

Space Policy Conference 2025

Space Sustainability & Debris Removal

Ensuring Equitable Access to Space for All

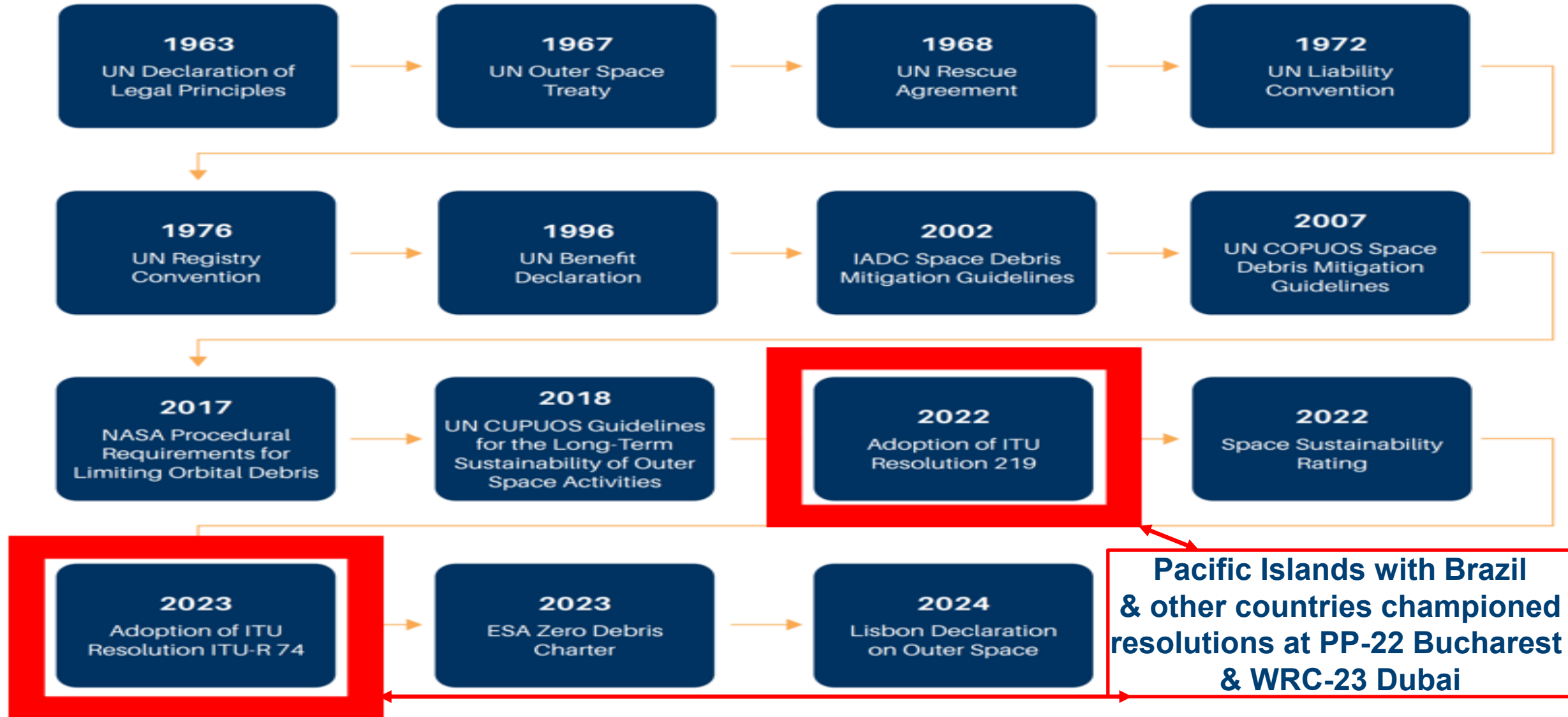
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Space Sustainability & Debris – Role of Various Agencies

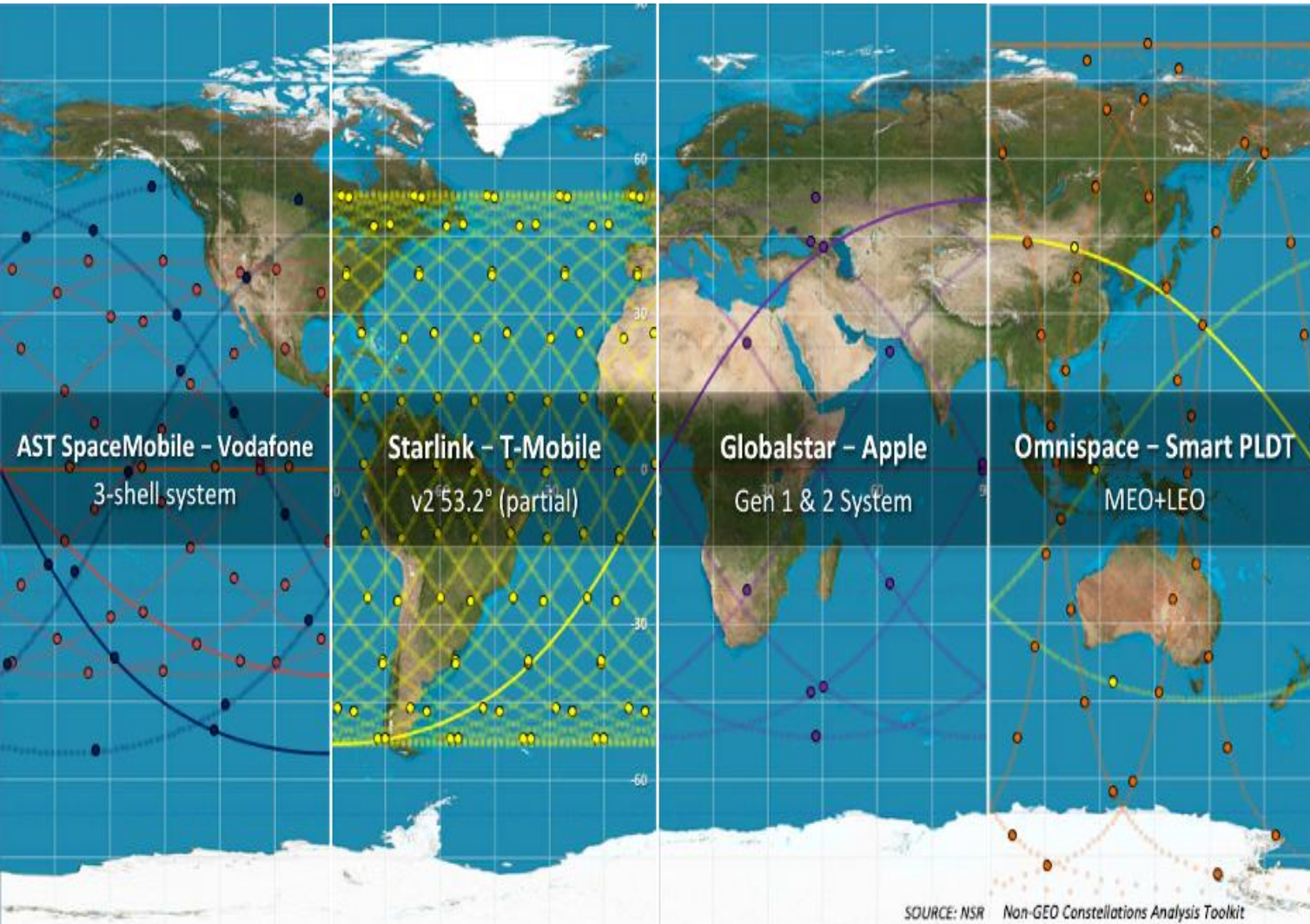
- ❑ ITU Perspective – Spectrum & Orbital resources
- ❑ UNOOSA Perspective – Space management
- ❑ UN COPUS – Debris Management
- ❑ Multi Stakeholders Actions – National agencies

ITU Perspective – Spectrum & Orbital Resources

Multi-lateral Effort – On Space Sustainability

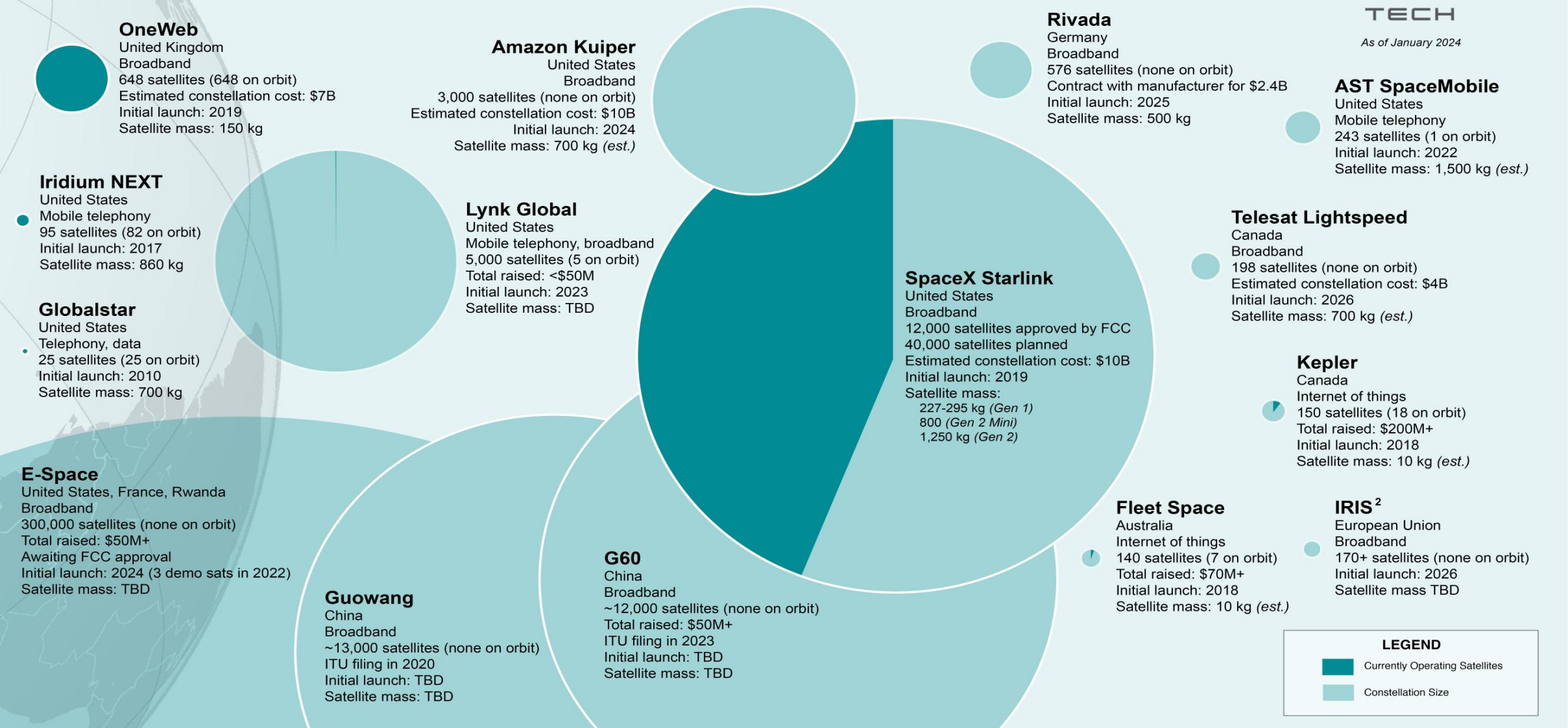


Key Findings Reported by RRB to RA/WRC-23



- Proliferation of large LEO constellations - Concerns for orbital sustainability, and spectrum congestion. Challenges for new entrants
- Challenges to ITU regulatory framework - Criticism of ITU's absence of true response to large constellations. Some countries considering rules outside ITU
- Increased risk of satellite interference - Complex scenarios with many satellites/planes.
- Misuse of regulatory provisions (No. 4.4) - Bypass normal procedures. Growing use for commercial services

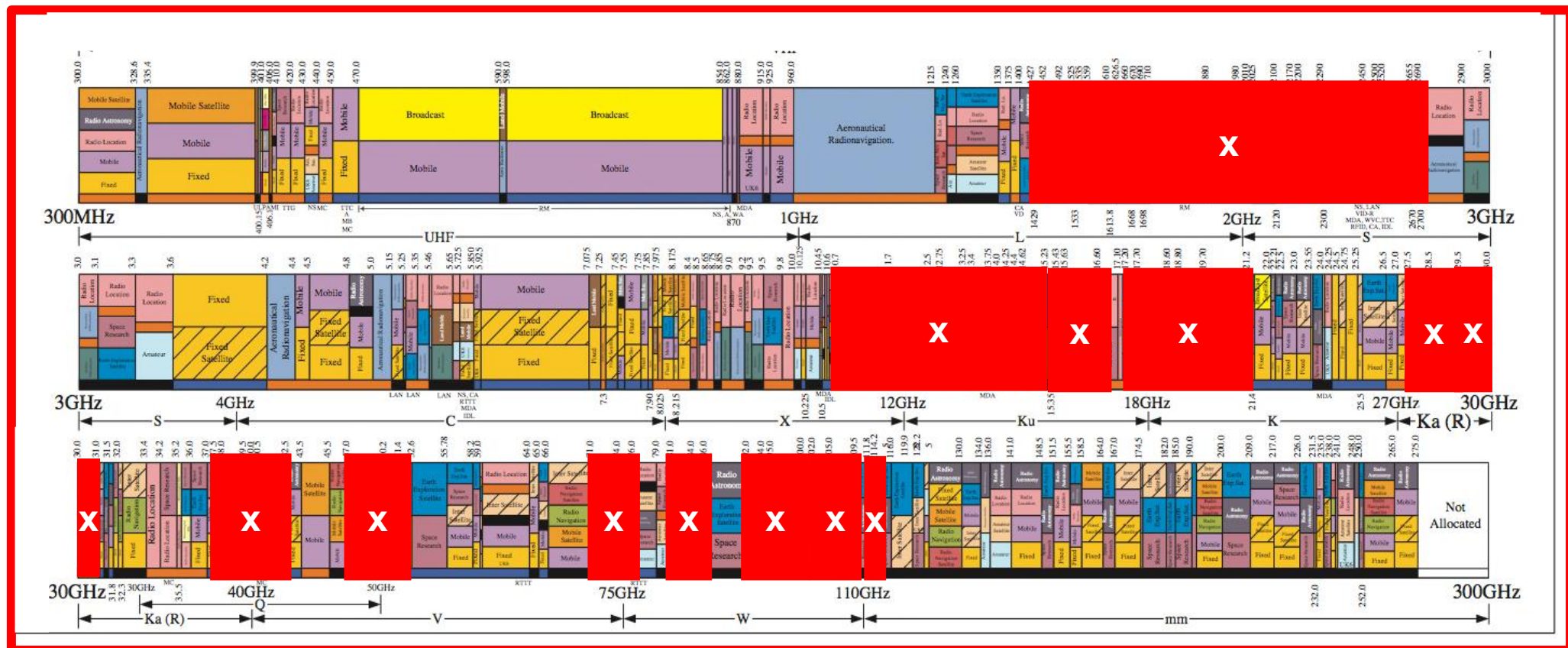
Major LEO Constellations



Access to Satellite Spectrum Is at Risk

For example: One proposal for 34,000 satellites with millions of beams and 51 GHz of spectrum

- With virtually all satellite spectrum below 100 GHz
- Including over 20 GHz to be considered for new or enhanced purposes at WRC-27



Need to Regulate Large NGSO Systems following the outcome of WRC-23

Article 22 EPFD limits for
GSO protection preserved

Unauthorised operation of
NGSO systems to be
addressed

Regulation of Large
NGSO Constellations is
urgently required

Methodology for
Assessment of Aggregate
EPFD Limits

Sharing amongst NGSOs -
Rational, equitable,
efficient and economical

ITU Constitution is Clear

ITU No. 195 of the Constitution states that “Members shall endeavour to limit the number of frequencies, and the spectrum used to a minimum essential to provide in a satisfactory manner the necessary services”

ITU No. 196 of the same Constitution also states that this natural spectrum and orbital resources must be used **Rationally, efficiently, and economically** to facilitate **Equitable access to all**

**Need to ensure Equitable Access to Space for
ALL Nations**

UNOOSA Perspective – Space management

Headline News: Debris falling from the sky

SpaceX rocket debris crashes into Poland



MAGAZINE 18 DAYS AGO

Why are Elon Musk's Starlink satellites burning up in the skies?

A mass retirement of first-generation Starlink satellites is resulting in the burning up of up to five space capsules daily, ringing alarm bells over atmospheric pollution.



TRENDING

Starship Flight 8 launch on Feb. 28

Night sky tonight!

Aurora

Stargazing

SpaceX Starlink satellite sparks brilliant fireball as it falls from space over US (videos)

News

By Tariq Malik published January 29, 2025

"I don't think that's normal," one observer said. Actually, it kind of is.



Comments (0)



Video: Starship explodes after...

India Today



SpaceX Starship debris littere...

NBC News



SpaceX debris streaks across...

Sky News



Amazing shots of Ship33 deb...



Debris from the @spacex star...



Starship explosion raises que...

UNOOSA - Safe and Sustainable Space Operations

Satellites are pivotal to the quality of human life and the world's economy & space is a valuable resource - both contested and congested

Increasing investments are resulting in growing number of launches into the highly productive but crowded orbits

Currently ~ 27,000 catalogued objects in orbit of size more than 10 cm.
Objects under 10 cm size could exceed 100 million

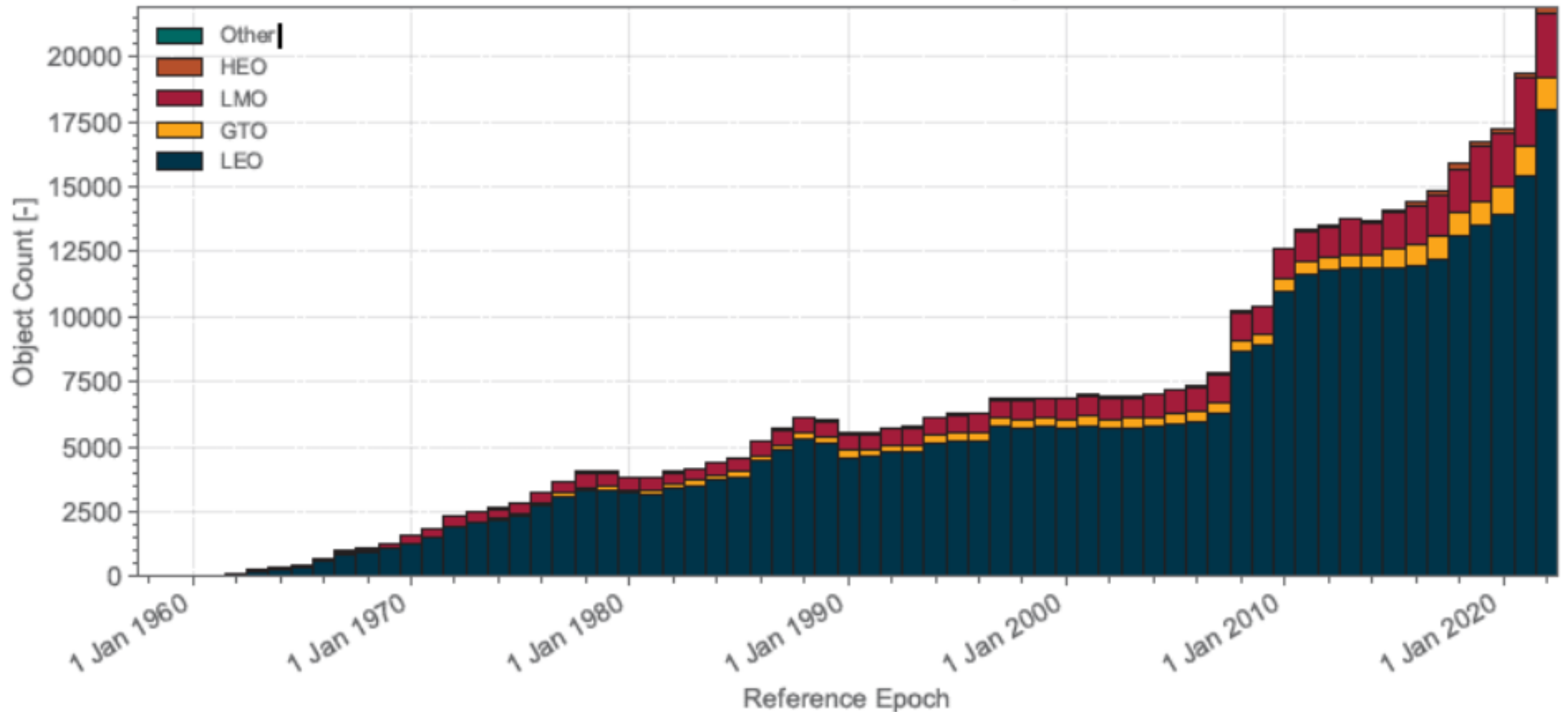
Higher risk of collision due to higher density of space traffic driven by commercial or scientific reasons

With Large constellations in LEO, the sustainability, safety and security of space are complex and questioned

UN COPUS – Debris Management

Continued Growth of Debris Environment

Penetration into LEO_{IADC}



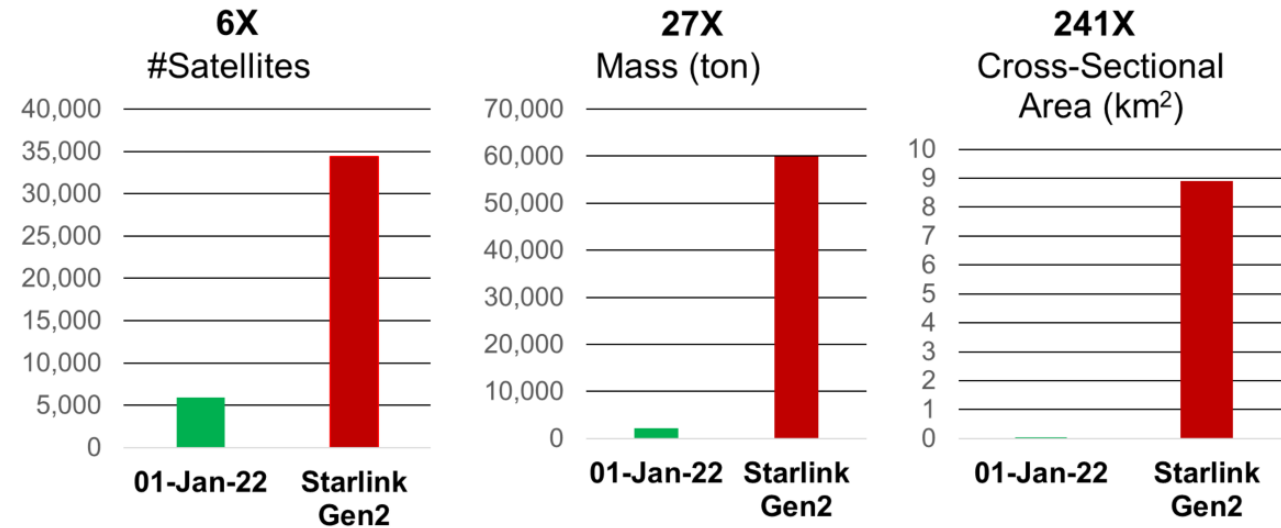
Impact of Debris Collisions with Satellites

Debris Object Size	Number in Orbit	Effect of Collision on Active Satellite
>10 cm	36,500	Catastrophic
1 cm to 10 cm	1,000,000	May be catastrophic or render it non-maneuverable
1 mm to 1 cm	130 million	May render it non-maneuverable

- 19,400 debris objects that are regularly tracked by Space Surveillance Networks
- Estimated 1,000,000 (& growing) pieces of debris between 1 cm and 10 cm that are unlikely to be tracked
- Collision risks with smaller objects (<1 cm) can be mitigated with appropriate design incorporating subsystem redundancy and shielding in satellite design

Space Safety and Sustainability - Aggregate Collision Risk

- It is **essential to assess the aggregate collision risk presented by all LEO systems** that seek to serve or use ground stations located in a nation.
- Collision risk in LEO scales with factors such as the **cross-sectional area of the satellites, satellite mass, the numbers and orbits of satellites, and satellite failure rates** related to maneuverability (i.e., the capability to avoid collisions). **These parameters are the dominant determinants of Space Safety and Sustainability**
- The massive increase in LEO constellation sizes is driving an exponential increase in the likelihood of an in-orbit collision. **Failing to address this issue could lead to devastating impacts on Space Safety and Sustainability.**



Trends in LEO Constellation Size, Mass, and Cross-Sectional Area

# of Satellites in Orbit	Allowed Mean Time Between Collisions in Years (Days)
1,000	5
5,000	1
10,000	0.5 (180 days)
50,000	0.1 (36 days)
100,000	0.05 (18 days)

Aggregate Risk Applying a Single Satellite Risk Standard

Multi-Stakeholders Actions

Concluding Remarks - Sustainability and Space Debris

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- The part of **space near Earth (250-600km)** that can be used for human activities is a **finite resource**, fragile and at risk of over-exploitation, just like resources on Earth.
- With the exponential growth of the size of satellite constellations in Low Earth Orbit (LEO), it is increasingly clear that the available “real estate” **will not be big enough to support the safe and sustainable operation and enable equitable access. ITU & National Regulators must act decisively.**
- The rise of mega-constellations in low Earth orbit poses a significant risk of denying access to LEO and radio spectrum, making it impossible for later arrivals to operate safely and sustainably. The core issue is crowding too many objects into valuable regions of space by as few as one or two individual nations or commercial actors.
- As the **Earth’s orbital environment is getting increasingly congested, concerns about its long-term sustainability, potential overexploitation, and risk of interference** are becoming increasingly evident and shared among policymakers, regulators, industry leaders, and academia.

Collectively, we must all ensure the protection of the space orbital, spectrum and environmental resources

National regulators have the power to ensure that the systems they authorize or allow to serve their countries do not threaten space safety and that multiple countries can share the limited LEO orbital resources equitably.

Thank you