

GSO Networks – Key Enablers for Broadband Penetration

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Two main WRC-19 decisions related to GSO broadband satellite networks

- 1. 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 (ESIM) communicating with GSO space stations in the FSS
- 2. Allocation of the frequency band 51.4-52.4 GHz to the FSS (Earth-to-space) for GSO use

1. Earth stations in motion (ESIM)

- WRC-19 defined the regulatory, operational and technical conditions for use of the frequency bands 17.7-19.7 GHz & 27.5-29.5 GHz by ESIM communicating with GSO space stations in FSS in all Regions
- This decision will increase the use and further development of ESIMs, while protecting other GSO networks and non-GSO systems and terrestrial services
- It enabled broadband connection of people on ships (M-ESIM), aircraft (A-ESIM) and land vehicles (land ESIM) and ensure their safety, security and comfort while in motion, extending the possibility offered by WRC-15 for ESIM in the bands 19.7-20.2 GHz and 29.5-30 GHz in all Regions

2. Frequency band 51.4-52.4 GHz

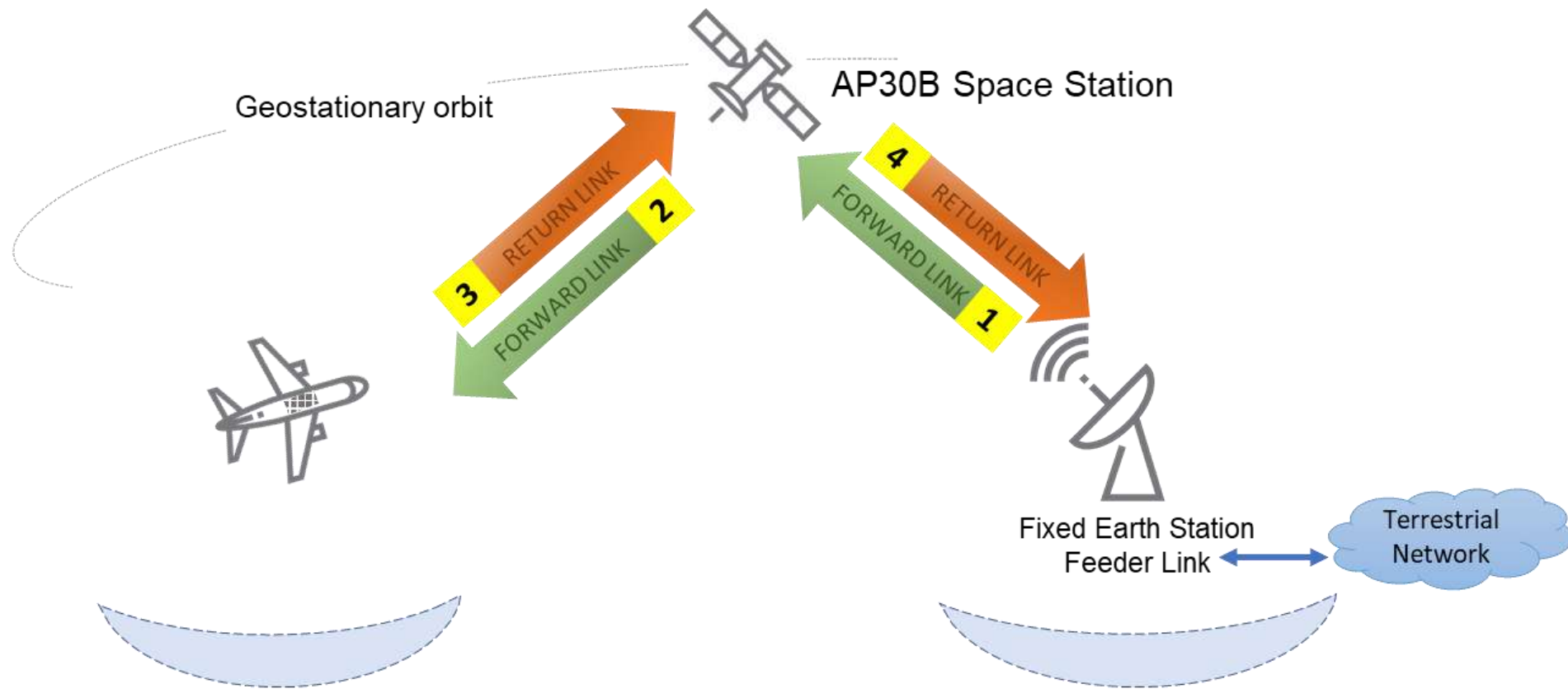
- WRC-19 added an allocation to the FSS (Earth-to-space) in the frequency band 51.4-52.4 GHz for use by GSO networks, while protecting other services
- The earth stations shall be limited to gateway earth stations with a minimum antenna diameter of 2.4 metres

Three main WRC-23 Agenda Items related to GSO broadband satellite networks

- **AI 1.15:** Use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with GSO space stations in the FSS globally (Resolution 172)
- **AI 1.17:** Technical and operational issues, and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz (Resolution 773)
- **AI 1.19:** Primary allocation to the FSS in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2

AI 1.15

- Calls for studies on the possible operation of A-ESIM & M-ESIM communicating with GSO in the FSS in 12.75 – 13.25 GHz
- It is **Planned band** and is subject to regulatory procedures and technical criteria as per **Appendix 30B of RR** which is different from other bands
- It requires explicit agreement of an administration for the partially or wholly inclusion of its territory in the service area of a proposed **AP30B** assignment
- Generally the service areas of **AP30B** networks are non-contiguous and the number of countries in these service areas ranges from one to fifty countries
- Additionally, RR **AP30B** provides that an administration may at any time exclude its territory from the service area of an **AP30B** assignment. Hence, these ESIMs need to have the capability to restrict operations in territories where agreements have been obtained



Requirements:

- A) Air space of country in AP30B Service Area
- B) Administration authorized Aero ESIM

Requirements:

- A) Country in AP30B Service Area
- B) Administration authorized fixed earth station

Frequency Band

Uplink: 12.75-13.25 GHz

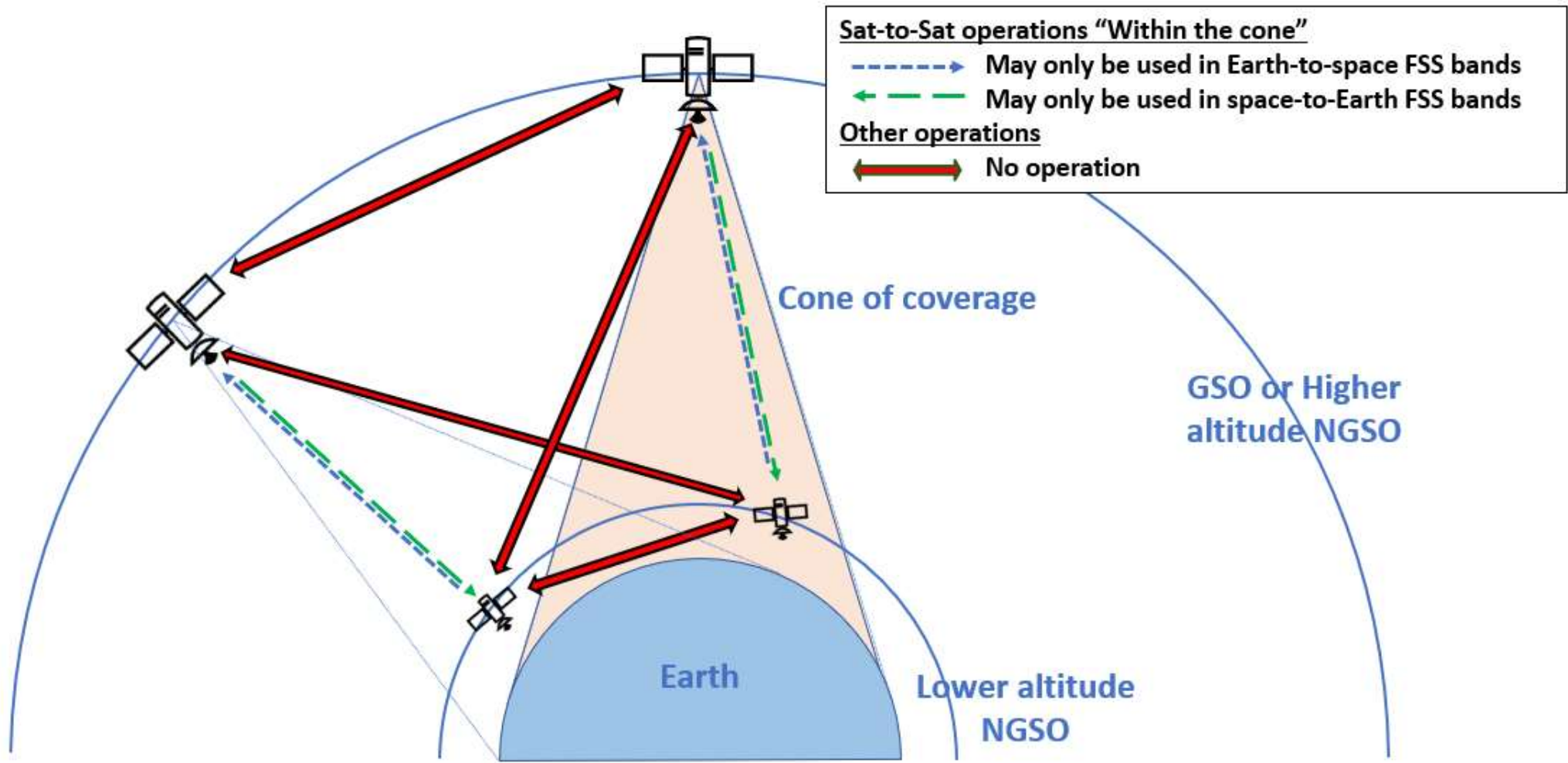
Downlink: 10.7-10.95 and 11.2-11.45 GHz

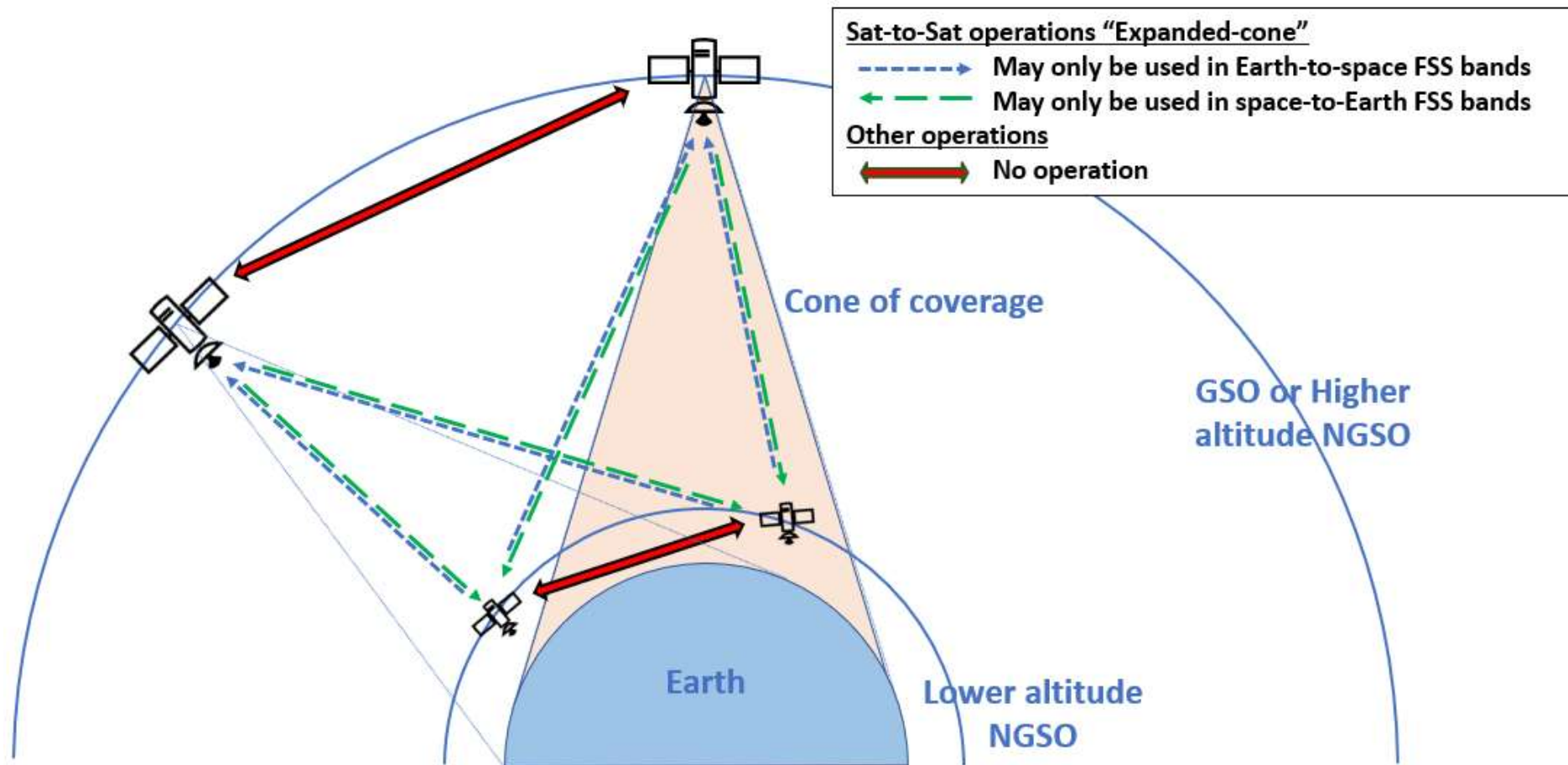
AI 1.17

- There is growing interest for utilising inter-satellite links relaying data to/from Earth using a GSO or non-GSO FSS space station operating at an altitude greater than the non-GSO user space station generating the data
- As most of these non-GSO missions are LEO, the user space station download is
 - mostly short-duration access (10 Mins/orbit) they have to their respective earth stations
 - Acceptable time delay for low latency applications like weather forecasting, disaster risk reduction
- Through inter-satellite links, data can be available in near-real time across a much greater portion of the user space station's orbit, enhancing the availability and value of instrument data for low latency applications
- Both small and large satellite missions would benefit from satellite-to-satellite transmission services. Even nano-satellites (1-25 kg) may carry a satellite-to-satellite transmission payload

CONOPS

- Two concepts of operations (CONOPS) were considered in the studies conducted under agenda item 1.17
 - The user space station is located **within the cone of coverage** of the service provider space station
 - The user space station is located **outside the cone of coverage** of the service provider space station





WRC-23 Agenda Item 1.2

- WRC-23 Agenda Item 1.2 will consider, among others, the identification of the following frequency band for IMT in accordance with Resolution 245 (WRC-19)
 - 6425-7025 MHz - in ITU Region 1 and
 - 7025-7125 MHz- Globally

Deployment scenario of 5.925 – 7.125 GHz band in India

S.No.	Uplink frequency (GHz)	Radio Regulations Provisions	Usages
1.	5.925 – 6.425 (500 MHz)	FIXED FIXED-SATELLITE MOBILE	Satellite-based applications : Teleports, VSATs, DSNG etc
2.	6.425 – 6.625 (200 MHz)	FIXED FIXED-SATELLITE MOBILE	Microwave Backbone for TSPs, MSS Feeder links etc
3.	6.625 – 6.725 (100 MHz)	FIXED FIXED-SATELLITE MOBILE	Government usages
4.	6.725 – 7.025 (300 MHz)	FIXED FIXED-SATELLITE MOBILE	Planned band for Fixed Satellite Services and also for Government usages
5.	7.025 – 7.125 (100 MHz)	FIXED FIXED-SATELLITE MOBILE	Microwave Backbone for TSPs

THANKS