NOVASPACE | Dubai Airshow

Direct-to-Device Satellite in the GCC

A New Frontier for Connectivity

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1 | Foreword

In an increasingly connected world, bridging the gap for those who remain unconnected has become more critical than ever. **Direct-to-Device** (D2D) services are emerging as a **game-changer**, enabling direct communication between satellites and mobile handsets, **bypassing traditional infrastructure**. This shift promises to **enhance connectivity** in remote, rural, and disaster-stricken areas, emerging as one of the largest opportunities in the global satellite communications market today.

D2D technology offers a spectrum of possibilities ranging from emergency to basic communication services, eventually promising full broadband coverage. **Success will depend on collaboration** between satellite operators, mobile service providers, and regulators with adoption largely driven by **willingness to pay**. The ability to extend mobile coverage to previously unreachable areas, without relying on ground infrastructure, is a transformative development.

For the GCC region, D2D services are of particular importance. With a focus on **bridging the digital divide**, D2D offers the opportunity to connect the unconnected in vast desert areas, along coastlines, and in industries that rely on **secure, uninterrupted communication**. Beyond serving as a critical lifeline for individuals in these areas, D2D can **facilitate economic activities** by providing vital connectivity to industries like oil and gas, maritime, and defense. The ability to extend D2D connectivity to individuals outside of terrestrial network coverage areas and enable mobile solutions for enterprises in remote areas is a catalyst for **transforming the region's growth and digital evolution**.

The move toward D2D technology represents a **pivotal moment for the satellite industry**. As the market develops, addressing both technological and regulatory challenges will be crucial to unlocking its full potential. This white paper delves into D2D's opportunities, focusing on its relevance to the GCC, and how it can help build a more resilient, inclusive digital ecosystem.

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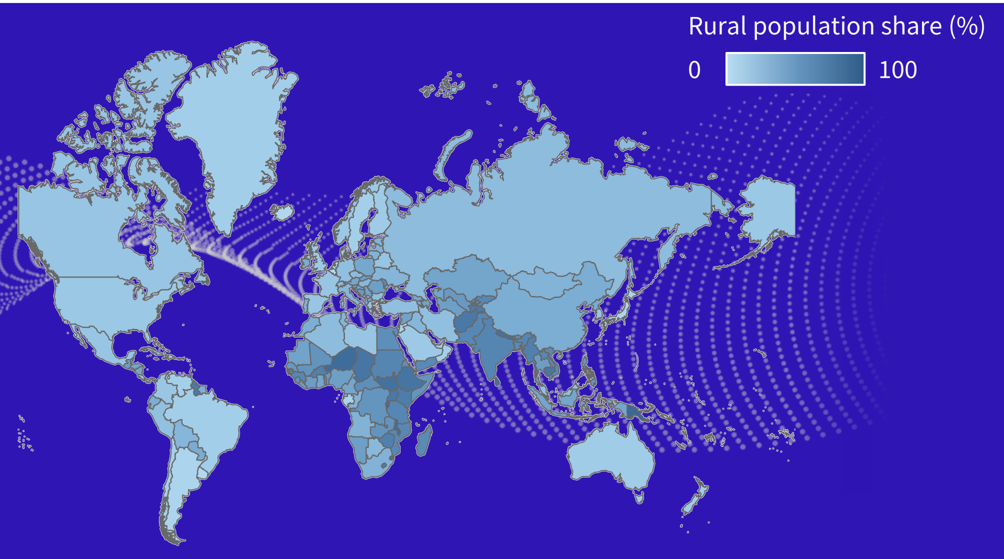
2 | How does D2D satellite connectivity work?

Satellite direct-to-device (D2D) connectivity is a broad concept that refers to a device's ability to establish a direct link with a satellite without any external physical device. This includes mobile and IoT devices. Satellite-enabled chipsets for direct-to-device services are offered by a variety of manufacturers with differing capabilities and prices. **Direct-to-phone** satellite connectivity enables standard (unmodified) cell phones to **communicate directly with satellites**, providing coverage when a terrestrial signal cannot be found, and devices are out of reach of terrestrial cell towers. Historically, connecting directly to a satellite required a special, dedicated satellite phone. However, a **new generation of operators** is emerging with a different goal: providing direct-to-phone satellite services to ordinary, unmodified phones. This **new approach** relies on hardware, chipsets and/or software that will be embedded or downloaded on regular cellphones.

Using low-Earth orbit (LEO) or geostationary (GEO) constellations, these systems connect directly to smartphones through **proprietary or standards-based** links that operate over **licensed mobile satellite service (MSS) or mobile network operator (MNO) spectrum**, depending on the operators' spectrum strategy. Basic services such as SOS emergency messaging, texting, calling, and limited internet browsing, are currently available through SNO–MNO partnerships, where satellites are configured to use terrestrial waveforms like 4G/LTE, or through device-level updates that enable handsets to communicate directly with compatible satellite constellations.

In **remote or rural areas**, such as deserts, mountainous regions, or sparsely populated zones, where terrestrial rollout faces challenges due to terrain, low population density, or high infrastructure costs, direct-to-device (D2D) connectivity bridges a **critical coverage gap** by **extending network reach**.



Source: World Bank urban population statistics (2023)

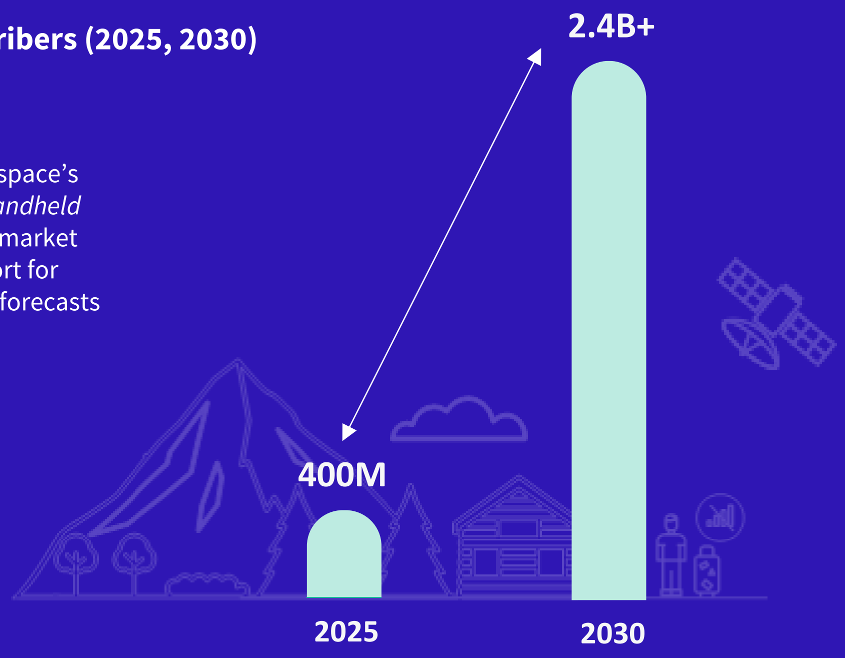
3 | Where is D2D being deployed?

Direct-to-phone subscriber growth is projected to grow by over 40% over the next 5 years.

- Large addressable market, expected to sustain a rapidly growing subscriber base
- Substantial % of total subscribers expected from out-of-coverage market
- Majority of subs adopting SOS emergency and text services due to demand for safety and security features

Global subscribers (2025, 2030)

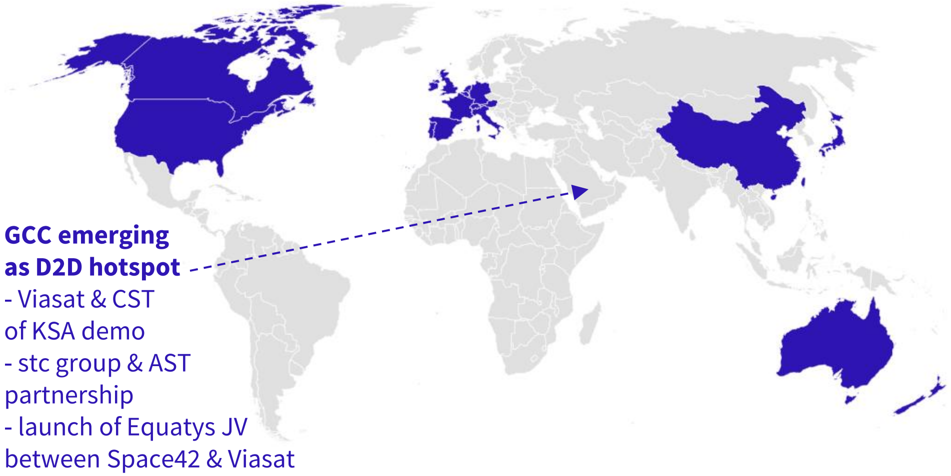
Check out Novaspace's *2025 Direct-to-Handheld and IoT markets* market intelligence report for detailed market forecasts



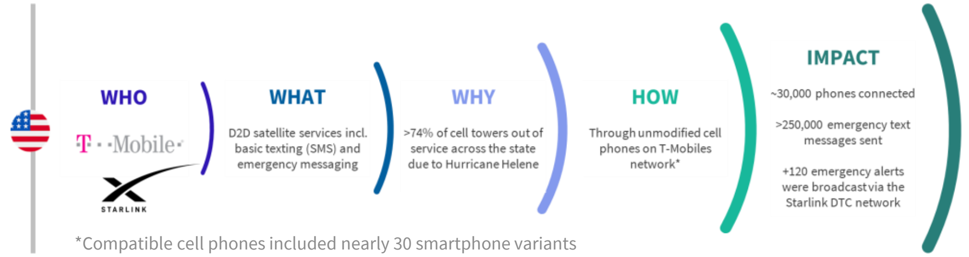
Source: Novaspace 2025 Prospects for Direct-to-Handheld and IoT Markets market intelligence report

Global commercial deployment

Direct-to-cell services are being commercially deployed in **21 countries** globally



Case Study: Critical communication for civil security & disaster response



This deployment marked the **first large-scale use of D2D satellite communications** during a natural disaster, successfully delivering critical connectivity when terrestrial networks were largely offline, demonstrating the **viability of space-based cellular infrastructure for emergency response**.

4 | What are the regulatory challenges?

Spectrum tradeoffs

Mobile Satellite Spectrum

Typical bands	**L-band (1-2 GHz), S-band (2-4 GHz)**
Interference risk	Low, harmonised spectrum used
Regulatory Status	Local frameworks often exist and allow for D2D; Global framework is well established
Impact on hardware	Specific hardware required, limited to few high-end devices

International Mobile Telecommunication Spectrum

Typical bands	**Low-band (<1 GHz), mid-band (1-6 GHz)**
Interference risk	Requires strict coordination with terrestrial networks
Regulatory Status	National frameworks exist in most countries, inclusion of satellite D2D services under discussion
Impact on hardware	Standard handsets used enabling mass adoption

Key regulatory challenges

Navigating regulatory challenges in this landscape requires close collaboration with industry players and key stakeholders. Regulatory requirements vary by country and include **complex approval processes for spectrum allocation, licensing, and market access**.

Key issues include:

- **Spectrum licensing:** coordinating with regulators to secure frequencies and prevent terrestrial/NTN network interference
- **Regulatory compliance:** Aligning with data protection, encryption, and privacy laws across jurisdictions and international bodies
- **Local gateways:** Meeting country-specific requirements for gateway placement and obtaining special service licenses
- **Cross-border oversight:** Managing interference, lawful interception, and national security obligations across multiple regulatory regimes

5 | Who are the key players?

Partnership and investment models

Joint ventures

Collaboration between satellite operators and MNOs combining space assets with terrestrial networks

Accelerates market entry and service scalability for D2D connectivity

- *E.g. Vodafone Europe & AST SpaceMobile; Space42 & Equatys*

Strategic investments

Capital investment in emerging D2D players to gain early exposure to new markets

Enables GEO operators, technology players and other companies in the value chain to diversify and shape the D2D ecosystem

- *E.g. SES & Intelsat investment in Lynk; AT&T, Google, Verizon & Vodafone in AST SpaceMobile*

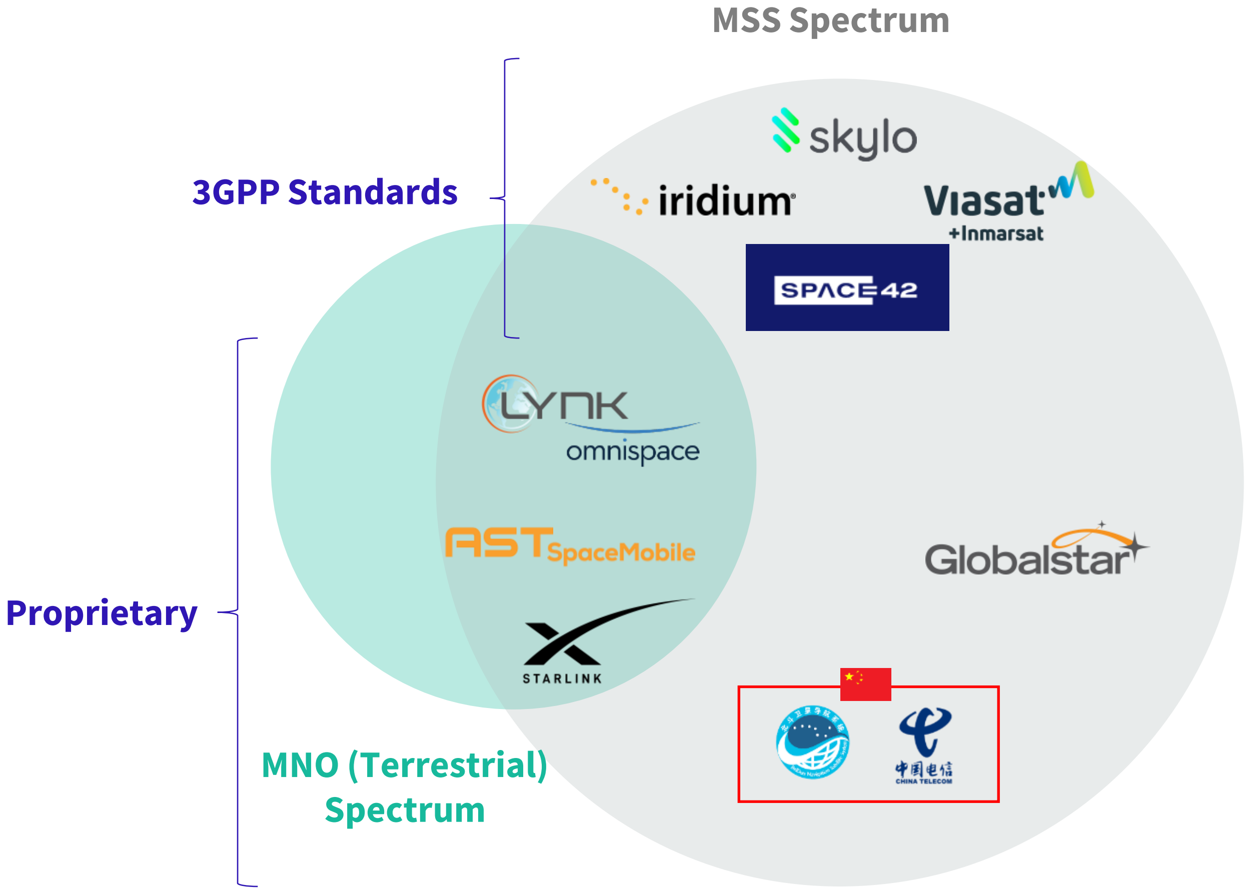
Partnerships & M&A

Partnerships or mergers between technology players and satellite operators to combine assets and expertise

Enhances competitiveness, accelerates innovation, and strengthens positioning in the D2D market; can support in securing first-mover advantage in satellite-enabled connectivity

- *E.g. Apple & Globalstar partnership; Lynk & Omnispace merger*

Key satellite operators / service providers



Source: Novaspace research and analysis

6 | Why does it matter for GCC?

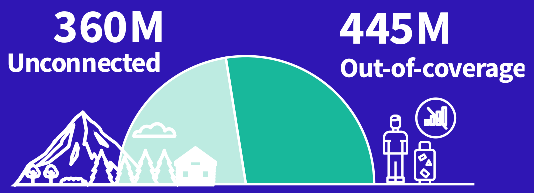
Given the region's ambitious digital transformation agendas and expansive geography, D2D satellite technology offers the GCC a unique opportunity to expand connectivity without the constraints of terrestrial infrastructure. By bridging remote areas, deserts, and coastal zones, D2D can connect unserved and underserved populations more cost-effectively, while providing a seamless extension of existing mobile networks. This convergence between satellite and terrestrial systems enables a hybrid communications ecosystem, where users experience uninterrupted coverage — from urban centres to the most remote oil fields or maritime routes.

For **consumers**, it brings continuous access to essential communication services; for **enterprises**, it enables efficient and resilient connectivity for logistics, transport, industrial operations, and IoT-driven processes; and for **government** and defense, it strengthens sovereign communication networks, supporting emergency response, national security, and public service delivery.

As GCC nations continue investing in smart infrastructure and space innovation, D2D technology stands to become a cornerstone of integrated regional connectivity, enhancing resilience, productivity, and inclusiveness across the entire digital ecosystem.

Consumer market

2024
MENA Addressable Market



805M potential subscribers

Bringing mobile connectivity to remote and underserved areas in the GCC, enabling access to essential communication

Enterprise

Transport & Logistics

Industrial operations

Emergency services

Automotive

Maritime

Natural resources

Facilitating seamless connectivity for GCC industries, enhancing operations across remote locations and improving efficiency and resilience

Government (civil & defense)

Civil government services: Supporting access to critical and social services in remote areas and ensuring communication during emergencies

Infrastructure & public services: Providing reliable connectivity for utilities and transport in rural regions to maintain essential operations

National defense: Delivering secure satellite links for defense forces across the GCC's diverse terrain and mission areas

Strengthening national security and sovereignty by ensuring robust, resilient D2D communication providing essential public services across the GCC

Source: Novaspace 2025 Prospects for Direct-to-Handheld and IoT Markets market intelligence report

7 | Outlook and call to action

The evolutionary steps to take D2D services to the next level

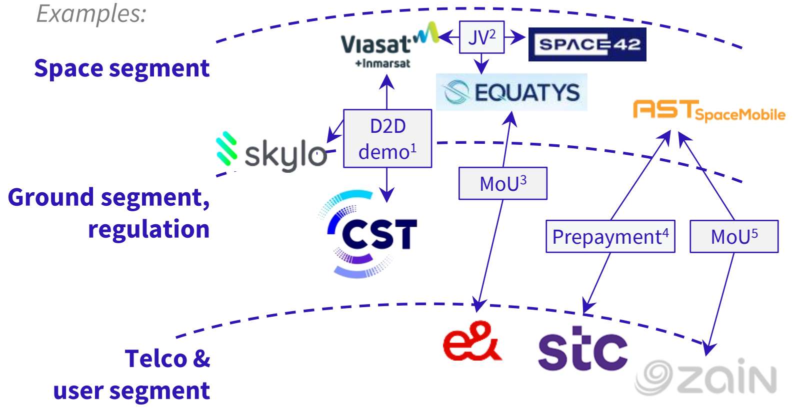
Services	Enablers: Space segment	Enablers: Ground segment, regulations	Enablers: Telco & user segment
Text Messaging Basic two-way satellite texting	D2D sats	Text relay gate-ways	Soft-ware patch
Emergency Messaging One-way SOS to emergency services	SOS relay with location sharing	Links to emer-gency network	SOS and GPS integration
Text and Voice Two-way texts, real-time calling	Persistent coverage for two-way calls	Synchro-nized routing for real time	Voice over satellite integration
Text, Voice and Data Text/voice/data with low data caps	Multi-beam LEO networks for data	Hybrid gateways for traffic management	3GPP NTN-capable devices
Text, Voice and Broadband Full mobile-broadband experience	Access to additional spectrum	Unified 5G/NTN core networks	Seamless satellite-5G access

Momentum in the GCC ecosystem

As D2D services advance from basic messaging, the GCC is positioning itself to seize this opportunity. Achieving this progression requires coordinated development across the space, ground, and user segments — expanding satellite constellations, modernizing gateway infrastructure, and aligning with MNOs to deliver seamless integration with terrestrial networks.

At the same time, regulatory clarity and regional collaboration will be essential to enable large-scale service deployment. Through these steps, the GCC can establish itself as a hub for next-generation satellite connectivity, complementing terrestrial 5G with resilient, universal broadband access.

Examples:



Background: 1) Viasat + Skylo D2D demo at CST-hosted event in Riyadh, Nov 2024; 2) Space42 & Viasat form Equatys JV, Sep 2025; 3) e& signs MoU with Space42 on Equatys/D2D at GITEX Global, Oct 2025; 4) stc group pre-pays USD 175 m to AST SpaceMobile under 10-year deal, Oct 2025; 5) Zain KSA signs non-binding MoU with AST SpaceMobile at LEAP Riyadh, Feb 2023

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Call to action

Coordinate a Regional D2D Framework
Establish GCC-level cooperation on spectrum, licensing, and interoperability to accelerate cross-border service rollout

Enable Telco–Satellite Partnerships
Encourage commercial collaboration between MNOs and satellite operators to create hybrid terrestrial–non-terrestrial offerings

Invest in Space and Ground Infrastructure
Expand regional satellite capacity, gateways, and data integration platforms to support end-to-end D2D connectivity

Champion Local Innovation and Talent
Foster R&D, startups, and workforce skills around D2D technologies to position the GCC as a global testbed for next-generation connectivity