

Update on NGSO related WRC-23 AIs 1.16 and 1.17

IAFI 4th National Preparatory Workshop for WRC- 23

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Telesat Lightspeed Updates

- ▲ Nelco and Telesat have successfully conducted their first in-orbit demonstration of high-speed broadband connectivity in India with Telesat's Phase 1 Low Earth Orbit (LEO) satellite
 - test was conducted in April 2022 at Nelco's Mahape teleport with a 85-cm Intellian parabolic antenna
 - over 50 representatives from various companies and government departments participated in the live testing and proof-of-concept demonstration, witnessing high-speed, fibre-like performance with 35 millisecond roundtrip latency
 - a wide range of cloud-based applications were demonstrated including real-time video conferencing over Microsoft Teams, as well as YouTube and Live TV video streaming
- ▲ The Telesat Lightspeed satellites incorporate next-generation technologies, including data processing in space, advanced phased array antennas, reconfigurable beams and optical inter-satellite links for a fully interconnected global mesh network in space
 - -acting as a virtual fibre network, Telesat Lightspeed will deliver hundreds of Mbps to a terminal, and multiple Gbps to a community



WRC-23 Agenda Item 1.16:

Enabling Ka-band NGSO Earth Station In Motion (ESIM)

WRC-23 AI 1.16 – NGSO ESIM in Ka-Band

▲ "... to facilitate the use of the frequency bands

17.7 – 18.6 GHz and 18.8 – 19.3 GHz and 19.7 – 20.2 GHz (space-to-Earth)

27.5 – 29.1 GHz and 29.5 – 30 GHz (Earth-to-space)

by NGSO FSS ESIM, while ensuring due protection of existing services in those bands..." –

Resolution 173 (WRC-19)

- ▲ Technical and regulatory provisions for the operation of ESIM under this Agenda Item are limited to aeronautical and maritime ESIM
- ▲ Allowing NGSO ESIM in Ka-band will provide a much required harmonized international framework also to protect existing services
- ▲ At the May 2022's meeting of WP 4A the membership agreed that only the notifying administration of the NGSO satellite system is responsible for the operation of ESIM
 - Further discussion required on the interference management issues (e.g. detection of interference, identification of source, etc.) in the subsequent WP 4A meeting
- ▲ A compilation of the Preliminary Draft New Resolution was developed based on the input documents

Protection of Terrestrial Services – AI 1.16

- ▲ Sharing studies in the frequency bands under consideration submitted so far in WP4A are confirming that the same conditions as for GSO ESIM would also protect terrestrial services from non-GSO ESIM
- ▲ 9 submissions were each received by the last WP4A on sharing studies between Aeronautical ESIM (A-ESIM) and Fixed Service as well as A-ESIM and Mobile Service:
 - Various types of studies were conducted under these sharing studies
 - General conclusion that the interference protection criteria is not exceeded for either any altitude/location or deployment scenario/type for A-ESIM and terrestrial service with the PFD limits at the surface of the Earth currently under consideration (**same as GSO ESIM in the same frequency bands**)
- ▲ One sharing study was received by WP4A between Maritime ESIM (M-ESIM) and Fixed/Mobile Service:
 - Results of study shows no exceedance of protection criterion for both FS and MS with the M-ESIM 70km distance from the coast and the power limits under consideration (**same as GSO ESIM in the same frequency bands**)

Proposed Preliminary Position for APG23-4 – AI 1.16

- ▲ Supports the adoption of harmonized regulatory framework as well as technical and operational measures that facilitate the use of NGSO ESIMs, while ensuring protection of existing services in-band and adjacent frequency bands.
- ▲ Based on ITU-R studies, aims to establish technical, operational and regulatory provisions similar to those for GSO ESIMs
- ▲ Supports the agreed discussion on the issues relating to the responsible administration involved with the operation of ESIM
- ▲ Supports the development of a methodology regarding examination by the Radiocommunications Bureau of compliance with pfd limits by non-GSO aeronautical ESIM or of adequate transitional measures in case WRC-23 could not finalise the methodology



WRC-23 Agenda Item 1.17:

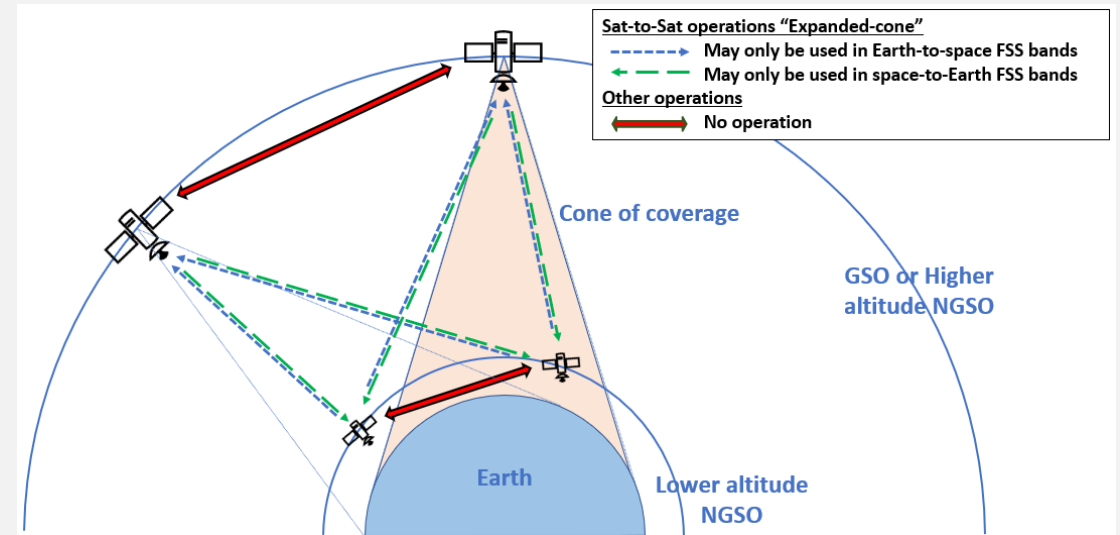
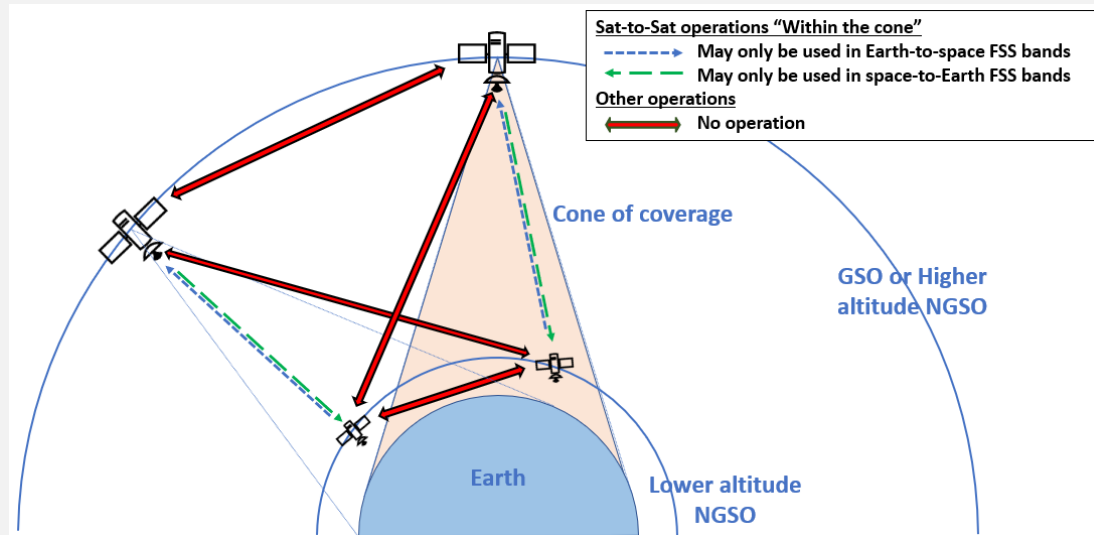
Enabling Inter-Satellite Links in portions of the Ku and Ka frequency bands

WRC-23 AI 1.17 – Inter-Satellite Links (ISLs)

- ▲ *"to determine and carry out... the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate"* - **Resolution 773 (WRC-19)**
- ▲ Frequency bands in consideration under this AI:
 - 11.7 – 12.7 GHz
 - 18.1 – 18.6 GHz
 - 18.8 – 20.2 GHz
 - 27.5 – 30 GHz
- ▲ There is a growing interest for utilizing ISLs for a variety of applications, for example
 - As a data transport layer, where there is limited access to Earth stations (e.g. over the oceans)
 - For most Earth observation and space science missions, data-download to the ground is a bottleneck as well as a key design driver. The possibility of relaying data to the ground via satellite-to-satellite links is a possible remedy to the existing limitations
 - Useful also for real or near-real time data applications, such as disaster management

Concept of Operations – AI 1.17

- ▲ Direction of transmission is limited to those of the existing FSS allocation
- ▲ Two Concepts of Operations have been discussed, as illustrated below



Progress of ITU-R Studies - AI 1.17

- ▲ Significant progress made to advance work in recent WP4A on preliminary draft CPM text, including the inclusion of methods to satisfy this Agenda Item

- ▲ Some of the issues discussed and that require further work include:
 - The concept of operations for the extended cone concept, including its implications
 - Protection of EESS, FSS and other NGSO systems
 - Organisation of spectrum needs based on future near-term and long-term requirements
 - Suggestions were made to improve the CPM methods to reduce complexity under this Agenda Item in subsequent WP4A
 - Possible introduction of a new ISS allocation

- ▲ Offline discussions will continue between now and the next WP4A

Proposed Preliminary Position – AI 1.17

- ▲ Support on-going studies under current FSS allocations according to the FSS directionality indicators (i.e. Earth-to-space or space-to-Earth) in accordance to Res 773 (WRC-19).
- ▲ Support the introduction of satellite-to-satellite transmissions and ensuring the same level of protection for GSO networks, NGSO systems and other incumbent services as currently provided in the Radio Regulations in the relevant frequency bands



Annex

APG23-3 Preliminary Views – AI 1.16

- On-going sharing and compatibility studies between NGSO ESIM and existing services (including passive services) in the frequency bands and those adjacent bands should be conducted to ensure the protection of existing services
- Operation of secondary services as allocated by previous WRCs and currently contained in the RR shall not be adversely affected by the potential operation of ESIM being studied under this AI.
- Regulatory provision and technical and operational measures with appropriate examination methodology by the BR for NGSO ESIM should be established. In the absence of such methodology, transitional measures should be developed and agreed by WRC-23
- NGSO ESIM characteristics shall remain under the envelope characteristics of typical NGSO earth stations
- For the protection of GSO FSS networks operating in 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz and 29.5-30.0 GHz, the relevant EPFD limits in RR No. 22.5C, 22.5D and 22.5F apply
- NGSO ESIM shall not cause unacceptable interference to the terrestrial services in-band and adjacent frequency bands.

Summary of other Regional Views – AI 1.16 (1 of 2)

ASMG	<ul style="list-style-type: none">- Follow and support the studies- No additional restrictions are imposed on earth stations of GSO FSS- Ensure the protection the existing services in these band- Development of methodology to assist BR to verify NGSO ESIM compliance under Resolution
ATU	<ul style="list-style-type: none">- Support studies towards development of regulatory framework for the use of frequency bands by NGSO FSS ESIMs
CEPT	<ul style="list-style-type: none">- Support the development of a regulatory framework for NGSO ESIM- Ensure the protection of GSO systems and other services- NGSO ESIM receiving in the 18 GHz band shall not claim protection from terrestrial services- Protection of GSO networks in the frequency bands 27.5 – 28.6 GHz and 29.5 – 30 GHz from NGSO ESIM can be achieved by complying with No.22.5D.- Protection of GSO networks and NGSO systems in the frequency band 28.6 – 29.1 GHz shall be achieved on the basis of coordination agreement between administrations and operators in accordance with No.9.11A

Summary of other Regional Views – AI 1.16 (2 of 2)

CITEL	<ul style="list-style-type: none">- Support studies on the technical and operational characteristics of ESIM and sharing and compatibility studies to develop technical and regulatory provisions in accordance with Resolution 173 (WRC-19)- Studies that were conducted to support the deployment of GSO ESIM in the Ka-band have many similarities with those that are being carried out under Resolution 173(WRC-19). WRC-23 should aim to establish the same technical, operational and regulatory provisions.
RCC	<ul style="list-style-type: none">- In favour of development of regulatory provisions and technical requirements for ESIMs to ensure protection of and not impose additional constraints on other services in these frequency bands and in adjacent bands- In the 18GHz band NGSO ESIMs shall not claim protection from terrestrial services operation- RR provisions for protection of GSO network from non-GSO FSS shall not be affected- ESIM should operate within the envelope of typical ES- Measures to exclude unauthorized use of ESIM in the territory of States that have not granted relevant authorizations are needed.

APG 23-3 Preliminary View – AI 1.17

- **Support ITU-R studies on sharing and compatibility as well as to develop technical and regulatory provisions in accordance to Res 773 (WRC-19)**
- **Use of inter-satellite service needs to fully protect the FSS**
- **Technical conditions and regulatory provisions developed shall not impact on the terrestrial services**
- **Consideration should be given to the operational of secondary terrestrial services currently contained in the RR in order that these terrestrial services should not be adversely affected by the inter-satellite service in the frequency band**

Summary of other Regional Views – AI 1.17 (1 of 2)

ASMG	<ul style="list-style-type: none">- Support development of regulatory framework to ensure protection of in-band and adjacent bands services- Support “within cone of coverage” concept of operations without the need for a new inter-satellite service allocation- Support the allocation of sate-to-sat transmissions within the current FSS allocation with the same directional designators in FSS
ATU	<ul style="list-style-type: none">- Support ongoing sharing and compatibility studies- Support allocation of satellite-to-satellite transmissions within current FSS allocation, with same directional indicators as in FSS- Support the “within the cone of coverage” concept of operations- Encourage execution of sharing studies on the “expanded cone” concept of operations- Avoid a new ISS allocation in these core FSS bands
CEPT	<ul style="list-style-type: none">- Support the development of a regulatory framework to enable ISLs- ISLs must ensure the same level of protection for terrestrial services and GSOs/NGSOs as currently provided in the RR and must not impose new constraints

Summary of other Regional Views – AI 1.17 (2 of 2)

CITEL	<ul style="list-style-type: none">- Support studies to consider technical and regulatory provisions to allow ISLs- Support confining studies to links that operate in the same direction of transmission as provided for in the current allocations and confined to satellite located on different orbits.
RCC	<ul style="list-style-type: none">- Support the development of technical and operational conditions, as well as regulatory provisions, including new allocations to inter-satellite service, for the operation of inter-satellite links.- Believes that the conditions for the use of inter-satellite links should ensure the protection of existing primary services that have allocations in the same or neighbouring frequency bands, including passive services and not impose additional constraints to these services

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