on location. The movement of the satellites across the horizon provide the

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1 Appendix 15 (Rev. WRC-12) is entitled “Frequencies for distress and safety communications for the Global Maritime Distress and Safety System (GMDSS)”.
user with better look angles (i.e., ability to see the satellite) in rough seas, especially in northernmost and southernmost latitudes;

- Will enable both voice and data GMDSS communications in a single, small form factor maritime mobile terminal, at a low cost (currently two mobile satellite system terminals may be required to meet operational and regulatory needs of the vessel (voice and data) at much greater cost;

- Provide an opportunity for a redundant communications platform for the maritime community in the event there is a catastrophic outage which disables part, or all, of other satellite-based GMDSS services

- Will provide for more efficient and comprehensive distress and safety communications by providing the Rescue Coordination Center with immediate voice communications capability, vessel identification, and a means to contact the vessel in distress;

- Will provide, for the first time, vessel owners with a choice of satellite-based GMDSS services, including choice of equipment with the state-of-the-art technology, new service offerings, and competitive pricing; and

- May be integrated with vessel “digital bridge” systems consolidating equipment and displays for the crew to monitor, while eliminating clutter on the bridge;

ISSUES

- What is the appropriate regulatory approach, including consequential modifications, to identify additional satellite systems to provide GMDSS?
- What sharing and compatibility studies may be required with other services and systems in the frequency band intended for GMDSS provision and adjacent frequency bands?

PRELIMINARY VIEW:

Canada, USA
With respect to Agenda Item 1.8, these Administrations support the activities of IMO related to the introduction of additional satellite systems into the GMDSS, as well as activities underway in the ITU-R. Based upon successful conclusion of these activities, these Administrations support appropriate modification of the Radio Regulations such as Appendix 15, to provide for introducing additional satellite systems into the GMDSS.
AGENDA ITEM 1.9.1
PRELIMINARY VIEWS FOR WRC-19
(Item on the Agenda: 3.1 (SGT2A))
(Document submitted by the Coordinator)

SGT2A – Radiolocation, Amateurs, Maritime & Aeronautical
Coordinator: Michael Razi (CAN)
Alternate Coordinator: Thomas vonDeak (USA)
Rapporteur Agenda Item:
Alternate Rapporteur Agenda Item:
**Agenda Item 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), in accordance with Resolution 362 (WRC-15)

**BACKGROUND**

RESOLUTION 362 (WRC-15) “Autonomous maritime radio devices (AMRD) operating in the frequency band 156-162.05 MHz”, prescribes a study process for WP5B in four parts: 1) to determine the spectrum needs for the devices, 2) to categorize the various kinds of devices, 3) to conduct sharing and compatibility studies to ensure that no undue constraints are placed on the GMDSS and the AIS, and 4) to conduct studies to determine potential regulatory actions and appropriate frequencies within the band 156-162.05 MHz.

The term AMRD is not part of the Database of ITU Terms and Definitions and needs clarification for a wider audience. At the May 2017 meeting of WP 5B, it concluded on the final definition of AMRDS and provides it to IMO and IALA:

“An AMRD is a mobile station; operating at sea and transmitting independently of a ship station or a coast station. Two groups of AMRDS are identified:

- **Group A:** AMRDs that enhance the safety of navigation,
- **Group B:** AMRDs that do not enhance the safety of navigation (AMRDs which deliver signals or information which do not concern the vessel can distract or mislead the navigator and degrade the safety of navigation).”

The devices discussed may use AIS technology; digital selective calling (DSC) technology; or transmit synthetic voice messages. Combinations of the technologies mentioned above can be found in equipment already available on the market.

The ITU Bureau sent a circular letter to all administrations including a questionnaire on the distribution and applications of AMRDS. The objective of the questionnaire is to get a clear overview of these devices and to compile and categorize existing AMRDS being used in different countries. Responses will be submitted to ITU-R Working Party 5B, the responsible group for this Agenda Item.

There is a need to recognize new autonomous maritime radio devices applications that aid navigation safety, safety communications and the maritime environment in an orderly and internationally-recognized way while limiting those that would hinder the safety applications of the GMDSS and AIS. Those new applications can be considered within the framework of ITU-R studies. The operation of autonomous maritime radio devices operating in the band 156-162.05 MHz should not constrain the frequencies designated for the GMDSS and AIS.

**PRELIMINARY VIEW**

**USA**

The United States supports the ITU-R studies prescribed in Resolution 362 (WRC-15) and these studies should also take into account the protection of the GMDSS and AIS.
AGENDA ITEM 1.9.2
PRELIMINARY VIEWS FOR WRC-19

(Item on the Agenda: 3.1 (SGT2A))

(Document submitted by the Coordinator)

SGT2A – Radiolocation, Amateurs, Maritime & Aeronautical

Coordinator: Michael Razi (CAN)

Alternate Coordinator: Thomas vonDeak (USA)

Rapporteur Agenda Item:

Alternate Rapporteur Agenda Item:
Agenda Item 1.9.2: modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth to space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in recognizing d) and e) of Resolution 360 (Rev. WRC-15);

BACKGROUND

RESOLUTION 360 (REV. WRC-15) “Consideration of regulatory provisions and spectrum allocations to the maritime mobile-satellite service to enable the satellite component of the VHF Data Exchange System and enhanced maritime radiocommunications”, invites ITU-R to conduct, as a matter of urgency, and in time for WRC-19, sharing and compatibility studies between VDES satellite components and incumbent services in the same and adjacent frequency bands specified in recognizing d) and e) to determine potential regulatory actions, including spectrum allocations to the MMSS (Earth-to-space and space-to-Earth) for VDES applications. To this end, the ITU-R has initiated sharing studies between the proposed VDES satellite (VDE-SAT) frequencies and the incumbent services in the same and adjacent bands so that this component does not impose any additional constraints on existing services in these and adjacent frequency bands as stated in recognizing d) and e) of Resolution 360 (Rev. WRC-15). The satellite component of the VDES could be beneficial towards enhancing maritime navigation and safety related applications on a global basis.

Traditional maritime communication methods (i.e. voice) have been used for the transfer of the information required to improve the safety of navigation particularly in adverse conditions. More information (such as weather, ice charts, status of aids to navigation, water levels and rapid changes of port status) is required in real-time to improve operational decisions on land and on ship that will lead to safer and more efficient voyages. Shore authorities have also demonstrated interest in increasing the quantity of information retrieved from ships in real-time (such as voyage information, passenger manifest and pre-arrival reports) in a more efficient way to transmit and process this information as digital information.

As a result of these additional requirements on maritime communications, WRC-15 made regulatory changes to Appendix 18 to facilitate the use of the terrestrial component of VHF Data Exchange system (VDES). These channels may be used by maritime authorities across the world to respond to increased data transfer and improve maritime safety and efficiency in the growing maritime environment.

VDES is an extension of the very successful Automatic Identification System (AIS) used by the maritime community, while protecting the original function of AIS identification, position reporting and tracking. AIS, designed primarily as a collision avoidance system, and application specific messages (ASM) will continue to operate along with the new VDES channels. VDES is based on robust and efficient digital transmission rates through the aggregation of several 25 kHz channels for increased throughput capacity.

Once vessels have travelled outside the area of terrestrial coverage from shore stations, satellite networks could provide VDES capability to support and enhance safety and navigation. The satellite component of VDES is being further studied for WRC-19 to take into account existing services within and adjacent to the frequency band under consideration.
Under **5.225A**, the adjacent frequency band 154-156 MHz includes a primary allocation to the radiolocation service in some countries.

Preliminary studies within ITU-R Working party 5B (WP 5B) concluded that compatibility between the radiolocation service and the maritime mobile satellite service (Earth-to-space) is feasible without imposing any additional constraints on the radiolocation service. Application of the radiolocation service in the frequency band 154-156 MHz is limited to the space surveillance radars.

Studies in WP 5B during the preparation for WRC-15, proposed a pfD mask for the maritime mobile satellite service to protect the incumbent fixed and mobile services. These studies are being considered during the WRC-19 cycle.

Furthermore, WP5B is currently drafting a report on the technical characteristics and feasibility assessment of the VDES satellite component including two proposed alternative frequency plans.

Frequency plan alternative 1 allow for utilization of the channels 24, 84, 25, 85, 26 and 86 in a shared manner between VDE-TER and VDE-SAT.

- Four channels 1024, 1084, 1025 and 1085 are shared between ship-to-shore and ship-to-satellite (VDE-SAT uplink) services
- Two channels 1026 and 1086 are exclusively reserved for ship-to-satellite (VDE-SAT uplink) services
- Four channels 2024, 2084, 2025 and 2085 are shared among shore-to-ship, ship-to-ship and satellite-to-ship (VDE-SAT downlink) services
- Two channels 2026 and 2086 are exclusively reserved for satellite-to-ship (VDE-SAT downlink) services.
- Two channels 2027(ASM 1) and 2028 (ASM 2) are shared between ship-to-shore, ship-to-ship, shore-to-ship and ship-to-satellite services

Frequency plan alternative 2 allow for utilization of channels 24, 84, 25 and 85 primarily for VDE-TER, while channels 26 and 86 exclusively reserved for VDE-SAT uplink. VDE-SAT uplink is also possible in channels 24, 84, 25 and 85, but the VDE-SAT uplink in these channels do not impose constraints on VDE-TER. Frequencies are exclusively reserved for VDE-SAT downlink within the frequency range 160.9625 MHz to 161.4875 MHz, which is not channelized in RR Appendix 18.

- Four channels 1024, 1084, 1025 and 1085 are reserved for ship-to-shore services, but ship-to-satellite (VDE-SAT uplink) services are possible without imposing constraints on ship-to-shore services.
- Four channels 2024, 2084, 2025 and 2085 are reserved for shore-to-ship and ship-to-ship services, but ship-to-satellite (VDE-SAT uplink) services are possible without imposing constraints on shore-to-ship and ship-to-ship services.
- Four channels 1026, 1086, 2026 and 2086 are exclusively reserved for ship-to-satellite (VDE-SAT uplink) services.
- Frequencies are exclusively reserved for satellite-to-ship (VDE-SAT downlink) services within the frequency range 160.9625 MHz to 161.4875 MHz, which is not channelized in RR Appendix 18.
Two channels 2027 (ASM 1) and 2028 (ASM 2) are shared between ship-to-shore, ship-to-ship, shore-to-ship and ship-to-satellite services.

ISSUES

- What is the appropriate pfd mask to ensure compatibility with in-band fixed and mobile services?
- Are there any regulatory measures necessary to ensure no additional constraints are imposed on the incumbent services (fixed, mobile, radiolocation and radio astronomy) in adjacent frequency bands?

PRELIMINARY VIEWS

Canada

Noting that the proposed alternatives are being discussed, Canada believes that other alternative channel plans must also be explored. In order to establish a comprehensive VDES channel plan for all VDES components, Autonomous Maritime Radio Devices (AMRDs) operating within the same frequency band must also be taken into account.

These devices may use AIS technology; digital selective calling (DSC) technology; or transmit synthetic voice messages. Combinations of these technologies can be found in equipment already available on the market. AMRDs are being addressed under Agenda Item 1.9.1. In view of this, VDES channel plans should take into account frequencies for AMRDs.

USA

The United States supports the ITU-R studies prescribed in Resolution 360 (Rev. WRC-15) and these studies should also take into account the protection of existing terrestrial services which operate in these and adjacent frequency bands.
AGENDA ITEM 1.10
PRELIMINARY VIEWS FOR WRC-19
(Item on the Agenda: 3.1 (SGT2A))
(Document submitted by the Rapporteur)

SGT2A – Radiolocation, Amateurs, Maritime & Aeronautical

Coordinator: Michael Razi (CAN)

Alternate Coordinator: Thomas vonDeak (USA)

Rapporteur Agenda Item: Luis Fernando (B)

Alternate Rapporteur Agenda Item: Sandra Wright (USA)
Agenda Item 1.10: to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with Resolution 426 (WRC-15)

BACKGROUND

While air travel in recent years has represented some of aviation’s safest years in terms of the number of accidents, the tragedy of Malaysia Airlines flight 370 in March 2014 highlighted needed improvements in the global air navigation system requiring urgent attention. To address these improvements, the aviation community embarked on a global effort to develop GADSS, and International Civil Aviation Organization (ICAO) forged consensus among its Member States and the international air transport industry on the near-term priority for a more comprehensive method of tracking civilian airline flights, regardless of their global location or destination.

The International Civil Aviation Organization (ICAO) held a Special Meeting on Global Flight Tracking of Aircraft in Montreal May 2014, and formed an ICAO ad hoc Working Group to develop a concept of operations to support future development of GADSS. A draft version of a concept of operations for GADSS, was developed by the ICAO Ad-hoc WG on flight tracking and introduced at the 2\textsuperscript{nd} ICAO High Level Safety Conference (2\textsuperscript{nd} HLSC, 2 – 5 February 2015). The 2\textsuperscript{nd} HLSC recommended that ICAO should expeditiously finalize and use the GADSS for the implementation of normal and abnormal aircraft tracking; autonomous distress flight tracking; search and rescue (SAR) activities; automatic retrieval of data from cockpit voice and flight data recorders; and related procedures including management of such information. In June 2015 the Ad-hoc WG delivered a final version of the GADSS concept of operations to ICAO, for consideration to publish as an ICAO document under the authority of the Secretary General.

As a result of expected developments in the implementation of various elements of GADSS, modifications to the Radio Regulations may be required to facilitate emerging needs of the aviation community and related distress and safety agencies. This agenda item was adopted at WRC-15 with sufficient flexibility to address potential modifications to the Radio Regulations required to allow implementation of the GADSS, taking into consideration the incumbent services that may be impacted as a consequence of these potential modifications. Specifically, Resolution 426 (WRC-15) invited the ITU-R to conduct relevant studies taking into account information provided by ICAO on the requirements for both the terrestrial and satellite components of GADSS.

During recent meetings, the Frequency Spectrum Management Panel (FSMP) of ICAO provided guidance on the type of spectrum required for each of the foreseen GADSS functions.

<table>
<thead>
<tr>
<th>GADSS Spectrum Guidance*</th>
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<tbody>
<tr>
<td>Function</td>
</tr>
<tr>
<td>Normal Tracking</td>
</tr>
<tr>
<td>Surveillance Tracking</td>
</tr>
<tr>
<td>Distress Tracking</td>
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<tr>
<td>Data Retrieval (not used for real-time functions)</td>
</tr>
</tbody>
</table>

A: any type of spectrum properly allocated, on a primary basis, for the function being performed
B: only protected aeronautical safety spectrum can be used.
C: only protected aeronautical safety spectrum, or protected distress spectrum (e.g., 406 - 406.1 MHz), can be used

*This table is not intended to imply that any new spectrum allocations are necessary to support GADSS.

The above guidance provided by the ICAO FSMP on the type of spectrum to be used for the identified functions, can be further described by separating the individual functions and quantifying what is available to support that function, as follows:

1) **Normal tracking** is identified as the means of following an aircraft throughout its entire flight within the context of availability of position reporting at least once in 15 minutes. This function is deemed to be under the purview of the airline or company operating the aircraft. More than one method is available for an airline or company to accomplish flight following or normal tracking of a flight. Spectrum requirements for normal tracking were identified at WRC-15.

2) **Surveillance tracking** is a specific air traffic control function that is accomplished in accordance with ICAO Standards and Recommended Practices relative to airspace separations standards, technical standards and also the onboard avionics certification. No additional spectrum requirements have been identified by ICAO for this capability.

3) **Distress tracking**, in the operational context, will occur during emergency conditions of an aircraft. This is a performance-based requirement which is not technology-specific. Performance requirements include the ability to be manually activated, operate in the event of aircraft power loss, and communicate information to relevant authorities such as search and rescue and air traffic services. Principle methods being considered within ICAO for this function include the use of emergency position-indicating radiobeacons (EPIRBs) and emergency locator transmitters – distress tracking (ELT(DT)) both of which operate on 406.1 MHz, which is already allocated to the mobile satellite service (Earth-to-space). No additional spectrum requirements have been identified by ICAO for this capability.

4) **Data retrieval** in respect to the transmission of flight data is an operational capability that is still under discussion within the responsible operational and technical Panels of ICAO. Until there is maturity regarding an agreed method to accomplish flight data retrieval, it remains premature to determine any potential for additional new spectrum requirements. ICAO and ITU-R continue to work closely together as discussions of spectrum requirements for data retrieval progress.

Some of the key issues that have been identified with the development and implementation of GADSS, which are expected to be addressed by ICAO include:

- What are the data traffic requirements for different system components of GADSS (such as the aircraft tracking, autonomous distress and flight data recovery systems) and their terrestrial and satellite components at each phase of the operation?
- What are the radiocommunication requirements related to safety-of-life applications?
- What are the performance criteria for terrestrial and satellite systems?
- After an analysis of the existing allocations to the relevant aeronautical services, is any additional spectrum required?
• If additional spectrum is required, would sharing and/or compatibility with existing services be possible?

ICAO has communicated, in a response to WP5B, that their initial expectation is that the three forms of tracking (normal, surveillance and distress) do not require additional spectrum allocations. Studies are continuing regarding the operational performance and spectrum requirements for data retrieval.

PRELIMINARY VIEW:

Brazil, Canada, USA

1. The quantification and characterization of the radiocommunications requirements for both the terrestrial and satellite components of GADSS are the responsibility of ICAO;
2. Based on those requirements, relevant studies should be conducted in the ITU-R to review existing regulatory provisions and determine if additional regulatory changes are needed;
3. ITU-R studies should be done in coordination with ICAO.
PRELIMINARY VIEWS FOR WRC-19

AGENDA ITEM 1.11

(Item on the Agenda: 3.1 (SGT-1))

(Document submitted by CITEL Member States)

SGT-1

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Agenda Item Rapporteur: David Tejeda – MEX - david.tejeda@ift.org.mx

Agenda Item Vice-Rapporteur: [name SURNAME] – [COUNTRY] – [email]
**Agenda Item 1.11:** to consider the results of ITU-R studies, take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, in accordance with Resolution 236 (WRC-15)

**BACKGROUND**

For many years the railway industry has been integrating a multitude of wireless systems for operational applications to improve railway traffic control, passenger safety and improve security for train operations and to meet the needs of a high-speed railway environment. As the railway transportation systems are evolving, the infrastructure investment and the need to integrate different technologies in order to facilitate various functions, for instance, dispatching commands, operating control and data transmission into railway train and trackside systems becomes even more essential. Timely studies have been requested on technologies providing for railway radiocommunication and international standards and harmonized spectrum would facilitate worldwide deployment of radiocommunication systems between train and trackside. The ITU Radiocommunication Sector (ITU-R) Study Group 5 is studying relevant technical and operational characteristics for railway radiocommunication systems.

Some of the regional railway communities are considering a successor to GSM-R (GSM for Railway), as the forecast obsolescence of the 2G-based GSM-R technology is envisaged around 2030. In order to meet future demands of train control and operation including passenger services, some national and international railway organizations have begun investigations on new technologies for next generation radiocommunication systems between train and trackside with required technology lifespans of multiple decades.

The 3GPP is considering standardization of the next evolution of train-to-trackside communications technologies which is supported by the International Union of Railways (UIC). According to the Motorola Solutions contribution to the Asia-Pacific Telecommunity (APT), September 2016 meeting, TETRA, 4G LTE and 5G technologies with low latency are candidates for future train-to-trackside communications. In addition, IP based RAN will replace the existing circuit Radio based GSM-R network for train-to-trackside communications.

In Mexico, the project called “Inter-urban passenger train from Toluca to Valley of Mexico,” which will be connecting the metropolitan area of the Valley of Toluca to the western side of Mexico City, is currently being built to improve mobility in the Valley of Mexico Metropolitan Area.

In the context of said project and as part of the criteria for its design and operation, use of the technological solution provided by the GSM-R standard in the frequency band 876-880/921-925 MHz was proposed for the purpose of meeting connectivity requirements. GSM-R systems have traditionally operated in this frequency band, because it is partially covered by the GSM 900 standard for mobile phones, mainly used in Europe in the 880-915/925-960 MHz range.

Likewise, the frequency band of interest has the allocation in the National Frequency Allocation Table to Mobile and Aeronautical Mobile, both as a primary service, where the frequency segment 849-851/894-896 MHz is allocated for national aeronautical mobile radiocommunication service.

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2 The Motorola Solutions contribution to the Asia-Pacific Telecommunity (APT) will be available as an information document at the CITEL November 2016 meeting.
Despite the above, this alternative entailed various implications for Mexico, namely:

a) The frequency band 824-849/869-894 MHz is granted in concession for the provision of national mobile broadband telephony. As a result, if this frequency band is used, geographical restrictions would have to be imposed on the base stations of the mobile broadband telephony service along the entire railroad line, a mechanism that would not necessarily guarantee protection of the railway systems.

b) Segment 896-901/935-940 MHz has been viewed as one of the viable alternatives for operating business narrowband systems, because this segment benefits from the standards for trunking service.

c) Aeronautical mobile service applications operate in the frequency bands 849-851/894-896 MHz, as a result of which, if additional spectrum is required for high-speed trains, there might be difficulties because of the coexistence of train operations on the basis of the GSM-R standard and aeronautical mobile services.

d) To not give continuity to the operation of aeronautical mobile services, if it is eventually decided that it is not feasible to have aeronautical mobile services and operations of the GSM-R standard coexist.

e) Depending on the railway network’s communication needs, only minimum needs can be met, as a result of which, in the event that said network is diversified or enlarged, it would be impossible to grant additional spectrum. In that respect, even when the band 896-901/935-940 MHz is considered apt for operating the GSM-R systems, it was determined that, in Mexico, in the ranges of 896-901 MHz and 941-946 MHz, only the operation of two blocks of 2.6 MHz for the uplink and downlink, respectively, would be feasible.

ISSUES

- To determine spectrum needs for the implementation of railway radiocommunication systems between train and trackside.
- To identify global or regional harmonized frequency bands, if needed, for the implementation of railway radiocommunication systems between train and trackside, within existing mobile service allocations. Determine how this “identification” would be done.
- To determine potential technical and operational characteristics and implementation of railway radiocommunication systems between train and trackside in the mobile service to assess compatibility with other services.
- To determine mitigation techniques to protect the existing primary systems of the other services within frequency bands with existing mobile service allocations.

PRELIMINARY VIEWS

Canada
Canada is of the view that the agenda item 1.11 is restricted to examining spectrum for railway radiocommunication systems between train and trackside in spectrum already allocated to the mobile service; therefore, Canada is of the view that this agenda item can be satisfied through ITU-R Recommendations and Reports without the need of changes to the Radio Regulations.
Mexico
The process of identifying possible radio spectrum segments for railway radiocommunication systems should be based on the premise that they should not be located in the bands currently allocated or authorized by administrations for mobile broadband telephony applications, so as to prevent possible harmful interferences or incompatibility with each administration’s spectrum allocation plans.

Although it is true that Mexico is at an advantage with respect to identifying spectrum for high-speed railway systems in frequency bands identified for IMT, because of the experience gained from the difficulty of allocating spectrum for this type of system, the Administration of Mexico believes that frequency ranges where the administrations do not have allocations for mobile broadband telephony applications should be taken into account.

The Administration of Mexico is willing to share experiences with respect to the allocation of frequencies to high-speed railways in the sessions where this subject will be discussed.

Furthermore, the Administration of Mexico is of the opinion that harmonized frequency bands should be identified for the implementation of high-speed railways in Region 2 and that ITU-R Recommendations and Reports are the best mechanisms to address item 1.11 on the WRC-19 agenda, without the need to make any amendments to the Radio Regulations.
PRELIMINARY VIEWS FOR WRC -19

AGENDA ITEM 1.12
(Item on the Agenda: 3.1 (SWG-1))
(Document submitted by CITEL Member States)

SWG-1

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Vice-Coordinador: José COSTA – CAN – jose.costa@ericsson.com


Alternate Rapporteur Agenda Item: [Francisco SOARES – B – fsoares@qti.qualcomm.com]
Agenda Item 1.12: to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with Resolution 237 (WRC-15)

BACKGROUND

Research and development has been ongoing for decades to integrate information and communication technologies into vehicle systems to improve traffic management and assist safe driving. This is expected to be important in resolving road traffic problems such as congestion and accidents.

ITS applications, including ETC (Electronic Toll Collection) and millimetre-wave radars, have already been deployed worldwide. The 3rd Generation Partnership Project (3GPP) is standardizing the radio interface, system architecture and service requirements of “LTE-based V2X Services” for ITS application and new vehicular radio communication technologies and ITS broadcast systems are emerging. New connected vehicles will use intelligent technologies in the vehicles’ combined advanced traffic management, advanced traveler information, advanced public transportation management system and/or advanced fleet management systems. Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications, called “co-operative ITS,” have been developing to achieve safe drive support systems.

Given the expected exponential growth in ITS deployment and the enormous size and safety impact of the global automotive industry, now is the time for consideration of spectrum harmonization for ITS applications globally and/or regionally.

International standardization activities for ITS info-communication systems have been conducted at the global and regional levels (ITU-R, ISO and ETSI, CEN, ARIB) and in private sector (IEEE, SAE). Several recommendations and reports have been published:


In the U.S. and Europe, the study of sharing ITS spectrum to be used for V2V and V2I, with Radio Local Area Network (RLAN) (WRC-19 agenda item 1.16), has begun. With the perspective of efficient use of the spectrum, some frequency bands which have been used for ITS applications for many years, or are planned to be used, and are allocated for mobile applications are being actively studied by some administrations and regions with a view to enable sharing with other applications.
ISSUES

- To determine spectrum needs for the evolving ITS applications.
- To identify global or regional harmonized frequency bands, if necessary, for the implementation of evolving ITS applications under existing mobile service allocations.
- To determine a definition for the applications covered under ITS radiocommunication systems.
- To determine potential technical and operational restrictions or mitigation techniques for evolving ITS applications operating in the mobile service to facilitate sharing with systems of incumbent services.
- To assess possible linkage to agenda item 1.16 dealing with frequency bands between 5150-5925 MHz given that some ITS systems operate in the upper part of that frequency range.

PRELIMINARY VIEWS

Canada

Canada is of the view that the agenda item 1.12 is restricted to studying spectrum for intelligent transport systems in spectrum already allocated to the mobile service; therefore, Canada is of the view that this agenda item can be satisfied through ITU-R Recommendations and Reports without the need of changes to the Radio Regulations.
PRELIMINARY VIEWS FOR WRC-19

AGENDA ITEM 1.13
(Item on the Agenda: 3.1 (SGT-1))
(Document submitted by CITEL Member States)

SGT-1

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Agenda Item Rapporteur: Camilo ZAMORA – COL - camilo.zamora@ane.gov.co

Agenda Item Vice-Rapporteur: Juan Pablo ROCHA – MEX – juan.rocha@ift.org.mx
Agenda item 1.13: To consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 238 (WRC-15);

BACKGROUND

Mobile broadband plays a crucial and fundamental role in providing access to information for businesses and consumers worldwide. According to ITU statistics, published on July 2016, “In developing countries, the number of mobile-broadband subscriptions continues to grow at double digit rates, reaching a penetration rate of close to 41 percent. The total number of mobile-broadband subscriptions is expected to reach 3.6 billion by end 2016.”

Mobile broadband users are also demanding higher data rates and are increasingly using mobile devices to access audio-visual content. The mobile industry continues to drive technological innovations in order to meet these evolving user demands. Research and development efforts from both industry as well as academia are facilitating the use of spectrum in bands above 6 GHz for mobile broadband. These efforts span the globe. Some countries and regions have also begun making spectrum available for mobile broadband applications in higher frequency bands in order to provide the benefits of these innovations to businesses and consumers worldwide.

The evolution of International Mobile Telecommunications (IMT), which provides wireless telecommunication services on a worldwide scale, has contributed to global economic and social development. IMT systems are now being evolved to provide applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications. Many of these ultra-low latency and very high bit rate applications will require larger contiguous blocks of spectrum than those available in the frequency bands currently identified for IMT. This has resulted in the need to address higher frequency bands to find these larger blocks of spectrum in the bands indicated in Resolution 238 (WRC-15).

In early 2012, ITU-R embarked on a program to develop “IMT for 2020 and beyond”. In November 2015, ITU-R approved Recommendation ITU-R M.2083 “Framework and overall objectives of the future development of IMT for 2020”, which highlights three key usage scenarios for IMT-2020: enhanced mobile broadband, massive machine-type communications, and ultra-reliable and low latency communications. The success of these usage scenarios, in both developed and developing countries, will rely on both spectrum availability for the terrestrial IMT-2020 systems and the support of high capacity backhaul capabilities (including fiber, wireless, satellite and microwave solutions). Recognizing the need to consider the spectrum in the range 24.25 to 86 GHz to support the terrestrial component of IMT in higher frequency bands, while protecting existing services, World Radiocommunication Conference (WRC) 2015 approved WRC-19 agenda item 1.13. ITU-R, standards development organizations, and industry continue to progress the work on the development of IMT-2020.

The central topic is the need to conceive, from the outset, high frequency bands that are harmonized enough to foster economies of scale and meet the short-, medium- and long-term spectrum requirements, and to incorporate the use of new technologies that can benefit from the physical features of various

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frequency ranges, whose bandwidths would enable lower latencies and higher transmission rates for the transmission and exchange of mobile data.

WRC-19 agenda item 1.13 (WRC-15 Resolution 238) decided to study candidate frequency bands in portion(s) of the frequency range between 24.25 and 86GHz for IMT identification. In order to better understand the situation in the Americas region with respect to this agenda item, a “Questionnaire on Usage and Future Plan of Frequency Bands Under Study in Agenda Item 1.13 of WRC-19, in Americas Region” was proposed, and responses from eight administrations were received and the compilation of the answers were compiled in document (CCP.II- RADIO/doc.4310/17) in the XXIX PCCII meeting (Orlando, Florida).

ISSUES

- To determine the spectrum needs for the terrestrial component of IMT (IMT-2020) in the frequency range between 24.25 GHz and 86 GHz.
- To assess the sharing/compatibility (co- and adjacent-band) of terrestrial IMT-2020 with systems of other services with allocations in each of the bands between 24.25 GHz and 86 GHz listed above.
- Based on these spectrum needs and sharing/compatibility studies, to determine which bands or portions of the bands listed above should be candidates for identification for the terrestrial component of IMT including the bands in which primary allocation to mobile will be required.
- Since some bands indicated for study under AI 1.13 are common to those indicated for a) HAPS under AI 1.14, b) non-GSO under AI 1.6 and c) GSO feeder links under AI 9.1.9, linkages to these items need to be considered including the details in the respective associated Resolutions.

PRELIMINARY VIEWS

BRAZIL

Agenda Item 1.13 is key to the future development of IMT systems for the delivery of IMT-2020 services. The aim of IMT-2020 is to create a more ‘hyper connected’ society by more comprehensively, and intelligently, integrating LTE, Wi-Fi and cellular IoT technologies, together with at least one new IMT-2020 radio interface. This will allow mobile networks to dynamically allocate resources to support the varying needs of a diverse set of connections – ranging from industrial machinery in factories, to automated vehicles as well as smartphones. A central component in the evolution of all mobile technology generations has been the use of increasingly wide frequency bands to support higher speeds and larger amounts of traffic. IMT-2020 is no different, ultra-fast IMT-2020 services will require large amounts of spectrum including above 24 GHz where wide bandwidths are more readily available. Spectrum above 24 GHz is well recognized worldwide as being the key component for the data intensive IMT-2020 services. Without them, IMT-2020 won’t be able to deliver significantly faster data speeds or support projected extensive mobile traffic growth.

With that in mind, we support appropriate sharing and compatibility studies under Agenda Item 1.13 in the bands 24.25-27.5 GHz, 31.8-33.4 GHz, 37-43.5 GHz, 45.5-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz. Such studies should consider that the significant extra capacity of IMT-2020 systems will need to be perfectly integrated with heterogeneous networks, including fibre, satellite and microwave systems, taking into account their specific benefits which are crucial to developing countries.
COLOMBIA

While all bands remain suitable for identification at this stage, Colombia would like to make the following observations regarding the lower portions of the range, from 24.25 GHz to 43.5 GHz:

- Responses received until the previous meeting of CCP.II to the questionnaire show that, except for a few cases, there are either no services licensed in these bands or the services belong to the fixed service category. When they belong to other service categories (such as FSS), most of them occupy a relatively small (500MHz or less) bandwidth with respect to the total range being considered for study (e.g. 3.25 GHz for 24.25GHz – 27.5GHz).

- Other regions initiated discussions on suitable bands among the lists of candidate bands. As an example, Europe ([2], [3]) identified the 24.25 GHz – 27.5 GHz as a “pioneer band”, while other bands up to 43.5 GHz have been positively considered. With the view of seeking not only regional but global frequency harmonization to the possible extent, it is positive to take under consideration activities of other regions.

- The lower portions of the range would provide comparatively more suitable propagation characteristics for deployment compared to the upper portions, considering that some installations could cover outdoor and indoor environments with some Non-Line-of-Sight (NLoS) situations.

Based on the considerations above, Colombia is of the initial view that the lower portions of the frequency range (from 24.25 GHz to 43.5 GHz) provide good opportunities in terms of availability, technical performance and potential for global harmonization. Colombia would like to invite other members to consider this initial view for consideration and collaboration towards a regional (and possibly global) harmonization of the frequency bands.

USA

Support studies under WRC-19 agenda item 1.13 and take appropriate action based on the results of these sharing and compatibility studies in accordance with Resolution 238 in the following bands:

- 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, which have allocations to the mobile service on a primary basis; and
- 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis.

MEXICO

Regional harmonization for this item on the agenda should consider similar approaches in terms of allocations and plans for the radio spectrum, in order to favor cost reduction and encourage the development of a sustainable ecosystem for the deployment of IMT systems.

A public survey is currently being prepared in Mexico to identify the IMT spectrum requirements from 24.25 GHz to 86 GHz. To this end, we plan to study the discussions and documents issued by the different working groups of both the International Telecommunication Union (ITU) and CITEL regarding regional and global spectral requirements for IMT at the frequencies of 24.25 to 86 GHz.
For this reason, we deem it necessary to conduct, in the best terms possible, the planned studies on sharing and compatibility in the bands agreed on through Resolution 238 (WRC-15), i.e., the segments of 24.25-27.5 GHz, 31.8-33.4 GHz, 37-43.5 GHz, 45.5-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, in order for the CITEL administrations to make better, more fully-grounded decisions to achieve regional or global harmonization for the future development of IMT-2020 systems.

REFERENCES.

1. CPM19-1 Decision on the establishment and Terms of Reference of Study Group 5 Task Group 5/1 (TG 5/1) on WRC-19 agenda item 1.13. 
   URL: https://www.itu.int/dms_pub/itu-r/oth/0a/06/R0A0600006D0001MSWE.docx
PRELIMINARY VIEWS ON WRC-19

AGENDA ITEM 1.14

(Items on the Agenda: 3.1 (SGT1))

(Document presented by CITEL Member States)

SGT-1

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Agenda Item Vice-Rapporteur: Vassilios MIMIS – CAN – vmimis@primus.ca
Agenda Item 1.14: to consider, on the basis of ITU-R studies in accordance with Resolution 160 (WRC-15), appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations

BACKGROUND

B

Article 1.66A of the ITU Radio Regulations define a high-altitude platform station (HAPS) as "a station on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth". Agenda Item 1.14 was adopted by WRC-15 to consider, in accordance with Resolution 160 (WRC-15), regulatory actions that can facilitate deployment of HAPS for broadband delivery. Resolution 160 resolves to invite ITU-R to study additional spectrum needs of HAPS, examining the suitability of existing HAPS identifications and conducting sharing and compatibility studies for additional identifications in existing fixed allocations in the 38-39.5 GHz band on a global basis and in 21.4-22 GHz and 24.25-27.5 GHz bands in Region 2 exclusively.

Currently there are 3 spectrum bands identified for HAPS. These are:
- 47.2-47.5 GHz and 47.9-48.2 GHz,
- 27.9-28.2 GHz and 31.0-31.3 GHz,
- 6 440-6 520 MHz (HAPS-ground) and 6 560-6 640 MHz (ground-HAPS).

However, spectrum needs of next-generation HAPS cannot be accommodated within these identifications due to either geographical restrictions or technical limitations which impairs their operation. The global identification for HAPS links (which is in the 47.2-47.5 GHz band fixed-service allocation paired with the 47.9-48.2 GHz band fixed-service allocation) suffers from the effects of rain fade attenuation that severely limit service provision over high-precipitation geographies. The remaining 2 available bands (27.9-28.2 GHz paired with the frequency band 31.0-31.3 GHz, and 6440-6 520 MHz paired with 6 560-6 640 MHz) have been identified by a very limited amount of countries, none of which is within ITU Region 2.

BROADBAND HAPS

Advances in aeronautics and transmission technologies have significantly improved the capabilities of HAPS to provide effective connectivity solutions and meet the growing demand for high capacity broadband networks, particularly in currently underserved areas. Recently conducted full-scale test flights have shown that solar-powered platforms in the upper-atmosphere can now be used to carry payloads that offer connectivity over large areas in a reliable and cost-effective way, and a growing number of applications for the new generation of HAPS are being developed. The technology appears particularly well suited to complementing terrestrial networks by providing backhaul. A number of advantages of the new generation of HAPS are foreseen:

- **Wide-area coverage:** A single plane will be able to serve footprints larger than 100 km in diameter, and recent technological advances in the development of optical inter-HAPS links now allow the deployment of multiple linked HAPS, in fleets that can cover whole nations.
- **Low cost:** The cost of operating solar planes is projected to be significantly lower than other connectivity solutions in many areas, while mass production of the aircraft will significantly lower upfront capital expenditure for deployment.
- **Reach**: HAPS planes will operate at around 20 km above ground, which reduces their vulnerability to weather conditions that may affect service, provides large coverage areas and avoids interference caused by physical obstacles.

- **Rapid deployment and flexibility**: It will be possible to deploy HAPS services without long lead times and it is relatively simple to return solar planes to the ground for maintenance or payload reconfiguration.

- **Geographical reach**: HAPS that use the architecture of solar planes can also provide connectivity where it is impossible to deploy terrestrial infrastructure: remote sites on land or sea.

- **Environmentally friendly**: HAPS can run exclusively on solar power for long periods, connecting people with almost no environmental impact.

**USA**

Demand for high-speed Internet access and broadband applications has risen dramatically since spectrum was first identified globally for HAPS. Meanwhile, technology has improved to the point that some entities are interested in using HAPS systems to provide broadband access to fixed locations in remote and underserved areas. WRC-15 recognized that technology evolution in solar panel efficiency, battery energy density, lightweight composite materials, autonomous avionics, and antenna design may improve HAPS viability. Using these innovative technologies, HAPS systems, deploying a service contour much greater than traditional cellular towers, could enable affordable, high-speed, broadband connectivity where today’s ground network infrastructure has heretofore been unable to reach.

Spectrum harmonization and utilization is facilitated by common worldwide identifications. International regulatory flexibility enable improvements in global connectivity by encouraging national regulators to permit operation of higher-speed Internet access services over new, complementary platforms, while ensuring protection of existing services. Additionally, harmonization of spectrum promotes economies of scale and commonality of equipment.

**PRELIMINARY VIEWS**

**Brazil**

Brazil supports studies in accordance to Resolution **160 (WRC-15)**. Provided that these studies demonstrate sharing and compatibility with existing services and candidate applications are feasible, and future development of existing services is considered, Brazil supports appropriate regulatory actions, including addressing additional spectrum needs for HAPS.

**USA**

In order to facilitate the use of HAPS links on a global or regional level, the United States supports studies, in accordance with Resolution **160 (WRC-15)**, and appropriate WRC-19 action based on the results of these studies, including possible modifications to the existing provisions on HAPS identifications in the Radio Regulations and possible new HAPS identifications in the fixed service bands at 21.4-22 GHz and 24.25-27.5 GHz in Region 2, and 38-39.5 GHz globally.
PRELIMINARY VIEWS FOR WRC-19

AGENDA ITEM 1.15

(Item on the Agenda: 3.1 (SGT-I))

(Document submitted by CITEL Member States)

SGT – 1

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Rapporteur Agenda Item: [name SURNAME] – [COUNTRY] – [email]

Alternate Rapporteur Agenda Item: [name SURNAME] – [COUNTRY] – [email]
**Agenda Item 1.15**: to consider identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with Resolution 767 (WRC-15).

**BACKGROUND**

At present, there are no international allocations for radiocommunications services above 275 GHz in the Radio Regulations (RR’s). However, footnote No. 5.565 does make identifications for radio astronomy, earth exploration-satellite (passive) and space research (passive) services. Recent advances in microwave technology make possible the use of this spectrum by active services for communications and related uses. Consistent with No. 5.565, frequencies for fixed and land mobile use could be utilized above 275 GHz, provided “all practicable steps” are taken to protect passive services.

Report ITU-R RA.2189 “Sharing between the radio astronomy service and active services in the frequency range 275-3 000 GHz” indicates that the radio astronomy service can share with terrestrial systems due to propagation conditions and power limitations of current active services technologies. The space research service (passive) and the Earth exploration-satellite service (passive) may also be able to share frequencies with the active services; however, studies are needed to demonstrate this.

**PRELIMINARY VIEWS**

**USA**

The United States is of the view that it may be possible to develop a similar footnote to that in No. 5.565 for land-mobile and fixed services, identifying bands for terrestrial active service use. To this end, the United States supports studies in the ITU-R on sharing and compatibility between passive and active services as well as spectrum needs for the land-mobile and fixed services for WRC-19 agenda item 1.15 under the terms of Resolution 767 (WRC-15).
PRELIMINARY VIEWS FOR WRC-19

AGENDA ITEM 1.16
(Item on the Agenda: 3.1 (SGT-1))
(Document submitted by CITEL Member States)

SGT-1

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Agenda Item Rapporteur: TBD
Agenda Item Vice-Rapporteur: TBD
Agenda Item 1.16: to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution 239 (WRC-15).

BACKGROUND

RLANs have proven to be a success in providing affordable and ubiquitous broadband access to the Internet. Introduced by some administrations in the 2.4 GHz band and subsequently expanded into some of the 5 GHz frequency bands, RLANs, specifically Wi-Fi devices, now carry approximately half of all global Internet Protocol (IP) traffic. In fact, mobile carriers have increased their reliance on Wi-Fi offload, voice-over-Wi-Fi (VoWiFi), and similar technologies. Wi-Fi in the 5 GHz band and elsewhere has also generated billions of dollars of economic value, as well as innumerable consumer benefits.

Much of this recent growth reflects a significant increase in the use of 5 GHz bands for RLANs, both to alleviate congestion in the 2.4 GHz band and satisfy consumer demand for higher-speed wireless access.

CITEL Recommendation PCC.II/REC. 11(VI-05) recommends the use of the 5 150 – 5 350 MHz, 5 470-5 725 MHz and 5 725-5 825 MHz frequency ranges by WAS including RLANs.

The bands 5 150-5 350 MHz and 5 470-5 725 MHz were made available to the mobile service for the implementation of wireless access systems (WAS) including radio local area networks (RLANs) by WRC-03. Based on studies carried out by the ITU-R, WRC-03 adopted footnote 5.446A and the associated Resolution 229 (Rev. WRC-12) that specifies technical and operational limits on RLANs to ensure compatibility with other services in the same frequency range (e.g., in the band 5 150-5 250 MHz the Resolution restricts WAS/RLAN implementation to indoor use). In addition, the ITU-R adopted several ITU-R Recommendations dealing with the sharing between the mobile service and other services in the 5 GHz frequency range. The frequency band 5 350 to 5 470 MHz was not considered at WRC-03.

In the frequency band 5 350 to 5 470 MHz there are no primary mobile allocations. Earth exploration-satellite service (EESS) (active) allocations in the frequency bands 5 350-5 460 MHz and 5 460-5 470 MHz are essential for Earth-observation programs and the data these provide is vital for reliable and up-to-date information on how our planet and its climate are changing. In addition, the band 5 350-5 460 MHz is also allocated to the aeronautical radionavigation service (ARNS) and the Radiolocation service on a primary basis.

Since 2003, there has been considerable growth in the demand for WAS/RLAN applications with multimedia capabilities; WAS/RLAN also complement licensed commercial mobile networks (i.e., offloading) and fixed wireline networks. As technology evolves to meet increasing performance demands,

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5 Id. at 25.

and traffic on broadband WAS/RLAN increases, the use of wider bandwidth channels in order to support high data rates may create a need for additional spectrum.

WRC-15 examined the possibility of additional global allocations to the mobile service in the frequency bands 5 350-5 470 MHz and 5 725-5 850 MHz to facilitate contiguous spectrum for WAS/RLAN, thereby enabling the use of wider channel bandwidths to support higher data throughput. The compatibility studies performed by ITU-R in preparation for WRC-15 indicated that when assuming the use of WAS/RLAN mitigation measures limited to the regulatory provisions of Resolution 229 (Rev.WRC-12), sharing between WAS/RLAN and the EESS (active) systems in the frequency bands 5 350 to 5 470 MHz would not be feasible, as well as being insufficient to ensure protection of certain radar types in this frequency band. For these cases, sharing may only be feasible if additional WAS/RLAN mitigation measures are implemented. However, no agreement was reached on the applicability of any additional WAS/RLAN mitigation techniques. No studies were also carried out for the frequency band 5 725-5 850 MHz. As such, WRC-15 concluded no change (NoC) for these frequency bands.

Nevertheless, considering that adequate and timely availability of spectrum and supporting regulatory provisions are essential to support future growth of WAS/RLAN applications and that harmonized worldwide bands that support future growth of WAS/RLAN applications are highly desirable in order to achieve the benefits of economies of scale, Resolution 239 (WRC-15) resolves to invite the ITU-R to conduct and complete in time for WRC-19:

a) to study WAS/RLAN technical characteristics and operational requirements in the 5 GHz frequency range;

b) to conduct studies with a view to identify potential WAS/RLAN mitigation techniques to facilitate sharing with incumbent systems in the frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz, while ensuring the protection of incumbent services including their current and planned use;

c) to perform sharing and compatibility studies between WAS/RLAN applications and incumbent services in the frequency band 5 150-5 350 MHz with the possibility of enabling outdoor WAS/RLAN operations including possible associated conditions;

d) to conduct further sharing and compatibility studies between WAS/RLAN applications and incumbent services addressing:

i) whether any additional mitigation techniques in the frequency band 5 350-5 470 MHz beyond those analysed in the studies referred to in recognizing a) would provide coexistence between WAS/RLAN systems and EESS (active) and SRS (active) systems;

ii) whether any mitigation techniques in the frequency band 5 350-5 470 MHz would provide compatibility between WAS/RLAN systems and radio determination systems;

iii) whether the results of studies under points i) and ii) would enable an allocation of the frequency band 5 350-5 470 MHz to the mobile service with a view to accommodating WAS/RLAN use;

e) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 725-5 850 MHz with a view to enabling a mobile service allocation to accommodate WAS/RLAN use;

f) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 850-5 925 MHz with a
view to accommodating WAS/RLAN use under the existing primary mobile service allocation while not imposing any additional constraints on the existing services.

**FIGURE 1**

**Summary of international allocations in the 5 GHz range**

ITU-R WP5A is the responsible working party for this agenda item. The first WP5A meeting for this study cycle was held from May 10-19, 2016 in Geneva, Switzerland. There are seven output documents related to this agenda item attached to the WP5A Chairman’s Report (see Annexes 10-11 and 22-26 of Document 5A/114). Liaison statements were also sent to other groups seeking information for sharing and compatibility studies (see Annex 2 of Document 5A/114).

**ISSUES**

In the different frequency bands within the 5 GHz range in Resolution 239:

- Determination of mitigation techniques to protect incumbent primary services (including their current and planned use) from a possible new allocation to the mobile service or potential relaxation of technical and operational restrictions for WAS/RLAN operating in the mobile service.
- Determination of potential technical and operational restrictions for WAS/RLAN operating in the mobile service to facilitate sharing with systems of incumbent services.
- Modelling of RLAN deployment, technical and operational characteristics (e.g., LTE-U/LAA not considered during WRC-15)
- Addressing linkages between WRC-19 agenda item 1.16 and issue 9.1.5 regarding updating of reference to the 5 GHz ITU-R Recommendation; and take into account any action in the ITU-R ITS (Intelligent Transport Systems) in the 5 GHz range.
• The candidate bands 5 850-5 925 MHz for WAS/RLAN are portions of the unplanned bands allocated to Fixed Satellite Services. In Brazil, the frequency bands 5 850-6 925 MHz are used for uplink of the C band and the use of C band is widespread in Brazil. Studies are necessary with the view to ensure protection of the C band uplink and of all existing services in the candidate bands.

• Some countries in Region 2 authorized RLAN operations that extend beyond current Radio Regulations including:
  - removing the indoor only restriction and increasing the permitted power for the 5 150-5 250 MHz frequency band;
  - modifying compliance measures to protect Terminal Doppler Weather Radar (TDWR) and other radars operating in the 5 250-5 350 MHz and 5 470-5 725 MHz frequency bands from harmful interference;
  - and authorizing RLAN operations in the 5 725-5 850 MHz frequency band.

PRELIMINARY VIEWS

Brazil
The Brazilian Administration supports the necessity for studies to consider possible additional spectrum allocation to be mobile service, including radio local area networks (WAS/RLAN), while ensuring protection of the C band uplink and of all existing services in the candidate bands.

Canada
Canada is of the view that only the specific frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz listed in the resolution of Resolution 239 (WRC-15) are to be considered and/or studied under WRC-19 agenda item 1.16 and not the entire 5 GHz frequency range (5 150-5 925 MHz).
Canada is assessing and may contribute to studies listed under invites ITU-R of Resolution 239 (WRC-15).

Mexico
WAS/RLANs have promoted the development of broadband access and have been deployed license-exempt, pursuant to the provisions of CITEL and ITU-R, in the frequency bands 5150-5250 MHz, 5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz, and 5725-5850 MHz. However, it is considered that a potential additional allocation to the mobile service should be based on evidence of spectrum saturation in existing bands, growth projections, and the non-affectation/degradation of any existing services that might operate in the potential additional spectrum.
AGENDA ITEM 7
PRELIMINARY VIEWS FOR WRC-19

(Item on the Agenda: 3.1 (SGT 3.3))

(Document submitted by the Coordinator)

SGT3 – Satellite services

Co-Coordinator: Brandon MITCHELL – USA

Alternate Coordinator: Juan MASCiotra – ARG

Rapporteur Agenda Item: Michelle CALDEIRA

Alternate Rapporteur Agenda Item: Ángeles GALLEGO – MEX; [Carolina DAZA – COL]
**Agenda item 7:** 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) to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit

**BACKGROUND**
Resolution 86 (Rev. Marrakesh, 2002) requested that the 2003 World Radio Conference (WRC-03) and subsequent Conferences review the regulatory procedures associated with the advance publication of information (API), coordination and notification and recording of satellite network filings. The objective is to simplify the process and provide the BR and administrations with cost savings while maintaining the guiding principles outlined in the Constitution and the Radio Regulations.

WRC-03 identified in Resolution 86 (WRC-03) the scope and the criteria to be used for the implementation of Resolution 86 (Rev. Marrakesh, 2002). WRC-07 amended Resolution 86 (WRC-03) to simplify and eliminate redundant elements. Resolution 86 (Rev.WRC-07) invites future Conferences to consider any proposals which deal with deficiencies and improvements in the relevant procedures of the Radio Regulations for frequency assignments pertaining to space services which have either been identified by the Board and included in the Rules of Procedure or which have been identified by administrations or the Radiocommunication Bureau, as appropriate. Future Conferences should ensure that these procedures and the related appendices of the Radio Regulations reflect the latest technologies.

**ISSUE A - Clarify the concept of bringing into use of frequency assignments for non-GSO satellite systems in the Radio Regulations**

**BACKGROUND**
During WRC-15, there were a lot of discussions with respect to the bringing into use of frequency assignments for non-GSO FSS/MSS systems. However, WRC-15 was not able to conclude on any specific provision in the Radio Regulations. As there are an increasing number of Non-GSO FSS/MSS satellite filings within the ITU, there is a need to specify in the Radio Regulations (RR) the requirements for the bringing into use of frequency assignments to a non-GSO satellite system to be considered completed.

**PRELIMINARY VIEWS [note to secretariat: these Prelim views are from the end of doc 4291 (see strike-outs at the end of this document)**

**CAN**
Canada is of the view that the current seven-year period may not be enough to deploy a “mega” non-GSO constellation. In trying to address this issue, it is important to adopt a balanced approach, taking into account the financial, technological and planning challenges posed by the multiple launches required to deploy this type of constellation but also the need to prevent any abuse that may lead to spectrum reservation. In this context, a milestone approach appears to be an appropriate solution.

**ISSUE B - Application of the coordination arc approach in some portions of the Ka-band for the determination of the coordination requirements between GSO MSS and FSS networks**
BACKGROUND
To be developed

PRELIMINARY VIEWS
To be developed

ISSUE C1 - Alignment of the wording of §8.17 of the Appendix 30B and No. 11.43A of Article 11 dealing with modifications to the characteristics of a recorded assignment

BACKGROUND
To be developed

PRELIMINARY VIEWS
To be developed

ISSUE C2 - Modification to Appendix 30B to explicitly allow the possibility to submit the Appendix 4 data elements for frequency assignments for only one of the following blocks/sub-bands, 10.70-10.95 GHz and 11.2-11.45 GHz

BACKGROUND
To be developed

PRELIMINARY VIEWS
To be developed

ISSUE C3 - Modification to Appendix 30B to prevent an inappropriate use of the existing provisions (§6.13, 6.14, 6.14bis and 6.15) relating to seeking the assistance of the Bureau for requests made under §6.5 (agreement required from administrations with allotments in the plan, assignments in the List or any pending assignments affected) to requests made under §6.6 (agreement required from administrations which territories are included in the service area of an Appendix 30B satellite network)

BACKGROUND
To be developed

PRELIMINARY VIEWS

CAN
Canada is of the view that the only procedure applicable for seeking the assistance of the Bureau in the case of requests for the inclusion of the territory of an administration within the service area of the satellite network is provided in No. 13.1. We also note that an absence of response to correspondences from the Bureau initiated under No. 13.1 for this type of request cannot be considered as an implicit agreement to be included in the service area. In this context, Canada is not convinced of the need to modified Appendix 30B and does not support the modification of §6.10 in article 6 of Appendix 30B.
ISSUE C5 - Modification to Article 11 to instruct the Radiocommunication Bureau to send a reminder to notifying administration before the end of the six-month period provided in No. 11.46 for the resubmission of a notice without a change to the original date of receipt

BACKGROUND
To be developed

PRELIMINARY VIEWS

B, CAN
Canada supports adding to the relevant provision of Article 11 the obligation for the Bureau to send a reminder to notifying administrations before the end of the six-month period provided in No. 11.46 for the resubmission of notice initially returned by the Bureau without a change to its original date of receipt.

ISSUE C6 - Modification to Appendix 30B to allow a simultaneous submission of the Appendix 4 data elements for the purposes of entering the frequency assignments in the List (§6.17) and recording them (§8.1)

BACKGROUND
To be developed

PRELIMINARY VIEWS

B, CAN
Canada supports allowing notifying administrations to submit simultaneously the Appendix 4 data elements for the purposes of entering the frequency assignments in the List (§6.17) and recording these frequency assignments (§8.1).

ISSUE D - Bureau identification and publication of specific satellite networks or systems to be considered when effecting coordination under Nos. 9.12, 9.12A, 9.13, or [9.21], as appropriate

BACKGROUND
To be developed

PRELIMINARY VIEWS

B, CAN
Canada supports extending the current Bureau identification and publication of the satellite networks or systems to be considered when effecting coordination under No. 9.7 and 9.7A to other types of coordination, namely coordination under No. 9.12, 9.12A or 9.13 as appropriate.

ISSUE E - Harmonization of RR Appendix 30B with RR Appendices 30 and 30A

BACKGROUND
To be developed
PRELIMINARY VIEWS

CAN
Canada is of the view that the specifics of the Region 2 Plan for BSS and its associated feeder links should be maintained.

ISSUE F - Concerns with the lack of implementation of certain provisions of the Radio Regulations that can lead to difficulties during the process of entering an assignment into the RR Appendix 30B list

BACKGROUND
To be developed

PRELIMINARY VIEWS
To be developed

ISSUE G - Updating the reference situation for networks under RR Appendices 30 and 30A when provisional recording is used

BACKGROUND
§ 4.1.18 of Appendices 30 and 30A of the Radio Regulations prescribes that in the case of recording of broadcasting-satellite service (BSS) and associated feeder link assignments in the Regions 1 and 3 List with outstanding coordination requirements this recording shall be provisional. The entry shall be changed from provisional to definitive recording in the List if the Bureau is informed that the new assignment in the Regions 1 and 3 List has been in use, together with the assignment which was the basis for the disagreement, for at least four months without any complaint of harmful interference being made. When the provisional recording becomes definitive, the reference situation of the interfered-with network will be updated. This could severely affect the reference situation of the interfered-with network.

In preparations for WRC-15, this issue was brought to the attention of RRB-70 meeting in October 2015 (Document RRB-70/10), requesting that a Rule of Procedure be prepared to outline the desired practice to be followed by the Bureau. RRB-70 however was of the view that such a RoP would consist in a change of the Radio Regulations and therefore was outside the authority of the RRB. WRC-15 decided, then, that “….it was felt that further study of this issue is required if this current practice is to be changed. ITU-R is therefore invited to study this issue under the standing agenda item 7 with the aim of finding an appropriate regulatory and technical solution to this issue.”

Issue G is in response to these activities and to the decision of WRC-15.

The corresponding provisions for the Region 2 BSS and associated feeder link Plans is § 4.2.21A of Appendices 30 and 30A. There are a number of differences in Appendices 30 and 30A for Region 2 as compared to Regions 1 and 3. One significant difference is the existence of a List in Regions 1 and 3; modifications or new assignments become part of a separate List, not part of the Regions 1 and 3 Plan itself. In Region 2, modifications actually become a part of the Plan (and hence enjoy the same status as the Plan) and not a separate List. Similarly, there are notable differences between the application of the procedures § 4.2.21A for the Region 2 BSS and feeder-link Plans and the application of § 4.1.18 for the
Regions 1 and 3 List. For example, for Regions 1 and 3, § 4.1.18 may be applied to List assignments and pending modifications to the List, while in Region 2, § 4.2.21A is applied in a much more limited fashion, solely to terrestrial services or fixed-satellite service (FSS) or unplanned BSS systems serving another Region. As a result, the concerns that led to Issue G in Regions 1 and 3 – concern with degrading a List assignment’s reference situation – do not exist in Region 2, as § 4.2.21A cannot be applied to BSS Plan assignments, modifications to the Plan or pending modifications to the Plan. As a result, the issue is somewhat academic in Region 2 and no change is needed to the Radio Regulations.

**PRELIMINARY VIEWS**

**B, CAN**
Brazil is of the view that the specifics of the Region 2 Plan for BSS and its associated feeder links should be maintained, thus, no modification to § 4.2.21A of Appendices 30 and 30A is needed. There are notable differences between the application of the procedures § 4.2.21A for the Region 2 BSS and feeder-link Plans and the application of § 4.1.18 for the Regions 1 and 3 List. Therefore Issue G should be limited to Regions 1 and 3.

**ISSUE H - Modifications to the Appendix 4 data elements to be provided in filings for non-GSO satellite networks/systems**

**BACKGROUND**
To be developed

**PRELIMINARY VIEWS**
To be developed
PRELIMINARY VIEWS ON WRC-19

AGENDA ITEM 9.1, ISSUE 9.1.1

(Item on the Agenda: 3.1 (SGT-1))

(Document submitted by CITEL Member States)

SGT – 1

Coordinator: Luciana CAMARGOS – B – lcamargos@gsma.com

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Rapporteur Agenda Item: [name SURNAME] – [COUNTRY] – [email]

Alternate Rapporteur Agenda Item: Olmo Ramirez – MEX - olmo.ramirez@ift.org.mx
**Agenda item 9.1, issue 9.1.1:** to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT.

**BACKGROUND**

The frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz (total of 230 MHz) were the very first identified for IMT at WARC-1992. Of these frequency bands, the bands 1 980-2 010 MHz and 2 170-2 200 MHz were also to be used for the satellite component of IMT, in No. 5.388 and under the provisions of Resolution 212 (Rev. WRC-15).

Resolution 212 (Rev. WRC-15) notes that the terrestrial component of IMT (e.g. LTE) has either been deployed or is currently being considered for deployment globally in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz. It further notes that both the terrestrial and satellite IMT have either been deployed or are planned for deployment in the bands 1 980 - 2 010 MHz and 2 170 - 2 200 MHz. In addition, Resolution 212 (Rev. WRC-15) reiterates that the attractiveness of IMT can be improved by making this 60 MHz spectrum available to both the terrestrial and satellite components of IMT.

Resolution 212 (Rev. WRC-15) further notes that it is not feasible to implement the terrestrial and satellite components of IMT on the same frequency and in the same geographical area is not feasible unless techniques such as use of an appropriate guard band or other mitigation techniques are applied to ensure the coexistence and compatibility of the terrestrial and satellite components of IMT. Finally, it invites the ITU-R to study possible technical and operational measures to ensure coexistence and compatibility between MS in one country and MSS in another country.

ITU-R WP 5D is responsible for the studies related to the protection of the terrestrial component of IMT, taking into account the technical and operational characteristics of satellite systems provided by ITU-R WP 4C. Similarly, the ITU-R WP 4C is responsible for the studies related to the protection of the satellite component of IMT, taking into account the technical and operational characteristics of terrestrial IMT systems provided by ITU-R WP 5D. An ITU-R report or recommendation will be prepared based on the studies. CPM text will be jointly developed by these two working parties.

The bands 1 980-2 010 MHz and 2 170-2 200 MHz overlap with parts of existing commercial mobile bands in some countries in the frequency ranges 1 850-1 920 / 1 930-2 000 MHz, 1 710-1 780 / 2 110-2 180 MHz and 2 000-2 020 / 2 180-2 200 MHz (see ITU-R Recommendation M.1036), in which terrestrial IMT systems exist or are expected to be deployed. The band 2 000-2 020 / 2 180-2 200 MHz is also licensed for MSS use in some countries. CITEL PCC.II has conducted a survey entitled “Request for information about the current and planned use of the bands 1 980-2 025 MHz and 2 160-2 200 MHz by the OAS/CITEL administrations for terrestrial and satellite services” in February 2015 (see Decision...
PCC.II/DEC. 173 (XXV-15) in CCP.II-RADIO/doc. 3857/15 rev.1, which may be relevant for the studies under this issue.

Also, CITEL adopted a recommendation on the frequency arrangement for the use of the 1 710-1 780 / 2 110-2 180 MHz band for broadband mobile services, recommending CITEL administrations that plan to use this spectrum do so by adding additional contiguous bandwidth as an expansion of the existing bands in the 1 710-1 770 / 2 110-2 170 MHz or 1 710-1 755 / 2 110-2 155 MHz in some countries (see Decision PCC.II/REC. 43 (XXIII-14) in CCP.II-RADIO/doc.3597 /14 rev.1).

ISSUES

- Determination of appropriate technical and operational measures from the studies being conducted within ITU-R to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) in one country and the satellite component of IMT (in the mobile-satellite service) in another country in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz.

PRELIMINARY VIEWS

Canada

There should not be any impact from the outcome of these studies on the existing use of the frequency bands by the terrestrial component of IMT in 2 170-2 180 MHz (part of the 1 710-1 780 / 2 110-2 180 MHz IMT frequency band) nor on flexible MS/MSS use in 2 000-2 010 & 2 180-2 200 MHz.

Mexico

For the administration of Mexico, it is important to know the outcomes of these studies, since the bands 1710 - 1780/2110 - 2180 MHz and 1850 - 1920/1930 - 2000 MHz are designated for the terrestrial component of IMT in Mexico. The segmentation specified for these bands is based on an FDD scheme in which the 1710-1780 MHz and 1850-1920 MHz segments are used for base-mobile transmission and the 2110-2180 MHz and 1930-2000 MHz segments are used for base-mobile transmission. In addition, Mexico is authorized to exploit the emission and reception rights of signals and frequency bands associated with foreign satellite systems that cover—and can provide services within—its national territory at the 2000-2010/2190-2200 MHz frequency band.

Accordingly, if the 1 980-2 000 MHz and 2 170-2 190 MHz frequency bands were used for the satellite component of IMT in a country with which Mexico shares borders, it would be necessary to set out the technical and operational measures to ensure coexistence and compatibility between the two IMT components.

7 The responses from different Administrations received to-date are available in CCP.II-RADIO/doc. 3988/15 rev.1 (Argentina, Brazil, Canada, Costa Rica, Ecuador, Guatemala, Jamaica, Panama and Nicaragua) and CCP.II-RADIO/doc. 4054/16 (Colombia).
PRELIMINARY VIEWS ON WRC-19

AGENDA ITEM 9.1, ISSUE 9.1.2
(Item on the Agenda: 3.1 (SGT-1))
(Document submitted by CITEL Member States)

SGT – 1

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Alternate Coordinator: José COSTA – CAN - jose.costa@ericsson.com

Rapporteur Agenda Item: [name SURNAME] – [COUNTRY] – [email]

Alternate Rapporteur Agenda Item: [name SURNAME] – [COUNTRY] – [email]
Agenda Item 9.1, Issue 9.1.2:  Compatibility of International Mobile Telecommunications and broadcasting-satellite service (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3.

BACKGROUND

In Region 2, the 1452-1492 MHz frequency band is allocated on a co-primary basis to the Fixed, Mobile, Broadcasting, and Broadcasting-Satellite services. In addition, the 1427-1518 MHz frequency range is identified for International Mobile Telecommunications (IMT) in Region 2 via No. 5.431B while No. 5.343 regarding Aeronautical Mobile Telemetry also applies.

World Radiocommunication Conference 2019 (WRC-19) agenda item 9.1/ issue 9.1.2 addresses the compatibility of IMT and Broadcasting-Satellite service (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3. Region 2 should not be impacted by, or subject to any regulatory changes, as a result of WRC-19 agenda item 9.1/issue 9.1.2.

PRELIMINARY VIEWS

Canada, USA and Uruguay
Studies under WRC-19 agenda item 9.1/ issue 9.1.2 are limited to Regions 1 and 3. Any eventual changes to the Radio Regulations under WRC-19 agenda item 9.1/issue 9.1.2 must not impact Region 2 services (and applications thereof) nor subject Region 2 to any changed procedural or regulatory provisions.
AGENDA ITEM 9.1, ISSUE 9.1.3

PRELIMINARY VIEWS FOR WRC-19

(Item on the Agenda: 3.1 (SGT-3))

(Document submitted by the Coordinator)

SGT-3 – Satellite services

Coordinator: Brandon MITCHELL – USA

Alternate Coordinator: Juan MASCIOTRA - ARG

Rapporteur Agenda Item: [Hugo Mario TRIVIÑO] – COL ; [Manoel ALMEIDA] - BR

Alternate Rapporteur Agenda Item: Marcella OST - CAN
Agenda Item 9.1, Issue 9.1.3 Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service

BACKGROUND

The Report of the Director of the Radiocommunication Bureau to WRC-15 acknowledged that there may be a need for “reviewing or confirming” assumptions that led to the development of the power limits found in Article 21 and Article 22, taking into account the characteristics of non-GSO systems recently submitted to the ITU-R. Moreover, given the growing interest in deploying non-GSO FSS systems, the Report of the Director of the BR noted that there is a need to ensure that all existing services are adequately protected.

As a result, WRC-15 adopted Resolution 157 (WRC-15), which discusses how facilitating the deployment of new types of non-GSO systems has the potential to augment the capacity, spectrum efficiency and benefits derived from GSO and non-GSO systems operating in the bands 3 700-4 200 MHz (space-to-Earth), 4 500-4 800 MHz (space-to-Earth), 5 925-6 425 MHz (Earth-to-space), 6 725-7 025 MHz (Earth-to-space).

There are approximately 170 GSO satellites currently operating in the 3700-4200 MHz band and 229 allotments in the 4500-4800 MHz band, both of which are globally allocated to provide C-Band FSS downlinks. Many highly sensitive and public services use the FSS C-band, such as satellite telemetry, disaster relief, public meteorological data distribution, and aeronautical applications in various regions. A number of next-generation NGSO systems are being developed that can provide high-capacity, low-latency communications to end users in all locations around the world, thus allowing those living and working in rural and remote areas to access the same level of connectivity as those living in more densely populated urban areas.

Resolution 157 (WRC-15) also contains a list of technical and operational issues (e.g. Article 21 and 22) to be studied for the bands identified above; requests the development of new regulatory provisions for the protection of terrestrial services in the band 4 500-4 800 MHz and non-GSO MSS feeder links receiving stations in the band 6 700-7 075 MHz; and the clarification of some existing regulatory provisions (e.g. 5.440A and 5.457C).

Article 21 and Article 22 of the Radio Regulations contain provisions to ensure compatibility of non-GSO FSS operations with terrestrial stations and GSO networks, respectively. Among these provisions, Article 21 contain power flux-density (pfd) limits to protect terrestrial stations and Article 22 contain equivalent power flux-density (epfd↓) limits in the frequency band 3 700-4 200 MHz (space-to-Earth) and epfd↑ limits in the frequency band 5 925-6 725 MHz (Earth-to-space) to protect GSO networks from unacceptable interference pursuant to RR No. 22.2.

The development of current regulatory provisions for sharing between non-GSO FSS operations with GSO networks in the 6/4 GHz bands was based on using highly-elliptical orbits (HEO). Based on the unique orbital configuration of the HEO systems, Article 22 epfd limits are more stringent than epfd limits in other FSS bands where non-GSO using circular orbits was taken into account. WRC-19 issue 9.1.3 calls for reviewing Article 21 power flux-density (pfd) limits and Article 22 equivalent power flux-density (epfd↓) limits applicable to non-GSO systems operating in the 3 700-4 200 MHz, 4 500-4 800 MHz bands.
MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands taking into account the characteristics of potential new non-GSO FSS operations, with the view to ensure protection of all existing services, since non-GSO FSS systems are obligated by No. 22.2 of the Radio Regulations not to cause unacceptable interference to or claim protection from GSO FSS networks. Resolution 157 (WRC-15) calls to study technical and operational issues and regulatory provisions for these non-GSO FSS operations.

ISSUES

Under the current regulatory framework, the use of the bands 3 700-4 200 MHz and 5 925-6 425 MHz by non-GSO FSS systems is allowed subject to regulatory measures such as Article 22 EPFD limits and Article 21 PFD limits developed to protect GSO FSS systems and terrestrial services, respectively, from a specific type of non-GSO FSS systems (HEO systems). These measures may not be suitable for other types of non-GSO FSS systems, noting further resolves 1 which states that the results of studies shall in no way change the protection criteria and protection levels defined in those criteria for the GSO FSS, the fixed service and the mobile service.

- Under the current regulatory framework, the use of the bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space) by the fixed satellite service shall be in accordance with the provisions of Appendix 30B, which is limited to the geostationary-satellite of the fixed-satellite service as per No. 5.441.

- Under the current regulatory framework, the protection of the non-GSO MSS feeder link receiving earth station in the band 6 700-7 075 MHz is ensured through the application of coordination procedures under No. 9.17A (see also Table 9a in Appendix 7). As already indicated above, the use of the band 6 725-7 025 MHz by non-GSO FSS in the earth-to-space direction is not allowed as per No. 5.441.

Traditionally, the C-band has had limited opportunities for sharing between non-GSO FSS operations with GSO networks, given the wider antenna beams and poorer off-axis discrimination. However, it is important to emphasize that the use of 3 700-4 200 MHz ("C band") is widespread in Brazil due to its climate characteristics, associated with its continental dimensions and the lack of telecommunications infrastructure in several parts of the Country. In these bands, uplink signals are operating in thousands of land stations associated with networks that provide crucial services for public institutions (public law enforcement and security, natural disasters, social programs for distance learning, electronic government services, etc.) which bring benefits to millions of citizens. These bands are also used by operators of commercial public networks (DTH, Internet, VOIP, backhaul of mobile telephony) with millions of private users.

It will be important to conduct the necessary studies including the development of the epfd mask for the potential new non-GSO FSS operations to determine the sharing potential between non-GSO FSS operations with GSO networks as well as, other incumbents in this band while ensuring the protection of existing services in this band.
PRELIMINARY VIEW

CAN
Canada supports the studies under Resolution 157 (WRC-15) for new non-GSO FSS satellite systems. Any modification to Article 22 for the inclusion of epfd limits for non-GSO FSS systems in the bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space) to protect the geostationary FSS allotments in the Plan and the assignments in the Appendix 30B List can only be considered in conjunction with modifications to Article 5, including No. 5.441 to authorize use of these bands by non-GSO FSS systems. This footnote specifies that the use of the bands by the FSS shall be in accordance with Appendix 30B, which is limited to the geostationary-satellite of the fixed-satellite service. This is not the case in the bands 3 700-4 200 MHz and 5 925-6 425 MHz where non-GSO FSS are currently allowed without any restrictions in Article 5.

Similarly, the adoption of regulatory measures to protect terrestrial services in the band 4 500-4 800 MHz (space-to-Earth) can only be considered in conjunction with modifications to No. 5.441.

Canada also notes that under the current regulatory framework, the protection of the non-GSO MSS feeder link receiving earth station from non-GSO FSS transmitting earth station in the band 6 700 -6 725 MHz and 7 025-7 075 MHz is ensured through the application of coordination procedures under No. 9.17A (see also Table 9a in Appendix 7). An extension of these coordination procedures to the band 6 725-7 025 MHz can only be achieved through modifications to No. 5.441 referred to above.

B
The Brazilian Administration is of the view that studies are necessary to ensure that the protection of GSO networks would not be reduced beyond that currently afforded by Article 22 epfd limits.

USA
The United States supports the study of a regulatory framework, under the terms of Resolution 157 (WRC-15), to enable circular-orbit non-GSO FSS satellite systems to operate in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands, while ensuring the protection of existing services and applications, and to take appropriate action based on the results of these studies.
AGENDA ITEM 9.1, ISSUE 9.1.4
PRELIMINARY VIEWS FOR WRC-19
(Item on the Agenda: 3.1)
(Document submitted by the Coordinator)

SGT2A – Radiolocation, Amateurs, Maritime & Aeronautical

Coordinator: Michael Razi (CAN)

Alternate Coordinator: Thomas vonDeak (USA)

Rapporteur Agenda Item: Sandra Wright (USA)

Alternate Rapporteur Agenda Item:
Agenda Item 9: to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

Agenda Item 9.1: on the activities of the Radiocommunication Sector since WRC-15.

Note: The subdivision of Agenda Item 9.1 into issues, such as 9.1.1, 9.1.2, etc., was made at the first session of the Conference Preparatory Meeting for WRC-19 (CPM19-1) and is summarized in the BR Administrative Circular CA/226, 23rd December 2015.

Agenda Item 9.1.4: to determine spectrum requirements for sub-orbital vehicles (space planes) and, based on the outcome of those studies, to consider a possible future agenda item for WRC-23

BACKGROUND

Advances in propulsion technology and rocket power has facilitated the design of vehicles which may reach altitudes greater than 100 km, also known as sub-orbital flight, and then return to earth without reaching orbit or deep space. A sub-orbital vehicle may be used for the purposes of commercial space flight, scientific research, point to point travel, cargo transportation, or Earth observation.

Commercial space flight has become a reality with a number of companies promising the chance to experience space flight. These vehicles are currently in their test and development phase. In order to ensure the seamless development and transition to operational use of such vehicles, all of the regulatory issues, including the Radio Regulation provisions, need to be addressed. This agenda item will determine if sub-orbital vehicles (space planes) can be accommodated within existing radiocommunication services and allocations, or if it is necessary that a future WRC define new radiocommunication services and decide on appropriate spectrum allocations to accommodate these vehicles.

Figure 1 shows the approximate distances of the atmospheric layers: the troposphere, stratosphere, and mesosphere. For the purpose of this discussion, the boundary between the Earth’s atmosphere and space is assumed to be 100 kilometers above the Earth’s surface.

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8 The boundary between the Earth’s atmosphere and space is sometimes hypothetically assumed to be 100 kilometers above the Earth’s surface, often referred to as the Karman line.
Figure 1

Figure 2
Figure 2 shows a sub-orbital vehicle (space plane) in flight below and above the boundary between space and the Earth’s atmosphere.

Resolution 763 (WRC-15) identifies a number of challenges that have to be addressed regarding the spectrum requirements of stations on board sub-orbital vehicles. The ITU Radiocommunication Sector is presently engaged in studying the current and future radio equipage on board sub-orbital vehicles. Studies will be required to identify any required technical and operational measures that could assist in avoiding harmful interference between radiocommunication systems and determine spectrum requirements to consider a possible future agenda item for WRC-23. These studies have been directed to be completed during the WRC-19 study cycle.

[Some initial issues that have been identified regarding spectrum access for sub-orbital vehicles include:

- Is there a requirement for a new radiocommunication system definition for sub-orbital planes?
- Can space planes use existing aeronautical and/or satellite spectrum for their operations?
- If not, is there a need for a future agenda item to identify spectrum for this application?
- The determination of spectrum requirements should take into account considering f) of Resolution 763 (WRC-15).]

**DISCUSSION**

[As a first step, it is necessary to address the question of what radiocommunication services are appropriate for stations on-board a sub-orbital vehicle (space plane). During Phase A of flight, the sub-orbital vehicle (space plane) is considered a terrestrial station and therefore could operate radiocommunication stations in terrestrial services. During Phase B of flight, the sub orbital vehicle (space plane) is operating beyond the boundary between the Earth’s atmosphere and space.]
Article 1 of the Radio Regulations sets out the terms and definitions used within the Radio Regulations. Below are questions and answers according to the interpretation of ITU RR Article 1.

*Is a sub-orbital vehicle (space plane) a satellite?*  No, a sub-orbital vehicle (space plane) is not a body which revolves around another body of preponderant mass and which has a motion primarily and permanently by the force of attraction of that other body (RR No. 1.179).

*Is a sub-orbital vehicle (space plane) a spacecraft?*  Yes, it is a man-made vehicle which is intended to go beyond the major portion of the Earth’s atmosphere (RR No. 1.178).

*Is a radiocommunication station operating on sub-orbital vehicle (space plane) a space station?*  Yes, it is a space station because it is located on an object which is beyond, is intended to go beyond, or has been beyond, the major portion of the Earth’s atmosphere (RR No. 1.64).

*Is this radiocommunication considered space radiocommunication?*  Yes, it is considered space radiocommunication because it is any radiocommunication involving the use of one or more space stations or the use of one or more reflecting satellites or other objects in space (RR No. 1.8).

*Is this radiocommunication considered radio astronomy?*  No, radio astronomy is based on the reception of radio waves of cosmic origin (RR No. 1.13).

**Figure 3**

![Diagram](image)

At low altitudes (Phase A in Figure 2), sub-orbital vehicles (space planes) are similar to any other aircraft and therefore their radiocommunication stations would be considered an aircraft station or aircraft earth
station within the scope of terrestrial stations. Aeronautical services within the mobile service and mobile satellite service would continue to be appropriate for this operation (shown in green in Figure 3).

Once sub-orbital vehicles (space planes) reach altitudes beyond the majority of the Earth’s atmosphere (more than 100 km) they would then be regarded as spacecraft and their radiocommunication stations would be considered a space station since they do not fit the definition of a satellite. As a result, the space station radiocommunication would be regarded as space communication (shown in red in Figure 3).

Does the radiocommunication, beyond the majority of the Earth’s atmosphere, fall within the definition of space operation service? Yes, it is a radiocommunication service concerned exclusively with the operation of spacecraft, in particular space tracking, space telemetry and space telecommand (RR No. 1.23).

Does the radiocommunication, beyond the majority of the Earth’s atmosphere, fall within the definition of space research service? No, the radiocommunication is not used for scientific or technological research purposes (RR No. 1.55).

Given the existing definitions in Article 1 of the Radio Regulations, there seems to be no need for new definitions either for services or stations for sub-orbital vehicles. These vehicles can be accommodated within existing definitions.]

**PRELIMINARY VIEW**

**Canada, USA**

1. To support studies called for by Resolution 763 (WRC-15), noting that those studies need to be completed during this study cycle.
2. Based on the outcome of those studies, consider a possible future agenda item for WRC-23.

**Canada**

Canada is of the view that existing station and service definitions in Article 1 of the Radio Regulations can be applied to sub-orbital vehicles (space planes).
PRELIMINARY VIEWS ON WRC-19

AGENDA ITEM 9.1, ISSUE 9.1.8
(Visit the Agenda: 3.1 (SGT-1))
(Document submitted by CITEL Member States)

SGT-1

Coordinator: Luciana CAMARGOS – B – lcamargos@gsma.com

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Agenda Item Rapporteur: Sergio Marquez – MEX - sergio.marquez@ift.org.mx

Agenda Item Vice-Rapporteur: [Jayne STANCAVAGE] – USA – [jayne.stancavage@intel.com]
**Agenda item 9.1, issue 9.1.8:** Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.

**BACKGROUND**

In the annex of Resolution 958 (WRC-15), focused on the urgent studies required in preparation for the WRC-19, there is the issue 9.1.8, related to the needs of spectrum by machine type communications (MTC), as follows:

3) Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.

Regarding ITU-R labor, at its 24th meeting, the Working Group 5D (WG5D) decided to create the “USAGE” Sub-Working Group to undertake, among other duties, work on issue 9.1.8 of Agenda Item 9.1 of the World Radiocommunication Conference 2019 (WRC-19).

During the work of WG5D, a preliminary draft was developed in this regard for the Report of the Preparatory Meeting for WRC-19. It did not progress as much as expected, because discussions focused on the responsibility of each Working Group and Sub-Working Group for the issue within WG5D.

Due to the above, a proposal signed by several Administrations, including Mexico, was introduced within the framework of the 27th Meeting of WG5D, one of whose purposes was to organize the work in such a way that the “USAGE” Sub-Working Group could continue with the efforts needed to complete the Proposed Draft in a timely manner for the Report of the Preparatory Meeting for WRC-19.

It is important to mention that it is vitally important to continue the studies on Machine-Type Communications including Internet of Things (IoT) for both narrowband and broadband, as use of this type of device is expected to grow exponentially within a short time.

**PRELIMINARY VIEWS**

**Brazil and Mexico**

Some CITEL administrations have analyzed the current and future spectrum use for MTC and IoT, also, are taking in to account the importance to know the development and eventual findings of the studies related to issue 9.1.8 of Agenda Item 9.1 of the WRC-19.

Accordingly, MTC and IoT applications and devices can be used effectively with all the benefits of the existent mobile broadband bands and the new frequency bands being studied for IMT. This approach avoids the necessity of establishing dedicated spectrum exclusively for MTC and IoT applications on identified IMT bands.
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CONSULTATIVE COMMITTEE II:
RADIOCOMMUNICATIONS
June 26 to 29, 2017
Orlando, Florida, United States of America

WRC-19 PRELIMINARY VIEW

AGENDA ITEM 9.1, ISSUE 9.1.9
(Items on the Agenda: 3.1 (SGT3))
(Document submitted by the Coordinator)

SGT-3 – Satellite services

Coordinator: Brandon MITCHELL – USA
Alternate Coordinator: Juan MASCOTTRA – ARG

Rapporteur Agenda Item:
Alternate Rapporteur Agenda Item:
**Agenda Item 9.1, Issue 9.1.9**  
*Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space), in accordance with Resolution 162 (WRC-15)*

**BACKGROUND:** Resolution 162 (WRC-15) states that “satellite systems are increasingly being used to deliver broadband services and can help enable universal broadband access...and that technological developments such as spot-beam technologies and frequency reuse are used by the fixed satellite service in spectrum above 30 GHz to increase the efficient use of spectrum.” Next generation high throughput satellites (HTS) GSO and non-GSO satellite networks both plan to utilize these technologies to deliver high-capacity broadband services.

Currently, 1 GHz of existing FSS uplink allocation at 42.5-43.5 GHz is not practicable for broadband FSS networks to use assuming they operate downlinks in the immediately adjacent space-to-Earth FSS frequency allocation below 42.5 GHz. Such adjacent band use is not viable due to prohibitive cost and technical obstacles. This leaves an imbalance of spectrum available for broadband applications between downlink and uplink FSS spectrum in the 50/40 GHz frequency ranges with 5 GHz of spectrum currently allocated to FSS in the space-to-Earth direction, but only 4 GHz of usable spectrum allocated to FSS in the Earth-to-space direction.

Access to an adequate amount of uplink and downlink spectrum would facilitate the opportunity for next generation FSS networks to provide broadband communication services and connectivity to users worldwide. To address the issue, WRC-15 established WRC-19 Agenda Item 9.1, Issue 9.1.9 to study the spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space), in accordance with Resolution 162 (WRC-15). **Resolves to invite ITU-R 1 of Resolution 162 (WRC-15) states: "to conduct, and complete in time for WRC-19, studies considering additional spectrum needs for development of the fixed-satellite service, taking into account the frequency bands currently allocated to the fixed-satellite service, the technical conditions of their use, and the possibility of optimizing the use of these frequency bands with a view to increasing spectrum efficiency."** It should be also noted **resolves to invite ITU-R 2 of Resolution 162 (WRC-15) states: “subject to justification resulting from studies conducted under resolves to invite ITU-R 1, sharing and compatibility studies with existing services, on a primary and secondary basis, including in adjacent bands as appropriate, to determine the suitability, including protection of fixed and mobile services, of new primary allocations to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS feeder links for geostationary orbit use, and the possible associated regulatory actions.”** Studies related to resolves 2 of Resolution 162 (WRC-15) should take into account the FSS GSO spectrum needs as appropriate. It is important to note that since WRC-19 AI 9.1.9 is seeking an allocation limited to GSO feeder links, there will still be an imbalance of spectrum available for non-GSO satellite networks.

Thus, the review of the spectrum needs for the FSS under **Resolves to invite ITU-R 1 of Resolution 162 (WRC-15) should consider all aspects of FSS operations. Next generation GSO and non-GSO FSS satellite networks can leverage innovative new satellite and earth station technologies to provide a wide range of advanced communications services for residential, commercial, institutional, and large-scale professional users worldwide. These satellite networks plan to provide data rates from 100 bps to greater than 1 Gbps on a single channel, while achieving highly efficient use of the spectrum and orbit resources. Adequate balanced uplink and downlink spectrum for GSO and non-GSO FSS networks utilizing these state-of-the-art technologies will be crucial to enable provision of much needed broadband services and other communications services via satellite simultaneously to all users, regardless of location.**
PRELIMINARY VIEW:

USA
The United States supports the study of all aspects of spectrum needs for the development of the fixed-satellite service under Resolves 1 of Resolution 162. The United States further supports the study as appropriate of possible primary allocation to the FSS of the frequency band 51.4-52.4 GHz (Earth-to-space), limited to GSO FSS feeder links, under the terms of Resolution 162 (WRC-15) to ensure compatibility with existing services, including adjacent bands as appropriate. Such studies should determine the suitability, including protection of fixed and mobile services, of a new primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space), limited to FSS feeder links for geostationary orbit use, and the possible associated regulatory actions based on the results of these studies.