
PLENARY MEETING

**Addendum 15 to
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Member States of the Inter-American Telecommunication Commission (CITEL)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 10

{Temporary information note to be deleted before the submission via CPI of this document to the WRC-19 Secretariat: In accordance with Resolution 804 (Rev. WRC-12), Administrations are invited to use the template provided in Annex 2 to that Resolution (TIES-protected) when proposing agenda items for WRCs. This template may be filled out for each of the proposed WRC agenda item and annexed to this document.}

10 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention.

INTRODUCTION:

A new Agenda item for WRC-23 is proposed under WRC-19 agenda item 10 to conduct studies identifying which frequency bands between 1.6 and 5 GHz may feasibly accommodate additional MSS allocations, to encourage and facilitate the use and development of Information-of-Things (IoT) and Machine-2-Machine (M2M) technology via satellite.

BACKGROUND:

At WRC-07, Resolution 231 was passed to study *additional allocations to the mobile-satellite service with particular focus on the bands between 4 GHz and 16 GHz* given the findings of ITU-R M.2077. Despite the shortcoming of nearly 300 MHz in required spectrum for the Mobile-Satellite Service (MSS), the outcome of WRC-2012 was that of no change. Since 2011, the demand for connecting devices and machines has grown substantially. The introduction of IPv6 alone demonstrates the requirement to connect devices as well as the increasing magnitude of nodes distributed around the world.

Historically, satellites have contributed heavily to global network access both through GSO and non-GSO systems alike. Whether provided under an MSS or EESS type application, society has benefited from the actionable information that IoT and M2M networks have provided. The satellite component of such systems contribute heavily towards facilitating the movement of data where terrestrial systems are unable to, and form an important part of ensuring that the movement of such data is not impaired by the vast geography that is currently not covered by terrestrial networks.

Due to the nature of MSS and how systems have historically been developed, sharing spectrum efficiently has been difficult between incumbent and new MSS systems. Additional complexity is added where such systems operate an Ancillary Terrestrial Component (ATC) to complement the satellite service. The aforementioned, existing coordination agreements, as well as geographical constraints have led to heavy band segmentation in the existing global MSS bands below 2.5 GHz.

Studying the frequency ranges that would facilitate the rapid deployment of MSS networks over the next few years suggest that not all bands are equal. When optimizing for throughput, power consumption and formfactor, the 1.5 – 4 GHz range provide an optimum range for facilitating the deployment of novel IoT and M2M MSS systems. Lower frequencies would require larger antennae, while higher frequencies would require more power and have more directional beams – neither scenario is optimal when attempting to develop a direct-to-sat IoT/M2M network in the MSS.

Operators have recently become more interested in using the MSS bands for the deployment of IoT/M2M networks via satellite. Some of these filings relate to systems that use a satellite architecture known as *cube satellites*. Such networks can be built and deployed rapidly, at a lower cost relative to historic developments, and may not be reliant on bent-pipe architecture. As a result, new allocations may facilitate sharing amongst several novel operators by means other than band segmentation.

Due to their form factor, such satellites are limited in power and have a relatively small area that may be allocated to antennas. In order to match typical performance requirements within the designated form factor, specifically the required gain and beam width, suitable frequency bands should be found to facilitate the deployment of novel IoT/M2M services via satellite.

Beyond 2.5 GHz, there exists no generally provisioned global MSS allocated spectrum within the target frequency range of up to 5 GHz. As noted previously, the allocated MSS spectrum below 2.5 GHz suffers from overcrowding by MSS systems. There is a need for an additional globally harmonized MSS allocation, to facilitate a standardized and ubiquitous rollout of satellite IoT/M2M networks.

Currently 2 x 121.5 MHz of spectrum is allocated to the MSS in the frequency range 1-3 GHz but only about 2 x 86.5 MHz are available on a global basis. Existing mobile earth stations (MESs) operating in the frequency range 1-3 GHz that provide low data rates between about 64 kbit/s and 500 kbit/s have to make use of directional antennas between about 15 cm and 80 cm in diameter. These services are available to ships, aircraft and land vehicles. For this type of terminal, the use of higher frequency bands (including those above 5 GHz) would be feasible, while keeping the size of terminals and other physical characteristics similar. With the use of similar-sized flat panel antennas and regulation surrounding ESIM, it would be possible to achieve similar data rates using spectrum in the 10 – 15 GHz range, and possibly higher, where sufficient power is available for both the earth and space stations. Over time, a migration of some classes of MES currently operating in the 1-3 GHz range to higher bands would create some additional capacity in the 1-3 GHz range to accommodate the predicted growth in smaller/handheld type devices which are more difficult to accommodate in higher frequency bands. In order to reach small terminals, MSS requires relatively high PFD levels and regulatory measures need to be developed to ensure the possibility of coordinating the use of such PFD levels.

A focused ITU-lead review of which bands could feasibly accommodate additional MSS allocations, would deliver regulatory efficiency and clarity. Considering the evolving satellite landscape and the potential benefits to allowing MSS in more frequency bands, the ITU should conduct studies to decide which bands could feasibly carry additional MSS capability, and further, what kind of regulatory mechanisms should be employed to protect existing services and prevent band segmentation as the de-facto sharing mechanism.

ADD IAP/6447A24A15/1

DRAFT NEW RESOLUTION [IAP10/(O) -2023] (WRC-19)

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

...

10.[MSS] to consider appropriate regulatory actions for additional allocations to, and sharing of, the mobile-satellite service for IoT and M2M applications on the basis of ITU-R studies for spectrum requirements, sharing, and compatibility with existing services in the range [1.5 GHz and 5 GHz], in accordance with Resolution **[IAP/10(O)/MSS-GSO-NGSO] (WRC-19)**;

Reasons: Systems proposing to use rapidly deployed satellites are being hindered due to frequency crowding and a lack of available spectrum for emerging systems, especially in relation to initiating global IoT/M2M services.

ADD IAP/6447A24A15/2

DRAFT NEW RESOLUTION [IAP/10(O)/MSS-GSO-NGSO] (WRC-19)

Potential Allocations to the Mobile-Satellite Service and Between 1.6 GHz And 5 GHz and Potential Sharing Between GSO and non-GSO in Existing Mobile-Satellite Service Frequency Bands Between 1.5 GHz And 2.7 GHz

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

- a) that a preliminary assessment of the spectrum requirements would suggest a pairing of 15 MHz in uplink and downlink may suffice for the applications of Internet of Things (IoT) and Machine to Machine (M2M) in the MSS,
- b) that many MSS bands already allocated above 2.5 GHz are outside of the inherent size, weight, and power restrictions of small satellites (usually having a mass of less than 100 kg) and the majority of small satellites utilize frequency bands ranging from 100 MHz to 15 GHz
- c) that examples of such satellites are given in Report ITU-R SA.2312, which provides technical characteristics
- d) that, since the number of these satellites is growing, the demand for suitable MSS allocations may increase
- e) that satellite operations are hampered and limited by increasing spectrum crowding,
- f) that data collection satellites, amongst others, provide information for the promotion of human welfare,
- g) that earth and space stations used within the application of IoT/M2M networks may use a combination of low power and intermittent transmissions to reduce interference and spectrum requirements

noting

- a) the need for studies to allow sharing of certain MSS spectrum between non-GSO and GSO to facilitate global services by non-GSO networks both within and outside the view of GSO systems.
- b) the possible difficulty of small satellites to provide MSS at frequencies above 5 GHz due to the physical limitations of the satellite.

recognizing

- a) the benefit that small satellites provide with regards to the pace of system deployment, ability to rapidly iterate on in-service technology, and typical ability to deorbit post mission life without the need for propulsion,
- b) that there is existing commercial interest for utilizing small satellites for MSS IoT & M2M deployments,
- c) the need for regulatory certainty regarding the available spectrum for both satellite and earth station design and planning purposes;
- d) the need to protect existing services when considering frequency bands for possible allocations to any service;
- e) that some of the frequency bands listed in Resolves b) are identified for IMT in accordance with Nos.5.429D, 5.430A, 5.431B, 5.441A and 5.441B;

resolves to invite ITU-R

- a) to conduct studies on spectrum requirements and system characteristics of applications envisaged in the MSS;
- b) to consider possible new allocations to the MSS in the ranges 1675 – 1710, 3300 – 3450, 4200-4940 MHz, based on the result of sharing and compatibility studies, while ensuring the protection of existing services;

further resolves

to invite WRC-23 to consider, on the basis of the studies conducted under the *resolves to invite ITU-R* above, appropriate regulatory actions

invites administrations

to participate in the studies by submitting contributions to ITU-R.

Reasons: To conduct studies identifying which frequency bands between 1.5 and 5 GHz may accommodate additional MSS allocations to encourage and facilitate the use and development of IoT/M2m technology via satellite.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR WRC-23

Subject: Proposed Future WRC Agenda Item for WRC-2023 to consider the results of studies on identifying which bands between 1.5 and 5 GHz may accommodate MSS allocations to encourage and facilitate the use and development of IoT/M2m technology via satellite.

Origin: the CITEL Member States

Proposal: To consider the spectrum requirements and potential new MSS allocations, or sharing methods, to support the use of IoT/M2M technology via satellite in the frequency bands 1.5 and 5 GHz

Background/reason:

Systems proposing to use rapidly deployed satellites are being hindered due to frequency crowding and a lack of available spectrum for emerging systems, especially in relation to initiating global IoT/M2M services.

Radiocommunication services concerned:

Mobile Satellite Service

Indication of possible difficulties:

WRC-12 resulted in no-change for a subset of the spectrum range in question.

Previous/ongoing studies on the issue:

Studies to be carried out by:	with the participation of:
TBD	SG4, SG5, SG7

ITU-R Study Groups concerned: SG4, SG5, SG7

ITU resource implications, including financial implications (refer to CV126): minimal

Common regional proposal: Yes/No

Multicountry proposal: Yes/No

Number of countries:

Remarks

