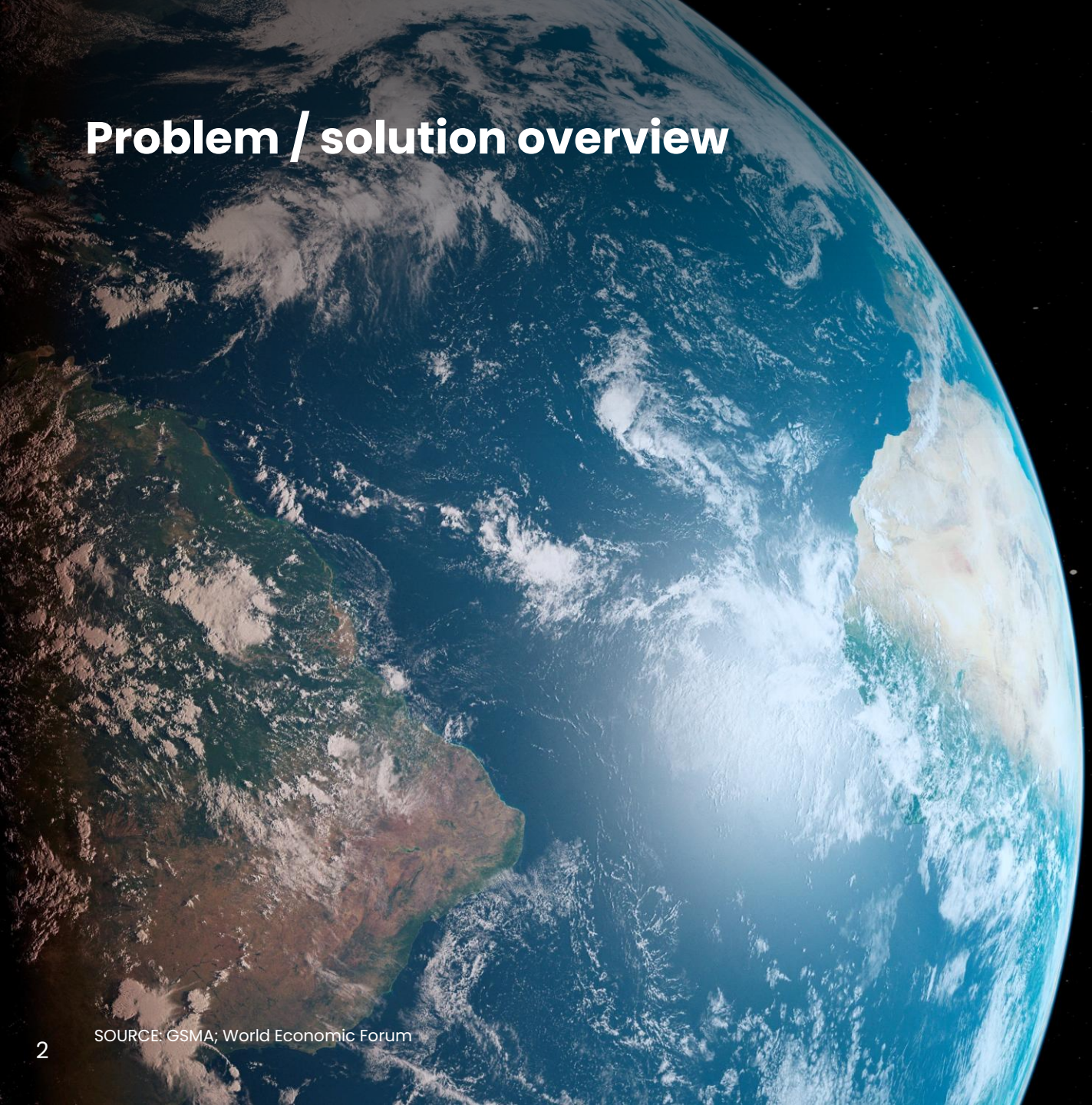
OQ TECHNOLOGY

The role of 5G NTN in Industrial Private Networks

2025

World's first global satellite 5G Direct-To-Device Operator

Problem / solution overview



Problem

2.5+ billion people still without connectivity

80% of the world has no cellular coverage

50% of disaster-related fatalities preventable with cell phone connectivity

5 American companies — OQ Technology is Europe's sole player in direct-to-mobile satellite

Solution

OQ Technology delivers seamless global connectivity through its advanced LEO satellite network, ensuring reliable, low-latency communication across industries. With full standard 4G/5G compatibility and robust global roaming capabilities, OQ enables billions of devices and applications to stay connected—anywhere, anytime.

SOURCE: GSMA; World Economic Forum

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OQ at a glance

Executive summary

- OQ Technology is the **world's first & fastest growing European satellite 5G NTN operator** with 10 satellites launched.
- Founded in 2016, OQ Technology is headquartered in Luxembourg, with offices in Saudi Arabia, Greece, the UAE, and Rwanda
- OQ Technology's mission aims at unlocking a large untapped **satellite D2D connectivity market estimated at $30 billion by 2035** thanks to its disruptive 5G NTN ecosystem, already serving well-known customers.
- OQ Technology is set to be **the first European Direct-to-Smart Phone operator** with three upcoming satellite missions and Fortune 500 companies signed up.

Key highlights

Global coverage: 10 satellite missions launched

International partnerships and customers

20+ 3GPP contributions made

12 patents granted in EU & US

Notified OQ own ITU filings – licensed spectrum and landing rights

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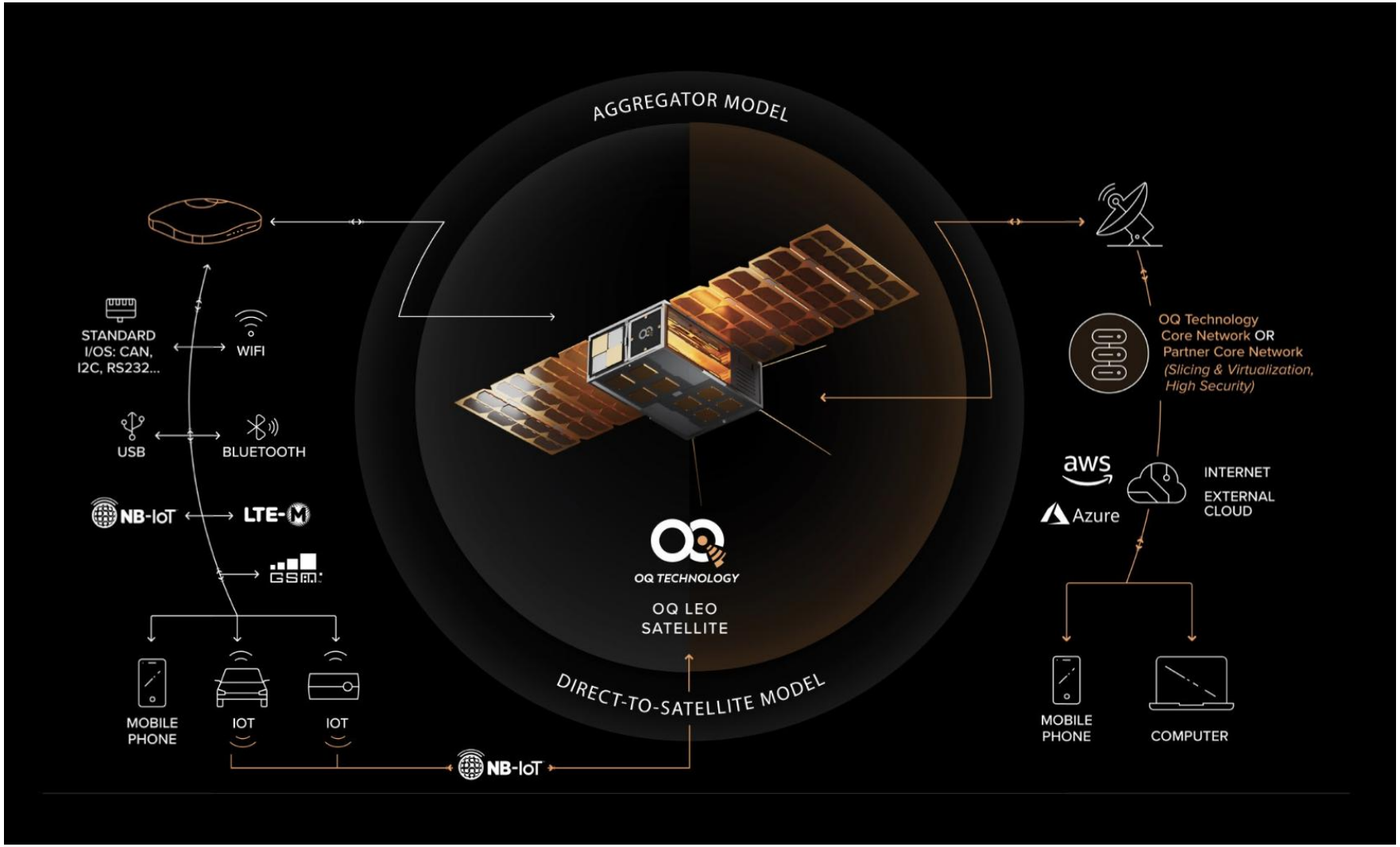
At the heart of OQ Technology

5G IoT platforms and 3GPP protocol standardization

- **IoT platforms**
- **Device management**
- **Application enablement**
- **Interoperability**
- **Security and privacy**



Disruptive technology enabling end-to-end solutions

Enterprise solutions

- End-to-end 5G NTN connectivity solutions
- Private secure 5G NTN network and teleport
- Certified 5G NTN LEO modules
- Bring-your-own-device (BYOD) compatible with 3GPP
- Full network management platform and analytics

MNOs/MVNOs

- Global NTN Roaming Partner
- Global NTN SIM Card
- Data Packages
- Direct-to-smartphone connectivity

Licensing

- D2D Tech licensing
- White-labelling
- Market Access

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Private 5G Networks Explained

Private 5G networks are standalone or hybrid cellular systems used on-premises.

Features:

- Low latency and high reliability

- Edge computing capabilities

- Full control and security

Common in sectors like manufacturing, mining, and oil & gas.

Use licensed, shared, or unlicensed spectrum.

Market Trends & Adoption

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- **5G NTN market projected to grow to $46B by 2030 (CAGR ~34%).**
- **Key drivers:**
  - LEO satellite constellations (e.g., Starlink, OneWeb)
  - Increased investment in private 5G infrastructure
  - Oil & Gas sector's digital transformation

- **Real-world deployments:**
  - OQ Technology deployment for Aramco of private 5G NTN network
  - Tampnet offshore 5G with AI analytics
  - Ericsson private networks for refineries

Deployment Challenges & Best Practices

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- **Challenges:**
  - High latency in GEO networks
  - Complex integration and spectrum licensing
  - Need for NTN-capable devices with GNSS and Doppler compensation

- **Best Practices:**
  - Begin with hybrid TN/NTN networks
  - Use edge computing to reduce delay
  - Collaborate with ecosystem partners and regulators
  - Plan for redundancy and scalable coverage

OQ Private 5G NTN Managed Services

Beyond end-to-end connectivity / Build Your Own IoT Ecosystem

Managed Services

One Global Network
- A single private network
- Government and Enterprise
- Complete connectivity requirements for existing and upcoming assets
- Closed Secure Network
- Possibility of signal lands directly at customers' gateway or though the cloud

BLOS – Beyond the Horizon
- Extends your coverage – No Geo Restrictions
- Usage of Satellite / Terrestrial

Satellites & Ground
- Advanced 5G secure & redundant gateways linked to your own core network

Products & Services
- State-of-the-art terminals, advances capabilities with NB data, D2D, Dual-Mode, Secure Two-Way Connectivity, OQ Network Management System

Analytics & Business Continuity
- Reliance on reliable and continuous stream of data for improved decision making

Key Benefits of OQ Private 5G NTN in Oil & Gas

1. Ubiquitous Coverage – Including Remote & Offshore Areas

- Traditional terrestrial 5G networks struggle in remote deserts, offshore rigs, or vast pipeline networks.
- NTN (especially LEO satellites and HAPS) offers blanket coverage **where fiber or towers don't exist**.
- A pipeline stretching across remote terrain can use satellite-based NTN links to ensure seamless sensor connectivity and real-time alerts.

2. Resilience & Redundancy

- Private 5G NTN acts as a **failover or backup layer** to terrestrial networks.
- In case of tower failure, fiber cut, or extreme weather, NTN keeps mission-critical systems running.
- **Example:** If an offshore platform loses its microwave link, NTN seamlessly continues to carry telemetry, video, and voice.

3. Simplified Deployment at Temporary or Moving Sites

- Oil exploration crews often move equipment and personnel between temporary locations.
- NTN enables **"connectivity on demand"** with little or no local infrastructure required.
- **Example:** A mobile base station with NTN backhaul can be deployed within hours at a new drilling site.

Key Benefits of OQ Private 5G NTN in Oil & Gas

4. Secure & Private Communications

- Unlike public satellite networks, a private NTN setup offers:
  - Dedicated bandwidth
  - Private spectrum slicing
  - Full traffic control and encryption

When integrated into a private 5G core, NTN can adhere to the company's zero-trust policies, cybersecurity architecture, and SIM-based access.

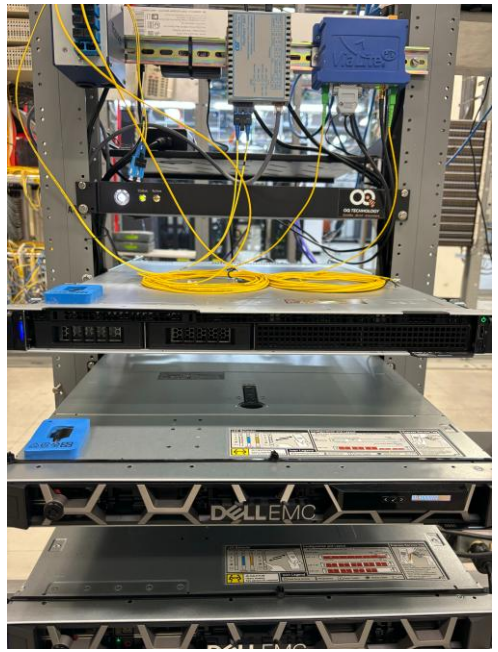
5. Enhanced IoT & Digital Twin Enablement

- NTN extends real-time data collection to the **edge of operations**, even far offshore or deep into a desert.
- This supports predictive maintenance, digital twins, and automation—especially where millisecond latency is not required.
- **Example:** Condition-monitoring of valves or pumps along a 300 km pipeline, where LTE is unavailable.

6. Workforce Safety & Monitoring

- Connected wearables, cameras, and emergency systems can function without terrestrial dependencies.
- Real-time worker tracking, health monitoring, and incident reporting across vast zones.
- **Example:** A safety sensor alert from a worker's helmet in a remote compressor station triggers an emergency response via NTN.

Private Satellite network infrastructure for Oil & Gas Industry



Use Cases in Oil and Gas: Remote Oil Well Monitoring

Use Case

Leveraging OQ Technology's satellite connectivity, Oil & Gas companies can efficiently monitor remote oil wells in remmote locations.

Sensors collect crucial data on well pressure, flow rates, and equipment status for non-critical wells every 8 - 12 hours.

Benefits

- Reduced Downtime: Predictive analytics reduce unscheduled outages
- Operational Efficiency: Automated data collection reduces manual labor
- Cost Savings: Optimization of maintenance cycles and minimized site visits.

Use Cases in Oil and Gas: Pipeline Integrity Checks

Use Case

OQ Technology enables Oil & Gas companies to monitor extensive pipelines traversing remote areas.

Updates every 8 - 12 hours, the system can identify slow-developing issues, facilitating scheduled maintenance and reducing the need for constant patrols. This approach enhances pipeline safety while optimizing resources.

Benefits

- Sensors track pressure, temperature, and potential leaks along the pipeline
- Designed for lengthy pipelines in remote areas.
- Bi-daily reports identify slow-developing issues proactively.
- Enhances overall pipeline integrity and safety.
- Scheduled maintenance reduces the need for constant patrols.

Use Cases in Oil and Gas
Pipelines Cathodic Protection Monitoring

Use Case

Pipelines suffer from corrosion due to electrochemical reactions with surrounding soil or water. While CP systems (e.g., impressed current or sacrificial anode) are widely used, traditional monitoring involves:
- Manual readings
- Infrequent inspections

Leveraging OQ Technology's satellite connectivity, Oil & Gas companies can monitor the CP system's performance

Benefits

- Reduced OPEX**:** Minimizes manual inspection trips and human error
- Data-Driven Decisions**:** Enables more accurate budgeting for maintenance and replacement.

Use Cases in Oil and Gas
Flow Meter and Water Level Automation

Use Case

Implementing IoT use cases for **water level automation** and **flow meter monitoring** can greatly enhance operational efficiency, resource management, and risk mitigation in sectors like agriculture and utilities,

Leveraging OQ Technology's satellite connectivity, Oil & Gas Companies can reduce human intervention, optimize the systems, and improve measurement accuracy

Benefits

- Reduced OPEX**:** Minimizes manual inspection trips and human error
- Data-Driven Decisions**:** Enables more accurate budgeting for maintenance and replacement.