

TAKE YOUR STORY ANYWHERE

ITU Emerging Space Technology
“Accelerating Cloud Connectivity Everywhere”

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SVP, Global Cloud Sales and Partnerships

July 7, 2021



The future is cloud (and edge) optimised

CLOUD SERVICES ADOPTION is expanding

16%

compound annual growth rate
of global public
cloud services market
(\$331.2B in 2022)



Source: Gartner

EDGE COMPUTE is on the rise

75%

of enterprise-generated data
will be created and processed
outside of a centralised
data centre by 2025



Source: Gartner

CLOUD BENEFITS are tangible

64%


of organisations
have experienced a significant
increase in business agility
from cloud services



Source: Harvard Business Review

Your customers want the *whole organization* to access applications that have migrated to the cloud

Firms with **50% or more of infrastructure and applications in the cloud** say...



They operate more efficiently

29% more likely

than firms with 30% or less of infrastructure and applications in the cloud



They make smarter, more profitable use of data

15% more likely

than firms with 30% or less of infrastructure and applications in the cloud



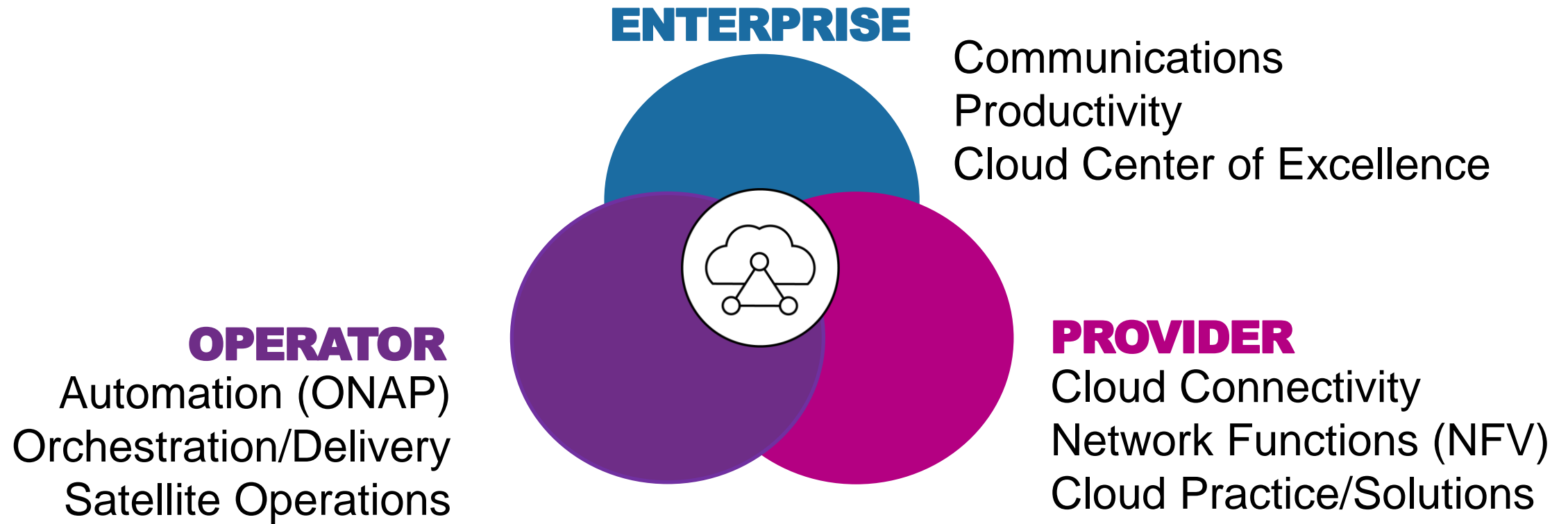
They improve customer satisfaction

24% more likely

than firms with 30% or less of infrastructure and applications in the cloud

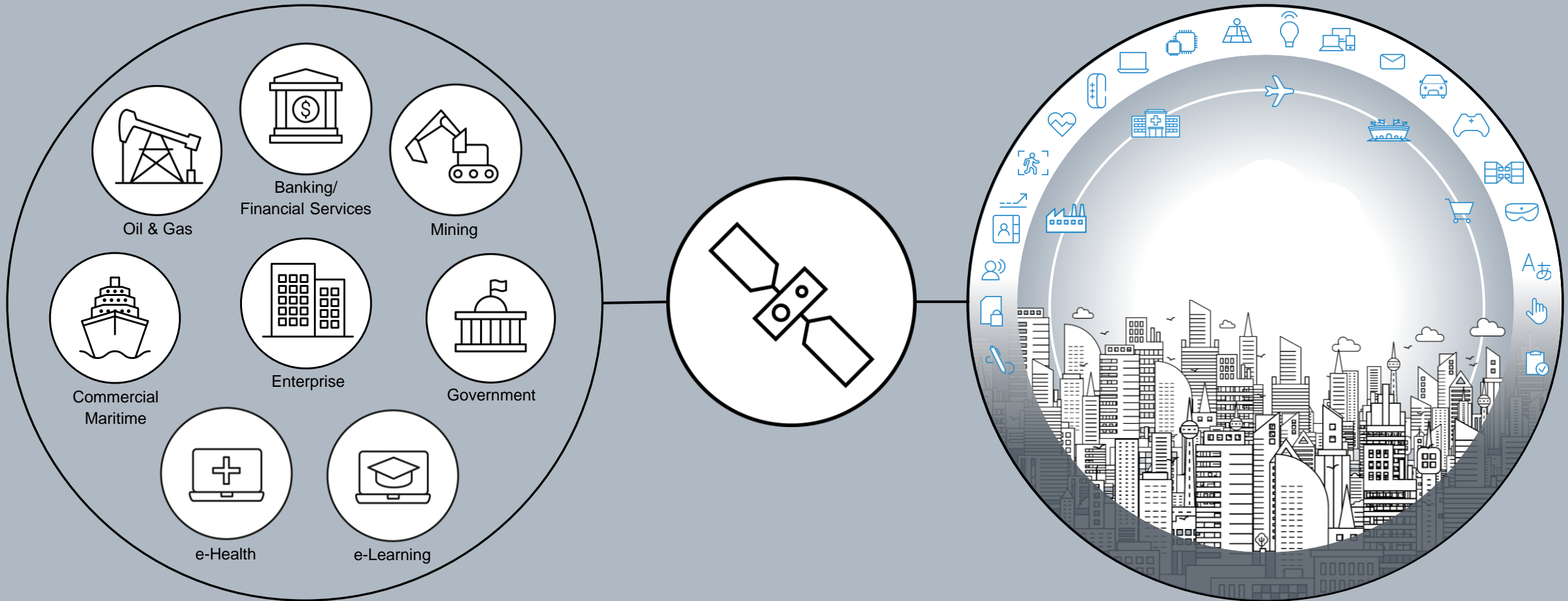
Source: IDG

Bringing cloud-enabled applications to all customer sites requires cloud-optimised connectivity

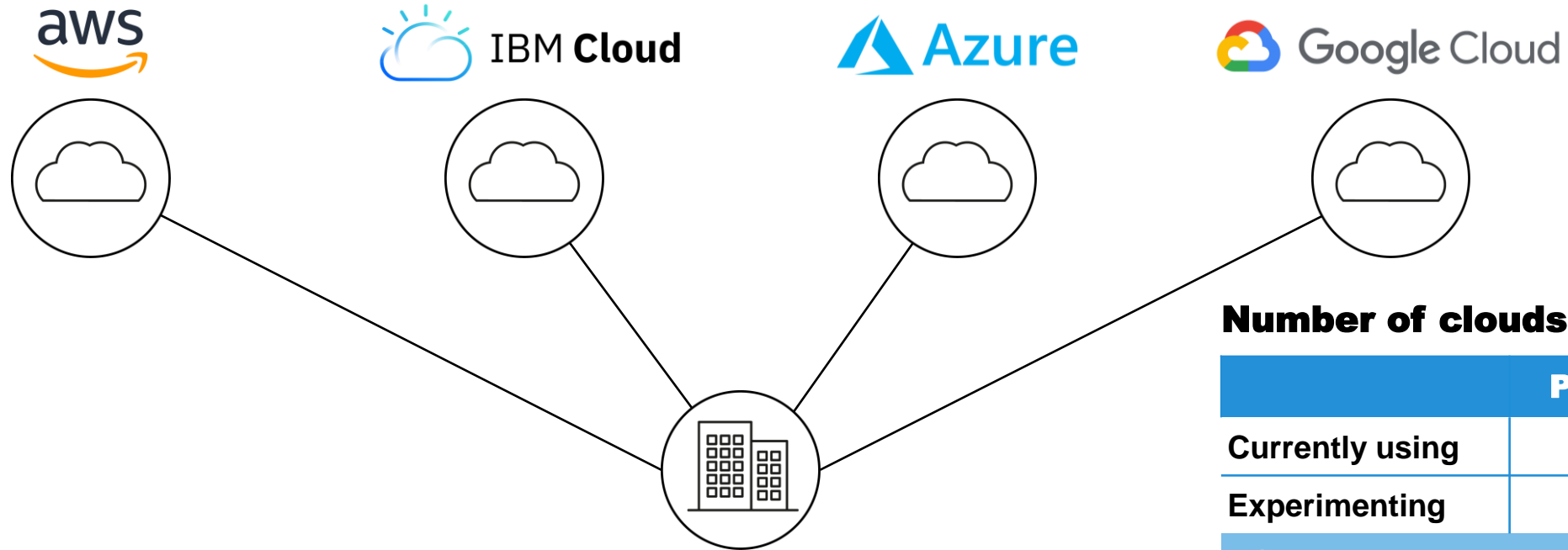


Transforming SES' and our Customers experiences through seamlessly harnessing the power of cloud, content and connectivity

Space is the fundamental enabler of connecting your customers directly to the cloud from anywhere



Increasingly, your customers are embracing “multi-cloud”



Number of clouds used on average

	PUBLIC	PRIVATE
Currently using	2.2	2.2
Experimenting	1.2	1.7
TOTAL	3.4	3.9

N=750

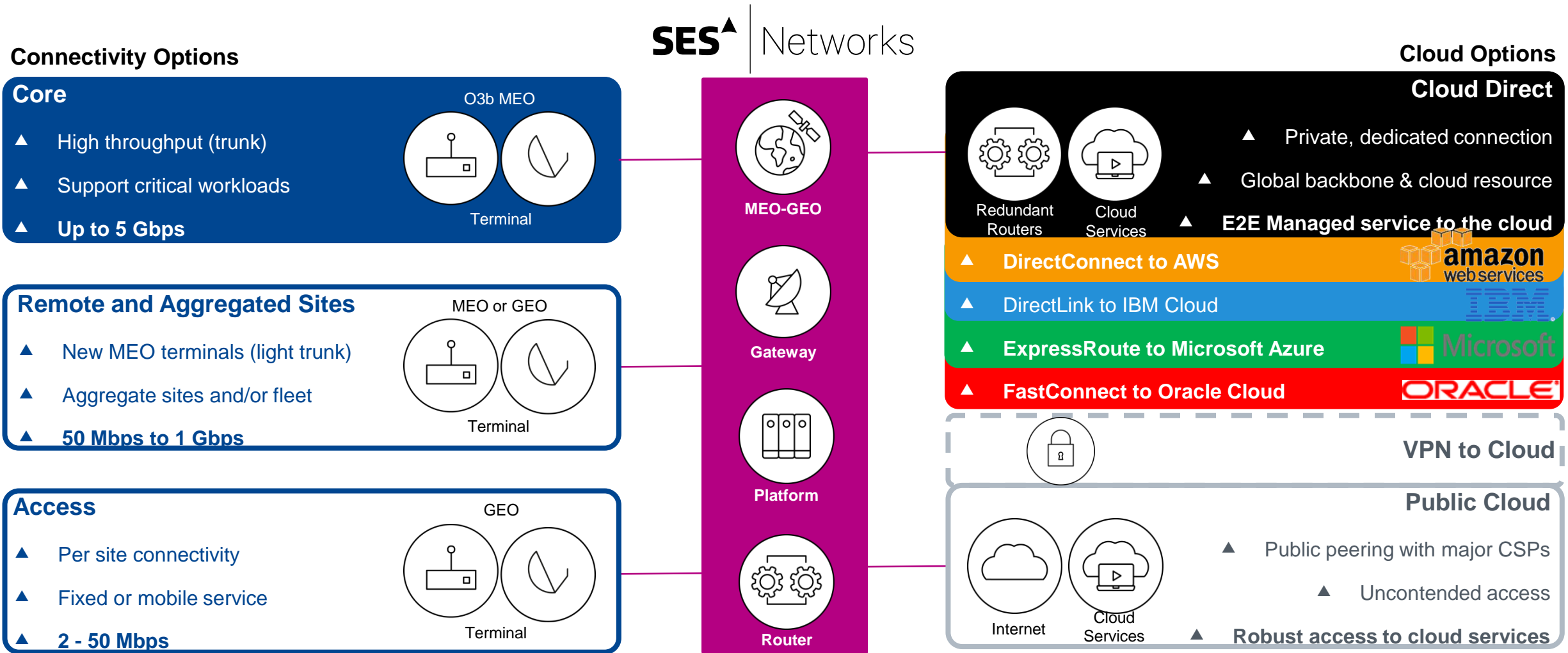
Source: Flexera 2020 State of the Cloud report

As your customers embrace multi-cloud, they will require a simple solution for dedicated multi-cloud connectivity from any remote site

Cloud Direct

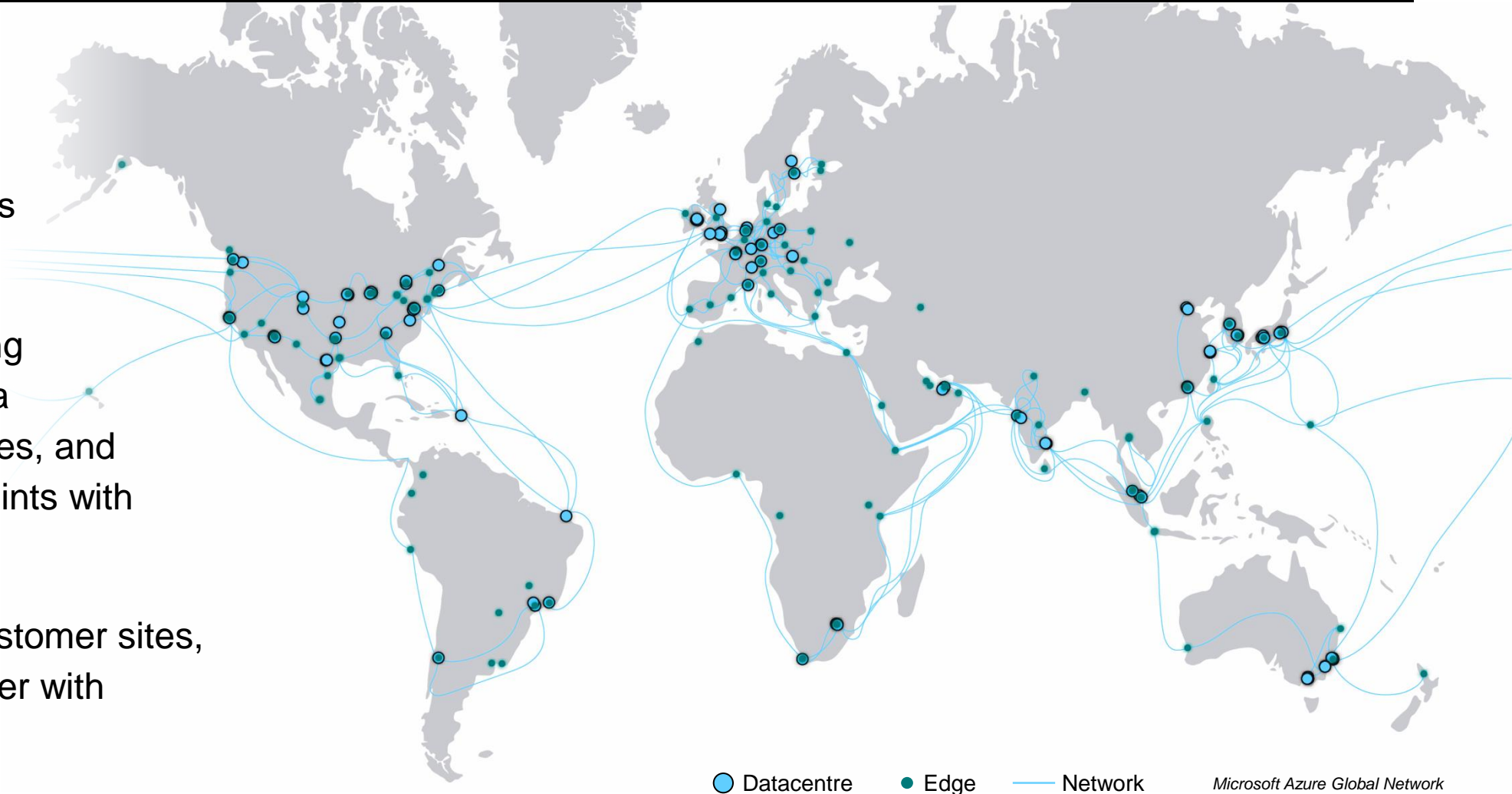


Multi-Orbit fleet provides more ways to connect to a Multi-Cloud World

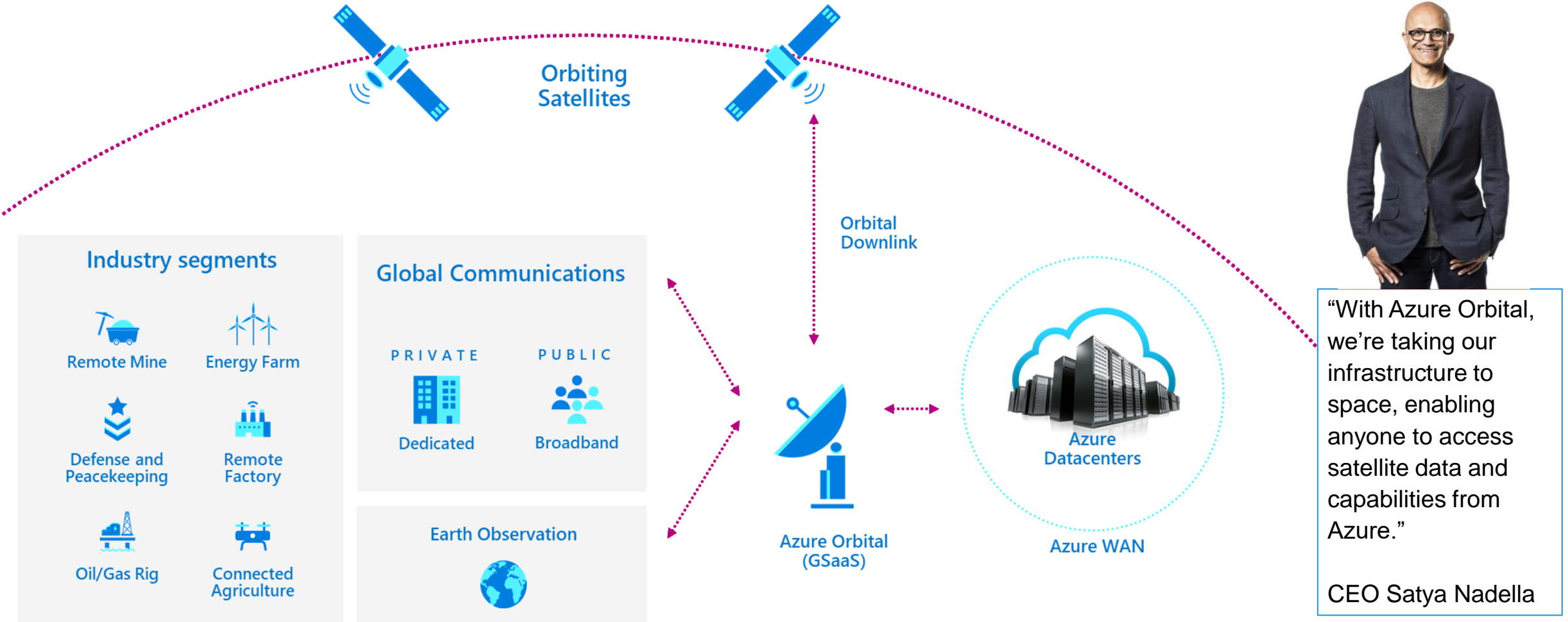


The world's largest cloud service providers are extending their network ecosystems with satellite

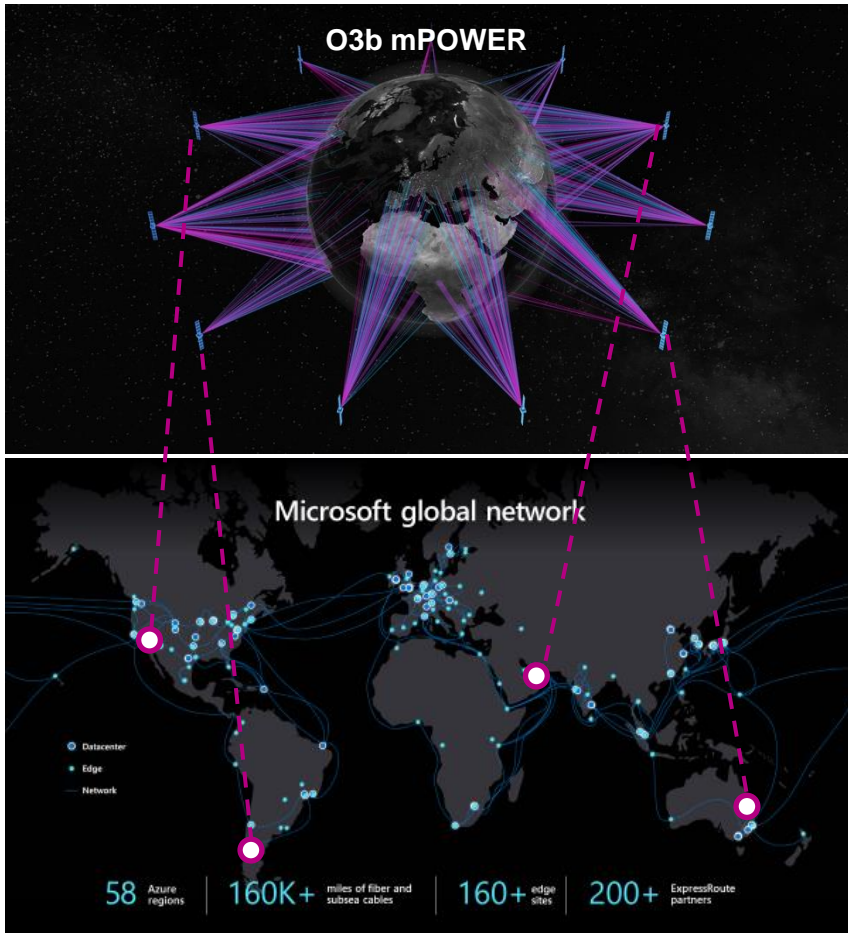
- ▲ Hyperscale cloud providers operate many of the world's largest networks
- ▲ They are increasing the number of data centres, edge nodes, and interconnection points with other providers
- ▲ But to reach all customer sites, they need to partner with satellite operators



Programs like Microsoft's Azure Orbital are bringing satellite and the cloud closer together



As an Azure Orbital partner, we create dedicated “one-hop” connectivity from any remote site or edge node to the cloud



- ▲ Improves cloud application performance
- ▲ Simplifies interconnection to Azure
- ▲ Faster service deployment
- ▲ Easy activation and monetisation of Azure-based applications

Cloud-optimised connectivity requirements



Dynamic high bandwidth allocation

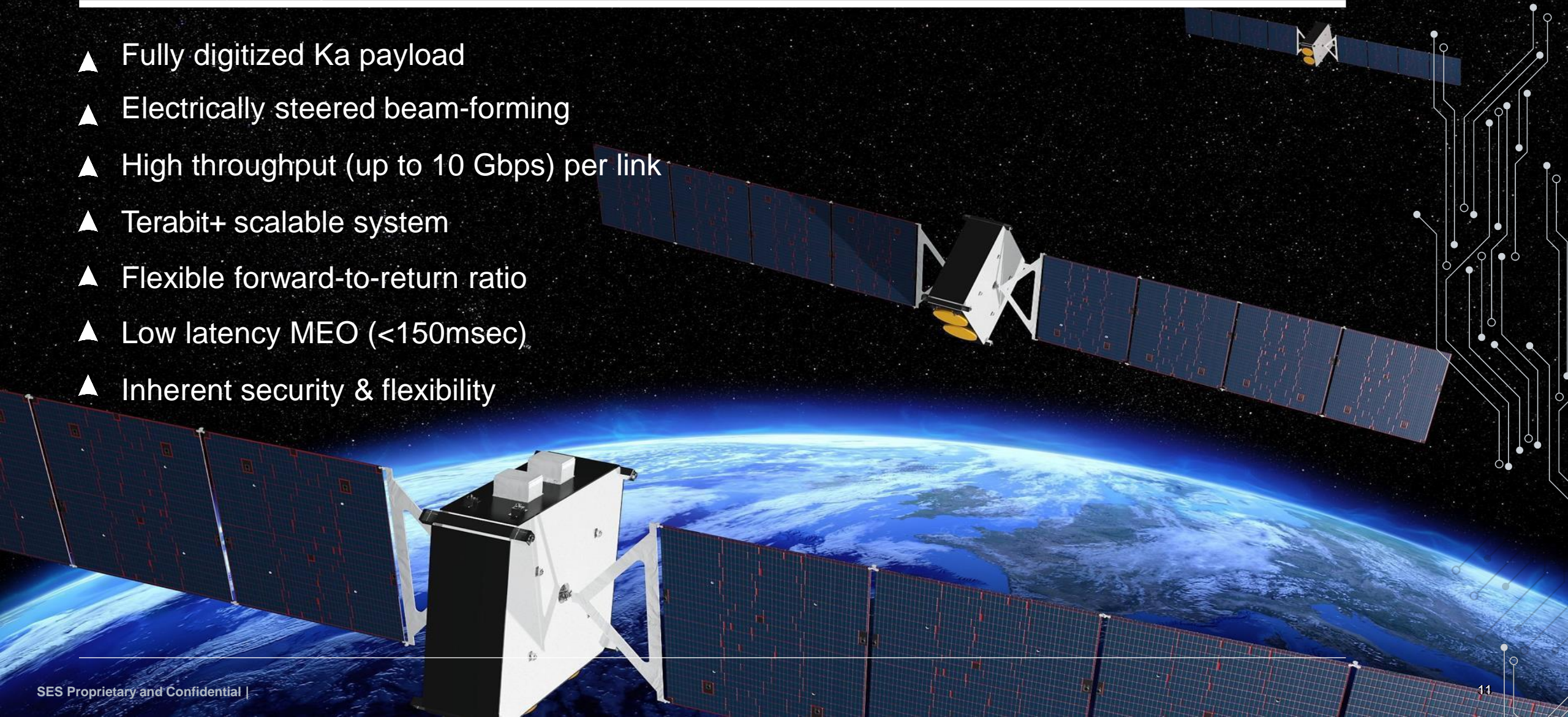
Consumption based services

Low latency

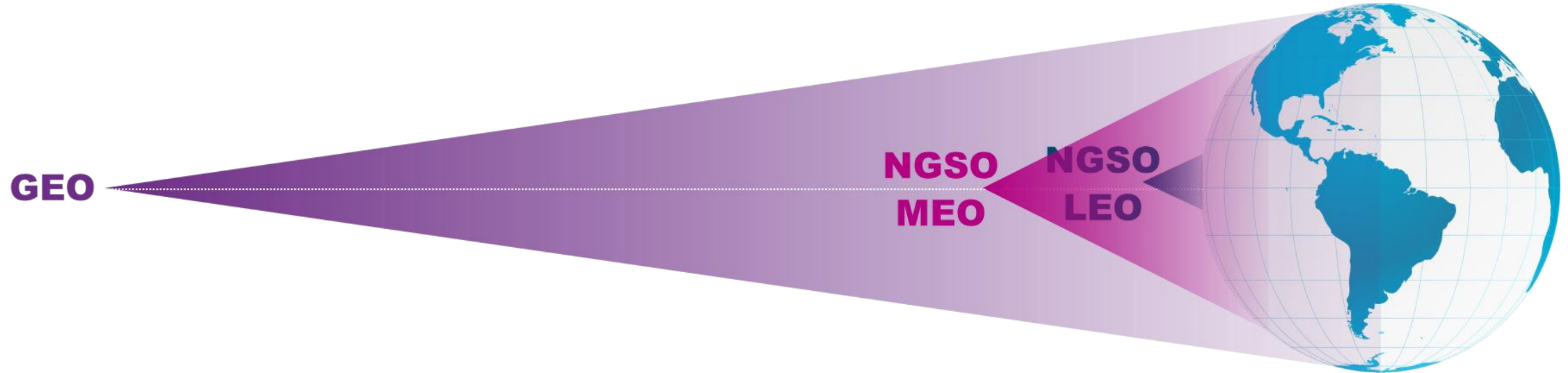
Reliable security

High availability & resiliency

- ▲ Fully digitized Ka payload
- ▲ Electrically steered beam-forming
- ▲ High throughput (up to 10 Gbps) per link
- ▲ Terabit+ scalable system
- ▲ Flexible forward-to-return ratio
- ▲ Low latency MEO (<150msec)
- ▲ Inherent security & flexibility



Throughput, Latency & Reach vs. Orbit



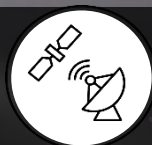
GEO – 36,000km	NGSO MEO – 8,000km	NGSO LEO ~1,000km
Very large Earth view	Large Earth view	Small Earth view
Very Mature Technology	Mature Technology	Emerging R&D Technology
< 100Mbps High latency (~700 msec)	up to 10 Gbps Low latency (~150 ms)	<100Mbps Very low latency (~50 ms)*
Stationary orbit fixed terminal	1-hour tracking equatorial orbit	10-minute fast tracking polar/inclined

* Gateway distance dependent

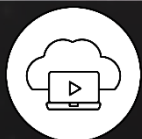
O3b mPOWER Enables a New Era of Satellite Network Services



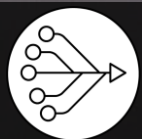
**Unique combination of Latency,
Reach & Throughput**



Carrier-grade CIR performance



Dynamic and adaptive control



Open network integration



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Connect with us





Low Earth Orbit ("LEO") Communication Satellites:

*Affordable Infrastructure
to Connect Your World*

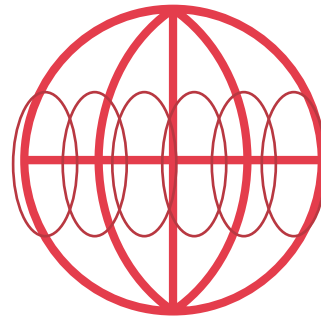
Orbit comparison

GEO: 1 satellite covers 1/3 of the world



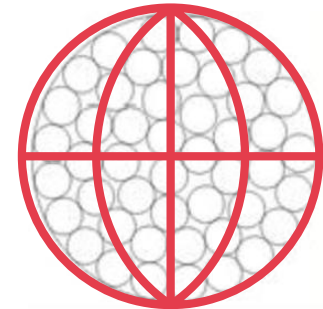
36,000 km

MEO: 8 satellites can cover 2/3 of the world



2,000-35,000 km

LEO: hundreds of satellites cover 100% of the world

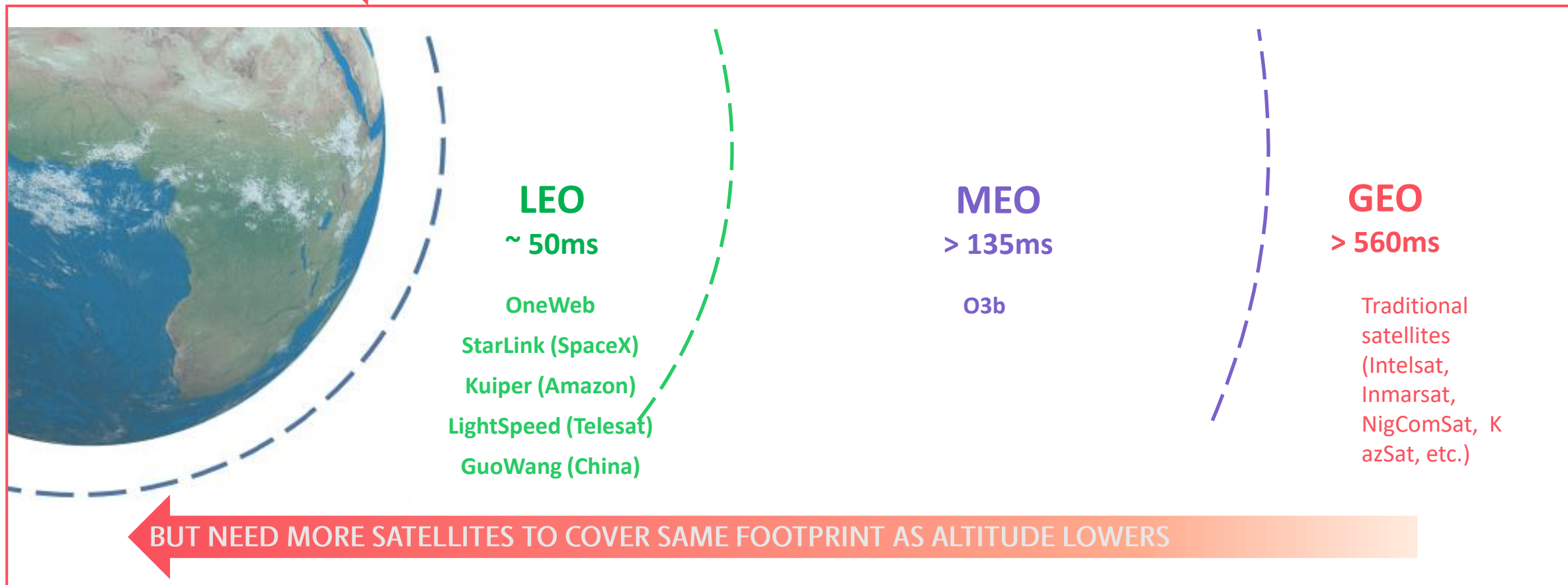


200-2,000 km

For reference, the Kármán Line is 100 km, and the ISS is ~250km

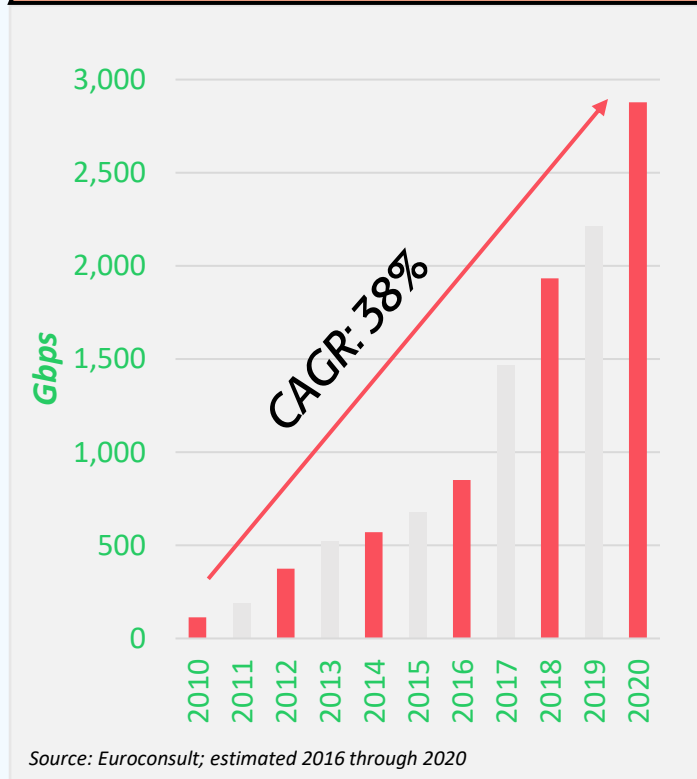
NGSO Constellations Offer Lower Latency

PERFORMANCE IMPROVES AS DISTANCE FROM EARTH DECREASES

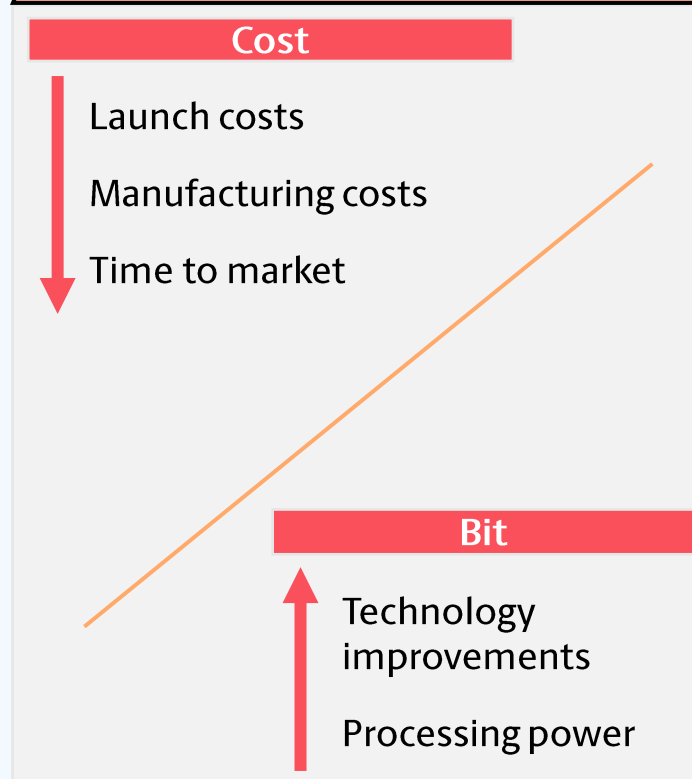


NGSOs take advantage of new tech to lower costs





High-Throughput Capacity



Cost Per Bit Decreasing









Satellite Becoming More Attractive

- 
Broadband: User experience and price are competitive with wireline; ideal for hard-to-reach regions
- 
Mobility: Provides broadband experience everywhere for passengers and crew
- 
Telco: Extends networks, offloads congestion, and price competitive with microwave
- 
Enterprise: In-office broadband experience in remote locations

Today's NGSOs build on that experience

Now, with the internet and personal mobility, the demand has skyrocketed at the same time the technology has developed and lowered in cost

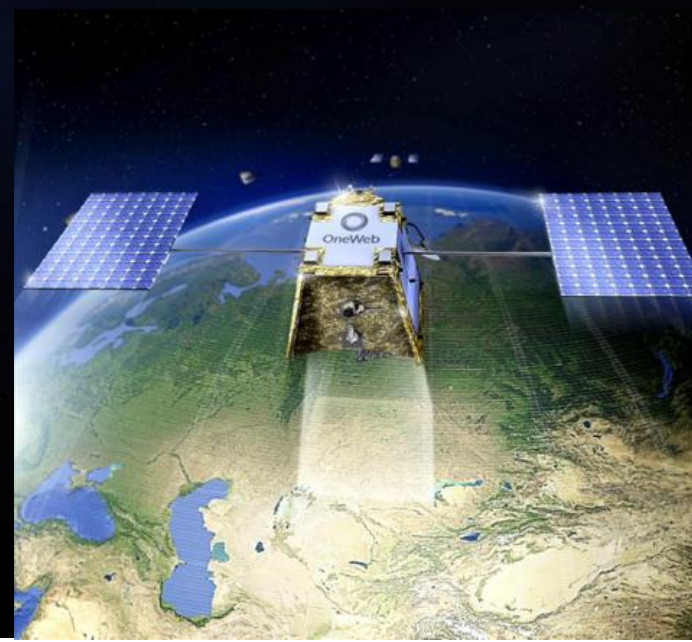
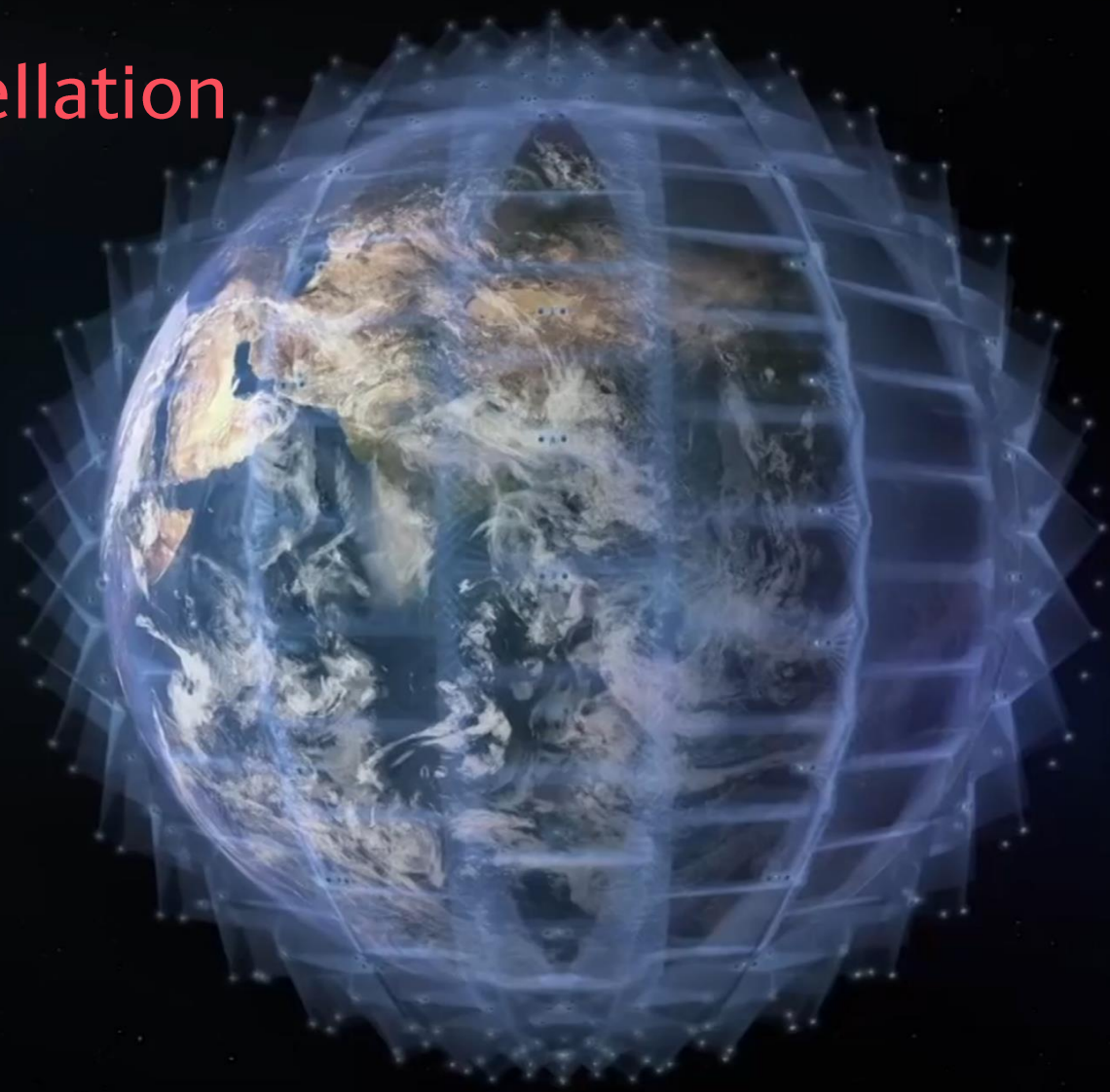
	 OneWeb	 SES [^] O3b mPOWER	 SPACEX STARLINK	 TELESAT LIGHTSPEED	 amazon project kuiper	 Guo Wang
Constellation Size	588 (Gen1) (182 launched)	11	4,409 (Gen1) (1,378 launched)	298	3,236	6080 Gen1 12,992 Gen2
Frequency Bands	Ka gateways Ku users	Ka	Ka gateways Ku users	Ka	Ka	Ka (maybe also V, Q)
Orbit	1,200 km	8,062 km	550 km	1000 km	600 km	590-600 km 1145 km
Capacity	~5 Tbps (~7.5 Gbps/sat)	~2.7 Tbps (~200-315 Gbps/sat)	~75 Tbps (~17 Gbps/sat)	~12 Tbps (20-50 Gbps/sat)	~30-32 Tbps	Unk.
Target Markets	Wholesale, B2B, backhaul, enterprise, government, mobility	Backhaul, trunking, energy, cruise, aero, government	Residential broadband, government	Backhaul, mobility, enterprise, government	Residential broadband, enterprise, backhaul, mobility	Belt & Road diplomacy

OneWeb's Constellation

A constellation of 600+ satellites in Low Earth Orbit 1,200 km from earth.

OneWeb satellites will provide low latency, high throughput, and global coverage.

They are easy to manufacture with fewer components, lighter weight, and cheaper to launch.



The OneWeb Solution

How it Works



Constellation

- Satellites travel in orbital planes; multiple satellites per plane
- Innovative beam technology
- High-volume satellite production yields lower cost per satellite

Ground

- A range of user terminals to meet varying target markets
- Many can be easily installed without position aiming
- Gateways across the globe



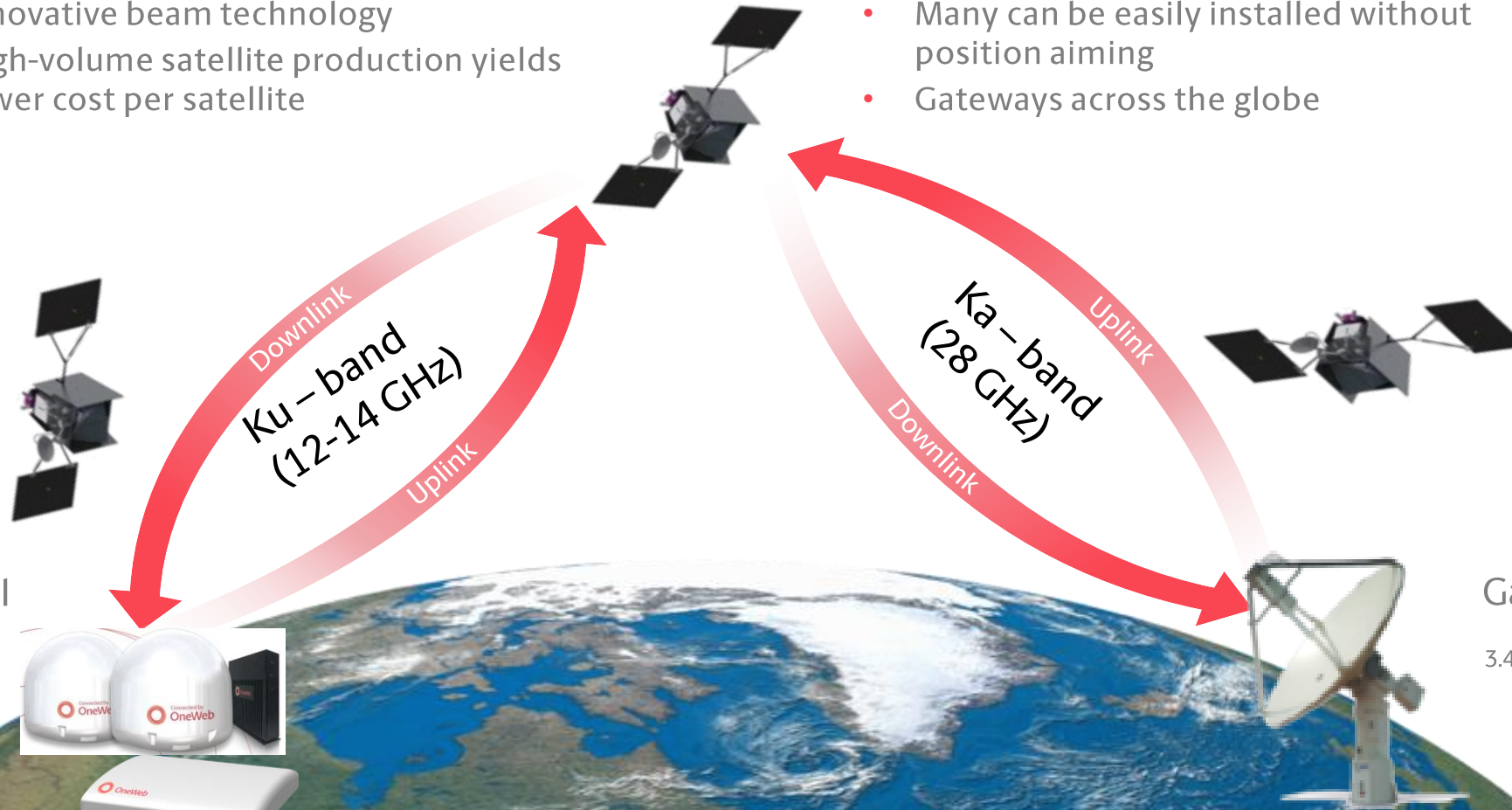
User Terminal

- Single parabolic
- Dual parabolic
- Small AESA
- Etc.



Gateway

Number of 3.4m Antenna



User Terminals

Variety of User Terminals (UT) planned to meet different vertical market requirements.

Design leverages Core Modules for ease of manufacturability and production.



Choice of UT for Fixed:

- Single parabolic (Enterprise)
- Dual parabolic (Cellular Backhaul)
- Small AESA



Integration with:

- 3G/LTE/5G
- Wi-Fi



Choice of UT for Mobility:

- Dual-Parabolic for Maritime
- AESA (flat panel) for Aero



Throughput:

- up to 400 Mbps down
- Up to 30 Mbps up
- * using 30W rate

Single Parabolic (Enterprise)
Dual Parabolic (Cellular Backhaul)



Stabilized Dual Parabolic (Maritime)

Compact Active Electronically Scanned Antenna (SME/small cell)



Active Electronically Scanned Antenna (Aero)



Our Market Sectors

Cellular Backhaul

- Macro-cell Satellite
- Integrated Small Cells

Government

- Emergency Response
- Local Government
- Military

Satellite Broadband

- Corporate Enterprise
- Small & Medium Business
- Consumer Residential

Mobility

- Maritime
- Aviation
- Government
- Oil and Gas
- Connected Car
- IoT

