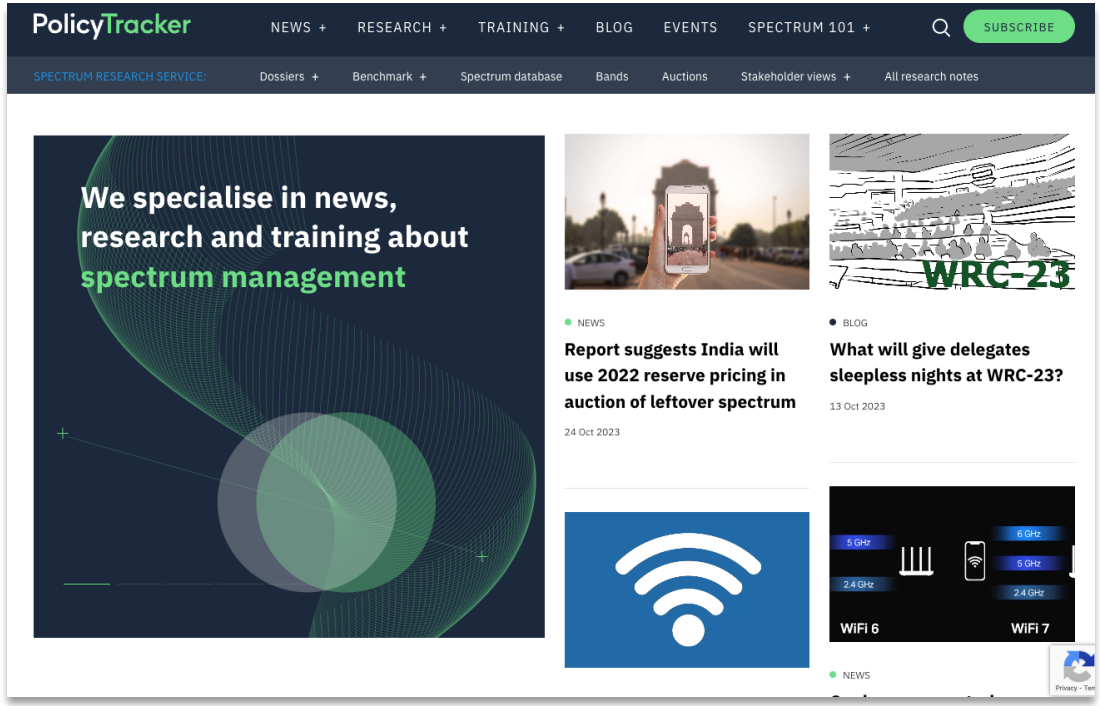
Non-terrestrial connectivity

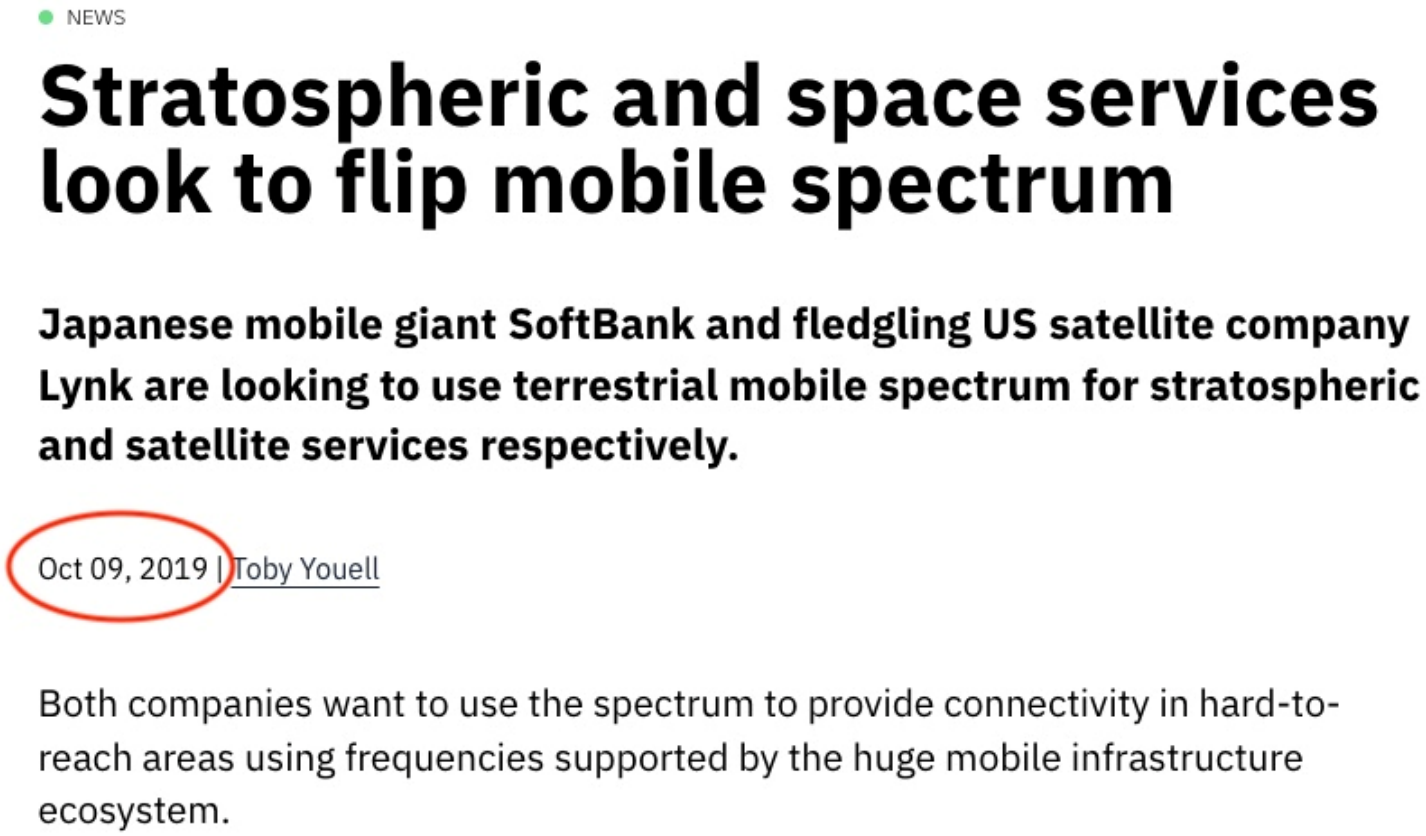
Spectrum challenges and market outlook

What is PolicyTracker?

- Focused on spectrum policy
- We produce a daily newsletter, provide research and training courses
- We work with various clients including the European Commission
- We are impartial and cover the activities of regulators, MNOs, vendors, satellite and all spectrum users



We've been covering non-terrestrial networks for a long time…



NEWS

Stratospheric and space services look to flip mobile spectrum

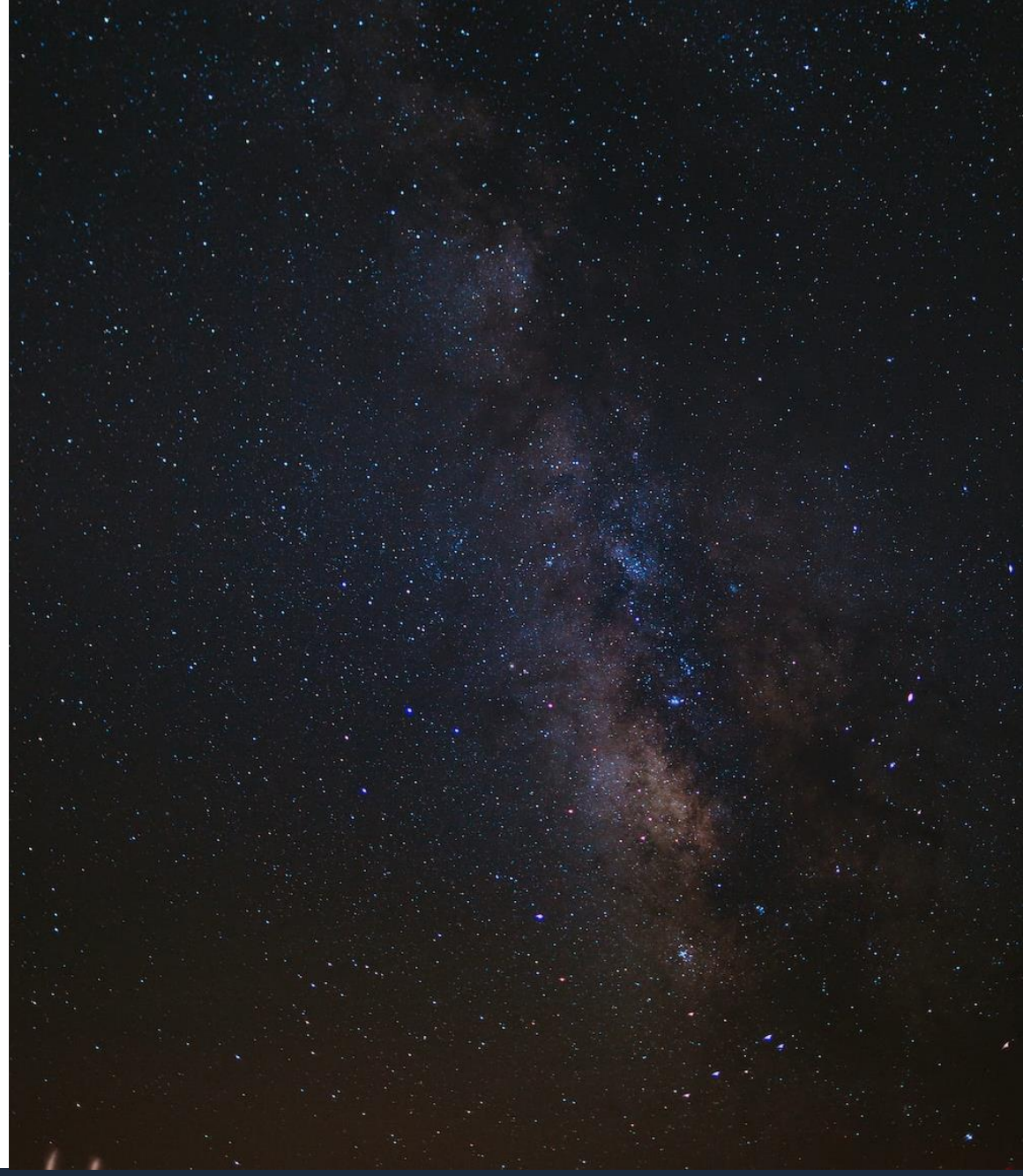
Japanese mobile giant SoftBank and fledgling US satellite company Lynk are looking to use terrestrial mobile spectrum for stratospheric and satellite services respectively.

Oct 09, 2019 | Toby Youell

Both companies want to use the spectrum to provide connectivity in hard-to-reach areas using frequencies supported by the huge mobile infrastructure ecosystem.

Overview

- There is a lot to cover in NTN
- I will focus on two main areas
- HAPS (& HIBS)
  - Spectrum needs & strategies
  - Market outlook
- Satellite D2D
  - Spectrum needs & strategies
  - Market outlook



High-altitude platform stations (HAPS) and High Altitude IMT Base Stations (HIBS)

HAPS and HIBS spectrum needs

- Several bands have been made available for HAPS over the years; only one band (2 GHz) available for HIBS.
- WRC-23 AI 1.4 calling for HIBS to have access to more existing IMT frequency bands. Including the 700—900 MHz, 1.8 GHz and 2.6 GHz bands.
- Several co-existence proposal: Most regional groups appear to be supporting position 3.
- Position 3: Global HIBS identification but without being able to claim protection from other services.
- While ideally, the industry wants to claim protection, they appear happy with this compromise.

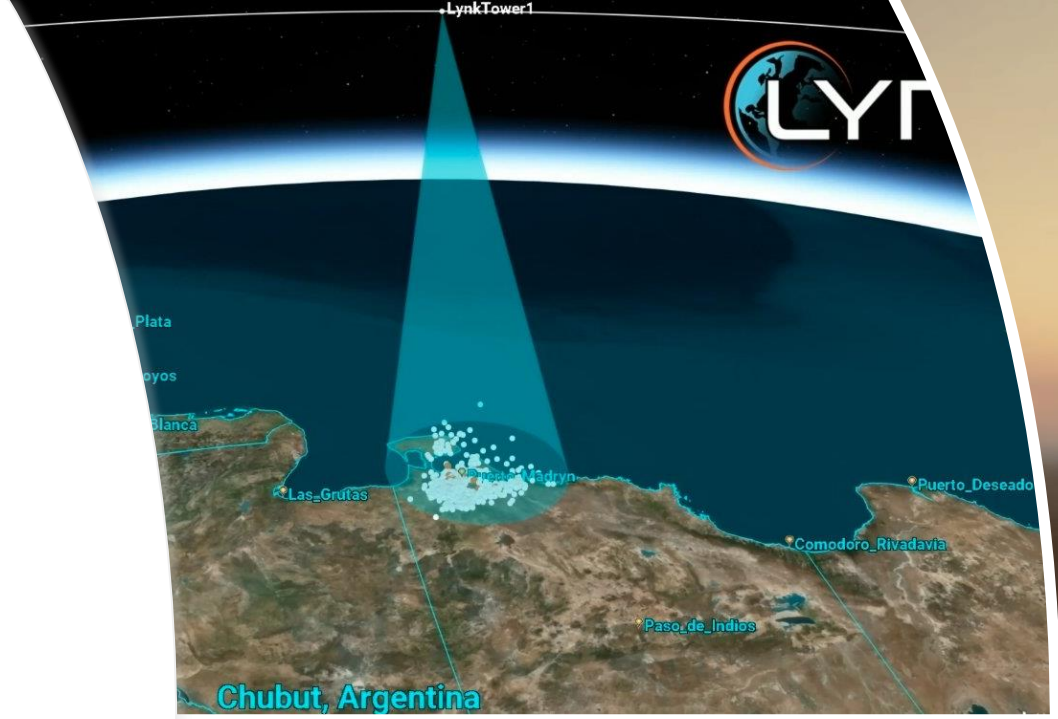
	Issue A (694-960 MHz)				Issue B (1 710-1 885 MHz)				Issue C (1 885-1 980 MHz, 2 010-2 025 MHz, 2 110-2 170 MHz)			Issue D (2 500-2 690 MHz)			
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
Africa (ATU)			X				X				X			X	
Europe (CEPT)			X				X				X			X	
CIS/CEE (RCC)	[X]		[X]				X				X			X	
Arab (ASMG)	TBD in September														
Americas (CITEL)		X				X				X			X		
Asia-Pacific (APT)		No common proposal					X				X			X	

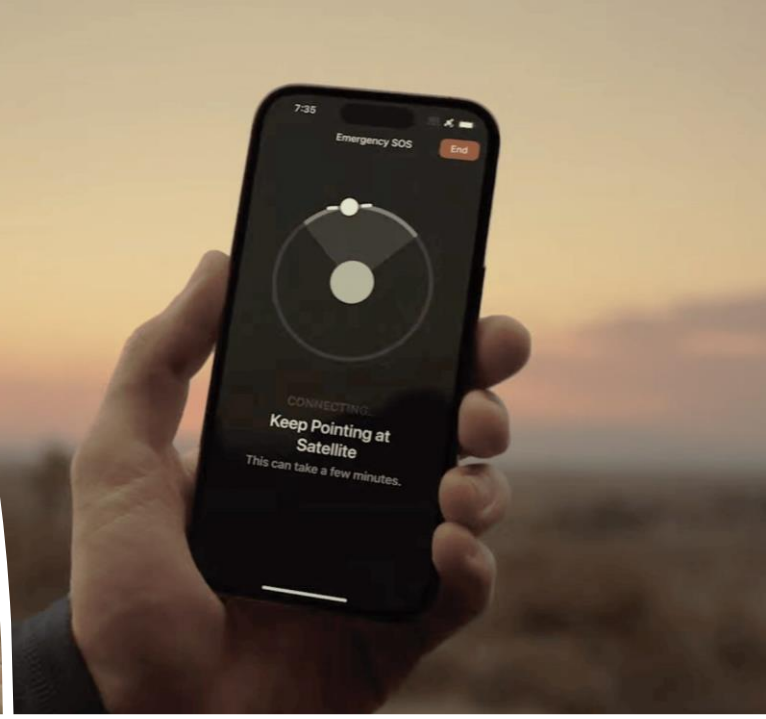
Preliminary positions of each ITU regional group. 1-4 represent the options, while A-D represent the different spectrum bands being considered. (*Source: HAPS Mobile*)

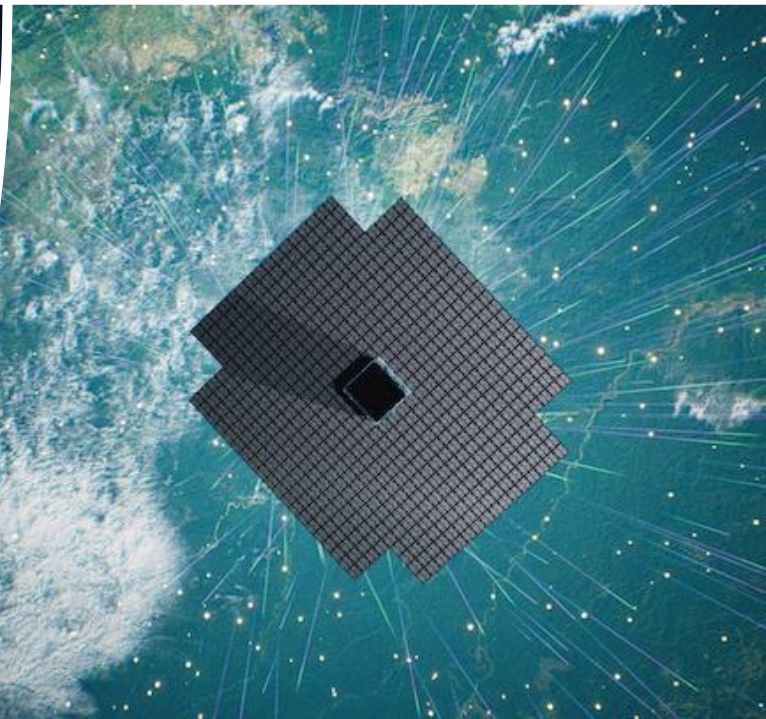
Doubts over HAPS/HIBS

- Spectrum was first allocated to HAPS at WRC-2000. Yet nearly 23 years on, it has yet to be deployed commercially.
- Spectrum unlikely to be a major barrier to commercial success.
- Several trials have taken place: the technology appears relatively mature.
  - In 2020, HAPS Mobile conducted a 5-hour test flight of sunglider
  - 2022: UK Stratospheric Platforms trialled a 5G network in The Red Sea in Saudi Arabia
- Various use cases being considered: covering previously uncovered areas with 5G, emergency communications in the case of natural disasters, and private networks.

Satellite direct-to-device (D2D)

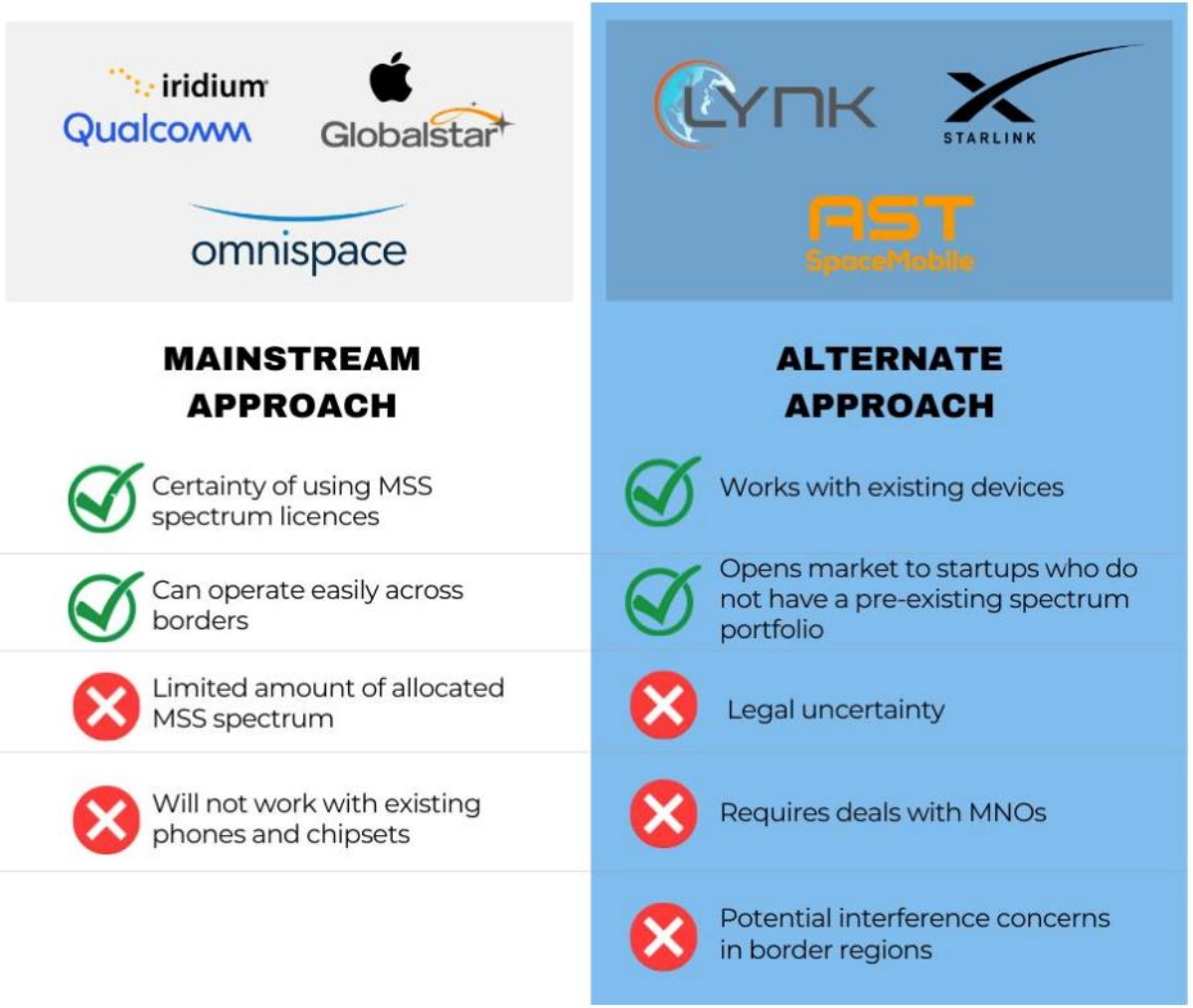






Satellite D2D spectrum strategies

- ‘Mainstream approach’ uses ‘traditional’ MSS spectrum licences.
- ‘Alternate approach’ re-uses terrestrial spectrum.
- There has been a push to ‘legalise’ the alternate approach through the WRC-process.



Spectrum approaches to satellite D2D (Source: PolicyTracker)

Satellite direct-to-device

Alternate approach

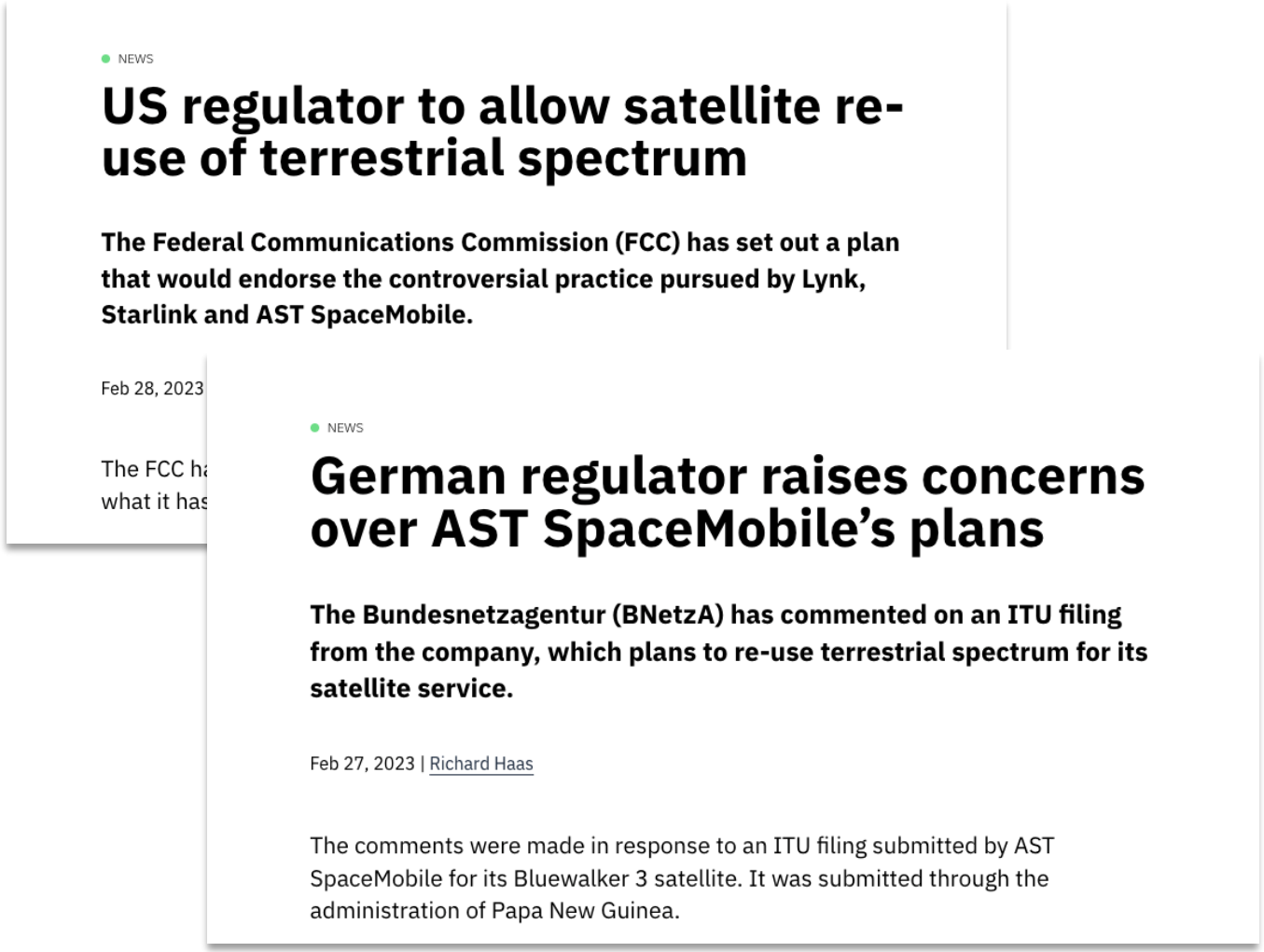
Company	Maturity	Type of service	Number of sate	Spectrum use
Lynk Global	In operation (limited)	SMS texting (with planned future support for voice & data)	3 commercial LEO satellites	Use of terrestrial MNO spectrum
AST SpaceMobile	Testing phase	Data services	1 LEO satellite	Use of terrestrial MNO spectrum
Starlink	Planned	SMS texting (with possible support for other messaging apps)	None	Use of terrestrial MNO spectrum

Mainstream approach

Company	Maturity	Type of service	Number of satellit	Spectrum use
Apple	In operation	Text-based emergency SOS	24 LEO satellites	Licenced MSS spectrum
Omnispace	Testing phase	Voice and data services	2 LEO satellites	Licenced MSS spectrum
Qualcomm	Planned	SMS texting (with possible support for other messaging apps)	66 LEO satellites	Licenced MSS spectrum

The risks of taking an “alternate” approach to spectrum

- Without global ITU rules, it will be up to regulators to allow/disallow this service
- The FCC has embraced satellite D2D
- But… some regulators are spooked



NEWS

US regulator to allow satellite re-use of terrestrial spectrum

The Federal Communications Commission (FCC) has set out a plan that would endorse the controversial practice pursued by Lynk, Starlink and AST SpaceMobile.

Feb 28, 2023

The FCC ha
what it has

NEWS

German regulator raises concerns over AST SpaceMobile’s plans

The Bundesnetzagentur (BNetzA) has commented on an ITU filing from the company, which plans to re-use terrestrial spectrum for its satellite service.

Feb 27, 2023 | Richard Haas

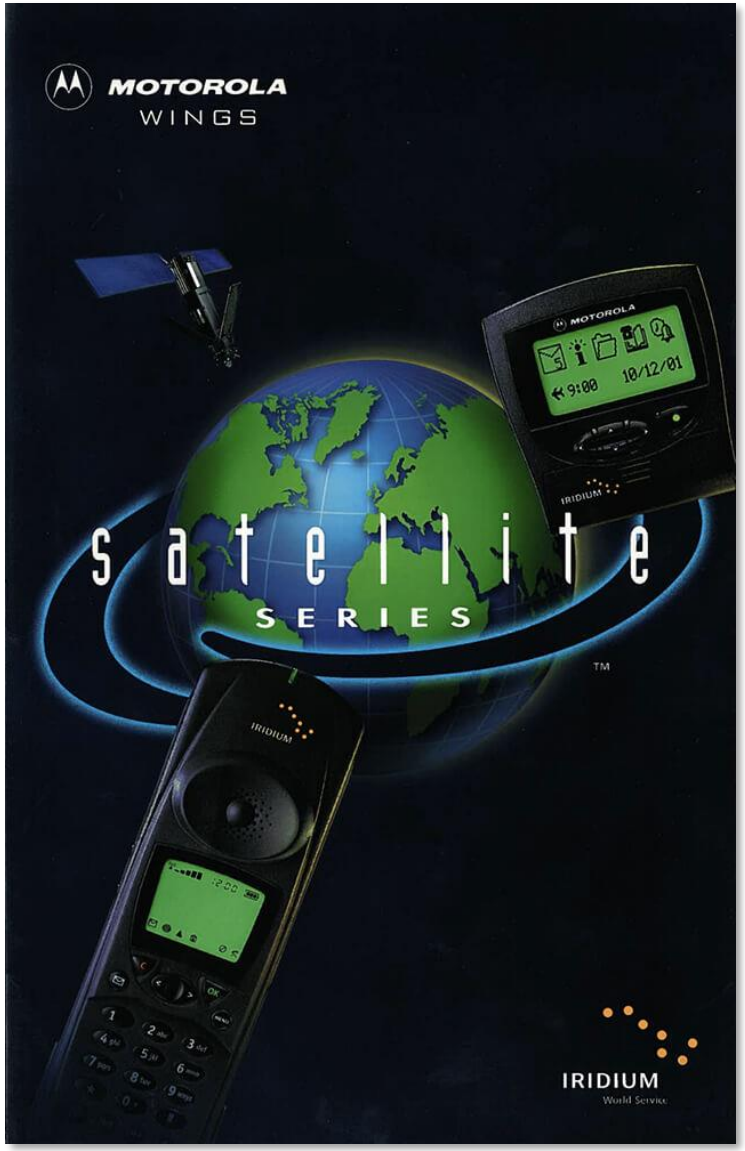
The comments were made in response to an ITU filing submitted by AST SpaceMobile for its Bluewalker 3 satellite. It was submitted through the administration of Papa New Guinea.

FCC Supplemental Coverage from Space (SCS)

- In February 2023 the FCC announced plans to develop a new regulatory framework to support SCS.
- SCS would be allowed through the creation of a footnote in the frequency allocation table in the following targeted bands (including 600 MHz; 700 MHz; 800 MHz; PCS and WCS bands)
- Several prerequisites:
  - Operators required to lease spectrum from terrestrial spectrum licence holders.
  - Existing authorisation needed for their NGSO systems.
  - Spectrum partners will need to hold all co-channel licences across an entire geographically independent area (GIA)
  - The regulator proposes the following GIAs: Continental US, Alaska, Hawaii, American Samoa, Puerto Rico/US Virgin Islands and Guam/Northern Mariana Islands.
- FCC often a leader in the region and other regulators may follow
- Little progress since initial announcement

A nuanced perspective on satellite D2D potential…

- Some argue we've been here before: Iridium 1998.
- The promise of 'global connectivity' is alluring, but addressable market could be overstated.
- Spectrum challenges are difficult to overcome.
- A future global broadband service will take time and requires significantly more investment.
- Existing services available today are very limited.
  - Apple Emergency SOS relies on prewritten messages.
  - Lynk service in Palau is limited to 1-2 satellite passes a day.



A 1998 catalogue from Motorola featuring its Iridium-compatible devices (Source: The Iridium Museum)

Thanks for listening!

www.linkedin.com/in/richardhaas99/

www.policytracker.com