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Cellular Backhaul 2018:
Satellite + 3G, 4G, LTE & 5G
Leveraging the Now! & The Sometime Soon

Martin Jarrold
Chief, International Programme Development
GVF

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Who Are We?

GVF is the single and unified voice of the global satellite industry

- **Founded in 1997**, it brings together organisations engaged in the delivery of advanced broadband and narrowband satellite services to consumers, and commercial and government enterprises worldwide

- **Headquartered in London**, GVF is an independent, non-partisan and non-profit organisation with around 200 members on six continents

- **The broad-based membership** represents every major world region and every sector of the satellite industry, including fixed and mobile satellite operators, satellite network operators, teleports, satellite earth station manufacturers, system integrators, value added and enhanced service providers, telecom carriers, consultants, law firms, **and users**

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SVF Satellite. Solutions. The World.

What Do We Do?... Who Do We Do It With?

Regulatory

Spectrum

Cyber Security

Type Approvals

MSF

Education & Training

Humanitarian Assistance & Disaster Response

Space Sustainability

SMALL CELL FORUM
HOME | ENTERPRISE | URBAN | RURAL

GSMA

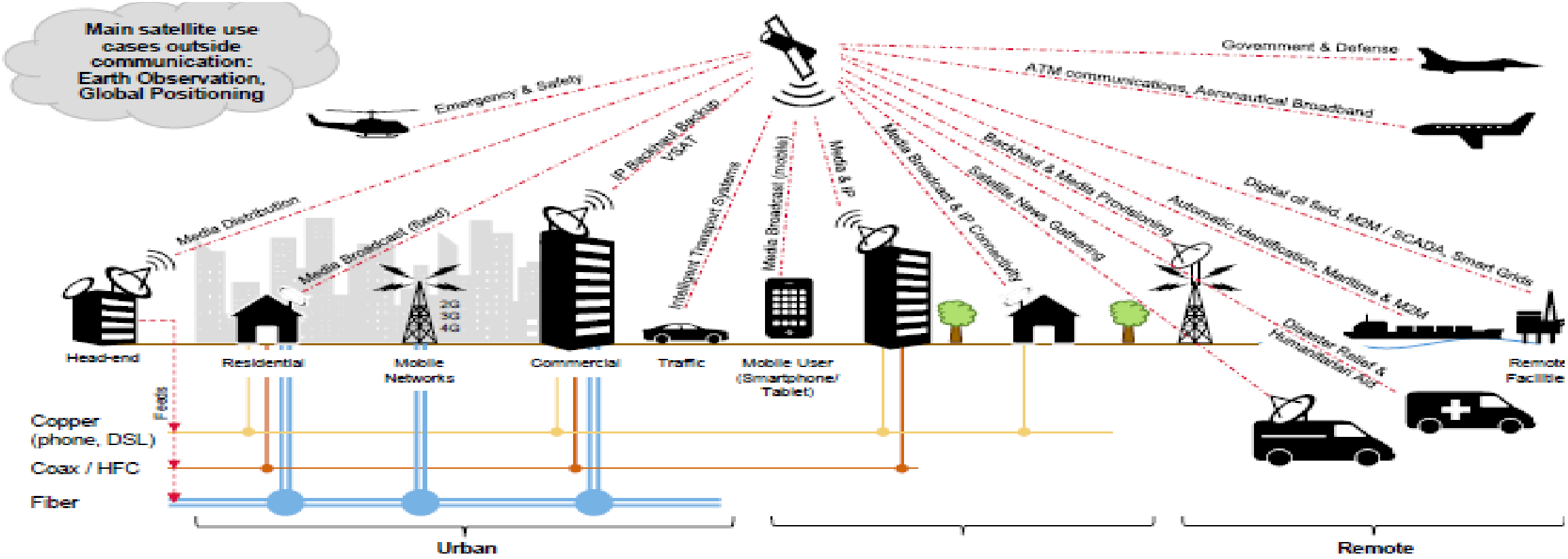
ESOA
EMEA SATELLITE OPERATORS ASSOCIATION

RGSIA
The Voice of the Satellite Industry

MSUA
Mobile Satellite Users Association

APSCC
Asia-Pacific Satellite Communications Council

Growing the Converging Communications Ecosystem



5G Use Cases Supported by Satellite *

- **Multimedia Delivery:** Mobile Broadcast **(5.53, 5.56, 5.64)**; Content Caching **(5.36)**; Broadcast to Home **(5.56)**
- **Broadband:** Mobile Broadband to Users & Vehicles **(5.28, 5.29, 5.53)**; Fixed Broadband to Homes & Enterprises **(5.41)**; Ubiquitous Coverage – Remote Area Services **(5.10, 5.30)**; Backhaul Connectivity **(5.10, 5.30)**; Broadband to Moving Platforms – Drones, Aircraft, Ships **(5.12, 5.29, 5.30)**
- **Machine Type Communication:** Fleet Tracking **(5.43)**; Asset Management **(5.43)**; Wide Area Sensor Management **(5.42, 5.73)**
- **Critical Communication:** Disaster Management **(5.3, 5.31)**; Air Traffic Management; Reliable Communications **(5.73)**
- **Vehicular Communication:** Traffic Updates & Software Upgrades **(5.33)**; eCalls & Emergency Notifications **(5.3, 5.31)**

3GPP A GLOBAL INITIATIVE

* **3GPP SA Use Case (TR 22.891-200)**

Satellite Role in European 5G Vision

- "**Satellites** will integrate with other networks rather than be a standalone network to provide 5G and it is this integration that forms the core of the vision"
- "**Satellite** systems are fundamental components to deliver reliably 5G services not only across the whole of Europe but also in all regions of the world, all the time and at an affordable cost"
- "Thanks to their inherent characteristics, the **satellite** component will contribute to augment the 5G service capability and address some of the major challenges in relation to the support of multimedia traffic growth, ubiquitous coverage, machine to machine communications and critical telecom missions whilst optimising the value for money to the end-users"
- "**Satellites** can proficiently be part of a hybrid network configuration, consisting in a mix of broadcast infrastructures and broadband infrastructures managed in such a way that it brings, seamlessly and immediately, converged services to all end-users…"

Satellite Working Group

European Technology Platform

European Commission Vision

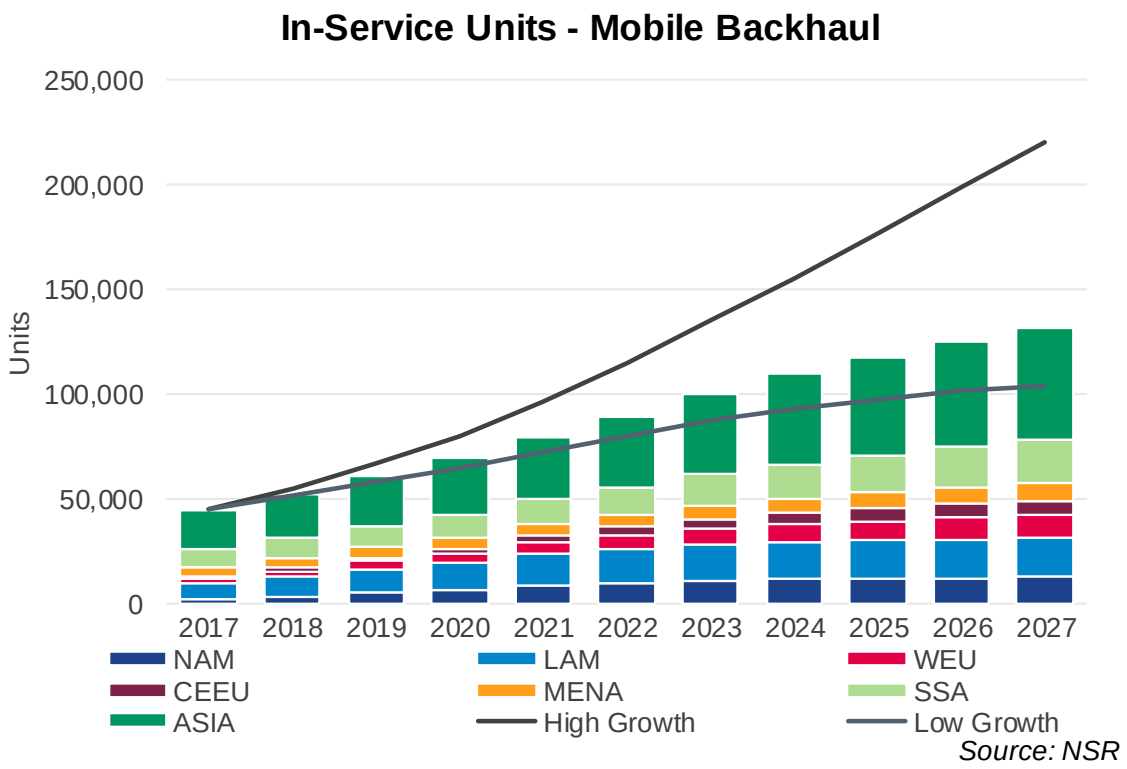
The European Commission (EC) urges stronger convergence, with the main initiative being the 5G Public-Private Partnership (5GPPP)

- "We have encouraged the communities to jointly develop standards so that new **HTS** is developed with the same 5G standards in mind as the terrestrial systems, and this has also been supported by the **European Space Agency [ESA]**, which has had a role in the activities of the **5GPPP**, managed by the **EC** for the public part and the 5G Association for the private part"

- "**HTS** should be an integrated part of the 5G architecture and final system, and complement the terrestrial technologies, especially in rural areas or areas which will be difficult or impossible to serve by terrestrial technologies."

- Working together with standards bodies, the **satellite** and wireless industries have an opportunity to create truly integrated networks that complement one another. Therefore, information sharing is crucial: The **satellite** and terrestrial industries must work more closely together and build trust. To this end, **satellite** is active in multiple 5G forums, such as the **EU's Horizon 2020**, **European Telecommunications Standards Institute (ETSI)**, **ESA**, the **European Conference of Postal and Telecommunications Administrations (CEPT)**, the **3GPP** and the **5GPPP**.

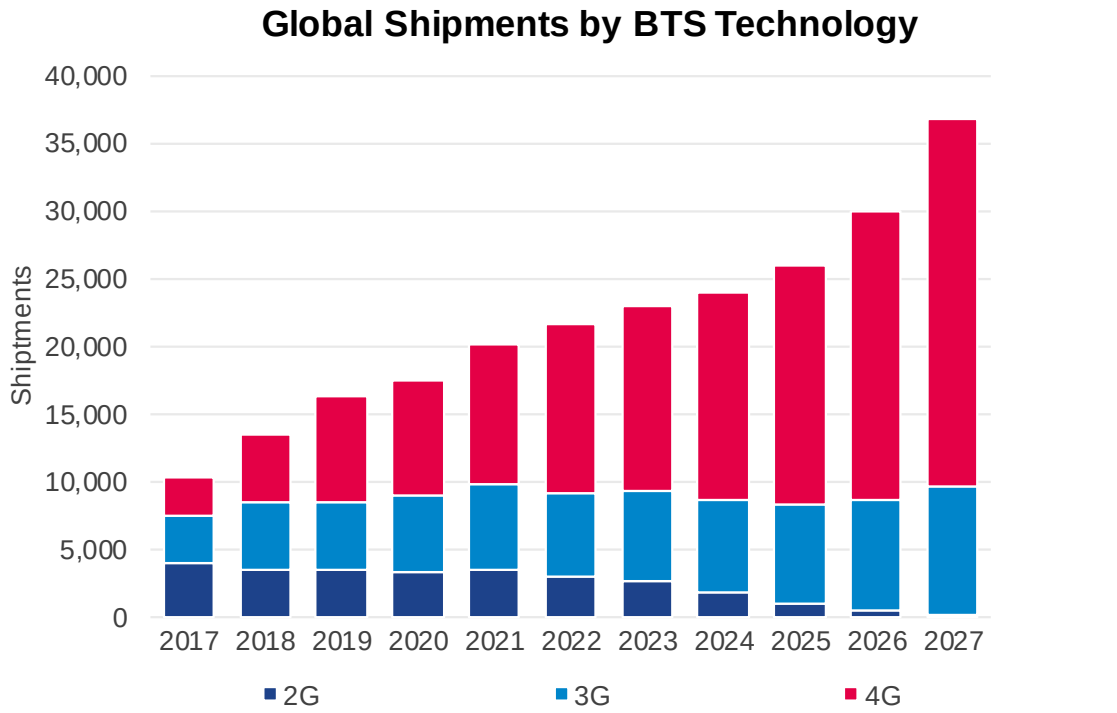
Cellular Backhaul Main Trends



Source: NSR

- **Extraordinary growth prospects** for all steps of the value chain.
- Competitive capacity pricing, advanced ground equipment and global Mobile trends favor rapid growth.
- Transition to 4G leads to **booming capacity demand.**
- Capacity price degradation challenges short-term revenue growth, but **elasticities will eventually unlock $3 billion in annual revs by 2027.**
- **Ground Segment** has a key role to play for Satcom to integrate with Telecom networks. **Growth prospects are robust** but only the most adaptive actors will capture growth in this generation change.
- **Managed services** critical for MNOs to adopt Satellite solutions.

Large Opportunities for All Steps of the Value Chain



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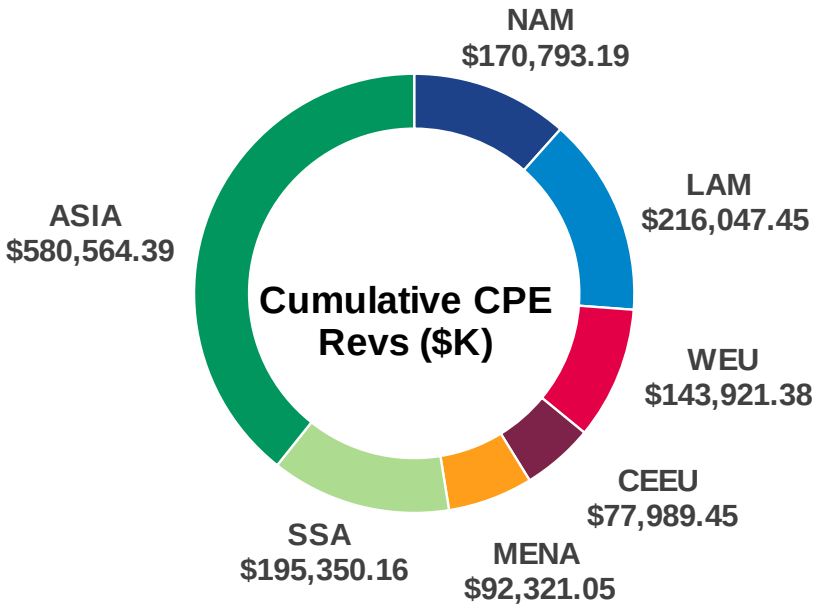
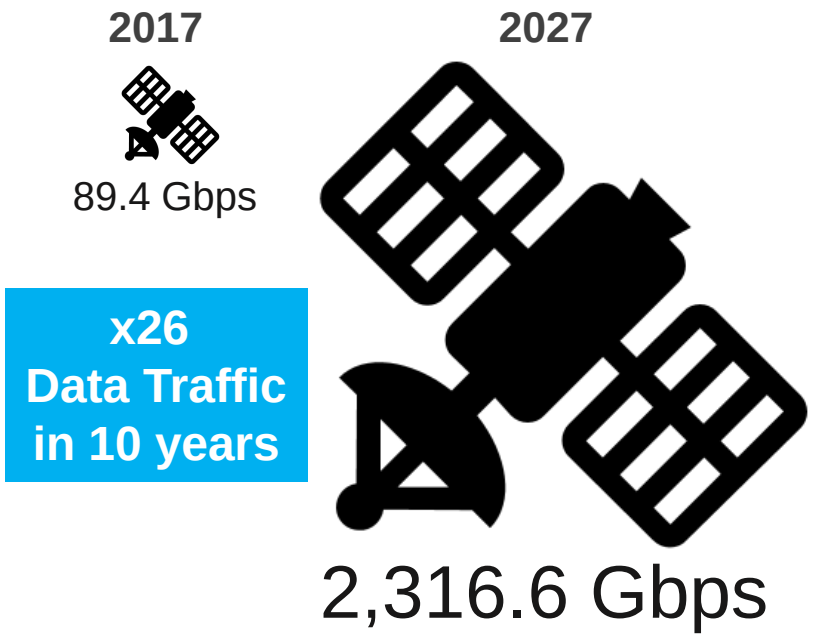
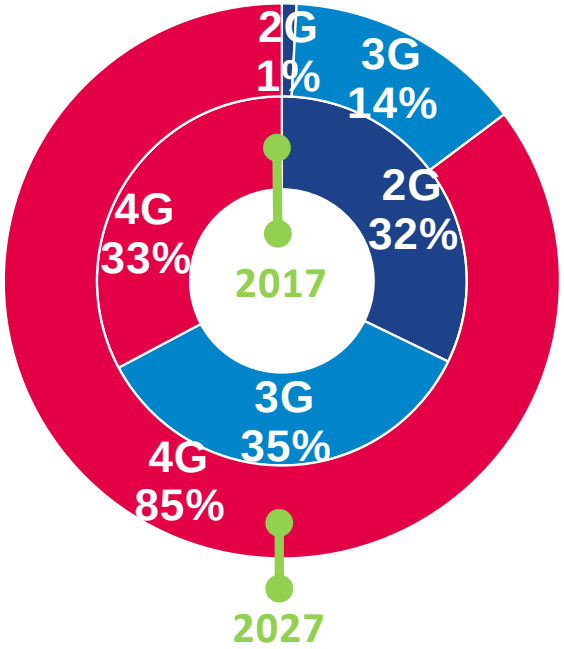


Source: NSR

Booming Capacity Demand Driven by Expanding Installed Base and Transition to 4G

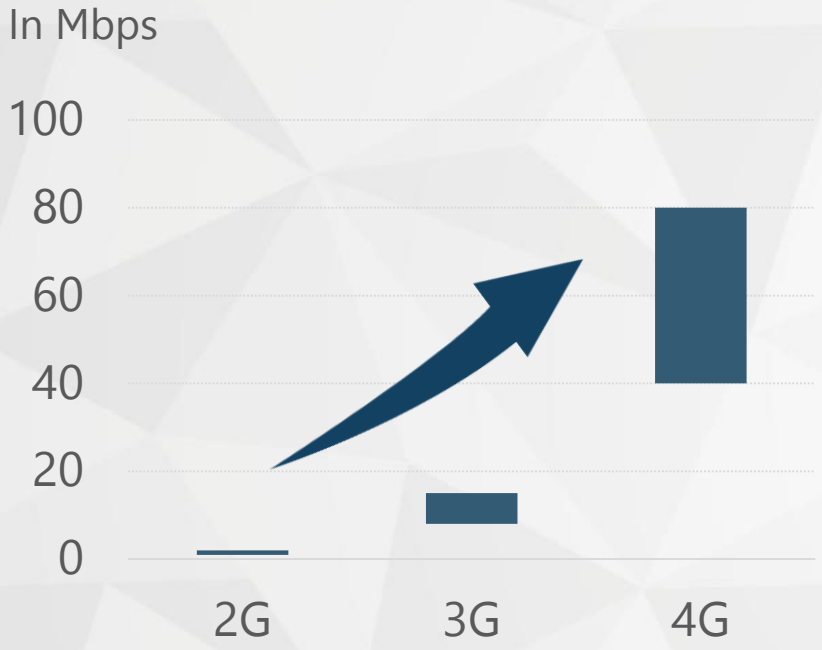




Capacity Demand by BTS Technology

CELLULAR BACKHAUL SUPPORTED BY NETWORK EXTENSIONS

EST. SAT CAPACITY PER MOBILE BTS



Small cell deployments presenting upside potential for the segment…

BACKHAUL & TRUNKING CAPACITY DEMAND

~170 Gbps 2016 → **5x** → **>900 Gbps** 2026

Recent acceleration in satellite backhaul commitments…

- **EE** (4G/LTE)
- **SPRINT** (4G/LTE)
- **SOFTBANK** (LTE *small cells*)
- **CLARO** (LTE)
- **TIM** (3G/4G *small cells*)
- **Globe** (2G/3G/4G)
- **AIS** (3G/4G)
- **Indosat Ooredoo** (3G/4G)
- **XL Axiata** (3G/4G)
- **Roshan** (3G)

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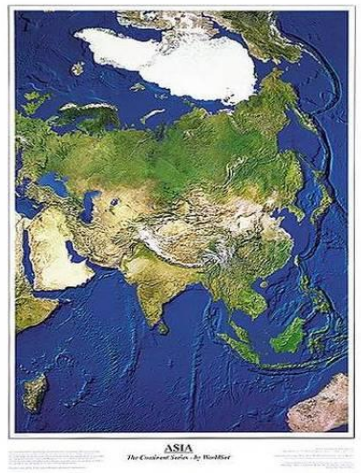

Thank You

martin.jarrold@gvf.org