

GSMA
Intelligence

Satellite and NTN Summit

Kicking into high gear



Topics in Focus Today

1	Space is becoming a crowded place	<ul style="list-style-type: none"> •LEO revolution •D2D •Competition heating up
2	Closing the coverage gap (and why terrestrial alone can't solve this)	<ul style="list-style-type: none"> •Sizing the coverage versus usage gap •Geographical comparisons •Cost challenges with terrestrial expansion •Pragmatism
3	Consumer lens	<ul style="list-style-type: none"> •Addressable base •Addressable revenue •Go-to-market
4	Enterprise and B2B lens	<ul style="list-style-type: none"> •Addressable base •Addressable revenue •Go-to-market
5	Where do we go from here?	<ul style="list-style-type: none"> •Technology questions •Partnership/biz model questions •Regulatory questions

Who we are



3 Global Offices

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Speaker Line-Up



Parth Trivedi
CEO and Co-Founder
Skylo Technologies



Alex Sinclair
CTO
GSMA



Anirban Chakraborty
Chief Technology
Officer, Comtech



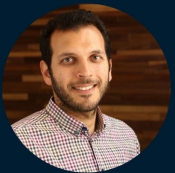
Dr. Paul Jacobs
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Globalstar



Amina Boubendir
Head of Research
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Airbus



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Product Manager
Rohde & Schwarz



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Why satellite matters in 2023

A pragmatic win-win

The Coverage Gap Remains

- **The gap:** 600 million people (around 7% of the global population) live outside the range of a mobile network
- **Economics:** While expansion of terrestrial base stations could bridge some of this gap, there will be diminishing returns as the costs get prohibitively expensive for the least populated regions

The Options are there

- **Numbers:** Satellites in orbit will number more than 8,000 (compared to 2,000-3,000 historically) once SpaceX and OneWeb's constellations reach full deployment. This offers to mobile operators a structural rise in connectivity capacity from space
- **D2D resurgence:** Direct-to-device and NTN standards integration change the game in how many people can tap in

Revenue Uplift

- **Consumers:** Closing the coverage gap would offer an uplift of around \$30 billion to the telecoms sector by 2035, or 3% of existing revenues
- **IoT/enterprise:** Underpinned by coverage gap across range of sectors (e.g. manufacturing, precision agri, logistics). \$10bn run rate by 2035 (20-25% uplift on existing telco IoT revenue)

Space is becoming a crowded place

LEO Revolution

Sector context = Low Earth Orbit (LEO) constellation explosion

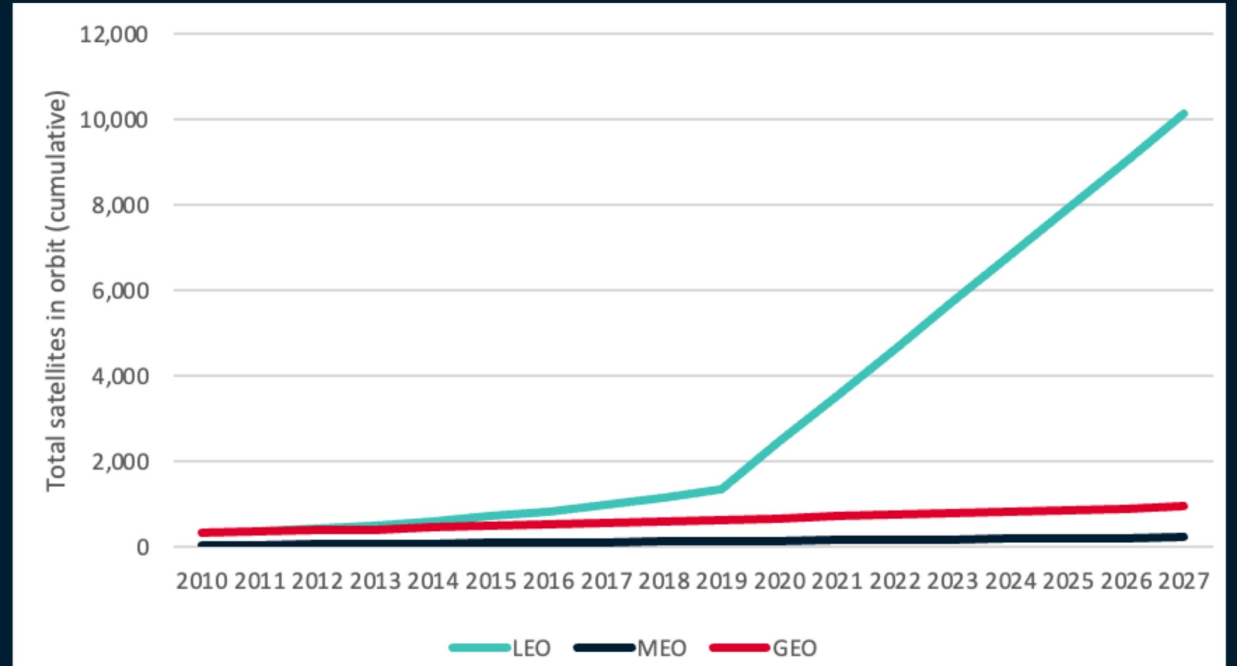
Satellite topology driven by trade-offs of 2 main factors

- Density
- Altitude

LEO has improved economics and performance from both

Starlink, OneWeb, Telesat, Kuiper (Amazon), host of others...

Satellite is exploding, driven by LEO volumes



Source: Union of Concerned Scientists (UCS), GSMA Intelligence

Space is becoming a crowded place

D2D = direct to device

Typically operates at LEO altitude, but differs in several ways from traditional constellations

Signal direct to device (handset or IoT). No requirement for dish or other receiving equipment

Advantages

- Cost savings + ease of integration with existing mobile network
- Time to market
- More accessible for consumers and businesses
- Conduit to new revenue streams

D2D is not new, but recharged by better tech and, crucially, NTN standards

Target segments

Consumer

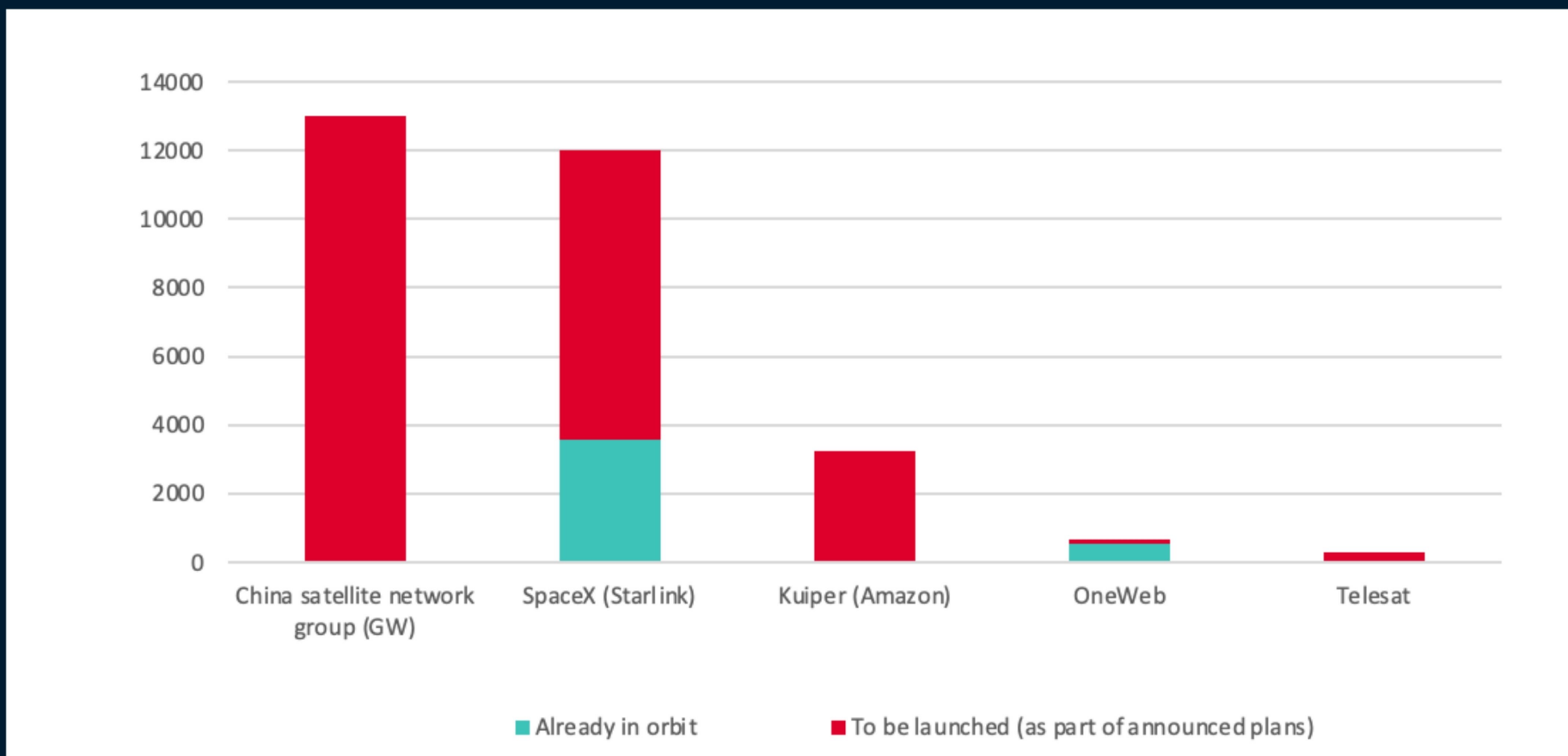
- Out of coverage
- Patchy coverage
- Roaming

- B2B
- Gov't

Space is becoming a crowded place

Competition heating up

Starlink and OneWeb are the global leaders in LEO, though many others are active



Closing the coverage gap

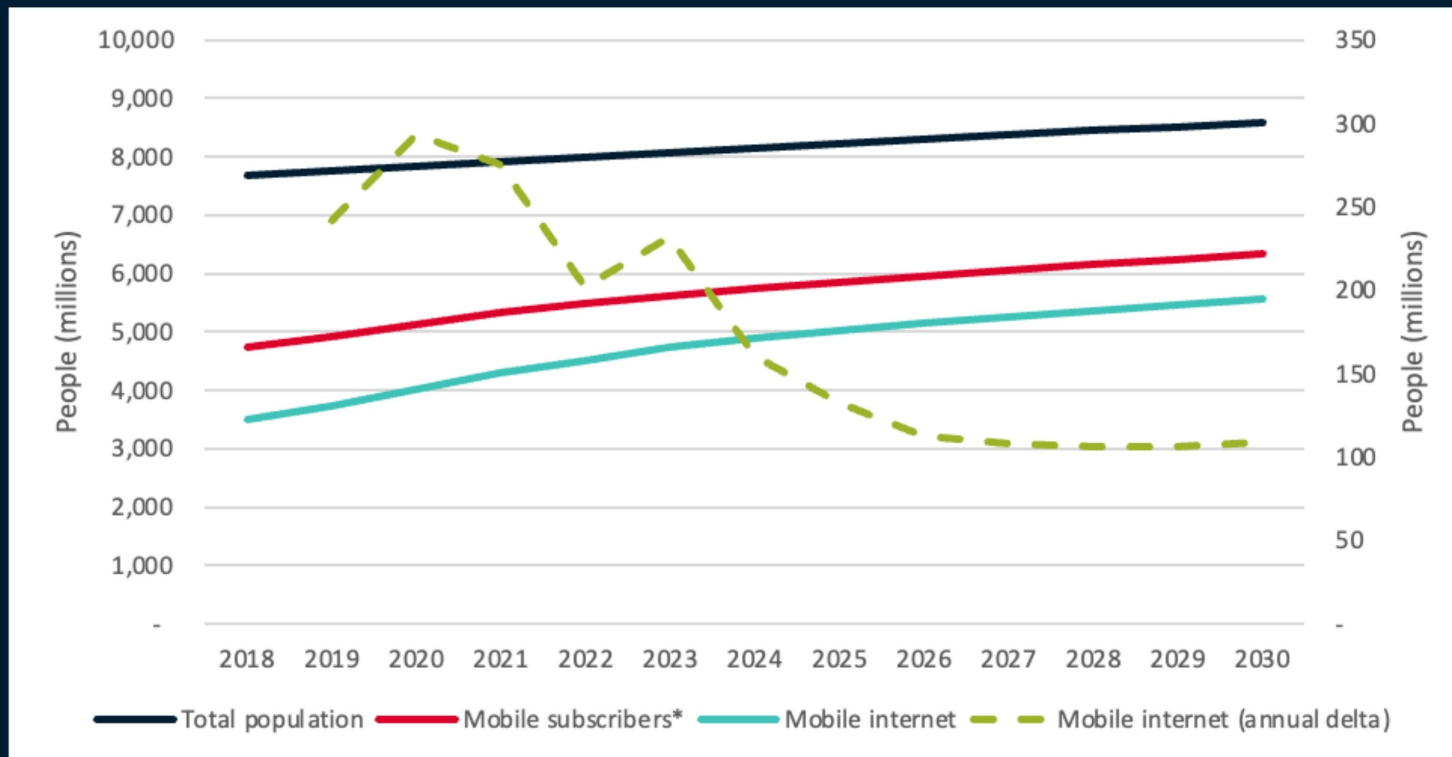
Still 500-600m people

Mobile coverage has improved significantly (3G/4G 90%+), but not spots are still material

Of the 1.3 billion people without a phone, 35-40% still face a network coverage barrier

Further extensions limited through terrestrial means because of tough economics

We are seeing diminishing returns in adding people to the internet...



Closing the coverage gap

...which, even by 2025, will still be 8% of the world

How strong are the different barriers to internet access?

	Adult population (m)	Mobile internet subscribers (m)	Usage gap		Coverage gap		
			Total (m)	Usage gap (% of population)	No coverage (m)	Edge of coverage (m)	Effective coverage gap (% of population)
East Asia & the Pacific	2,126	1,786	278	13%	62	83	6.9%
Europe & Central Asia	729	657	46	6%	25	28	7.3%
Latin America & the Caribbean	575	435	131	23%	10	24	5.8%
Middle East & North Africa	453	307	132	29%	14	20	7.3%
North America	336	309	26	8%	0	13	4.1%
South Asia	1,682	933	682	41%	66	70	8.1%
Sub-Saharan Africa	888	415	408	46%	66	42	12.1%
Global	6,788	4,841	1,704	25%	243	279	7.7%

Source: GSMA Intelligence

Consumer Lens

Coverage and roaming both in play

\$30bn untapped, or 3% of existing telco revenue base overall

Consumer is majority but there is realistic sell-in to B2B and gov't/military

Consumer = 60%

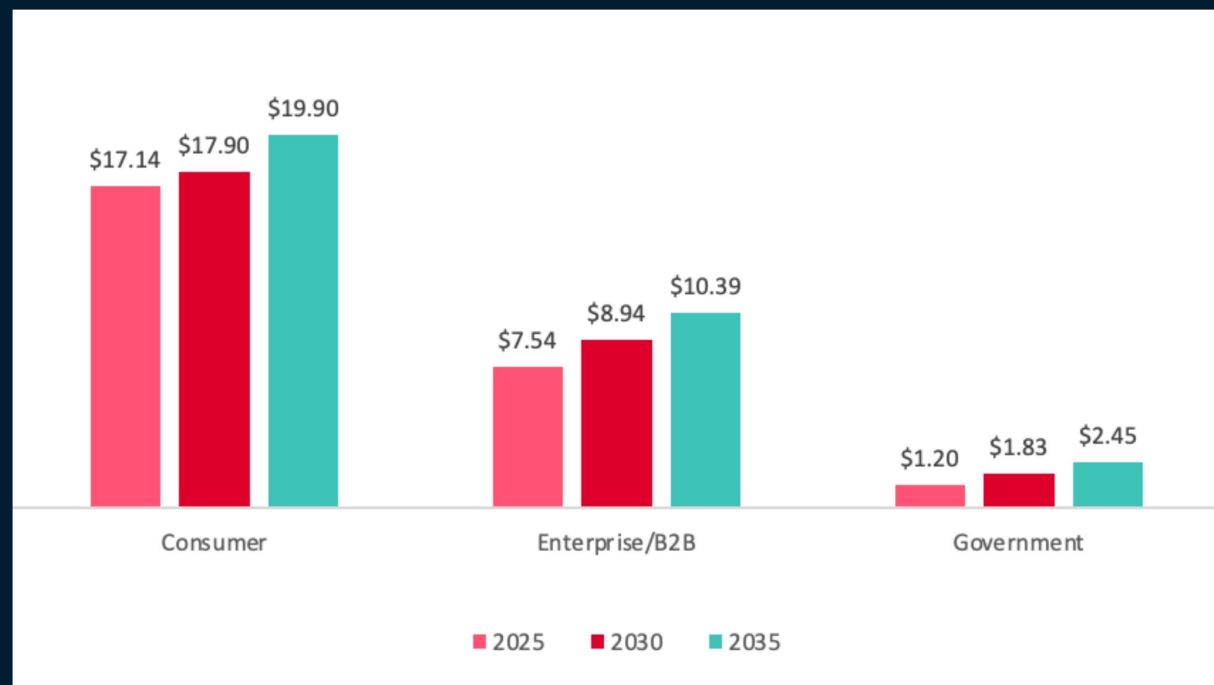
B2B verticals = 30-35%

Gov't = 5-10%

Primarily a wholesale play, telcos own customer relationship

Front and backhaul

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

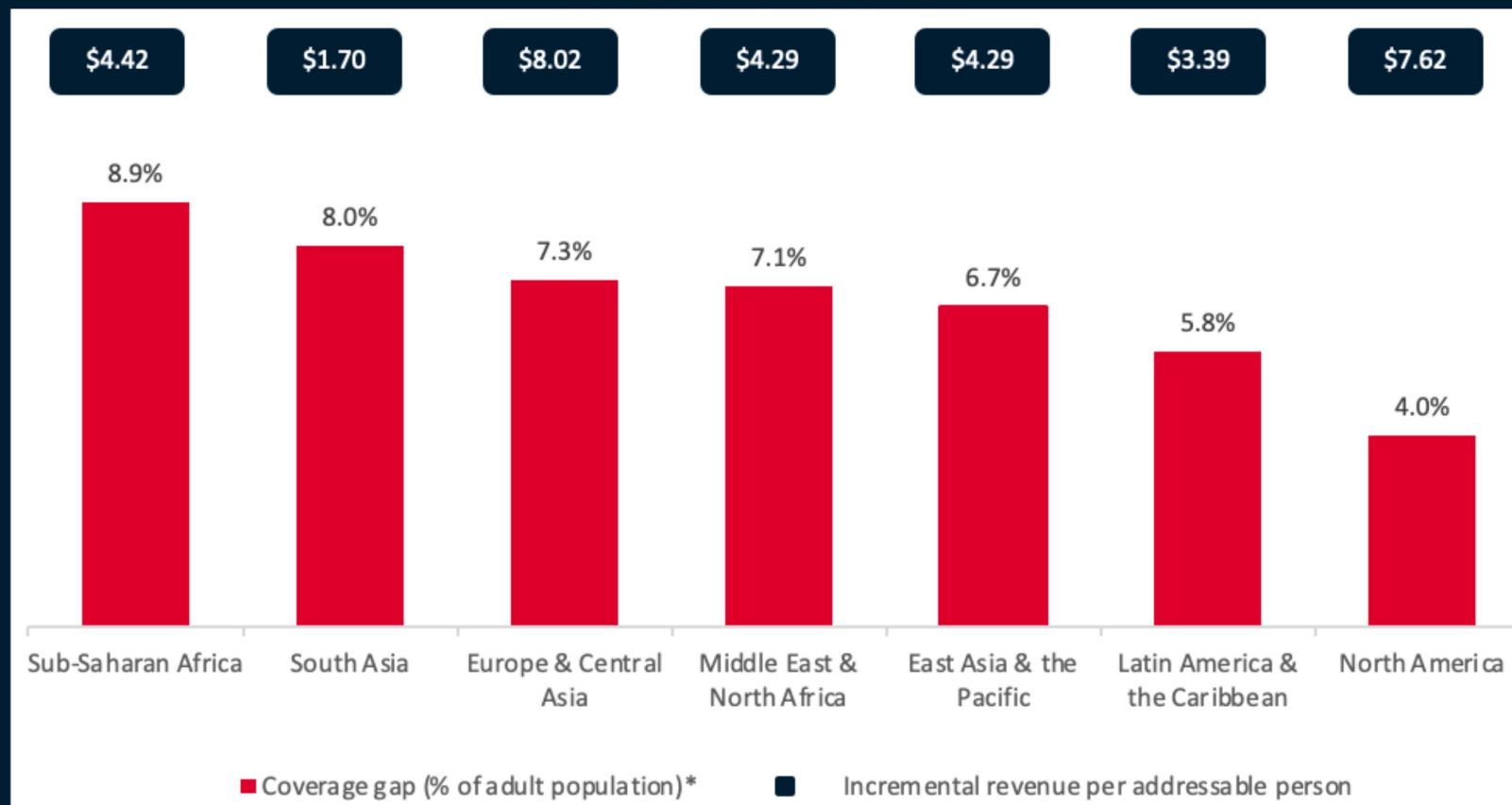


Source: GSMA Intelligence

Consumer Lens

Africa, Indian subcontinent and SE Asia clearest plays

Consumer spend uplifts from connecting each incremental sub sit between 3G and LTE ARPU's



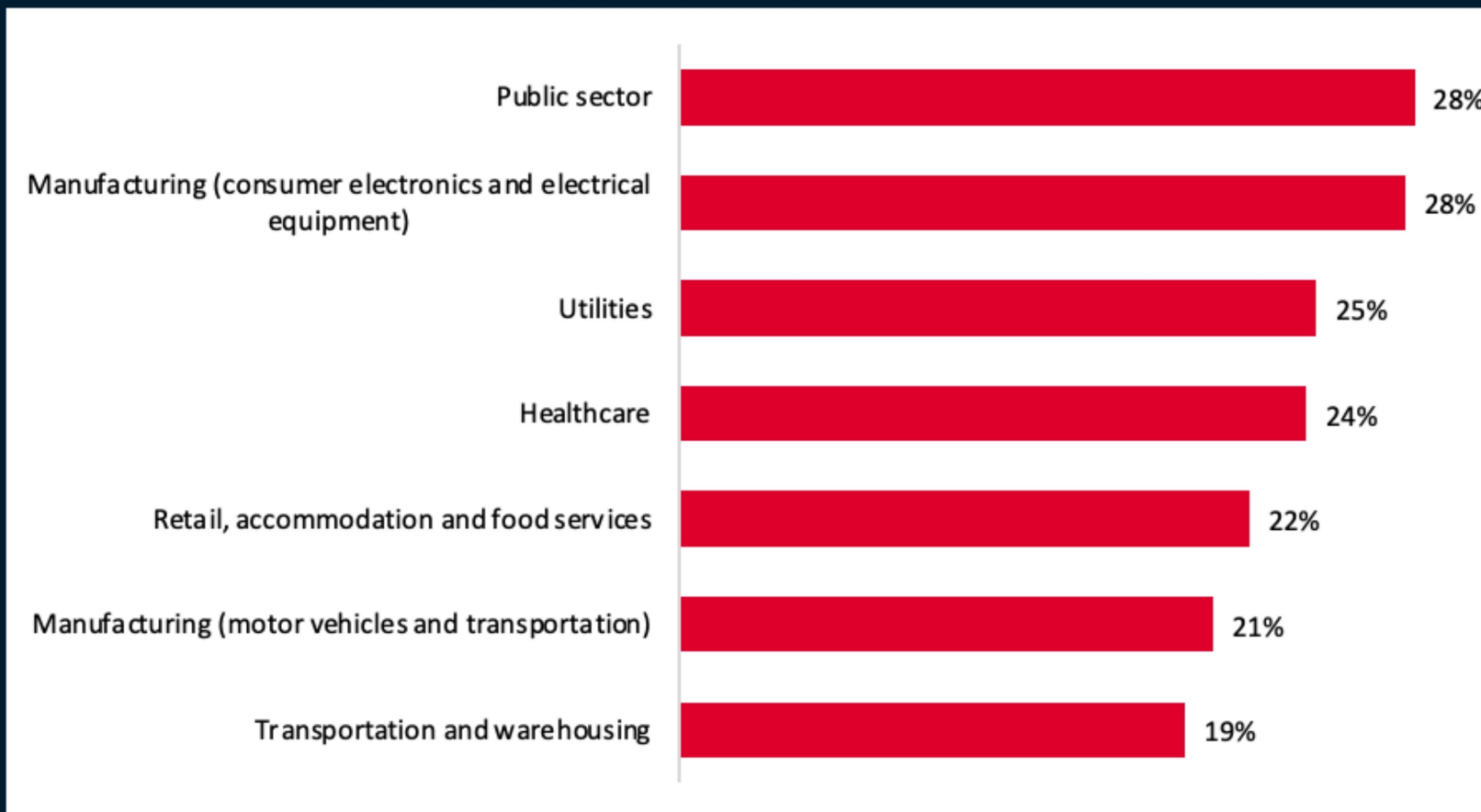
Source: GSMA Intelligence

B2B Lens

Don't forget, the coverage gap isn't just a consumer problem

Would you consider using satellite connectivity for your business?

Enterprise survey
(N=2,000, 2020/21)



Source: GSMA Intelligence

B2B Lens

Low power use cases across range of sectors

Most natural plays where assets are moving

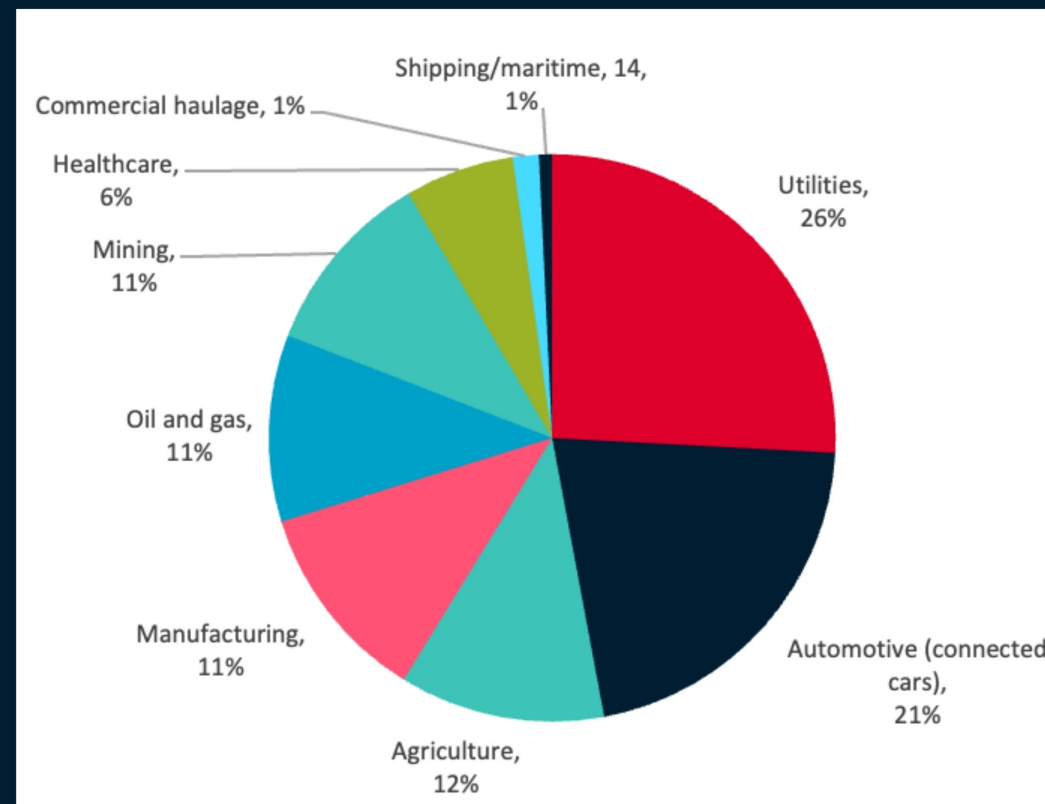
- Automotive
- Commercial logistics
- Shipping

However, also demand in sectors with remote installations

- Agri
- Heavy industry (oil/gas, mining)
- Rural manufacturing
- Hospitals and health clinics

Revenue sell in = \$10bn/yr by 2035 = 25% of existing IoT connectivity revenues

1.9 billion devices (8% of the IoT market) are addressable for D2D satellite by 2035



Figures are number of IoT connections addressable to satellite and the sector share of the total

Source: GSMA Intelligence

Where do we go from here?

Making the science non-fiction

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?

Partnership / Business Model

Wholesale > retail: Does wholesale remain GTM? Is Starlink alone with retail?

Integration costs + set up: how can telcos minimize opex/capex vis-à-vis NTN integration?

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?

Thank you

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