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ITUEvents

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#ITUWRC

Aeronautical and maritime ESIM in 47.2 – 50.2 GHz and 50.4 – 51.4 GHz (Earth-to-space)

WRC-27 agenda item 1.1

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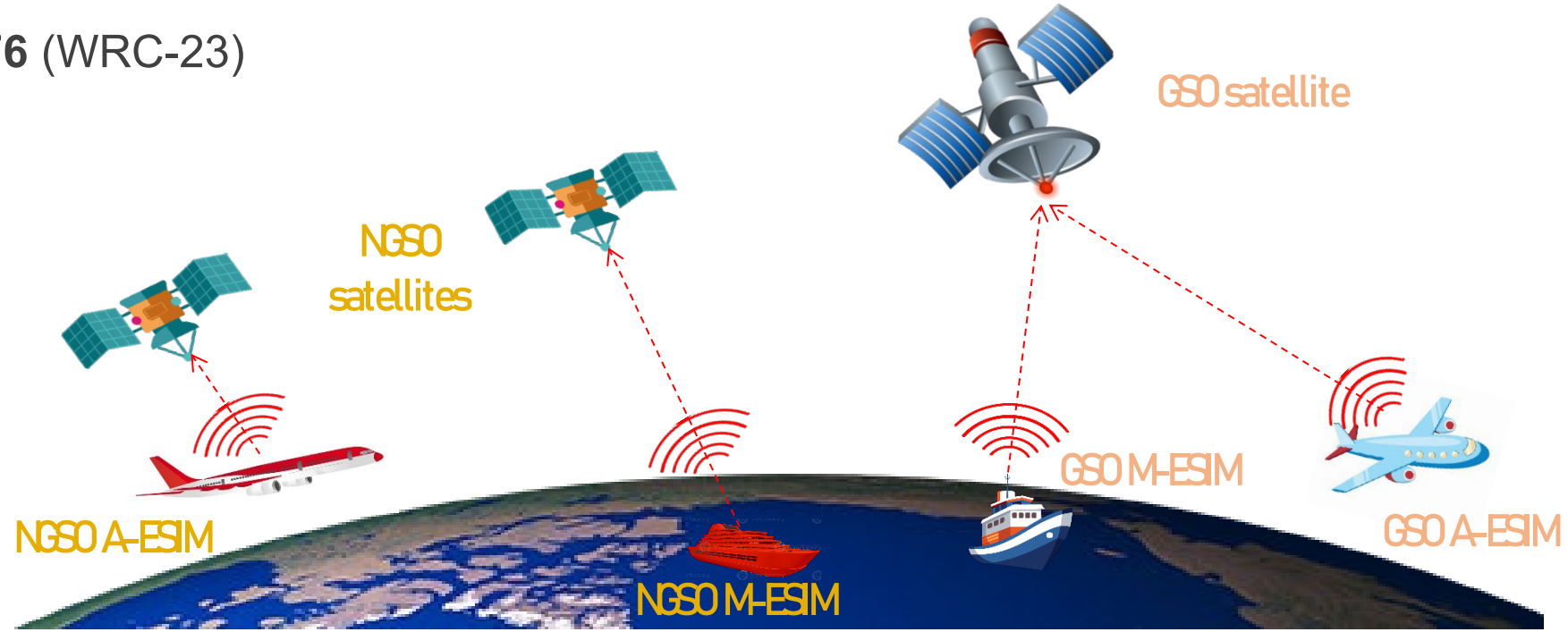
Chair, ITU-R WP 4A SWG AI 1.1

Earth stations in motion (ESIM) in 47.2 – 50.2 GHz and 50.4 – 51.4 GHz (Earth-to-space)

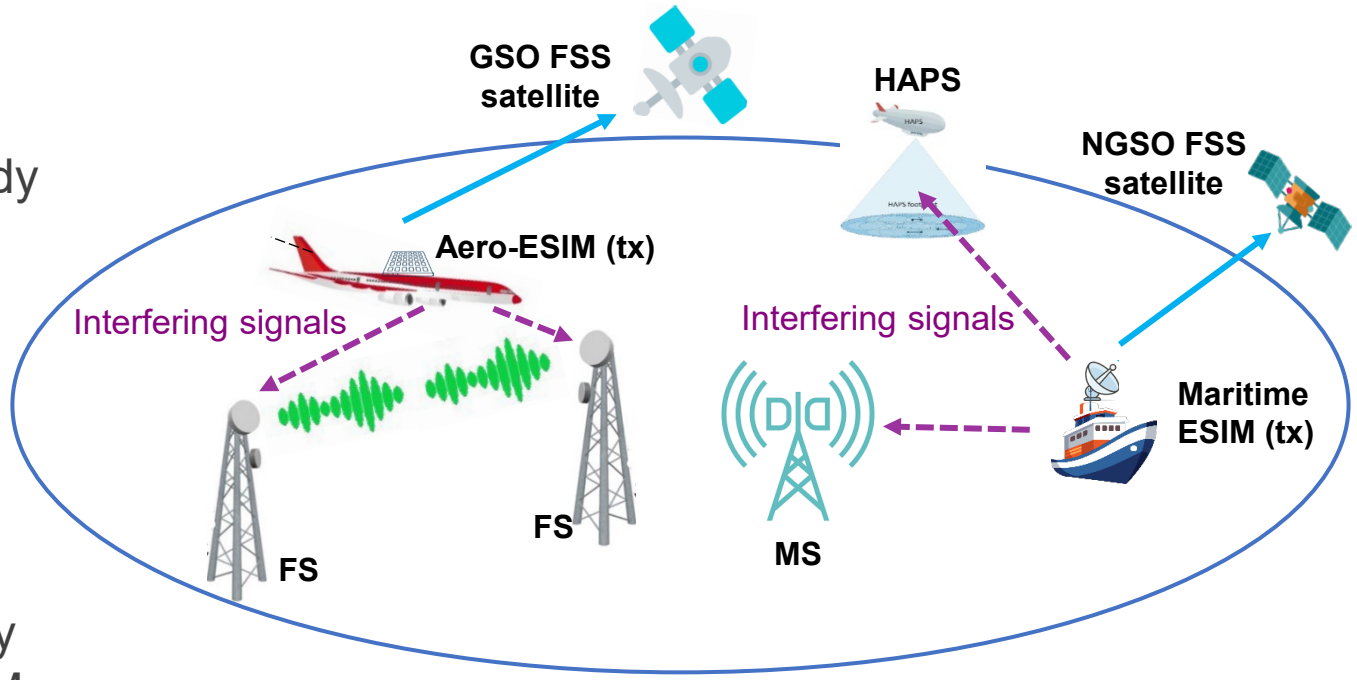
- ✓ Aeronautical and maritime ESIMs communicating with GSO and NGSO satellite networks/systems
- ✓ Transmissions (Earth-to-space) in existing global primary FSS allocation
- ✓ For global broadband communications (non safety-of-life)
- ✓ Resolution **176** (WRC-23)



Technical conditions for the protection of incumbent services (1/3)

Terrestrial services

- ✓ FS and MS primary in the bands under study
- ✓ HAPS in 47.2- 47.5 GHz, 47.9-48.2 GHz
- ✓ IMT in 47.2- 48.2 GHz in R2 and a number of countries



Protection mechanisms

From aeronautical ESIMs: Power-flux density limits on the Earth's surface from single ESIM

$$\begin{aligned}
pfd(\theta) &= -121 \quad dB(W/(m^2 \cdot MHz)) && \text{for } \theta \leq 5° \\
pfd(\theta) &= -157 + 51.5 * log10(\theta) \; dB(W/(m^2 \cdot MHz)) && \text{for } 5° < \theta \leq 25° \\
pfd(\theta) &= -85 \quad dB(W/(m^2 \cdot MHz)) && \text{for } 25° < \theta
\end{aligned}$$

From maritime ESIMs: minimum distance [60 km] from low-water mark of coastal states & maximum e.i.r.p. density [4.9 dBW/3.5 MHz] towards the horizon

Technical conditions for the protection of incumbent services (2/3)

Passive services

EESS (passive) in adjacent band

- ✓ 50.2 – 50.4 GHz
- ✓ GSO and NGSO sensors
- ✓ Studies on aggregate impact from GSO and NGSO ESIMs

Protection mechanism

From aeronautical and maritime ESIMs:

Limits for unwanted emissions from single ESIM falling into the passive band (TBD)

Radioastronomy

- ✓ in-band 48.94 - 49.04 GHz
- ✓ in adjacent band under national arrangements (51.4 - 54.25 GHz)*

Protection mechanism

From aeronautical ESIMs:

Pfd limit on the Earth's at radio astronomy sites from single ESIM [−251.5dBW/m^2/Hz]

* Divergent views were expressed on the protection of RAS observations under national arrangements. Further discussion is needed on this subject (see slide 6)

Technical conditions for the protection of incumbent services (3/3)

Fixed-satellite service

- ✓ FSS (↑) with typical/specific ES
- ✓ BSS feeder links
- ✓ Receiving HD FSS ES

Protection mechanisms

- ✓ For GSO FSS from GSO ESIMs: envelope of typical ES characteristics and coordination agreements
- ❑ For GSO FSS from NGSO ESIMs: ongoing discussion on applicability of current framework for typical NGSO ES to NGSO ESIMs*, no coordination mechanisms to rely on
- ❑ No particular technical conditions yet identified to protect receiving HDFSS ES (↓)
- ❑ No particular technical conditions yet identified to protect BSS feeder links other than those granted by the envelope of typical ES characteristics used in coordination agreements where applicable

Progress on regulatory framework

- ✓ Two draft new Resolutions addressing GSO and NGSO ESIMs separately
- ✓ Building on existing ESIMs frameworks in Ku and Ka bands
  - Space stations required to be coordinated and notified under Art. 9, 11
  - ESIM operations only if authorized by relevant admin
  - Land ESIMs authorizations prerogative of each admin, not in the scope
- ✓ Similar approach as in Res. **121**(WRC-23) and **123** (WRC-23) for ESIM notification, interference management and pfd examination

Further discussions required on:

- ❑ RAS observations in adjacent band (under national arrangements)
- ❑ Availability on elements related to NCMC
- ❑ Intra-service protection for : HDFSS (R1)
  GSO networks from NGSO ESIMs

Thanks for your attention !

For questions and discussion:

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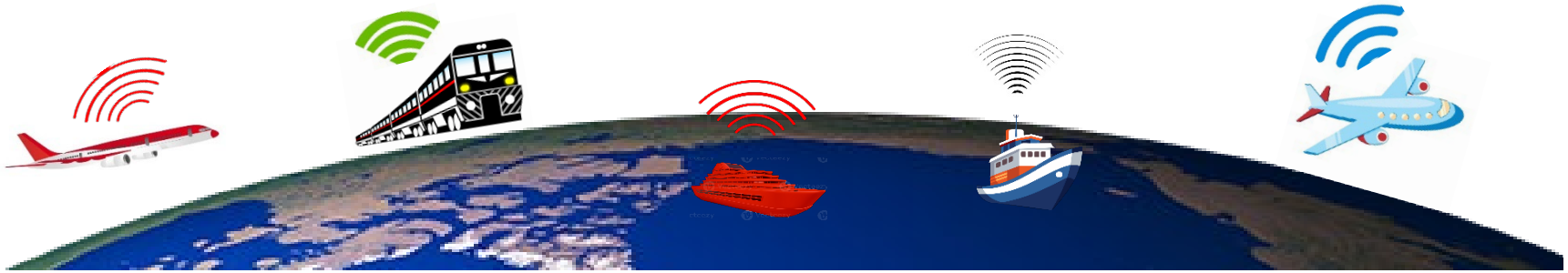
BACKGROUND INFORMATION

Resolutions related to Earth stations in motion

- ✓ Resolution 902 (Rev.WRC-23) → ESV, 5 925-6 425 MHz, 14-14.5 GHz
- ✓ Resolution 156 (Rev.WRC-23) → GSO ESIM, 19.7-20.2, 29.5-30.0 GHz
- ✓ Resolution 169 (Rev.WRC-23) → GSO ESIM, 17.7-19.7, 27.5-29.5 GHz
- ✓ Resolution 121 (WRC-23) → GSO ESIM (Earth-to-space), 12.75-13.25 GHz
- ✓ Resolution 123 (WRC-23) → NGSO ESIM, 17.7-18.6, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1, 29.5-30 GHz (Earth-to-space)



BACKGROUND INFORMATION

Reports related to Earth stations in motion

Report ITU-R S.2223-1 – Technical and operational requirements for GSO FSS earth stations on mobile platforms in bands from 17.3 to 30.0 GHz, October 2016.

Report ITU-R S.2261-0 – Technical and operational requirements for earth stations on mobile platforms operating in non-GSO FSS systems in the frequency bands from 17.3 to 19.3, 19.7 to 20.2, 27 to 29.1 and from 29.5 to 30.0 GHz, September 2012.

Report ITU-R S.2357-0 – Technical and operational guidelines for earth stations on mobile platforms communicating with geostationary space stations in the fixed-satellite service in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz, June 2015.

Report ITU-R S.2464-0 – Operation of earth stations in motion communicating with geostationary space stations in the fixed-satellite service allocations at 17.7-19.7 GHz and 27.5-29.5 GHz, July 2019.