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ICAO WRC-27 Preparatory Workshop

Agenda item 1.16 :

To consider studies on the technical and regulatory provisions **necessary to protect radio astronomy operating in specific Radio Quiet Zones (RQZs),** and in frequency bands allocated to the radio astronomy service on a primary basis globally, **from** aggregate radio-frequency **interference caused by non-geostationary-satellite orbit systems**, in accordance with Resolution 681 (WRC-23).

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Presentation Overview

01 **Background**

02 **Potential Issues**

03 **ICAO Position**

04 **Conclusion**

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Background

Radio Astronomy

Astronomy based on the reception of radio waves from cosmic origin (No 1.13 of ITU-R RR)

Radioastronomy sites with radio quiet zone (RQZ)

- the Square Kilometre Array Observatory in South Africa
- The Atacama Large Millimeter/submillimeter Array (ALMA) in Chile

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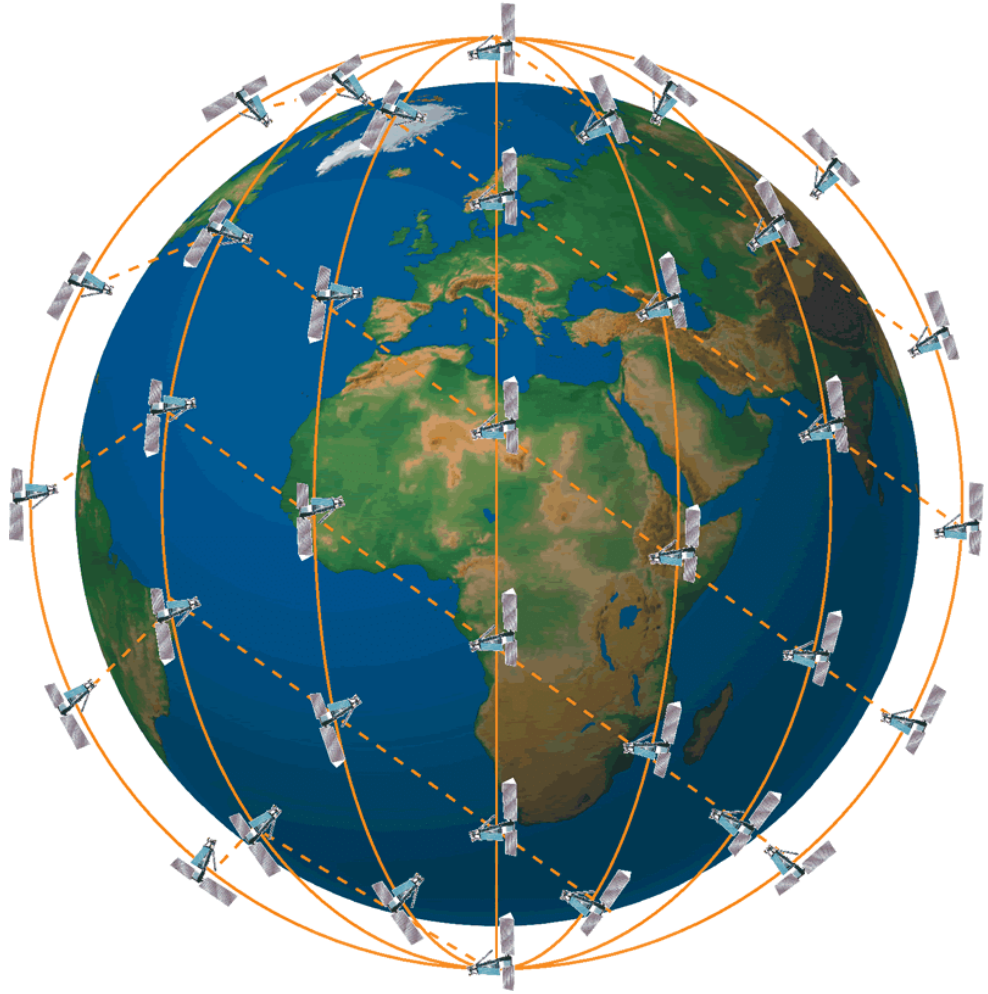
Background

Non-geostationary-satellite

NGSO, or non-geostationary satellite orbit, refers to those satellites which occupy either a low-earth orbit (LEO) or medium-earth orbit. (MEO). Unlike geostationary (GSO) satellites, LEO (and MEO) satellites do not occupy a stationary position but **move** in relation to the Earth



Background

Artificial satellites above our head

- 1957 : Sputnik 1, first artificial satellite
- 1962 : Telstar first telecommunications satellite
- 1990 : 500 satellites
- 2010 : 1000 satellites
- 2018 : more than 2000 satellites
- 2019 : first Starlink satellite, since then at least 6,700 are over our heads, with the objective of 12,000 for the final constellation
- 06 sept 2024 : 10,345 satellites were active
- And more mega-constellations are expected

This is causing concern in the astronomical community

Background

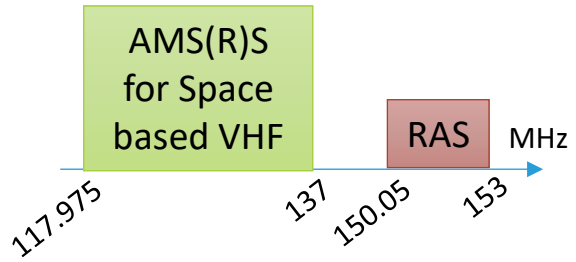
Civil aviation is a user of non-GSO constellations when operated in the AMS(R)S and RNSS, and it is expected to grow in the coming years with new SATCOM usage (example: Space Based VHF and satellite-based C2 Link)

Potential Issues

Resolution 681 (WRC-23) asks for :

1. Studies on how unwanted emission from one and multiple non-GSO satellite systems operating in the adjacent and **nearby frequency bands** to those in Table 1 of Resolution 681 (WRC-23) affect RAS (Resolves 1 and 2)
    - "nearby frequency bands" are not defined and "nearby" is subjective.

2. Potential solutions for **characterising RQZ** in the Radio Regulations and/or in a WRC resolution (Resolves 3, 4, 5, 6)
    - This action identifies no frequency band even outside allocated to RAS and could include any frequency band including those used by Civil Aviation.



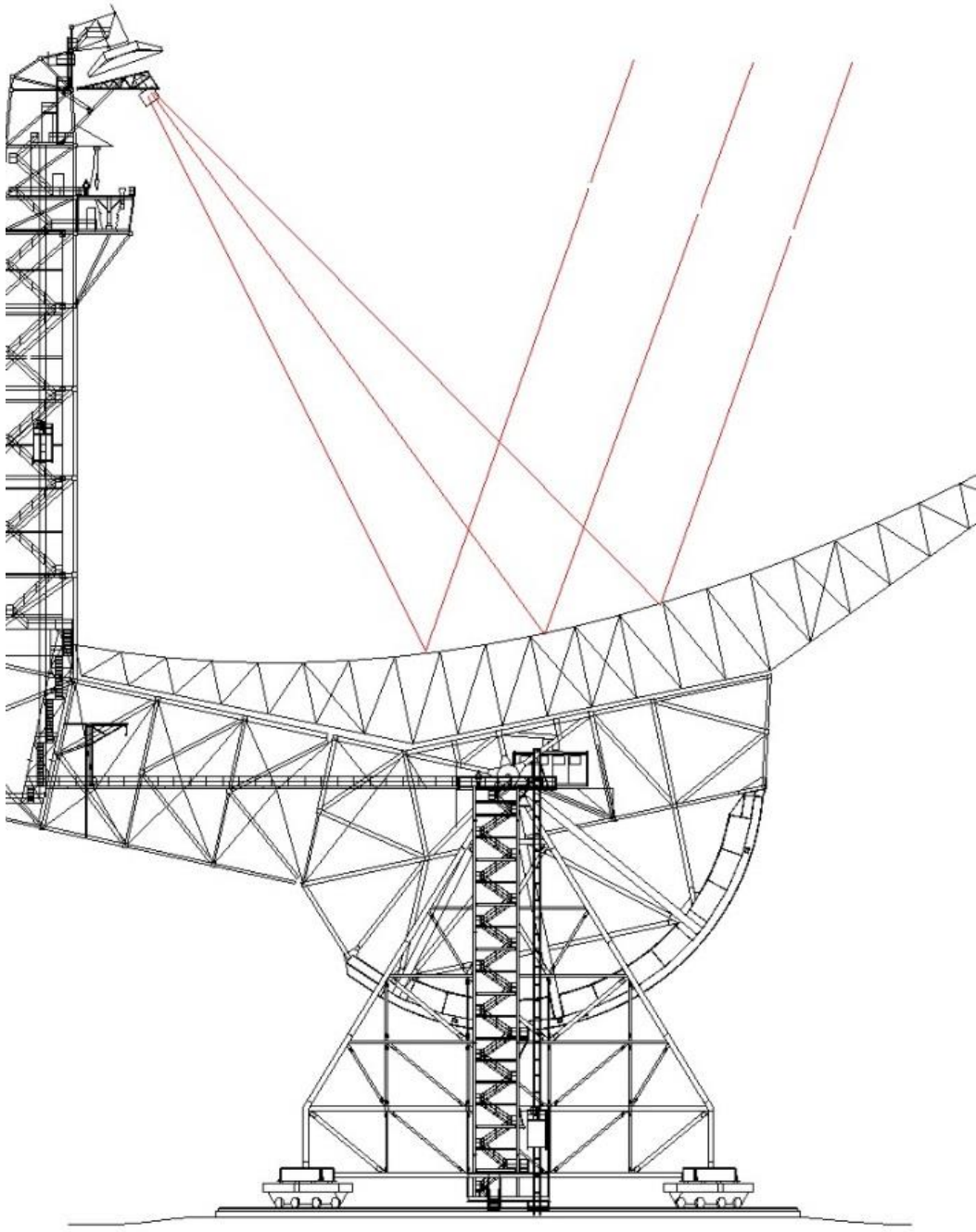
ICAO Position

To ensure that any measures as part of this agenda item related to RQZs would not impose operational and development constraints on non-GSO satellite systems operating in AMS(R)S and RNSS frequency bands.

Conclusion

Although the term '**nearby**' **is subjective**, the aeronautical frequency bands are relatively far from those identified in Resolve 1 and 2 of this agenda item. But we must remain vigilant.

The real threat could come from "to consider […] potential solutions **to characterize the RQZs**". This 'invite' is very open and an **uncontrolled outcome** could jeopardize the use of all aviation frequency bands in certain regions of the globe.



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Question ?

Thank You

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