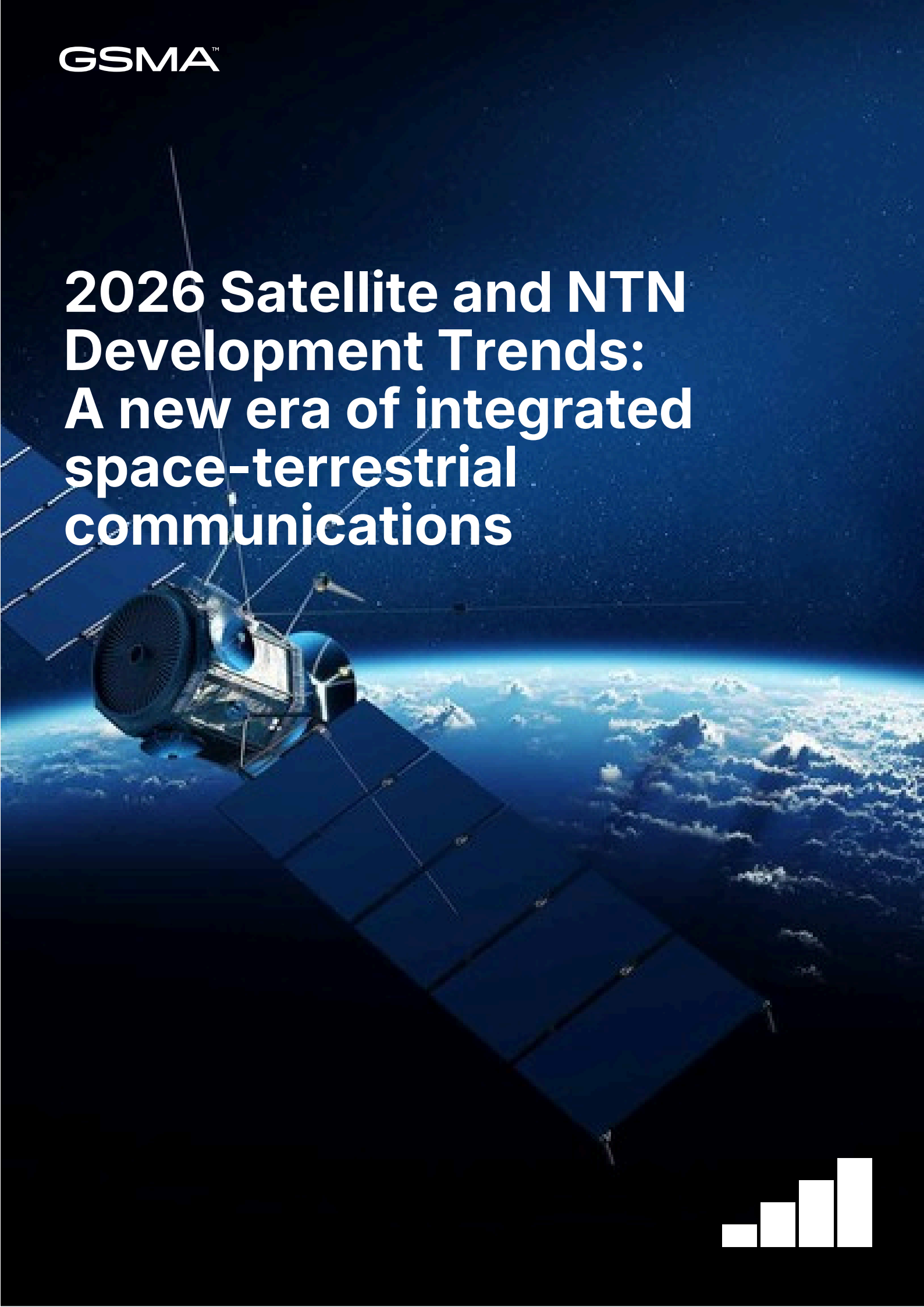
GSMA

2026 Satellite and NTN Development Trends: A new era of integrated space-terrestrial communications



Introduction

Satellite internet has finally moved from a capital-intensive experiment to a commercially sustainable business.

It has, in fact, taken nearly three decades. Back in 1998, Motorola invested $5 billion to launch the Iridium satellite system. Yet due to prohibitively high call charges and bulky terminals, the venture declared bankruptcy after just nine months of commercial operation.[1] After which, the satellite communications industry remained largely stagnant, confined mainly to specialised applications in maritime and aviation sectors. The turning point came in 2019. A new generation of satellite constellations - represented by Starlink - ignited a disruptive transformation. Low Earth orbit (LEO) satellites, functioning like “cell towers in space,” were densely deployed at altitudes of around 550 kilometres. To date, Starlink has launched approximately 7,000 satellites[2], accounting for 85–90% of global in-orbit satellite capacity[3], and has achieved positive free cash flow [4] - signalling the growing financial strength of the sector.

Today, the positive momentum of satellite internet is converging deeply with 5G and 6G standards. 3GPP Release 17 formally incorporated satellite communications into global mobile standards for the first time[5], This means that ordinary smartphones - without hardware modification—will soon be able to automatically switch to satellite networks when terrestrial signals disappear, as seamlessly as switching between Wi-Fi and cellular data.

In 2026, this **“great convergence of space and earth” is transitioning from technical validation to large-scale commercial deployment.**[3]

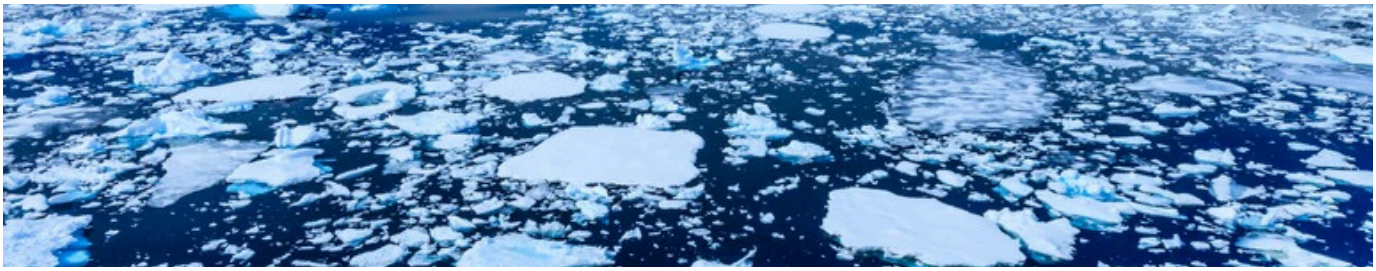
I. Technological breakthroughs in satellite communications

Why satellite plays a key role in connectivity

Traditional mobile networks rely on terrestrial towers, typically covering only a few kilometres in radius. Despite extensive global deployment of base stations, 2.6 billion people - approximately 32% of the world's population - still lack reliable internet connectivity.[6]

To put it simply, Non-Terrestrial Networks (NTN) move base stations into the sky. [5] Satellites and high-altitude platforms serve as "flying base stations" enabling a single satellite to extend coverage across hundreds or even thousands of kilometres. Unlike terrestrial infrastructure, satellites are unaffected by terrain. Whether trekking in the Himalayas, sailing across the Pacific, or conducting research in the Sahara, satellites overhead can automatically function as your mobile base station.

Beyond LEO (low Earth orbit) constellations such as Starlink and OneWeb, NTN also encompasses geostationary orbit (GEO) satellites, medium earth orbit (MEO) satellites, low- altitude platforms (LAP), and high-altitude platform systems (HAPS). At present, 5G NTN development and applications are concentrated primarily in GEO and LEO domains.[7]



Core breakthroughs

1. **The LEO revolution:** shifting from traditional 36,000 - kilometer GEO orbits down to 550 - 1,200 kilometres has reduced signal latency from roughly 600 milliseconds to 20 - 40 milliseconds - making services viable in practice.
2. **Dramatically lower launch costs:** reusable rocket technology has sharply reduced per- kilogram launch costs, making large - scale constellation deployment economically viable.

3. **Miniaturised phased-array antennas:** Significant reductions in terminal size and cost have enabled consumer-grade satellite applications.[7]
4. **Unified standards and protocols**: With 3GPP standardising satellite access[5], smartphone chipsets can support NTN without redesign, removing the final barrier within the device ecosystem.

Complementing, not replacing

NTN is not designed to replace terrestrial networks - but to complement them.[3][8] The relationship is similar to high-speed rail and urban metro systems: high-speed rail handles long-distance intercity travel, while metros serve dense intra-city commuting. Each fulfils a distinct role.

Terrestrial base stations remain unmatched in densely populated areas due to their high capacity and low cost per user. Satellites, by contrast, excel in wide-area coverage and mobility scenarios - cargo ships at sea, international flights and remote villages - where building ground infrastructure is economically or practically infeasible.

The ideal future is a unified “one network across sky and earth”: smartphones use 4G/5G in cities and automatically switch to satellite coverage in rural areas - without users even noticing the transition.[8]

II. Rapid expansion of satellite communications

Global commercial deployment

According to GSMA Intelligence, as of September 2025, 110 operator groups - **representing 67% of global mobile connections - have established active partnerships with satellite companies.**[9]This year marks a pivotal commercialisation milestone: operators such as AT&T and T-Mobile have launched services in Europe and North America, with rapid expansion underway in the Middle East and Latin America.

Real-world adoption

Progress has exceeded expectations. 70% of global mobile operators - including China Mobile, Verizon, and Vodafone - have signed agreements with satellite providers.[9]In Japan, more than one million KDDI users have used satellite messaging while hiking or at sea. In New Zealand, One New Zealand customers have collectively sent over one million satellite-enabled text messages.[9]

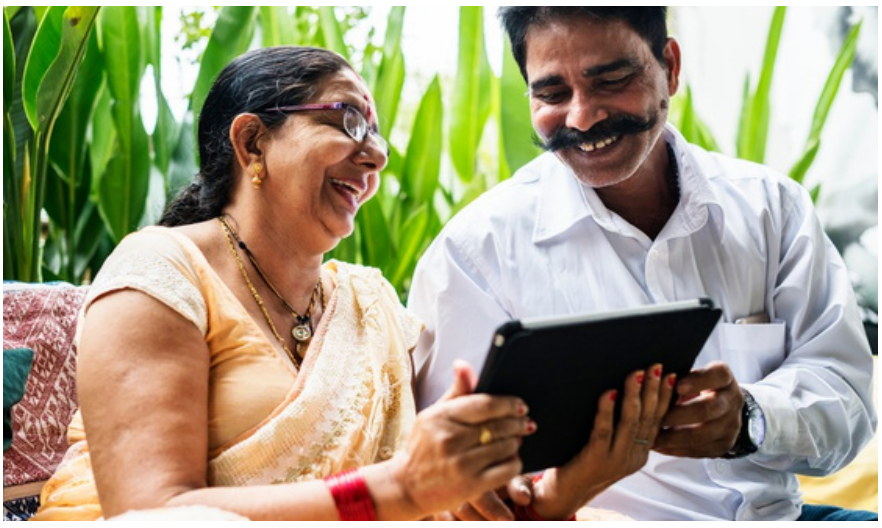
One of the most dramatic cases comes from Ukraine. Kyivstar partnered with Starlink, and within just two days of service launch, 300,000 users accessed satellite connectivity. Amid war-related destruction of terrestrial infrastructure, satellites became a communications lifeline. [10]

Growing willingness to pay

How much is satellite connectivity worth? A GSMA survey of 12,390 respondents across 12 countries found that **60% are willing to pay 5–8% more on their monthly bill for ubiquitous coverage – and nearly half would switch operators for such a service.**[6]

Indian consumers are willing to pay a 9% premium - significantly higher than the 5–8% seen in the United States[6] - reflecting stronger demand for reliable connectivity in regions with frequent service disruptions.

The commercial logic is clear: the value of satellite service lies not in peak speed, but in availability during the critical “last 1% of moments.”



III. China’s strategy and innovation

National-level constellation development

China is accelerating satellite internet development at a national scale. Major constellation initiatives include:

- **Guowang Constellation (12,992 satellites)**[11]
- **Qianfan Constellation (over 10,000 satellites)**[12]
- **Integrated projects such as Hongyan and Hongyun**[13]

Combined, these projects total approximately 33,000–38,000 satellites.

By the end of 2025, China submitted frequency and orbital resource submissions (filings) for over 200,000 satellites to the ITU - the largest such application in history - though experts caution that filings do not equate to immediate deployment and should be viewed rationally.[14]

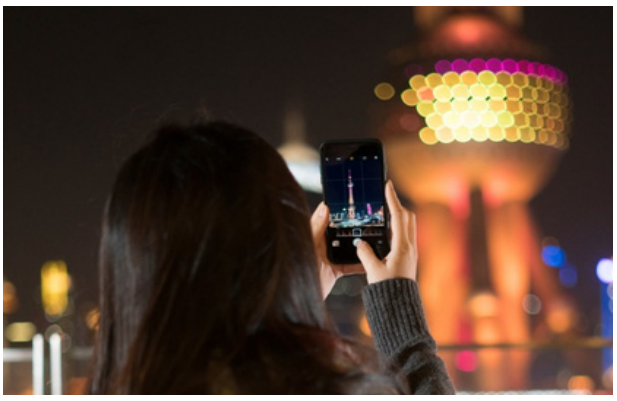
All three major Chinese telecom operators have obtained satellite mobile communication licenses. China Mobile and China Telecom position NTN as a core capability within 5G/6G architecture rather than a standalone system.[7]

Technically, China is pursuing a “three-orbit coordination” strategy:

- **GEO for broadcasting and emergency communications**
- **MEO for global coverage**
- **LEO for low-latency broadband**[7]

China’s approach: dual-mode terminals

In terminal innovation, China has adopted a distinctive approach. Rather than focusing solely on direct-to-device (D2D) satellite connectivity, large-scale deployment has first centred on dual-mode terminals - devices supporting both terrestrial cellular and satellite communication.



When ground coverage is available, devices default to 4G/5G; when out of range, they automatically switch to satellite mode, seamlessly and transparently.[7]

This approach maintains compatibility with existing infrastructure, controls terminal costs and avoids waiting for fully mature direct satellite standards. Manufacturers such as Huawei and Xiaomi have already integrated dual-mode satellite features into flagship devices, enabling satellite messaging, location sharing and emergency assistance - bringing satellite connectivity from professional equipment into the consumer mainstream.

IV. Commercialisation challenges

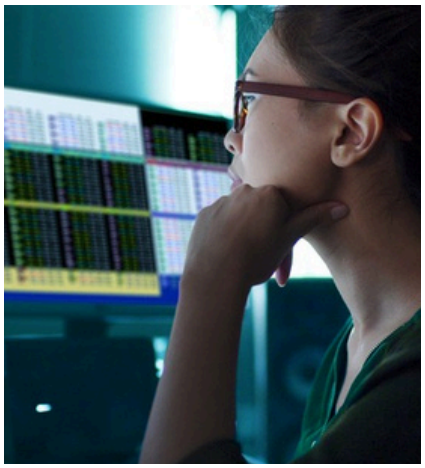
Despite promising prospects, significant hurdles remain.

Cost pressures

Global constellations require massive investment. Upstream costs include satellite manufacturing and launch, while limited satellite lifespans necessitate continuous replenishment. Downstream, device subsidies are often required for mass adoption. Currently, only a handful of companies have achieved profitability - primarily through premium markets. Reaching mass affordability likely requires crossing a threshold of tens of millions of users.

Technical bottlenecks

Switching between terrestrial and satellite networks requires signal reacquisition and authentication, potentially introducing latency. Weak satellite signals can significantly increase handset power consumption, reducing battery life. Integrating satellite antennas within limited smartphone space poses physical constraints.[7] Additionally, satellites cannot be repaired once deployed, requiring exceptionally high reliability.



Space-based computing

As satellite communications evolve toward broadband services, onboard computing power has emerged as a new frontier. Traditionally, satellites functioned primarily as signal relays. Next - generation satellites increasingly integrate onboard processing to analyse data in orbit, reducing backhaul loads and latency.

In commercial remote sensing, some satellites now compress imagery and perform target recognition onboard, transmitting only essential results rather than raw data.[3][7] However, space-based computing faces unique constraints: radiation-resistant chip design, thermal limitations and complex over-the-air software updates. These challenges are accelerating convergence between aerospace-grade and commercial AI chips and inspiring the long-term vision of “space data centres.”

Regulatory divergence

Satellite signals transcend national borders, raising sovereignty concerns. Some countries require foreign operators to partner with domestic companies; others mandate content filtering gateways. The use of satellite services in the Ukraine conflict sparked debate over civilian infrastructure in military contexts, prompting renewed export control scrutiny.[3]

Space traffic management

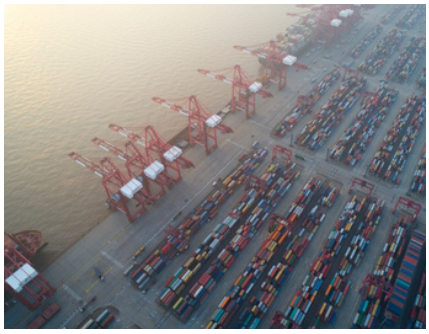
Large constellations intensify congestion in low Earth orbit. Frequency and orbital resource allocation follows a “first-come, first-served” principle, yet filings (the formal, technical and legal submissions) do not guarantee deployment.[14] Establishing international frameworks for collision avoidance and sustainable orbital governance remains a systemic challenge.

V. The future landscape of satellite communication

The true value of satellite communications lies not in serving populations already covered by 4G/5G, but in empowering scenarios overlooked by terrestrial networks: remote IoT deployments, mobile transportation and disaster recovery.
Perhaps most transformative is the emergence of the “low-altitude economy” - economic activity below 1,000 meters of airspace - projected to exceed RMB 2 trillion in China by 2030.[15]

Upgrading existing industries

- Emergency response: Following earthquakes or floods, satellites rapidly restore communication links.
- Maritime shipping: real-time IoT monitoring of temperature and humidity ensures pharmaceutical cold chains and hazardous cargo safety.
- Precision agriculture: Herds and pasture conditions in Inner Mongolia can be monitored via satellite-connected sensors hundreds of kilometres away.
- Energy inspection: Long-distance pipelines crossing uninhabited regions transmit
- Operational data via satellite for AI-based leak detection, reducing connectivity-relatedoperational disruptions by 20%.[9]



Enabling the low-altitude economy

The low-altitude economy demands high reliability, low latency and broad coverage - precisely the strengths of integrated space–terrestrial networks.

- Drone logistics: Companies such as SF Express and Meituan are testing drone delivery. While terrestrial networks handle urban operations, satellite connectivity supplements coverage in mountainous or remote regions.

- Urban Air Mobility (UAM): Passenger air vehicles require uninterrupted communication with air traffic control. Coordinated terrestrial-satellite networking ensures continuous coverage across suburban and over-water routes.[8]

Industry chain synergy

NTN development is catalysing the broader ecosystem. Chipmakers Qualcomm and MediaTek have introduced Release 17-compliant basebands. Smartphone manufacturers such as Huawei and Samsung plan to standardise satellite features in 2026 flagship models. Equipment vendors Nokia and Ericsson are developing transparent architectures to seamlessly integrate satellite traffic into core networks.[8] GSMA projects annual satellite communications revenue of $30–35 billion by 2035[3], with IoT alone accounting for 2.5–3 billion satellite-connected devices and roughly $10 billion in annual revenue[9] - equivalent to building another global satellite TV industry.

Conclusion
2026 The Beginning of “Never Losing Connection”

In 2026, we stand at the commercialisation turning point of satellite communications. As LEO capacity expands, smartphone chipsets natively support seamless terrestrial-satellite switching[8] and global regulatory frameworks mature, the era of integrated connectivity is just beginning.

The latest developments in this transformation will be showcased at MWC26 Shanghai. **For the first time, the event will feature a dedicated "Future Constellations" zone,** bringing together satellite operators, device manufacturers and vertical industry partners to demonstrate NTN technologies, integrated networking solutions and commercial use cases.

From standards to business models, from consumer terminals to industrial applications, **MWC26 Shanghai will offer a comprehensive window into the satellite communications ecosystem.**

This June in Shanghai, we look forward to witnessing together a milestone moment in the integration of space and earth.

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