



Regulatory Framework in a Rapidly Changing Environment

Can ITU Keep Pace?

01 September 2026

Reaching Further, Bringing You Closer

Satellite Industry in Rapid Change

- **Exciting development**
- LEO
 - "Mega constellations«
 - VLEO
 - IoT
 - Short duration missions
 - Remote sensing, earth observation
- Intersatellite links (LEO-LEO, LEO-GEO,)
- D2D
- Mobile terminals in FSS bands
- **Technical and regulatory challenges**
- One size fits all?

Topics

1. **Co-existence between non-GSOs**
2. **Co-existence between non-GSO and GSO**
3. **Co-existence between satellite and terrestrial**
4. **Authorization and control of operation**
5. **Operation under RR No. 4.4**

Co-existence between non-GSOs

- Non-GSO coordination requests
 - 18.8-19.7 GHz band: 185
 - 14-14.25 GHz band: 99

=> All filed satellite systems within a frequency band are likely not compatible with each other

=> Need for assessment of technical compatibility

- Current criteria for assessing technical compatibility
 - Frequency overlap

=> Will there be space for late comers? (Equitable access)

- Other, more precise criteria for ITU to assess compatibility?
 - Orbit constellations (inclination, sun synchronous,)
 - VLEO/LEO/MEO/HEO
 - Coverage area
 - $\Delta T/T$
 - Throughput degradation
- Satellite systems subject to detailed coordination,
- Satellite systems not subject to detailed coordination

ASIASAT (Less information to enable assessment of technical compatibility)

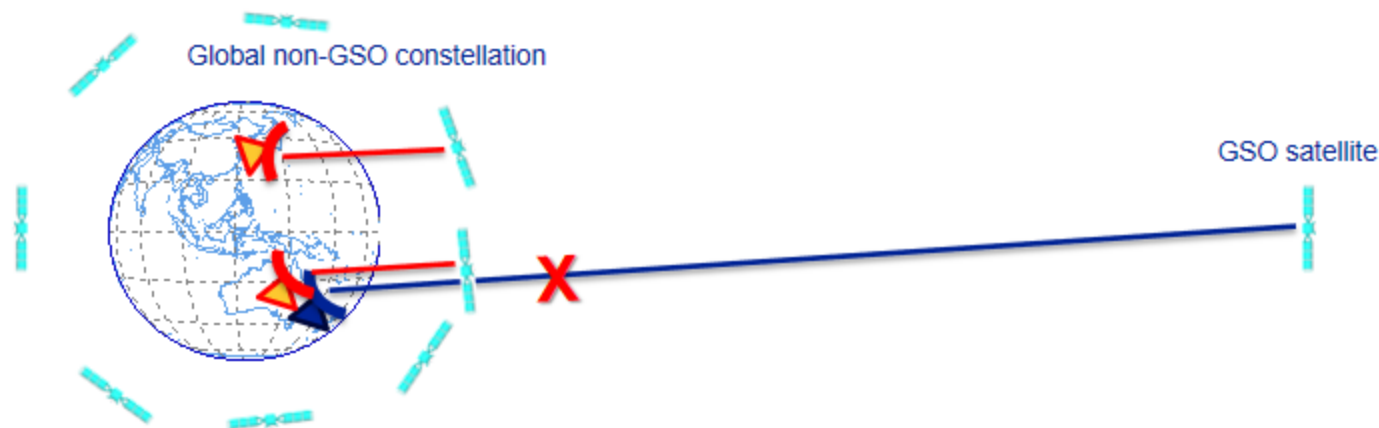
Co-existence between non-GSO and GSO (1)

- RR No. 22.2
non-GSO
 - Cause no unacceptable interference to GSO
 - Claim no protection from GSO
- No coordination
- No quantification of what constitute "unacceptable" interference
- Non-GSO effectively secondary in respect of GSO

=> Uncertain operating conditions for non-GSO

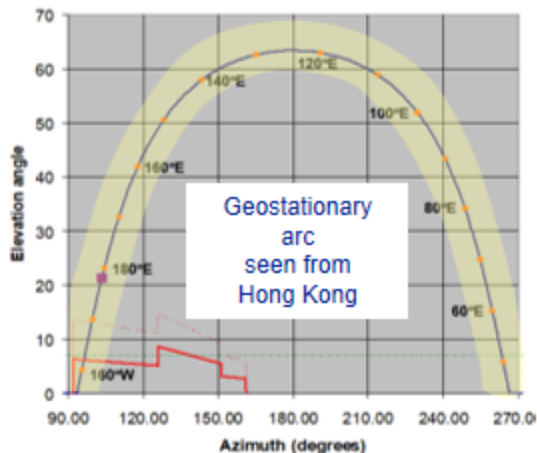
Co-existence between non-GSO and GSO (2)

- Bands with coordination between non-GSO and GSO
 - "Non-GSO bands", 18.8-19.7 GHz_↓, 28.6-29.5 GHz_↑



One single global non-GSO constellation has the potential to block all further development of GSO satellite networks

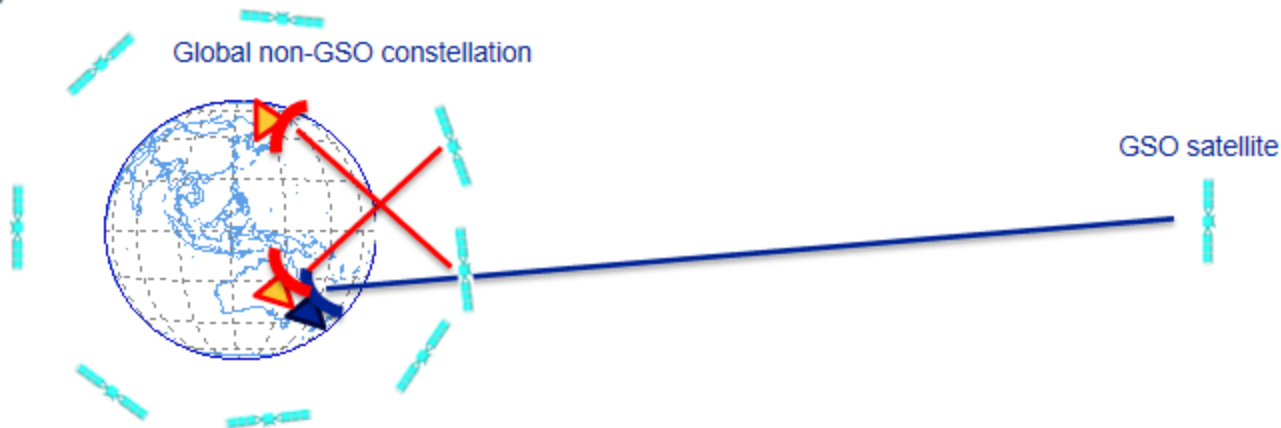
Co-existence between non-GSO and GSO (3)



From any location on earth, GSO satellites will only be seen along one single arc over the sky

WRC-2000:

By non-GSO avoiding link geometries that co-incide with, or are close to, GSO link geometries, non-GSO and GSO can share the same frequency band with no adverse impact on each other



Co-existence between non-GSO and GSO (4)

- Equivalent power flux density limits (epfd)

- C-, Ku-, Ka-band
 - Statistical calculated interference from all satellites of one satellite filing
 - May be seen as quantification of "acceptable interference" (RR No. 22.2)
 - RR Art 22, Tables 22-1A to 22-4B
- C/N, throughput degradation
 - Q/V-band
 - RR No. 22.5L & M
 - Reference GSO links, Resolution 770 (WRC-23)

- Hard limits

- No coordination

- Introduce similar criteria for more frequency bands?

TABLE 22-1A (WRC-03)

Limits to the $\text{epfd}_{\downarrow}$ radiated by non-geostationary-satellite systems in the fixed-satellite service systems in certain frequency bands^{3, 4, 5, 6}

Frequency band (GHz)	$\text{epfd}_{\downarrow}$ (dB(W/m ²))	Percentage of time during which $\text{epfd}_{\downarrow}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern ⁷
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	-175.4	0	40	60 cm Recommendation ITU-R S.1428-1
	-174	90		
	-170.8	99		
	-165.3	99.73		
	-160.4	99.991		
	-160	99.997		
	-160	100	40	1.2 m Recommendation ITU-R S.1428-1
	-181.9	0		
	-178.4	99.5		
	-173.4	99.74		
	-173	99.857		
	-164	99.954		
	-161.6	99.984		
	-161.4	99.991		
	-160.8	99.997		
	-160.5	99.997		
	-160	99.9993		
	-160	100		

Co-existence between non-GSO and GSO (5)

- Epfd limits

- Limits for individual satellite filings
- Satellite constellations often operate under multiple filings
=> aggregated interference from all filings of a satellite constellation may exceed epfd limit
- Several satellite constellations operate in the same frequency band
=> aggregation of interference from all satellite constellations
- WRC-2000, assumed a total of 3.5 satellite filings simultaneously operational in a given frequency band
=> aggregate interference assumed to be ≈ 5 dB higher than epfd limits
- **This assumption of WRC-2000 may no longer be valid**

- RR No. 22.5K, Res 76

- Aggregate interference
- Need to be identified by GSO admin
- No ITU tools
- **Which admin / non-GSO constellation should reduce power?**

The number is 3.5

Co-existence between non-GSO and GSO (6)

Non-GSO

- Epfd limits limiting
=> relax epfd limits
and/or
=> change technical characteristics
used in models to assess compliance
with epfd limits (in particular reference
antenna patterns)
- Need to support new applications



GSO

- GSO characteristics relatively unchanged
since WRC-2000
- More non-GSO satellite filings in
simultaneous operation than what assumed
by WRC-2000
=> tighten epfd limits
- Need to provide adequate protection for
GSO, including its further development

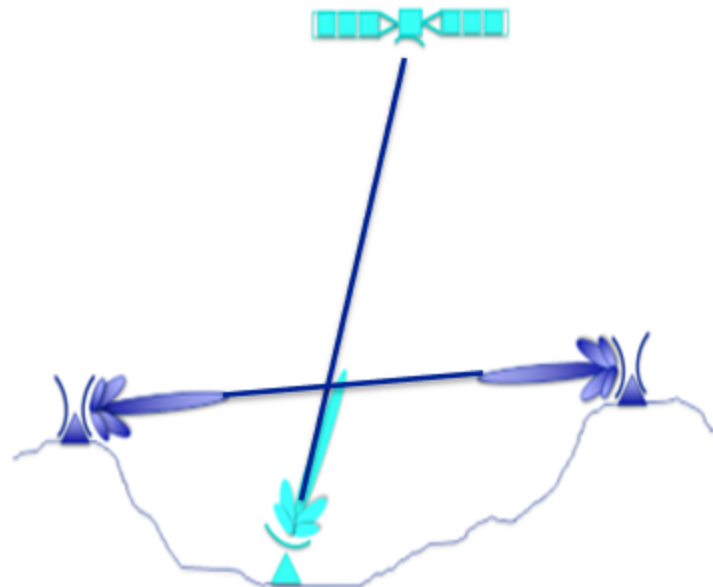
What is the right balance?

Could there be proposals for the Plenipotentiary Conference 2026 (PP26) to make decisions that could instruct ITU-R how to review conditions for co-existence between non-GSO and GSO?

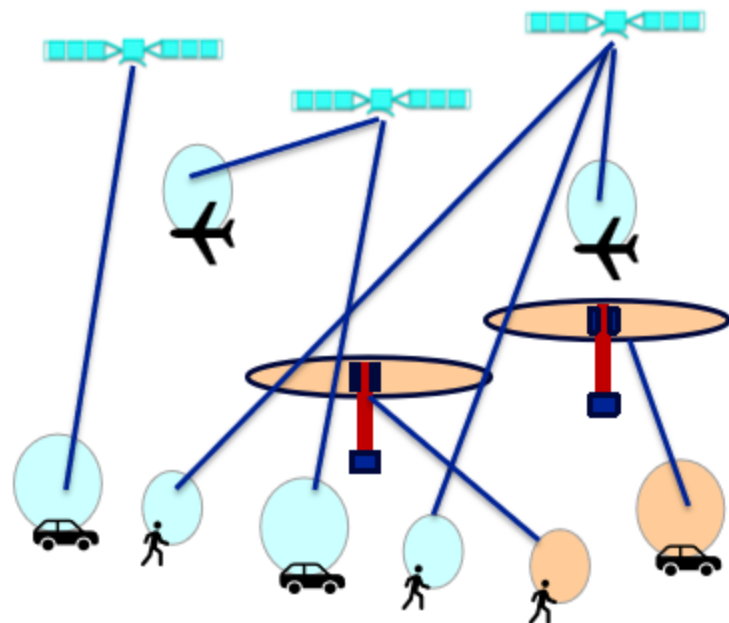
- PP26 has the authority, but may not have the technical insight

Co-existence between satellite and terrestrial

- With D2D, satellites become base stations in the sky
- Large number of small terminals, mobile or ubiquitously deployed, used in FSS bands shared with terrestrial services
- Aggregation of interference from multiple satellite systems using the same frequency band
- Competition for use of shared frequency bands
- WRC-27 Agenda Item 1.13



Traditional FS – FSS frequency sharing



MS – D2D frequency sharing

Authorization and control of operation (1)

- RR No. 18.1

"No transmitting station may be established or operated by a private person or by any enterprise without a licence issued in an appropriate form and in conformity with the provisions of these Regulations by or on behalf of the government of the country to which the station in question is subject"

=> Countries are sovereign to determine who they want to authorize to operate in their country

- Satellites with global/regional visibility beyond that of notifying administration

- Operation technically feasible

- Small, transportable satellite terminals (D2D)

=> Operation in their country is difficult/impossible for administrations to detect

Authorization and control of operation (2)

- **Resolution 25 (Rev. WRC-23)**

Notifying administration of satellite systems responsible to oversee that their satellite operators observe RR 18.1

- **Resolution 22 (Rev. WRC-23)**

When unauthorized transmissions are reported, administrations shall cooperate *"to the maximum extent possible"* to cease the operation

Authorization and control of operation (3)

- Cases of unauthorized operation with non-GSO systems reported
- Despite repeated efforts, including by RRB, over several years, cases remain unresolved

WRC-27 Agenda Item 1.5

=> Mechanisms to better enforce compliance with RR 18.1

=> Clarify responsibilities of administrations licensing satellite constellations

**=> Consequences of failing to comply with regulatory provisions
Cancel satellite filings?**

Operation under RR No. 4.4 (1)

- Operation in derogation of either the Table of Frequency Allocations or other provisions of RR
 - Non-interference
 - Non-protected
 - Need for notification, i.e. international publication, if capable of causing interference to services of other administrations
- Intended for special cases (limited duration)
- Originally developed for terrestrial operation
Terrestrial operation may be crafted to have little or no impact on other administrations

Operation under RR No. 4.4 (2)

- Trend towards more widespread use by satellite
 - Non-GSO for FSS and MSS
 - Including larger satellite constellations, providing regular services and not only for short duration missions
 - Not the intended use of RR No. 4.4
 - In anticipation of future frequency allocations e.g. for D2D or IoT

RR No. 4.4 networks and systems submitted per type

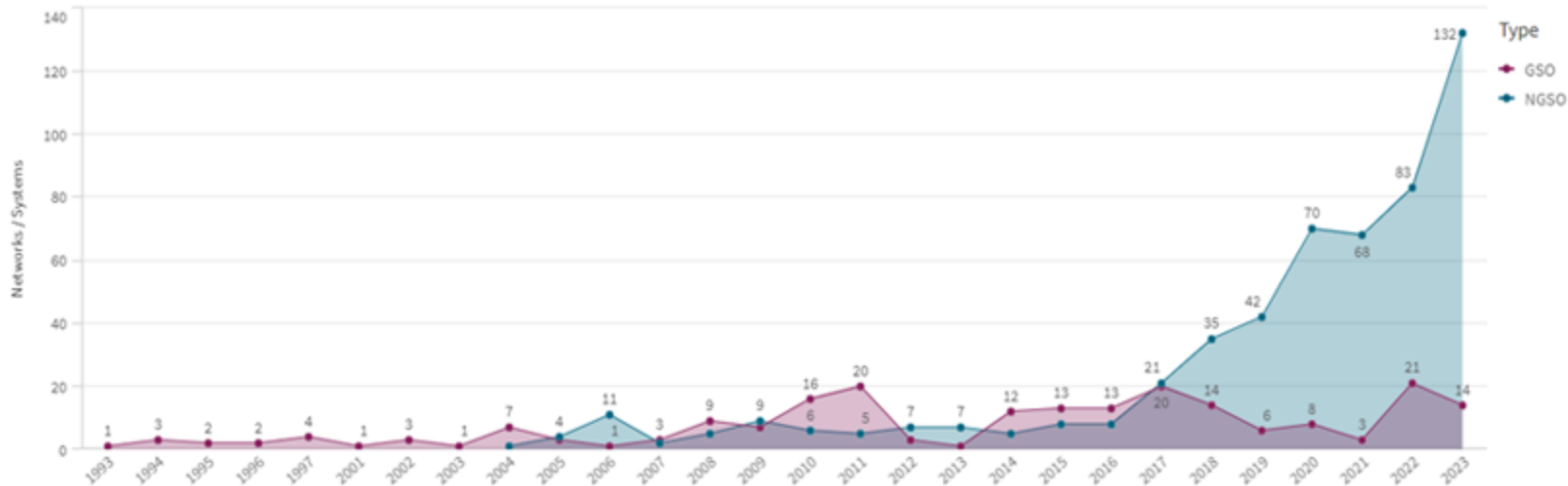


Figure from Annex 19 to document 4A/1064, the WP 4A Chair's Report from the May 2026 meeting

Operation under RR No. 4.4 (3)

- In submissions, only check flag for use of RR No. 4.4. No need to indicate;
 - which RR provision is being derogated
 - the technical justification for the derogation
 - the geographic coverage area
 - the intended duration of operations.
- Assessment of interference potential difficult.
- Difficult to distinguish legitimate experimental or transitional use from systematic long-term commercial exploitation under RR No. 4.4.
- Need to eliminate interference after it has happened rather than preventing it from happening

Operation under RR No. 4.4 (4)

- Issue raised at WRC-23 in RRB Report
- Further consideration pushed to be conducted under WRC-27 agenda item 7
- No changes to RR No. 4.4 under agenda item 7 but possible additional requirements or limitations for application of RR No. 4.4 considered

ITU-R Radio Regulations

- Purpose:
 - facilitate equitable access and rational use
 - assist in the prevention and resolution of cases of harmful interference
 - facilitate the efficient and effective operation
 - provide for and, where necessary, regulate new applications
- A rapidly changing satellite environment
 - **Need for the ITU and Radio Regulations to adapt**
 - **To facilitate new applications**
 - **To retain relevance and impact**
 - **To facilitate use of radio frequency spectrum in an orderly manner, in accordance with the Constitution of ITU**
- Alternative: Law of the jungle

Satellite industry and administrations need an ITU and international regulations that are relevant, up to date and have an impact!



Reaching Further, Bringing You Closer

Thank You

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