Satellite and NTN Summit

Presented by: GSMA Intelligence

Al Translation



Tim Hatt

Head of Research and Consulting, GSMA Intelligence

Al Translation



Intelligence

Every mobile operator. Every network. Every spectrum assignment.

Backed by the GSMA, GSMA Intelligence provides comprehensive insights, forecasts and research into the telecoms and communications industries covering topics including IoT, 5G, Open RAN, NTN, AI, and more.

Data and analysis covering the complete mobile ecosystem

1,000+

Mobile operators



50 million+

Data points



4,500+

Mobile networks



200+

Reports per year



NEW website out now



Space is (still) getting more crowded

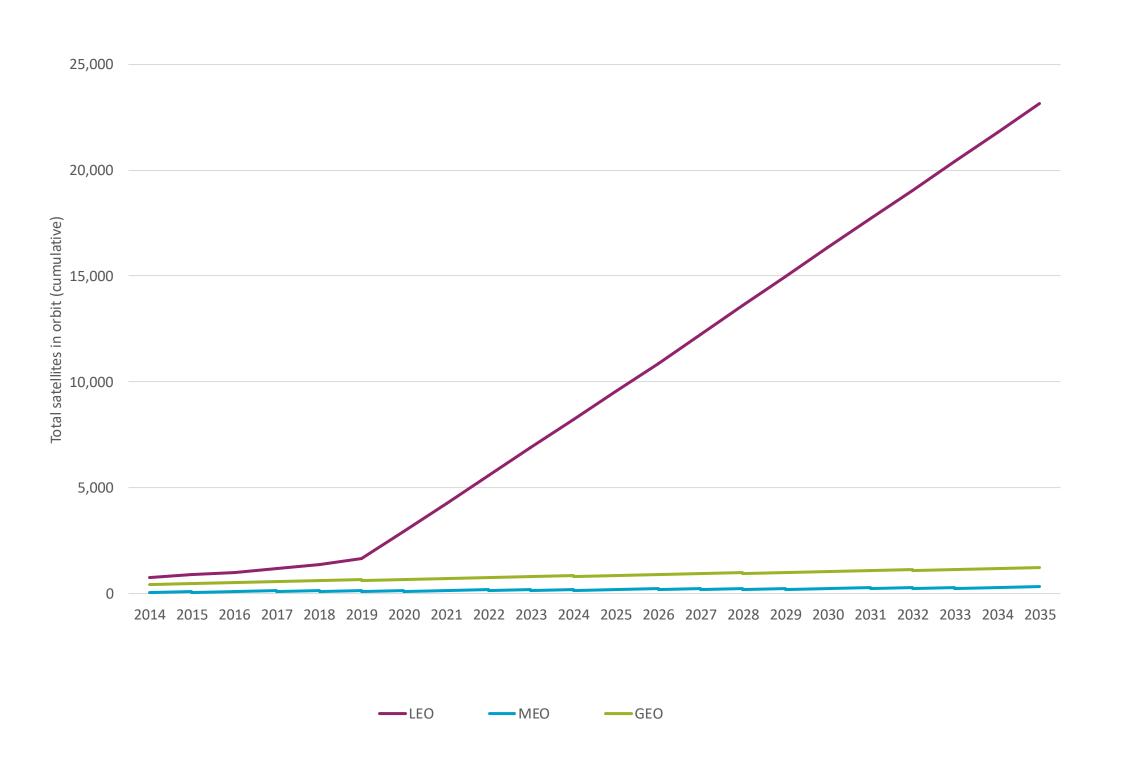
Huge momentum

- LEO constellation explosion. Total satellites in orbit will be 10x pre 2020 levels by end of decade
- Driven by improved satellite economics and performance
- Telco demand growing

Wide ranging use cases

- Consumer = unconnected, roaming, emergency service
- IoT/industrial sell in coming into frame across several industries
- Emergency + disaster response

Satellite is exploding, driven by LEO volumes







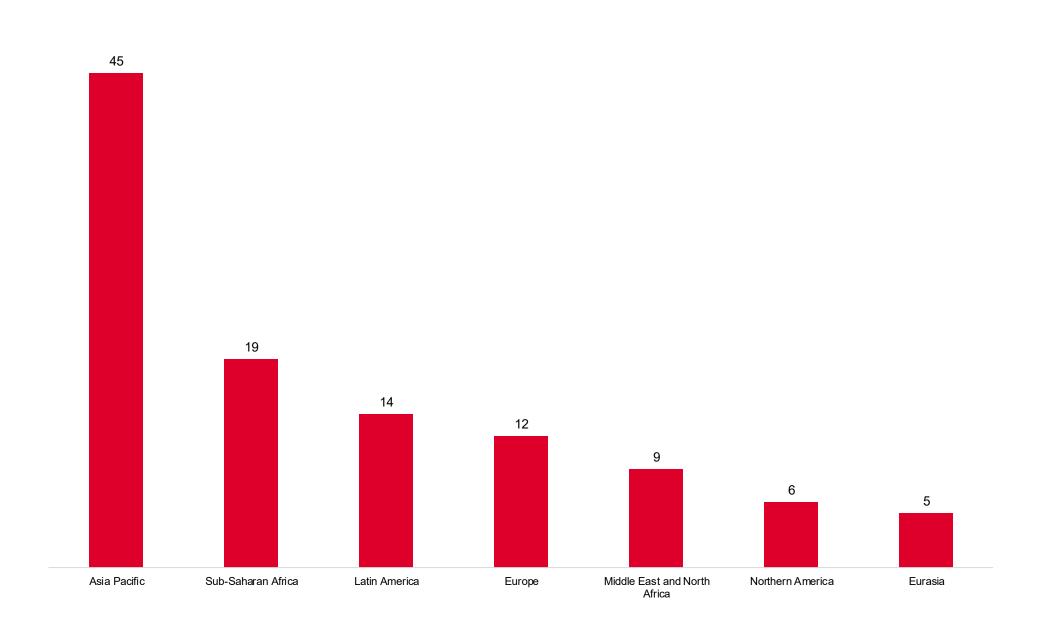
The market in numbers: >110 telcos working with satellite

Telco satellite and NTN footprint

Metric	May 2025	August 2025	Change (last three
			months)
Operators with satellite service*	109	110	+1
Of which are live	27	28	+1
Of which are planned or testing	82	82	-
Mobile connections footprint (million)	5,752	5,881	-
Share of total connections base covered by satellites and NTNs	66%	67%	+1ppts

^{*} Defined as unique operators or operator groups operating a direct constellation or offering satellite connectivity through one or more partnerships.

Regional split of telcos with a satellite presence



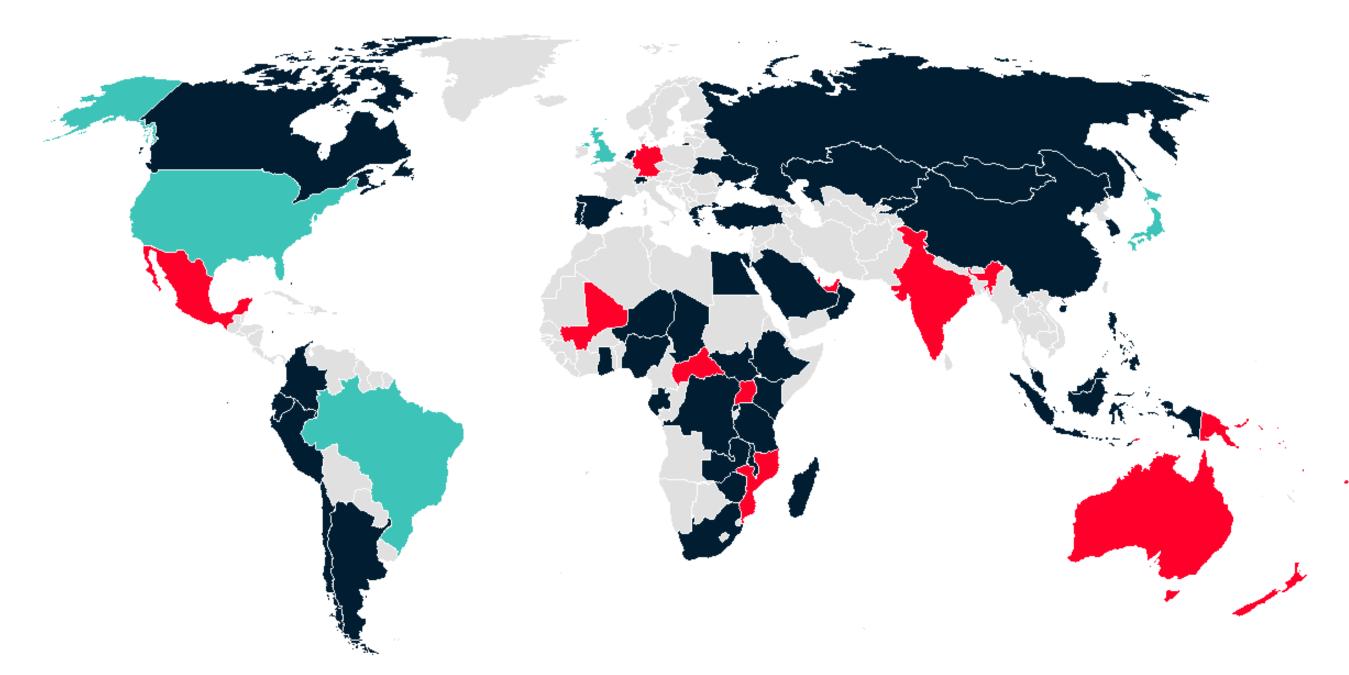
Data correct to September 2025 Source: GSMA Intelligence



Global view (changing by the week)

Global view of telco satellite coverage

- Satellite not yet launched but either planned or in testing phase
- Satellite coverage available from one operator
- Satellite coverage available from two or more operators

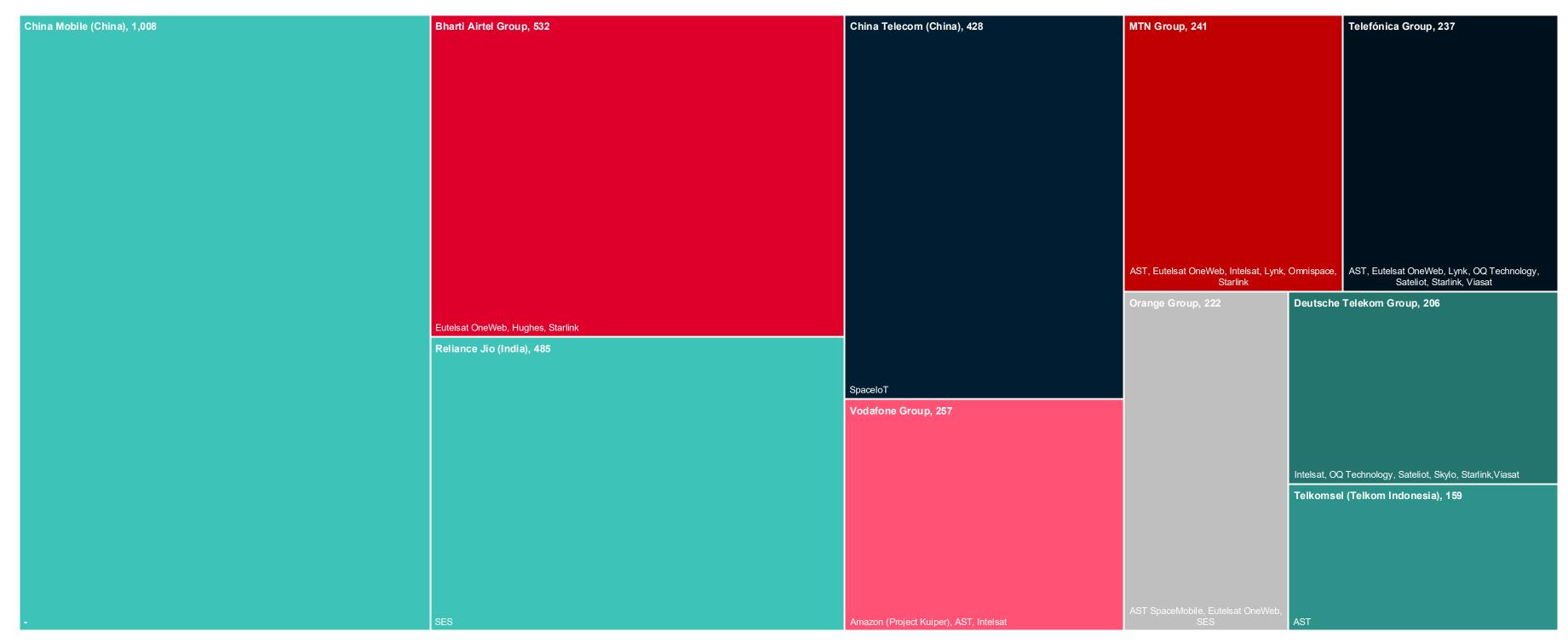


Note some countries may not be shaded but still have operators with satellite partnerships not been publicly disclosed Data correct to May 2025.

Source: GSMA Intelligence



A varied set of partnerships



Note: The number of mobile subscribers for each operator or group represents the addressable footprint for a partnership, assuming national satellite coverage.

Data correct to September 2025

Source: GSMA Intelligence



How does the satellite story split between generations of mobility?

Consumer satellite segments split into three: coverage gaps, edge of coverage and roaming (premium)

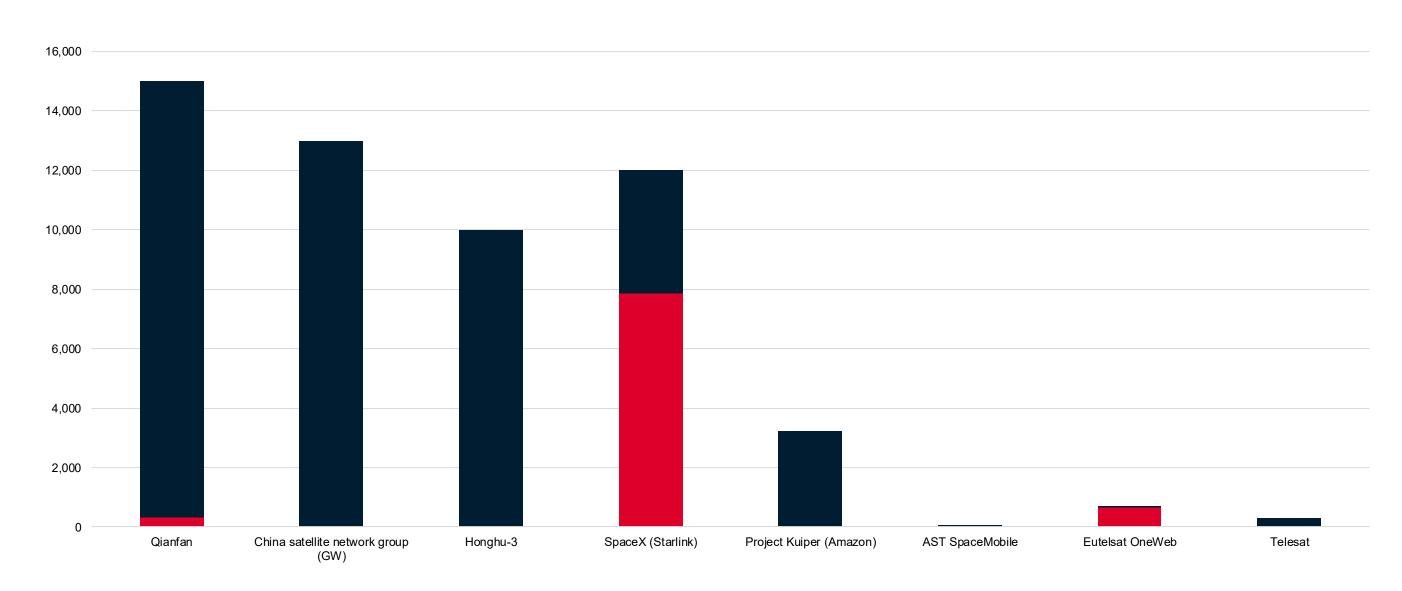
		2/3G	4G	5G	Total
Share of mobile base (%)	Coverage gap	14.4%	1.2%	0.0%	2.1%
	Coverage edge	11.2%	1.5%	0.4%	2.1%
	Premium service	5.1%	3.1%	8.8%	4.9%
	Total	30.7%	5.8%	9.2%	9.1%

Figures represent the mobile technology that someone who is addressable for satellite connectivity is currently on (those in the coverage edge and premium service segments) OR that we anticipate they would take if and when becoming an active mobile subscriber if not already Source: GSMA Intelligence



Competitive landscape: satellites

China + global top 5 Number of satellites



■ Already in orbit

■ To be launched (as part of announced plans)

Data correct to August 2025 Source: GSMA Intelligence



Competitive landscape: satellites (part 2)

Starlink

- First mover
- Bolstering spectrum position (Echostar)
- Cross sell

AST and Kuiper

- AST fraction launched, fully financed for remainder
- Kuiper larger in scale, strategy likely more in broadband and logistics, D2D TBC

• The rest

 A raft of existing sat-co's from Iridium to Viasat and SES/Intelsat have large fleets that will be leveraged for D2D over the next 3 years

Top satellite constellations (ex China)

	Currently in orbit	Planned constellation (all services)	% of constellation deployed
Starlink	7,875	12,000	66%
Lynk	5	5,000	0.1%
Kuiper	27	3,232	1%
Eutelsat/OneWeb	655	673	97%
SES/Intelsat	142	142	100%
Iridium	66	66	100%
AST Space Mobile	5	60	8%
Viasat/Inmarsat	23	41	56%
Globalstar	32	32	100%
Echostar	10	10	100%
Space42 (merger of Yahsat and Bayanat)	6	8	75%
Skylo*	-	_	
Omnispace	Not yet launched		

Data correct to September 2025 Source: GSMA Intelligence



Direct to cell is all the rage (for now)...

- Momentum. The direct to cell phenomenon is driving a significant amount of telco-satellite partnerships. Our data indicates that, for AST, Starlink and Lynk, this model powers the majority of their telco partnerships for satellite service that integrates with mobile networks
- Phased launches. That does not, however, mean that commercial services will spring up tomorrow. We are instead likely to see a phased transition where satellite constellations at LEO start by offering partial service (2-3 hours/day) in 2025/26 when satellites are overhead, gradually expanding to 24/7 offerings to the polar latitudes by 2027/28

Satellite operator	Live telecoms operator partnerships*	Planned telecoms operator partnerships*	Delivery mode: direct to BTS	Delivery mode: direct to device**	
AST SpaceMobile	0	31	6%	94%	
Lynk	3	23	4%	96%	
Starlink	8	13	52%	48%	
SES/Intelsat***	8	12	95%	5%	
Eutelsat OneWeb	3	8	91%	9%	
Others	11	38	47%	53%	
Total/average	33	125 42%		58%	

^{*} Figures are for satellite partnerships with telecoms operators for mobile connectivity, either by providing backhaul or direct to device. Where a satellite player has partnered separately with an operator group and its subsidiary, this has been counted twice. Satellite broadband services (e.g. at home, businesses or community locations) are not included.

Intelligence

^{**} Includes direct to cell and direct to IoT device

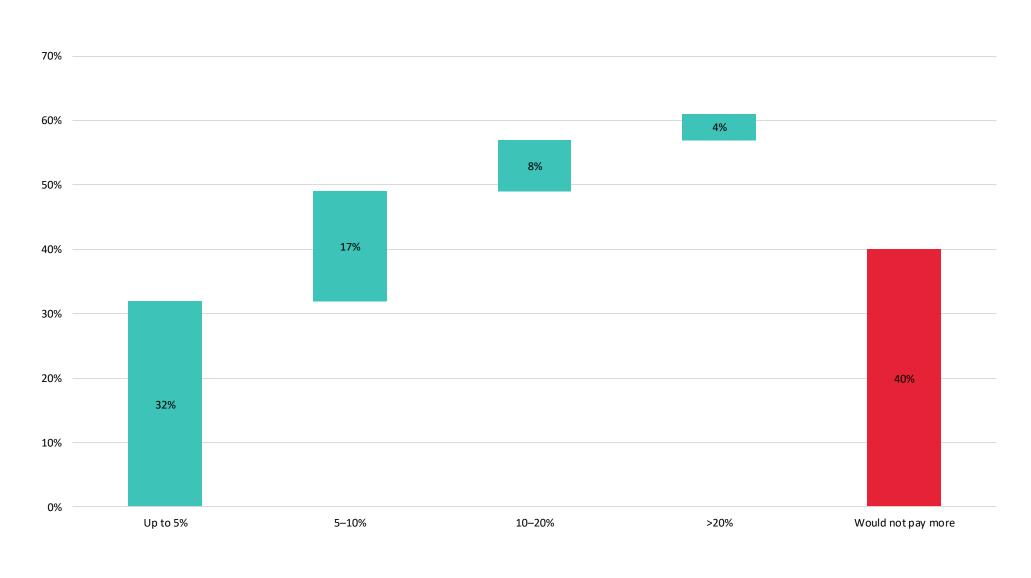
^{***}Numbers of SES and Intelsat have been combined post completion of their merger

How much would people pay?

- Wants vs. needs. Assessing willingness to pay is part science and part art, in large part because we take consumer attitudes with a grain of salt, compared to actual purchases
- 60% would pay. That said, our survey data indicates a fairly buoyant picture, with 60% of people, on average across the 10 countries, willing to pay more on top of their existing spend on mobile airtime.
- **Uplift**. To be conservative, it is sensible to discount the figures towards the lower end; half of those willing to pay more would pay only up to 5% on top of existing spend.
- **Boost to revenues**. However, even this would be a meaningful boost to ARPU when spread across the applicable customer base of the mobile operators most likely to take satellite

How much more would consumers be willing to pay on their existing mobile spend if the tariff included satellite connectivity (aggregate across 10 countries)?

Percentage of respondents



Increase on current monthly spend for mobile airtime

N=1,000 respondents per country (across 10 countries) Source: GSMA Intelligence Satellite Consumer Attitudes Survey June 2024



Market pricing implies a 15-25% uplift for satellite

Telco pricing for D2D in cellular tariffs (selected examples)

Operator	Satellite partner	Service launch date	Service	Base contract tariff (\$ per month)	Satellite bolt-on (\$/month)	Contract ARPU (\$/month)	Effective satellite uplift (percentage of contract ARPU)
Rogers, Canada	Starlink	July 2025 (trial)	SMS	\$73/ \$51	0/ \$10.95	\$58	0%/ 19%
T-Mobile, US	Starlink	July 2025	SMS	\$105/ \$50	0/ \$10	49	0%/ 31%
Entel, Chile	Starlink	May 2025	SMS	\$13.72	-	11.70	0%
Verizon, US	Skylo	January 2025	SMS	-	0	45	0%
One NZ, New Zealand	Starlink	December 2024	SMS	29	0	24	0%
SmarTone, Hong Kong	Tiantong-1 satellite system	August 2024	Voice/SMS	-	\$3.60	28	13%
3 (CK Hutchison), Hong Kong	Tiantong-1 satellite system	July 2024	Voice/SMS	-	\$2.45	25	10%

Data correct to September 2025 Source: GSMA Intelligence, company websites



There is also an allure of convergence

- Portfolio. D2D may garner the headlines, but it's not the only game in town when it comes to the satellite portfolio
- Bundling strategies
 - D2D cross sell to broadband and/or IoT
 - Vice versa
 - Some other combination
- Benefits. Why? In theory...
 - Higher bundle value
 - Lower churn
- Limitations. In practice, watch for...
 - Capacity constraints
 - Competition

Product offerings among major satellite companies

Satellite provider	Home broadband	Backhaul	Direct to device	loT	Telco partnerships (live)*	Telco partnerships (planned)*
Starlink	Available	Available	Available	Available	6	14
AST Space Mobile	Not offered	Not offered	Available	Not offered	0	30
Lynk	Not offered	Available	Available	Not offered	3	23
Kuiper	Planned	?	5	?	0	3
Eutelsat/OneWeb	Available	Planned	Available	Available	3	8
Viasat/Inmarsat	Available	Available	Planned	Available	2	2
Skylo	Not offered	Not offered	Available	Available	2	3
Echostar	Available	Available	Planned	Available	0	0

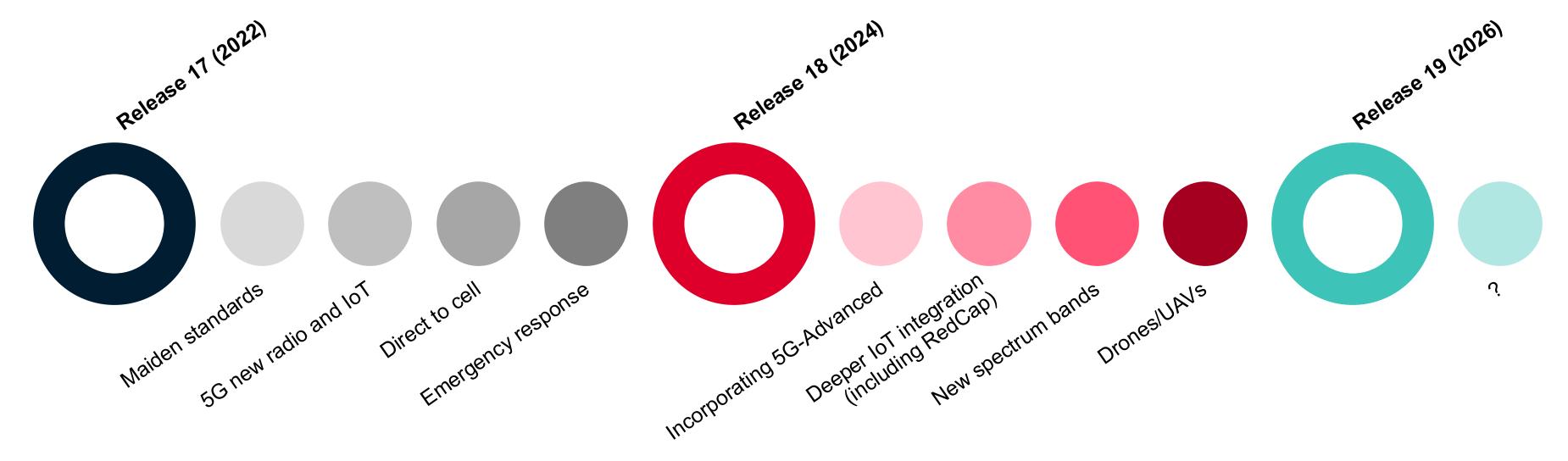
Source: GSMA Intelligence



IoT ready for prime time?

- Coming to fruition. Satellite for IoT is one of the most interesting storylines of 2025. This rests on the total addressable market of 2.5–3 billion IoT devices across a range of industries and the fact that 20–25% of enterprise CTO and CTIOs say they intend to incorporate NTNs into their connectivity portfolios.
- **Standards impact.** The next standards update (Release 19) should also help by adding new functionality such as RedCap into NTNs for IoT. There is already a competitive segment that focuses mostly on IoT (e.g. Skylo, Orbcomm), with the new standards also attracting Iridium and other legacy satellite providers. Starlink is an X factor, with the potential to put downward pricing pressure across the board, although it would have to tolerate a low-margin business to do this.

Satellite capabilities get better with each standards release



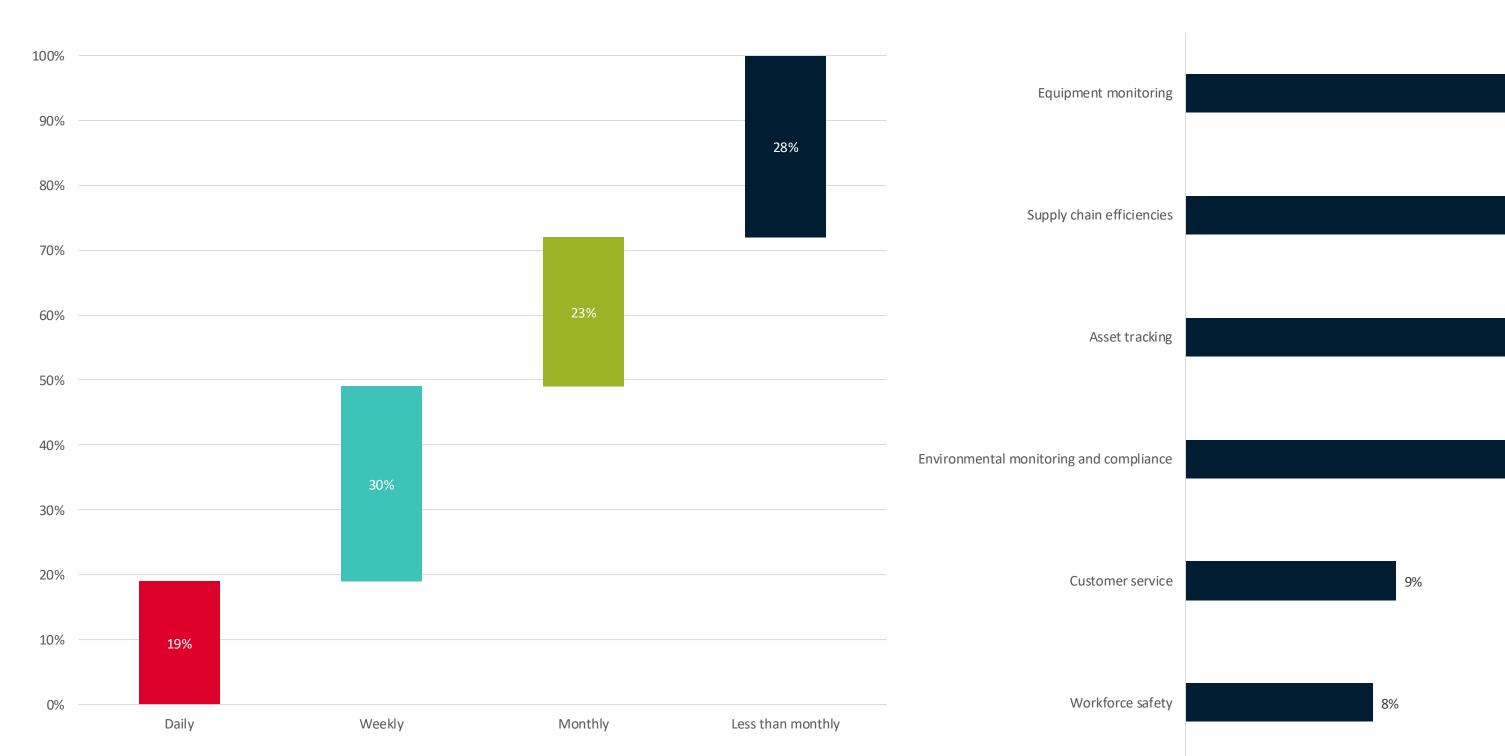
Source: GSMA Intelligence, 3GPP



Plugging gaps that directly impact business performance

How often do businesses have critical operations delayed by lack of timely data?

Where could satellite MOST help?



Source: GSMA Intelligence and Skylo survey of satellite enterprise attitudes (2025)



25%

21%

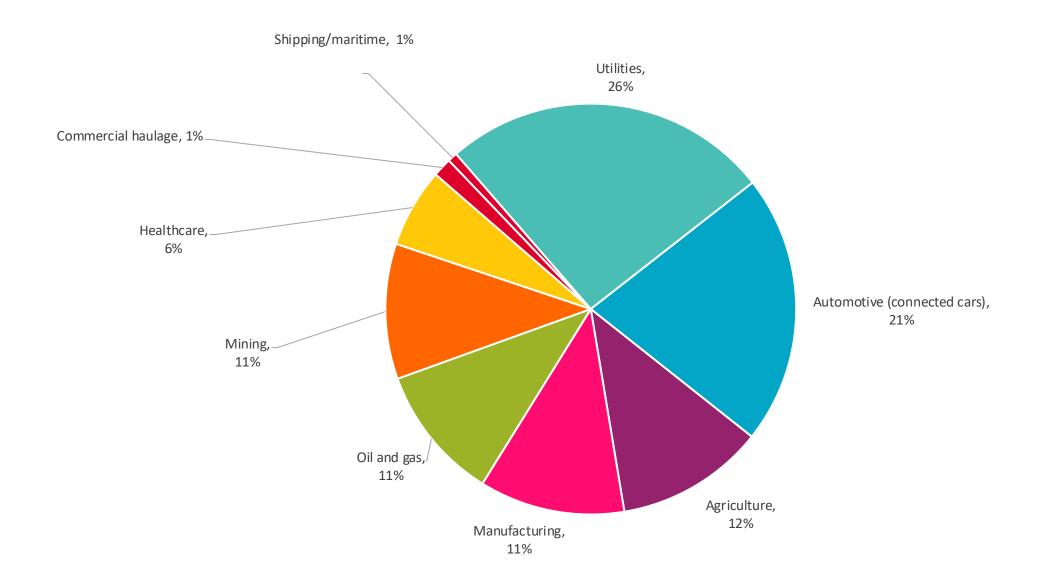
15%

14%

IoT universe = 2.5bn devices

- Myriad sectors. The range of industries wishing to tap into satellite connectivity is wide, playing to company premises being in rural or remote areas (e.g. mining, oil and gas), or businesses that deal in asset tracking (e.g. logistics, cars)
- Pricing. Pricing is highly variable with ARPUs for IoT modules usually being well under \$1 per month (except connected car subscriptions), so overall addressable revenues have big bound of uncertainty
- \$10bn run rate by 2035. Our base case is that IoT revenues enabled by satellite can get to \$10bn per year by 2035, roughly 25% of what mobile operators make on IoT as of now

2-2.5bn IoT devices sit within the satellite addressable base



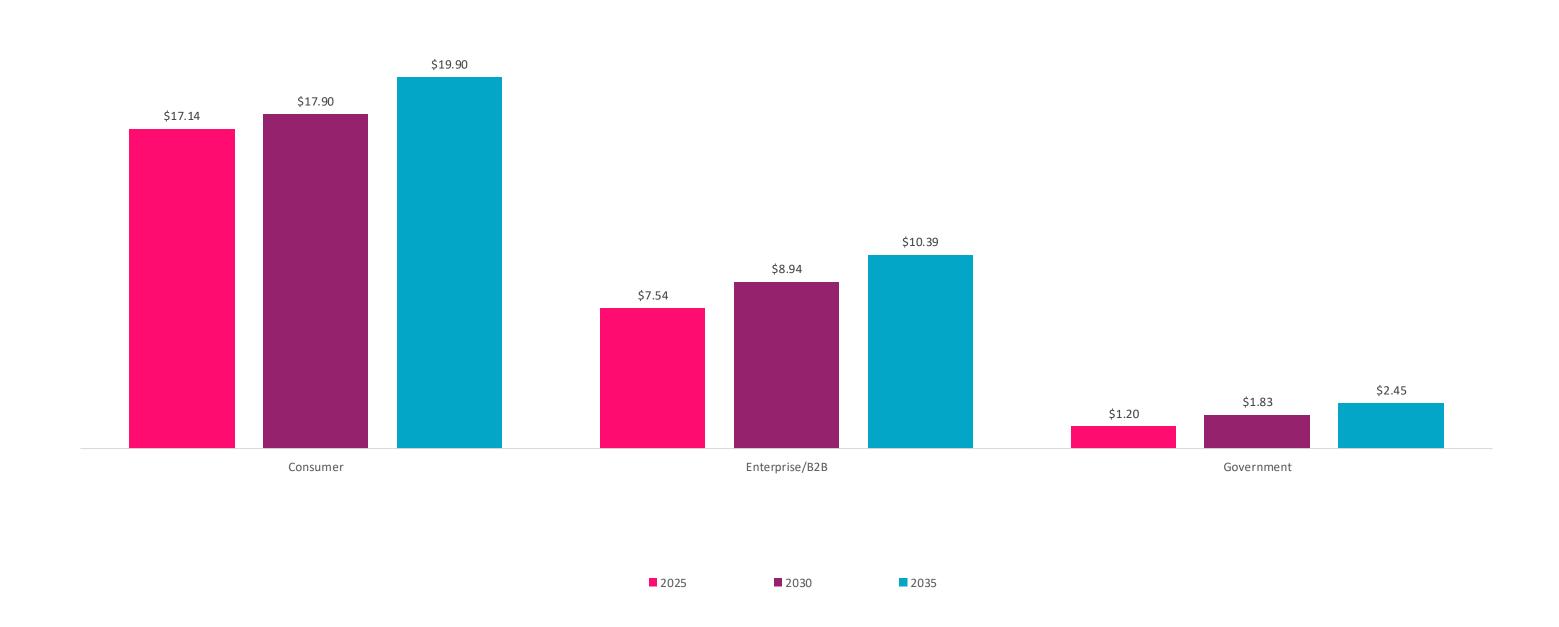
Source: GSMA Intelligence



What's it all worth?

\$30-35bn is in play...2-3% of the telco topline

Addressable telco revenues via wholesale sat partnerships (\$ billions)



Source: GSMA Intelligence



Spectrum models and trade-offs

Mobile Satellite Spectrum (MSS)

Terrestrial (repurposed)

Companies









Bands

L band (1.5-2.5 GHz) S band (2.2-2.7 GHz) Depends on holdings of partner operator

T-Mobile US, Salt = 1.9 GHz

AT&T, Verizon = 850 MHz

Sub 1 GHz (Pacific Islands, Africa)

One NZ = 1.8 GHz

- Both have advantages and challenges
 - TRADE-OFFS
- Watch the news (e.g. Starlink/Echostar)



Overall outlook. Big questions? It's why we're here!

Technology

- Network performance: does it get beyond '3G-like?'
- Satellite longevity: does this lengthen? How long?
- **D2D:** real deal?
- Chipsets and handsets: how quickly is NTN integrated? How fast can people tap in?

Commercial

- Integration costs + set up: how can telcos minimize opex/capex vis-à-vis NTN integration?
- Willingness to pay: will people pay more for satellite...and by how much?
- Proving the revenue story: to what extent do these show up? Do operators disclose the NTN impact?

Regulatory

- Spectrum: interference mitigations? Borrowing terrestrial? MSS?
- Landing rights: getting global alignment...possible?
- NTN standards integration...and 6G: NTN impact with 5G-advanced and 6G?



Want to learn more? Check it out





Ilya Polshatov

Chief New Business Officer, Kyivstar

Al Translation











LEARNINGS FROM DIRECT TO CELL **IMPLEMENTATION**

Ilya Polshakov Head of Cloud and Satellite Business, VEON Group

WHY ARE NON-TERRESTRIAL NETWORKS RELEVANT NOW?





The cost per kilogram of payload delivered to Low Earth Orbit has decreased one hundredfold since the 1980s, dropping to below \$1,000.

NASA's target for 2040 is to bring this cost down to just tens of dollars per kilogram.



The in-orbit satellite count has grown 8× versus pre-2020 levels, and NTN providers now plan over 60,000 satellites, with about 13% active today.



Existing MNO infrastructure cannot fully meet broadband demand in hard-to-reach areas or during emergency and disaster-response



Satellite broadband internet access already offers quality comparable to fiber networks and pricing that is increasingly similar, while Direct-to-Cell connects directly to customers' mobile devices, removing the final barriers to adoption.

WHY ARE NON-TERRESTRIAL NETWORKS RELEVANT NOW?





COVERAGE IMMEDIATE EXPANSION

Terrestrial networks can be complemented by NTNs to extend coverage to remote or rural areas where terrestrial infrastructure is limited or unavailable



ENHANCED NETWORKS RESILIENCE

Combining both network types can improve network resilience, as disruptions to one network can be mitigated by the other



ENABLE NEW BUSINESS CASES

The integration enables new applications like satellite-based IoT, global positioning, and emergency communication services



COSTS/CAPEX EFFICIENCY

In some cases, NTNs can offer a more cost-effective way to provide connectivity to sparsely populated areas compared to deploying extensive terrestrial infrastructure

THE CASE FOR SATELLITE-POWERED CONNECTIVITY IN VEON MARKETS



UKRAINE





Energy infrastructure under attack, resulting in long blackouts



30% of the country is mined



Kyivstar has xx% population coverage in 4G, but xx% territory coverage

STARLINK

Launched Starlink D2C on Nov. 24th starting with SMS services

KAZAKHSTAN





9th largest country by land area



~ 89% of territory remains uncovered



~ 40% of population yearly outside stable coverage due to travel and regional mobility

STARLINK

Announced agreement with Starlink to launch D2C in 2026

DIRECT TO CELL: USE CASES TESTED IN UKRAINE

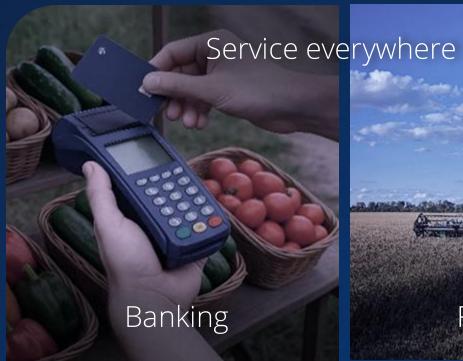


B2G

B2B

B2C















Tim Hatt

Head of Research and Consulting, GSMA Intelligence

Ilya Polshatov

Chief New Business Officer, Kyivstar

Al Translation



Panel: Telco – Satellite Convergence

Tim Hatt
GSMA Intelligence

Saher Abudaqar SES

Dragos Serban Vodafone Qatar Afke Schaart

Eulestat

Mohamed Samir Nokia



Jassem Nasser

Chief Business Development Officer, Space42

Al Translation





Space42 NTN

MWC Doha - November, 2025

Copyright © 2024 Space42 Plc (Space42)

This document contains Space 42's proprietary and confidential information. Any disclosure, copying, distribution or use is prohibited, if not otherwise explicitly agreed with Space 42 in writing.





Space42 Company Overview

Solutions and Satellites

SPACE 42

Enlighten the world from space

Space42 is an unprecedented combination between Yahsat's advanced satellite (S) communication capabilities and Bayanat's geospatial (G) data analytics expertise to create an artificial intelligence (AI) powered space technology champion.







- Tech-enabled innovation through SGAI combination
- · Scalability of global space systems coverage
- UAE as sandbox and platform for regional lead and global development



- Space Services: upstream, infrastructure-centric
- Smart Solutions: downstream, AI focus



Merger unlocks new growth horizons for Space42

- Positioning to capture fast-growing market, aligned with trends
- Growth fueled by scalability, value-chain expansion and innovation

Key Financials LTM as of 30 Sep 20241

USD 2.7 Bn Total Assets

USD 723 Mn Cash

> -0.1x Leverage²

USD 739 Mn Revenue

42%
Normalized Adjusted
EBITDA margin

23%
Normalized
Net Income margin

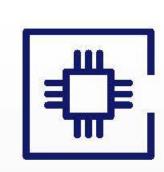
1. Unaudited management figures combining both Bayanat and Yahsat financials, excluding purchase price adjustments in total assets, 2. Based on Net debt/LTM Normalized Adjusted EBITDA



Yahsat Space Services

Business unit focuses on Upstream and Midstream infrastructure-centric activities, mainly covering Yahsat's satellite communications business





Bayanat Smart Solutions

Business unit focuses on Downstream AI-enabled services and new technology incubation, mainly covering Bayanat's geospatial analytics business

Expertise

Satellite communication (SatCom) services





Geospatial data acquisition and management

SatCom satellites and ground station operations and management





AI driven multi-intelligence leveraging geospatial data

Earth observation satellites and ground station operations and management





Smart Autonomous Mobility

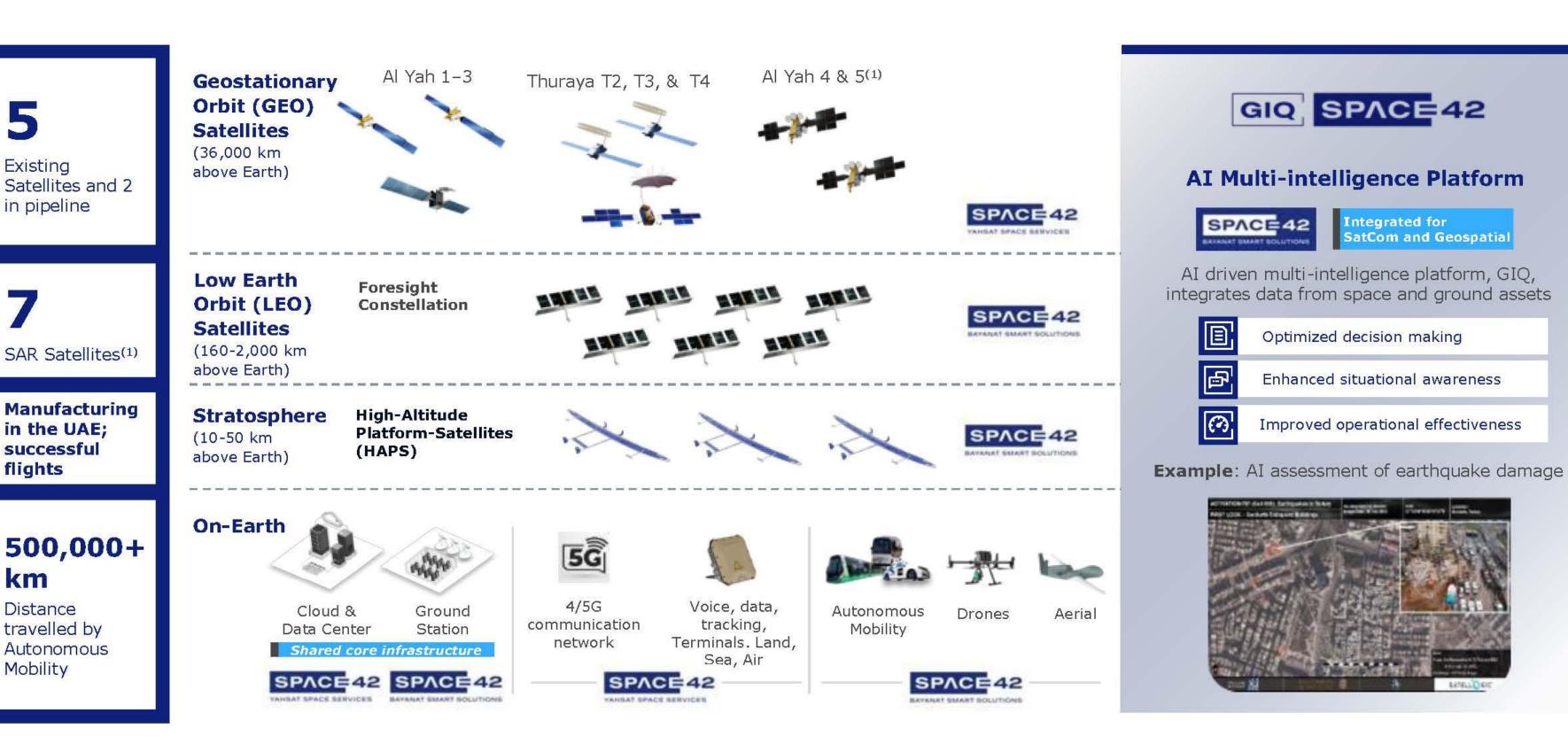




Space42 Capabilities

Infrastructure

Assets covering the entire value chain – from Earth to Space



1. 2 already launched

Existing

in pipeline

in the UAE;

successful

flights

km

Distance

Mobility

travelled by

Autonomous

Copyright @ 2024 Space42 Plc (Space42)





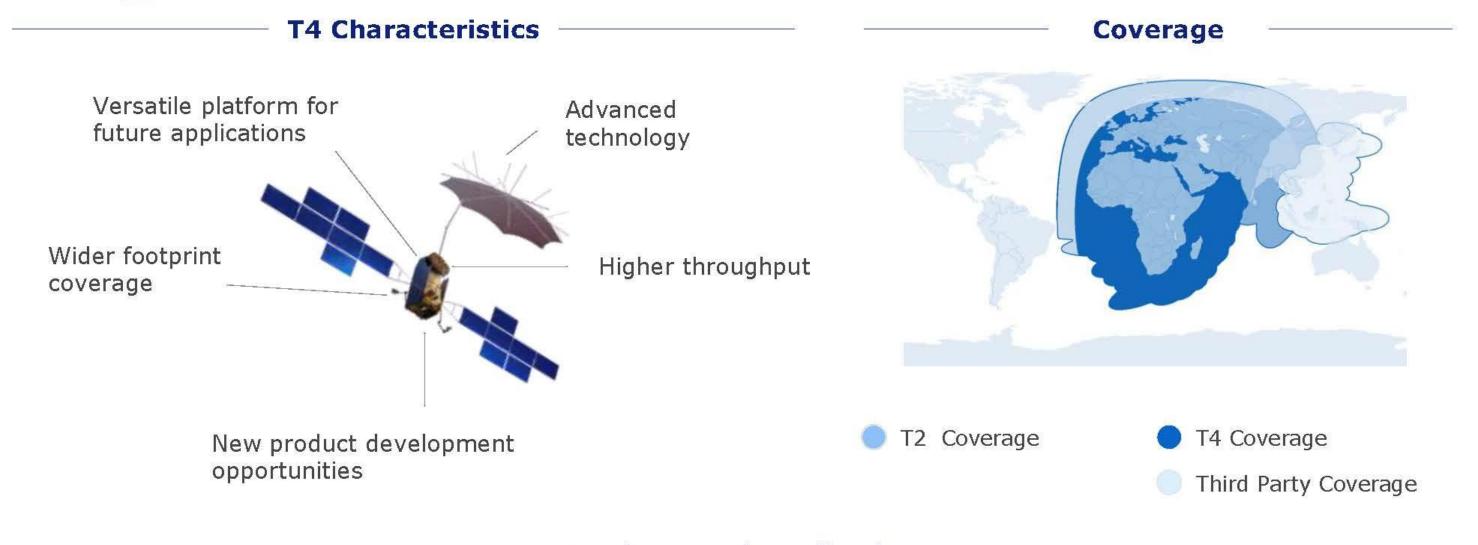
Space42 Mobility

Thuraya

Mobility Services

Satcom - Thuraya 4 and new applications





New Products and Applications



T-TAC:
Tactical Satellite
Communication Solution



Thuraya One



Broadband user terminals (up to 1Mbps)



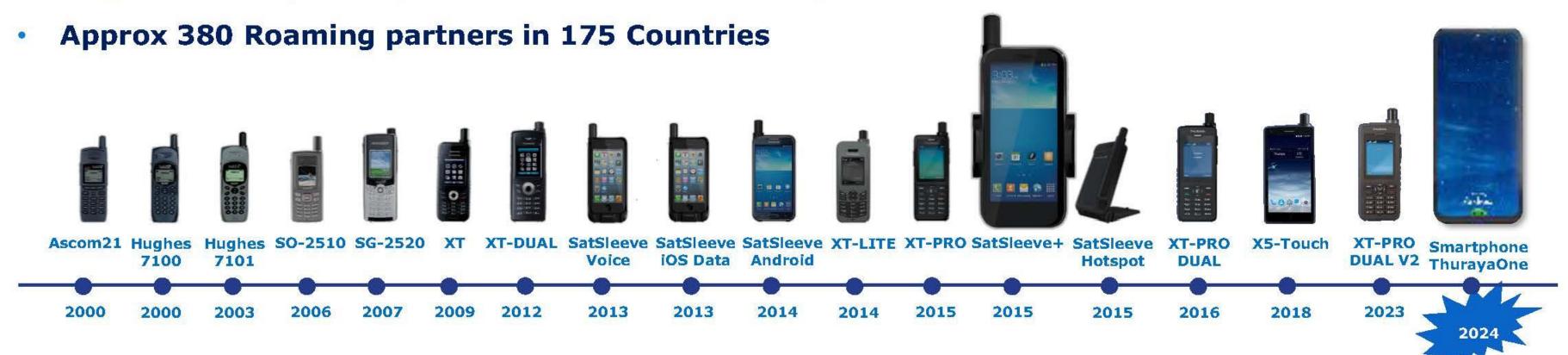
IoT system

Mobility Services

The largest portfolio of Satcom handsets built by any operator

Thuraya has been on the forefront of the satellite phone business for many years:

- Innovation leader
- No. 1 in satphone sales
- Largest handset product portfolio in the satellite industry



+20 years of satellite phone history

Current Satellite Phones

Simple. Reliable. Affordable for Voice/Text/Tracking/NB

XT-LITE



- Best-value
- Calls and SMS in satellite mode
- Casual user
- Smallest and lightest satellite phone
- Long battery lifetime

XT-PRO secure



- Ruggedized phone, built to provide reliability
- 9 hours talk and 100 hours standby time
- Glare resistant Gorilla® glass
- Tracking service
- **SOS button** (even if phone is switched off)
- Secure and private voice channel
- Speakerphone
- GPS, BeiDou, Glonass capability
- Compatible with Fixed Docking Units

XT-PRO DUAL



- Ruggedized phone, water & dust resistant, shock proof (IP65/IK05)
- SOS button (even if phone is switched off)
- Dedicated **Tracking** button
- Speakerphone
- Dual-SIM and dual-mode SAT & cellular phone
- Dual mode where SAT & cellular can be on at the same time
- Glare resistant Gorilla® glass
- Powerful battery 3400 mAh
- Up to 11 hours talk time and up to 100 hours standby time
- GPS, Beidou, Glonass, and Galileo for maximum flexibility

Thuraya One

Satellite Smartphone





5G Android smartphone with satellite connectivity



Satellite antenna not visible from outside; extends only when needed



IP67 ingress protection, Gorilla™ Glass display



3 rear & 1 front camera, main camera with 50MP



Dual SIM and dual mode (cellular and satellite)



Can be used either with MNO SIM or with MNO plus Thuraya SIM









5G: NR N1/N3/N5/N7/N8/N28/N38/N40/N41/N77/N78 4G: LTE B1/B3/B5/B7/B8/B20/B38/B39/B40/B41/B42

3G: UMTS B1/B2/B5/B8

2G: GSM G900/G850/G1800/G1900



Thuraya L-band satellite in ME, Europe, Africa, Asia





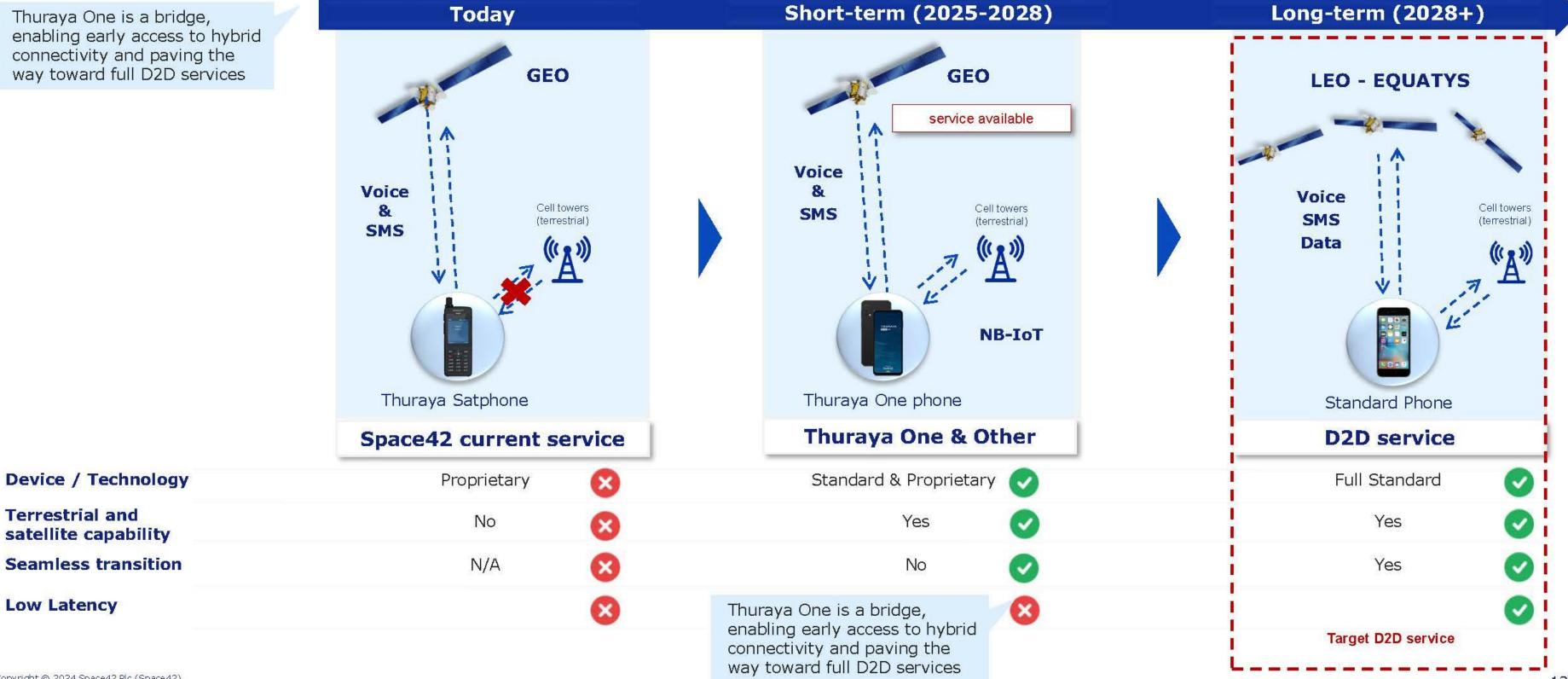
Evolution to Direct to Device (D2D)

From legacy to open standard

Path to Direct to Device (D2D) Services

A full transformation journey to full D2D service by currently leveraging its existing service types (voice & SMS) over Thuraya One handset

Thuraya One is a bridge, enabling early access to hybrid connectivity and paving the way toward full D2D services



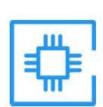




EQUATYS

NTN

Overall, the telecom industry is facing numerous challenges but can benefit from breakthrough opportunities



Growing demand for global connectivity

Billions of people and assets remain unserved or underserved by traditional Terrestrial Networks (TN)



Coverage vs cost dilemma

Mobile operators (MNOs) face a constant challenge to provide ubiquitous cellular coverage, while keeping costs manageable



Natural and manmade catastrophes

Leaving entire communities, sometimes in the millions, isolated



Digitized economy

Growing importance to monitor assets anywhere anytime



Bridging digital divide

Persistent divide despite universal service efforts, leading to social barriers and hindered development and innovation

Direct-to-Device (D2D) enables standard devices to connect directly to satellites, eliminating the need for special equipment or cell towers

Key Enablers

Terrestrial / satellite convergence

Integration of L- and S-bands spectrum in 5G standards for NTN1 services (3GPP release 18) would allow interoperability with terrestrial devices

Cost advantage for MNOs3

In low population density areas and traffic levels, D2D is expected to become the most cost-efficient solution for MNOs

Chipset and device OEMs² buy-in

Smartphones are being launched with native D2D support (e.g., Apple with Globalstar, Pixel with Skylo)

Demand and universal access needs

Increased mobility, needs for rural connectivity and connectivity for remote critical infrastructure

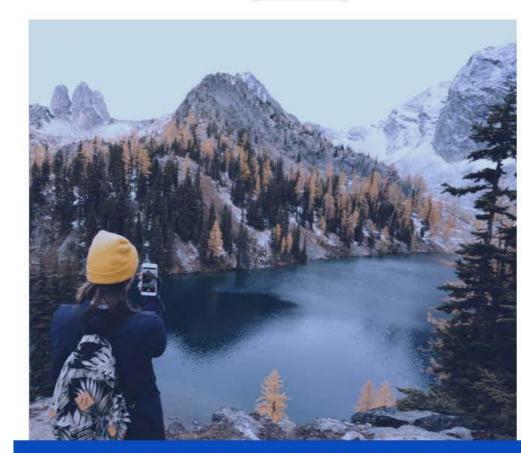
D2D unlocks new cost efficiency opportunities for MNOs while extending their coverage footprint beyond terrestrial limits

a USD ~200Bn business opportunity

Expanding the new mobile frontier

D2D unlocks incremental revenue across consumer, IoT, and mission-critical verticals, shifting satellite from niche to mainstream

NEW PRODUCTS ENABLED BY D2D



Consumer smartphone

Direct comms from satellites to standard phones: wholesale opportunity through MNOs and OEMs enabling comms services



loT

loT connectivity to support scenarios in remote areas, e.g., connected cars, asset tracking and environment monitoring

EXPANDING TRADITIONAL MSS¹



MSS

Secure and resilient comms to MSS devices with better QoS², e.g., private networks, military operations, and border surveillance

Purpose-built model for scalable expansion

Space42 Approach

Open architecture designed to extend MNO networks, close coverage gaps, and monetize unserved demand at global scale



· Bridges coverage gaps and extends MNO reach across congested, unserved, and underserved areas







Total Opportunity

USD 200Bn
(2025-40)

Why Partner with Us

Total D2D revenue opportunity for MNOs is considerable, benefiting directly from ARPU uplift as well as indirect revenue impact

Coverage extension

- Integration of L- and S-bands spectrum in 5G Eliminate coverage gaps in rural, remote, and hard-to-reach areas
- Provide seamless connectivity in regions with challenging terrain
- Access to global network coverage

Spectrum

- Avoid costs and operating complexities associated with the need to release blocks of spectrum
- Reduce interference risks
- Possibility to contribute own spectrum

Costs Efficiency

- Reduce need for extensive terrestrial infrastructure investment (CAPEX and OPEX savings)
- Provide coverage in lower-traffic and less densely populated areas, at lower cost

New revenue streams & churn reduction

- Enable service offerings in previously unserved market/segments
- Expand portfolio with specialized enterprise and government solutions
- Decrease churn and increase market share

Market Differentiation

- Offer unique space terrestrial end-to-end connectivity solutions
- Attract customers seeking comprehensive, seamless coverage
- Achieve universal service and other in-country regulatory obligations

Device Compatibility

- Enable standard Smartphones and other devices (IoT) to connect directly to satellite networks without specialized hardware
- Possibility to develop innovative and unique product roadmap leveraging standard 5G technology



Copyright © 2024 Space42 Plc (Space42)

This document contains Space 42's proprietary and confidential information. Any disclosure, copying, distribution or use is prohibited, if not otherwise explicitly agreed with Space 42 in writing.

Panel: Innovation pipeline, competitive landscape and regulatory questions

Tim Hatt
GSMA Intelligence

Ali Cheema Ericsson

Hasan Iftikhar
Deloitte

Cyril Anand
Starlink

Johan Borsjo
Ooredoo

