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OneWeb views towards WRC-23

WRC-23 Topics

- AI 1.17 (ISL)
- AI 7
 - Topic A (Orbital tolerances)
 - Topic B (Post milestone procedures)
 - Topic J (Res 76)
- Future Agenda Items:
 - 51.4-52.4 GHz
 - 13.75-14.0 GHz

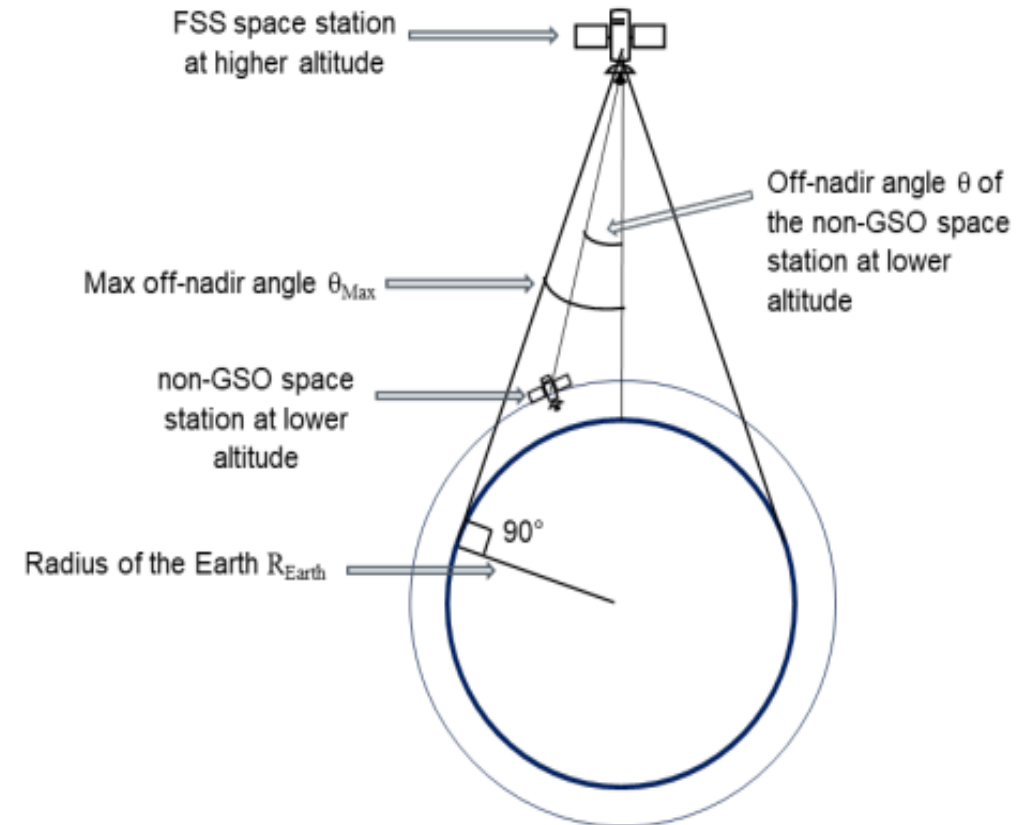


Agenda Item 1.17 – Inter Satellite Links

- Agenda item 1.17 deals with the addition of a new allocation for inter-satellite links (ISL) in the 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz frequency bands.
 - Primary focus on assuring protection of incumbents from harmful interference
- NGSO systems requires protection from these links as they have the potential to interfere with and even permanently damage other systems
- There are several key issues to ensure protection to incumbent systems:
 - Within-the-cone vs. Outside-the-cone operation
 - Interference Protection through EIRPsd limits
 - Hardware Protection through total EIRP limits

Agenda Item 1.17 – OneWeb views

- Within-the-cone vs. Extended cone
 - OneWeb supports within-the-cone concept with an Inter-satellite Service allocation with limits to use by science missions
- Interference protection
 - OneWeb supports the following limits:
 - LEO user-to-GSO EIRPSD limit: -17.5 dBW/Hz
 - LEO user-to-MEO EIRPSD limit: -20 dBW/Hz
 - LEO user-to-LEO EIRPSD limit: -30 dBW/Hz
 - [CPM Text](#) Section 4/1.17/5.2 Method B, Annex 4



Within-the-cone concept of operation

Agenda Item 1.17 – OneWeb views

- **OneWeb supports** Hardware damage protection (Method B)
 - **No ISS systems** from 900 km to 1290 km
 - Total EIRP limits vary with altitude to account for increased spreading loss at lower altitudes, Different total EIRP limits for nGSO to LEO and nGSO to MEO, as provided below:
 - See [CPM Text](#) Section 4/1.17/5.2 Method B

Tx nGSO space station altitude	Maximum total e.i.r.p. (dBW)
< 450	60
450 to < 600	58
600 to < 750	55
750 to 900	53
>1290	N/A

Table 1. NGSO to LEO EIRP limits

Tx nGSO space station altitude	Maximum total e.i.r.p. (dBW)
< 450	63
450 to < 600	61
600 to < 750	58
750 to 900	55
>1290	N/A

Table 2. NGSO to MEO EIRP limits

Agenda Item 7 Topic A – Orbital Tolerances

The purpose of the Orbital Tolerances topic is to limit differences between the notified and deployed orbital characteristics in the following situations:

1. For BIU or BBIU a filing
2. For operational constraints
3. Meet milestones for Resolution 35

As an example, this was proposed to prevent the BIU of a MEO filing with a LEO satellite. Hence, a tolerance was needed.

It would define the maximum variation in altitude and in inclination for any of the satellites which could be used for BIU a filing and would limit the operations of the system.

- **Issues:**
 - Adopting tolerances smaller than what operational NGSO systems like OneWeb need to safely operate their fleets
 - Adopting small tolerances that restrict the ability to accommodate multiple systems in the same orbital space while still operating within each operator's ITU filing

Agenda Item 7 Topic A – Orbital Tolerances

- Restricting altitude deviations may prevent accommodation of other systems if severe penalties apply for operating outside ITU filing
- Administrations can require smaller operational tolerances and reach operational agreements outside of ITU regulatory environment
- **OneWeb supports** a large tolerance that can provide flexibility to operators to accommodate their system while ensuring that other operators can use the same orbit.
- **OneWeb supports** Method A2 with **100 km** altitude tolerance + Option A for the Resolution to apply these tolerances
 - Resolves Option A2A4
 - Option 1 in the Annex with $\Delta\text{altAllowed} = 100 \text{ km}$ and $\Delta\text{iAllowed} = 3 \text{ degrees}$

Agenda Item 7 Topic B – Post-Milestone procedure

- WRC-19, Resolution 35 introduced milestones for NGSO systems
- Res35 includes resolves 19 which applies regulatory procedures for NGSO systems which have completed the milestone process
- Agenda item 7B is concerned with reviewing Resolution 35 resolves 19 and possibly adopting a post-milestone procedure for NGSO systems that have completed all milestones and subsequently reduced the number of space stations deployed

Given the earliest NGSO FSS systems will not complete their milestones until 1st February 2028,
WRC-27 will occur prior to this last milestone

- OneWeb supports addressing this issue at WRC-27 after more experience has been gained with the Resolution 35 milestone process and the actual deployment of NGSO systems
- OneWeb supports Method B1 - NOC

Agenda item 7 - Topic J- Background

- NGSO Systems/Network shares the spectrum bands allocated for the FSS, which is also shared with GSO FSS and BSS networks.
- Resolution **76** set forth limits on aggregate epfd radiated by non-GSO FSS systems in certain frequency bands to ensure the protection of the GSO FSS and BSS networks for different Ku and Ka frequency bands and antennas diameters.
- However, there is no clear methodology nor procedures outlined in Resolution **76** for the administrations involved to collaboratively determine whether these aggregate levels are exceeded and what actions should be taken.
- Topic J aims to address this by developing or calling for the development of a consultation process to be applied to non-GSO FSS-systems operators to avoid and potentially remedy any exceedance of the aggregate interference levels in Tables 1A to 1D of the Resolution based on accurate modelling of non-GSO systems.

Agenda item 7 - Topic J - Methods to resolve

Method J1 No change

Methods J2, J3 and J4

Modify Resolution 76 introduce the concept of “consultation process/meetings” among administrations of non-GSO systems

The meetings begin once the Recommendation on the methodology to calculate the aggregate epfd is approved by SG 4.

Two methodologies are currently under development by SG4

- 1 methodology to calculate the aggregate epfd produced by all non-GSO systems;
- 2 methodology to adapt the operations of all non-GSO systems when the aggregate epfd levels given are exceeded.

Until the relevant methodologies are available, in case the aggregate epfd limits are exceeded, the protection of GSO is ensured by the provisions of RR No. 22.5K.

Method J2

Option 1:

Only operating non-GSO systems are included

Option 2:

Both operating or planning to operate (occur within the period of **18 months**) non-GSO systems are included

Method J3

In the aggregate calculation, only non-GSO operational systems will be taken into account

Option 1:

consultation meetings begin once the **two** methodologies are adopted by SG4

Option 2:

consultation meetings begin once the First methodology is adopted by SG4

Method J4

both non-GSO operational and planned systems to operate within one year will be taken into account.

Method J5

call for further study on accurate modelling of non-GSO systems and a regulatory procedure for assuring compliance with the aggregate emission limits

Agenda item 7 Topic J – OneWeb View

OneWeb supports: Method J5 of the [CPM text](#) or J3 with few modification

OneWeb supports the following provisions as part of J3:

- Systems with a minimum number of operational satellites identified under Resolution 35 under resolves 7 & 8 should be taken into account in determining aggregate EPFD & addressed in consultation meetings
- NGSO systems submitted under multiple ITU filings should be treated as a single system for purposes of Resolution 76
- An accurate aggregate calculation method is needed before holding consultation meetings

AI 10: WRC-27 Future Agenda - NGSO in band 51.4-52.4 GHz



- **OneWeb supports** WRC-27 agenda item to “conduct Studies relating to the use of 51.4-52.4 GHz to enable the use by gateway earth stations in the fixed-satellite service operating with a space station in non-geostationary-satellite orbit (Earth-to-space)”
- The band 51.4-52.4 GHz frequency band is allocated on a primary basis to the fixed-satellite service (FSS) in the direction Earth-space;
- In accordance with 5.555C of the RR, the use of the 51.4-52.4 GHz by the fixed-satellite service (Earth-space) is limited to geostationary satellite networks, and Earth stations shall be limited to head-end earth stations with a minimum antenna diameter of 2.4 meters.

Allocation to services		
Region 1	Region 2	Region 3
51.4-52.4	FIXED FIXED-SATELLITE (Earth-to-space) 5.555C MOBILE 5.338A 5.547 5.556	

- The need for additional spectrum in the FSS in the 50 GHz range for Earth-to-space links of non-GSO earth station systems was established in response to WRC-19 agenda item 9.1.9 in ITU-R Report S.2461. These studies concluded that the need for spectrum for GSO and non-GSO SFS networks.

OneWeb invites member states to consider conducting studies for expanding the use of the FSS (Earth-space) band in 51.4-52.4 GHz to address the spectrum needs of non-GSOs for earth station in the FSS operating with a space station in non-geostationary-satellite orbit (Earth-to-space), by WRC-27

AI 10: WRC-27 Future Agenda - NGSO operation in 13.75-14.0 GHz

OneWeb proposes WRC-27 agenda item *“to review the use of the band 13.75-14 GHz and study possible revisions to the constraints adopted by RR Nos. 5.502 and 5.503, in accordance with Resolution [13.75-14 GHz] (WRC-23), to enable efficient use of the band by non-GSO FSS earth stations as well as GSO FSS earth stations”*

- There has noted rapid increase in the number of (GSO) and (non-GSO) satellite networks in recent decades.
- The use of smaller FSS earth stations at frequencies around 10-15 GHz has also been increasing with the deployment of satellites providing large throughput and broadband connections.
- The 13.75-14 GHz band was allocated globally by WARC-92 for FSS on primary basis for (Earth to space) direction,
- Meanwhile the use of the FSS allocation is subject to limitations were introduced in RR Nos. 5.502 (antenna diameter limitation of 4.5 meter for NGSO and 5.503 (limitation to the e.i.r.p density emissions)
- WRC-03 modified these footnotes 20 years ago, those limitation hinders the efficient use of smaller non-GSO FSS uplink earth station antennas.

Allocation to services		
Region 1	Region 2	Region 3
13.75-14	FIXED-SATELLITE (Earth-to-space) 5.484A RADIOLOCATION Earth exploration-satellite Standard frequency and time signal-satellite (Earth-to-space) Space research 5.499 5.500 5.501 5.502 5.503	

OneWeb invites member states to consider review the constraints imposed on non-GSO uplink earth stations and GSO uplink earth stations in the fixed-satellite service in the frequency band 13.75-14 GHz in Earth to Space direction, by WRC-27

Connectivity



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