Perspective

MNOs and OEMs need to adopt satellite D2D now

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1. Executive Summary

This paper provides insights on how satellite direct-to-device (D2D) can be a key differentiator in this new era of mobile connectivity. For mobile network operators (MNOs), adopting D2D can empower them to strengthen their subscriber base and create new revenue streams. For smartphone original equipment manufacturers (OEMs), implementing D2D can unlock new value-added product segments and expand their customer base. Satellite D2D is commercially viable today, and MNOs and OEMs need to act fast or risk missing the opportunity. 2025 marks the turning point for D2D with services like Skylo reaching full commercial availability.

D2D is an emerging capability allowing mobile devices to connect directly to satellites for services such as emergency alerts, messaging and, in the future, voice and data. D2D offers a powerful tool for differentiation, customer retention, and long-term value creation. By integrating satellite messaging and safety features into their offerings, MNOs can help their customers communicate when they need to and provide a peace-of-mind that is not otherwise available, deepening their relationship. This can ultimately result in reduced churn, a broader customer base, and higher average revenue per user (ARPU). For OEMs, embedding D2D capabilities leads to new product categories and appeals to broader target customers in an increasingly competitive device market.

Skylo's D2D service, built on 3GPP-aligned architecture and operating over MSS (mobile-satellite service) spectrum, is the only commercially available solution today for MNOs outside of China. Apple/Globalstar is based on proprietary technologies and is controlled by Apple's ecosystem. It is only available for Apple devices. Starlink/T-Mobile is still in beta testing and presents multiple challenges to scale the system related to technology, regulatory approvals and interference mitigation. Skylo has launched stable and reliable services for smartphones or IoT with major operators including Verizon, Spectrum Mobile, Xfinity Mobile, Deutsche Telekom, and Telefónica Germany with KPN launching soon. Skylo enables reliable, always-on messaging for smartphones, with wide geographic coverage and low implementation friction. In contrast, today, both the T-Mobile/Starlink and the Apple/Globalstar services still can't offer uninterrupted services with gaps sometimes lasting minutes.

D2D also raises important strategic questions for MNOs around spectrum control, standards alignment, and long-term positioning in the mobile value chain. Tech giants like Apple (and potentially, eventually Starlink) pose a potential threat to MNOs' role which they have spent decades building. Aligning with standard, operator-friendly platforms like Skylo ensures MNOs can retain customer ownership and control over pricing, branding, and service experience.

Although short-term direct revenues from D2D remain modest, the value MNOs can achieve from reducing churn is substantial. Analysys Mason's global consumer survey shows that 82% of subscribers considering switching providers are interested in D2D messaging, highlighting its immediate relevance for loyalty strategies. In a market increasingly defined by the need for always-on communications, D2D is no longer optional, it is a strategic imperative.

2. Satellite D2D is commercially viable, and MNOs and OEMs need to act fast or risk missing the opportunity

Satellite direct-to-device (D2D) is an emerging capability allowing mobile devices and IoT devices to connect directly to satellites for services such as emergency alerts, messaging and, in the future, voice and light data. Satellite D2D is a disruptive reality in mobile communications. It offers distinct advantages across the mobile ecosystem. For subscribers, it ensures peace of mind with reliable, off-grid access to connectivity. For mobile network operators (MNOs), D2D satellite connectivity serves as a powerful tool to reduce churn, expand rural reach, and differentiate in a crowded market. For smartphone original equipment manufacturers (OEMs), integrating satellite capabilities enables device-level innovation offering a differentiating feature that broadens the target customer base and promotes brand loyalty.

Several converging trends are facilitating the emergence of satellite D2D. The commercial viability of D2D is the outcome of coordinated progress across standardization bodies, OEMs, MNOs, satellite companies, and regulatory entities. This ecosystem-wide readiness makes D2D services technically scalable and increasingly viable for mainstream deployment. The introduction of 3GPP-compliant non-terrestrial network (NTN) standards has laid the groundwork for satellite-to-phone integration. Simultaneously, satellite-capable chipsets from Qualcomm, MediaTek, Samsung, MLink, Altair, and others are making it possible for OEMs to embed satellite functionality directly into mainstream smartphones. Additionally, consumer expectations have evolved. In an age where uninterrupted connectivity is considered essential for business, safety, and convenience, users increasingly expect service even in remote or disaster-affected areas. D2D satellite services offer a critical solution like filling coverage gaps where terrestrial towers are not available, enabling connectivity during emergency situations, in disaster areas, or in rural or underserved areas.

This momentum is further reinforced by strategic moves from major industry players. Skylo and its operator partners, including Verizon, Spectrum Mobile, Xfinity Mobile, Deutsche Telekom, and Telefónica Germany, have moved from trial stages to active commercial deployments of D2D satellite messaging services in consumer segments, IoT, or both. In contrast, other high-profile partnerships, such as T-Mobile with Starlink and AT&T with AST SpaceMobile, remain in beta and testing phases. Apple's service with Globalstar is live but limited to Emergency SOS, iMessage and SMS. These early services, mainly emergency messaging and texting are setting user expectations and proving that satellite-to-smartphone connectivity is commercially and operationally viable. Skylo is currently routing satellite SOS messages from consumers needing emergency services nearly every other day, showcasing the real impact these services are having in subscriber's lives today.

A key enabler of D2D satellite connectivity is the growing alignment around 3GPP's non-terrestrial network (NTN standards, introduced in Release 17 and evolving in Release 18 and beyond). However, not all major players (e.g., Apple or Starlink) follow these standards. 3GPP-compliant players such as Skylo or Sateliot share an approach that many mobile operators, chipset makers, and satellite providers are using to ensure interoperability and scalability. These capabilities are evolving, starting with narrowband services like emergency alerts and messaging but eventually will expand to offer voice and data.

D2D is a strategic imperative for MNOs. It can play a measurable role in reducing churn by aligning with subscriber preferences. Analysys Mason's consumer survey found that 82% of users considering switching mobile providers within the next six months expressed interest in D2D messaging services. This strong correlation suggests that D2D features such as off-grid messaging and SOS can be powerful differentiators in customer retention strategies.

For OEMs, D2D satellite connectivity presents a powerful opportunity to differentiate in a saturated market. As consumers increasingly value safety and universal coverage, OEMs can position devices with satellite capabilities as premium products. Integrating D2D helps OEMs boost brand value and meet the growing demand for always-on connectivity. D2D is also a key feature for rugged and safety-focused devices.

However, MNOs and equipment vendors need to make a number of strategic choices now to participate in the market and scale D2D to its full potential.

Figure 2.1: Key Strategic Choices to Unlock D2D Satellite Connectivity

Source: Analysys Mason

The first decision revolves around spectrum and technology strategy. MNOs must determine whether to pursue D2D by transferring their spectrum assets to partner satellite operators such as Starlink, AST or Lynk, or to partner with providers that have access to mobile-satellite service (MSS) spectrum like Skylo. Each path carries trade-offs in terms of interference, regulatory complexity, device compatibility, technology, and time to market. Additionally, there is a large opportunity cost for MNOs using terrestrial spectrum assets for satellite services when originally intended for terrestrial coverage. The resulting satellite services revenue would need to meet the high thresholds envisioned when the spectrum assets were originally purchased or the MNO would likely face a large accounting write down of their spectrum assets. This places a high burden on the revenue that must be derived from satellite services delivered via terrestrial spectrum and therefore a higher cost to the consumer is likely in this approach.

In many parts of the world, there is no regulatory framework currently in place or a pathway laid out for a regulatory framework similar to Supplemental Coverage from Space (SCS) in the United States that would allow MNOs to pursue D2D by transferring spectrum assets to satellite operators. This issue can be a major impediment to adoption in key markets and should be explored in further detail. Similarly, OEMs face a choice between aligning with 5G NTN standards or pursuing proprietary integrations that offer speed but risk future fragmentation. It should be noted that pursuing a 3GPP Release 18 standards-based solution that relies solely on an SCS-type regulatory framework may limit adoption as standards in some cases are progressing faster than regulatory frameworks in certain geographies.

Pricing and service tiering are closely linked. D2D capabilities can be bundled with existing plans or charged independently. Some operators are currently experimenting with freemium models. Verizon is offering emergency SOS and SMS use for free to consumers with compatible devices. MNOs such as T-Mobile in the US are upselling these services at $10 per month and higher. Others might prefer to bundle the service in their premium plans. The right model will vary by market, but differentiation and clarity of value proposition are essential as these services evolve to include appDATA and voice.

Underlying both spectrum and service models is the importance of ecosystem alignment. The most successful players will be those who secure the right satellite partnerships early, align on device roadmaps, and deeply understand the timelines and implications of regulatory frameworks in key markets around the world. For OEMs, chipset selection and certification with satellite networks is a critical enabler, supporting the standards and bands that will unlock future use cases and global scale.
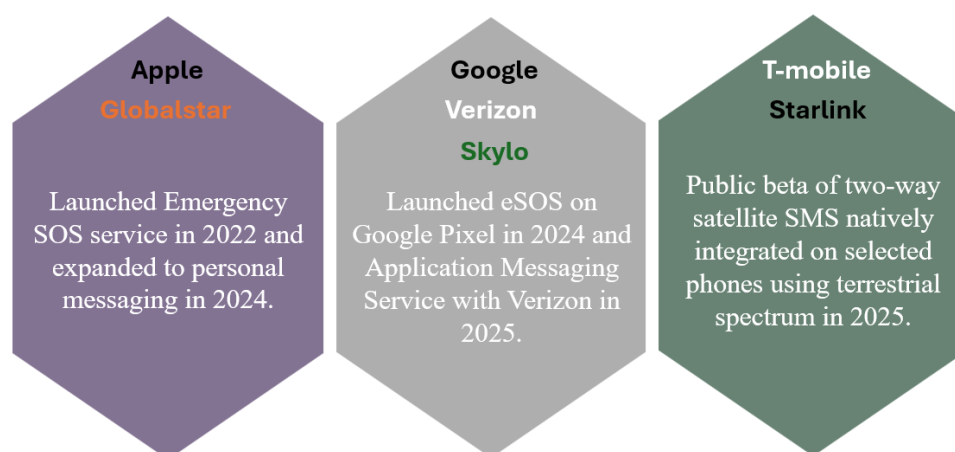
Finally, the quality of user experience will be key to D2D adoption. Native integration, where satellite messaging works seamlessly through the phone's default SMS and apps, ensures familiarity and ease of use. In contrast, OTT models that rely on third-party apps create friction and limit everyday usage. To drive mass adoption, MNOs and OEMs should focus on built-in, app-free functionality that feels like a natural extension of cellular service. The goal should be to minimize any changes to user behaviour in order to maximize adoption. Seamless usability matters as much as technical capability.

In summary, direct-to-device satellite connectivity represents a paradigm shift in mobile access. It is extending the boundaries of coverage by combining terrestrial and satellite infrastructure into one seamless experience. For MNOs and OEMs, now is the time to make strategic decisions on spectrum options, standards and technology roadmap, regulatory approach and timelines, pricing and business model, partnerships, device integration, and user experience. These decisions will define their success in the satellite D2D fast-growing opportunity.

2025 marks the turning point for D2D

2025 is proving to be the inflection point for mainstream D2D satellite adoption. Strategic partnerships and expanding satellite capabilities are moving D2D from concept to commercial reality. Rising end-user interest together with clear business opportunities for MNOs and OEMs are accelerating momentum, positioning D2D as the next must-have in mobile connectivity.

Figure 2.2 Notable Milestones in Consumer D2D Satellite Messaging

Apple
Globalstar

Launched Emergency SOS service in 2022 and expanded to personal messaging in 2024.

Google
Verizon
Skylo

Launched eSOS on Google Pixel in 2024 and Application Messaging Service with Verizon in 2025.

T-mobile
Starlink

Public beta of two-way satellite SMS natively integrated on selected phones using terrestrial spectrum in 2025.
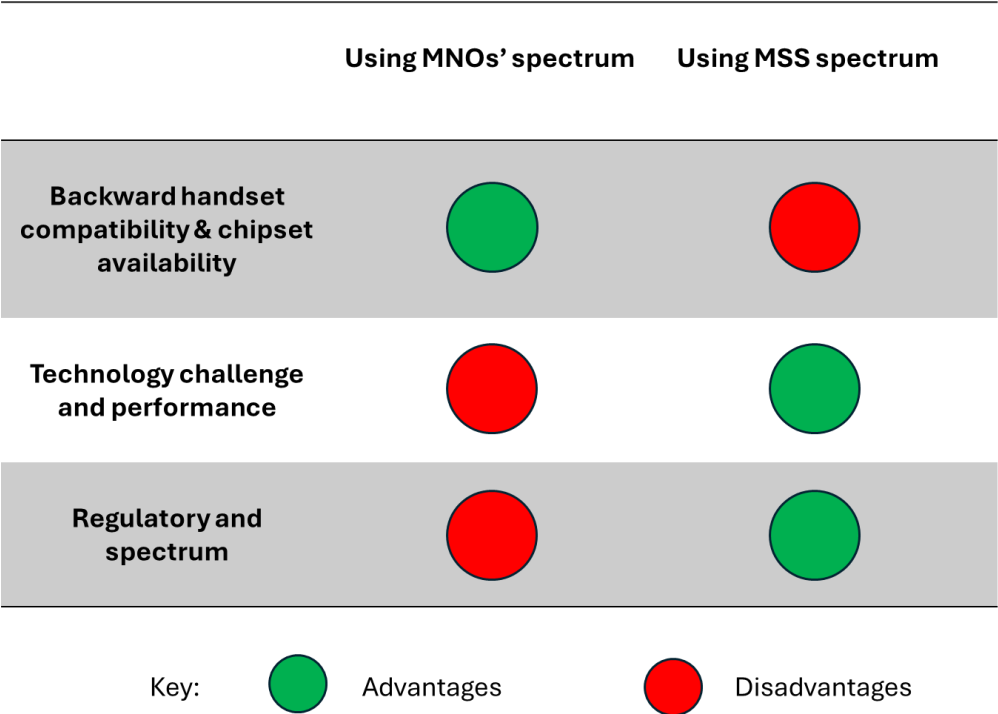
Source: Analysys Mason

These developments show a clear path forward. D2D satellite connectivity is emerging as the next major differentiator in an increasingly commoditized mobile landscape. Operators and device makers that move quickly can gain early competitive advantage while those that delay, risk falling behind in a market that's quickly becoming a necessity.

The adoption of MSS spectrum offers regulatory certainty and performance advantages, while using terrestrial spectrum from space offers certain level of backward compatibility

There are two spectrum strategy options for deploying satellite D2D services. One involves using spectrum assigned to mobile-satellite services (MSS) while the other involves repurposing MNO-licensed terrestrial spectrum. The two options offer very different pathways to market. Among them, MSS spectrum stands out as the most immediately viable.

Figure 2.3: Implications for the different selection of satellite D2D spectrum options

Source: Analysys Mason

MSS spectrum is assigned for satellite communication and benefits from decades of regulatory alignment across international jurisdictions. It has historically been used to enable broad geographic coverage for satellite phones worldwide. Because it operates in distinct frequency bands (such as L- and S-band), MSS offers no risk of interference with terrestrial mobile services, removing the complexity of frequency coordination. This makes it ideal for delivering consistent, reliable coverage across diverse geographies, including remote and underserved regions. In regions such as Europe, where many countries are geographically close together, the benefits of MSS overlaying country boundaries can be clearly seen in comparison to terrestrial spectrum that is country-based and requires offset zones of no coverage between countries. Crucially, MSS-based services can be deployed quickly and broadly, thanks to fewer national licensing barriers and the existing infrastructure of global satellite networks.

With 3GPP standards now incorporating NTN protocols, mainstream chipsets are being updated to support direct satellite communication over MSS bands. As a result, device and chipset makers are beginning to roll out MSS-compatible phones and accessories, which is unlocking the potential for mass adoption. Certification programs such as Skylo's for chipsets, modules, and devices ensure compatibility with the satellite networks. Though backward compatibility with existing phones is not possible, the trade-off is a head start in service availability, allowing operators to move early with emergency and messaging services that build user trust and brand value.

By contrast, using terrestrial MNO spectrum for satellite communication offers some level of backward compatibility with current smartphones. Although, in the case of Starlink, the network is only compatible with selected models from just 4 smartphone OEMs as of May 2025. Those models require special OS updates and/or additional software. The Starlink service only works on T-Mobile devices and unlocked devices. Additionally, in the US, the models that are connected to satellite networks need to be registered with the Federal Communications Commission (FCC). This is another level of complexity for the MNOs to manage with their device partners. This approach also faces steep regulatory challenges as noted above. Each country must issue specific licenses for space-based use of terrestrial spectrum, and each individual operator must navigate complex coordination to avoid interference with ground-based services. These constraints can delay deployments and limit scalability.

In summary, MSS spectrum offers a faster, more globally aligned route to delivering satellite connectivity. For MNOs and OEMs seeking to lead in the next phase of mobile innovation, MSS represents a high-impact, near-term opportunity to extend coverage, build customer trust, and position for a long-term differentiation.

3. Apple/Globalstar and Starlink/T-Mobile create the hype, but Skylo offers a more stable and reliable service today

D2D satellite networks can be categorized along two key axes: spectrum access and standards compliance

The primary divisor between satellite D2D providers is between those using terrestrial spectrum bands, and those using traditional mobile-satellite service (MSS) frequency bands, i.e. L- or S-band, which are licensed to satellite operators. The choice of spectrum band places strict boundaries on the types of consumer mobile devices the D2D operator can connect to.

Starlink, Lynk, and AST SpaceMobile are testing the use of terrestrial spectrum bands to connect to consumer mobile devices from space. SpaceX Starlink has launched 598 D2D-capable V2-mini satellites launched as of May 2025. These payloads can connect to selected 4G phones with SpaceX's custom LTE emulation architecture in a service that is in beta testing in the US. Startup operator, Lynk Global, deploying a network of smallsats, is also using terrestrial spectrum to connect to mobile phones, even 2G handsets. Currently, Lynk operates just 6 LEO satellites, providing non-continuous messaging services running across 8 countries. The company's plans to scale the constellation have been hindered by funding uncertainty, but a USD 85 million funding round in February 2025 shores up their near-term future. AST SpaceMobile is building a constellation of 243 "BlueBird" satellites designed to act as cellular towers in space, the first five of which were launched in September 2024. To offer continuous service over the US, AST needs to attract billions in additional investments to scale the constellation, which is still months, if not, years away. AST has filed a plan with the FCC to launch and deploy the 243 satellites through 2028.

Alternatively, D2D providers like Globalstar and Skylo are using existing satellite assets in MSS bands to connect to devices with L- or S-band capable chipsets. Globalstar, which operates 24 LEO satellites at ~1500km altitude, has been providing emergency messaging services to Apple iPhone 14 models and newer since late 2022. Skylo, on the other hand, partners with existing satellite operators such as Terrestar Solutions, Viasat, Ligado Networks, and Echostar for spectrum and capacity to provide a unified international network across 37 countries and 60 million square kilometers of coverage. Skylo has already commercialized services in partnership with various MNOs and service integrators. In May 2025, Skylo announced it had commercially activated more than 5 million devices worldwide. Furthermore, startups such as OQ Technologies and Sateliot are developing LEO smallsat constellations that will connect directly to compliant IoT devices.

There are players pursuing proprietary technologies as well as those aiming to comply with 3GPP NTN standards. All the players using terrestrial frequencies such as Starlink, AST SpaceMobile, and Lynk that want to be backward compatible with existing phones need to follow a proprietary adaptation of the protocols. These networks use custom messaging stacks to emulate the behaviour of a mobile base station. The specific requirements of satellite connectivity, such as managing latency, doppler, jitter, etc. need to be compensated at the baseband side of the network. This puts a heavy load on the baseband and the network orchestrator of the satellite network which can be a challenge when scaling these systems to support thousands of subscribers per beam. Each of these actors use different coordination strategies with the MNOs via roaming-like interfaces (Lynk) or directly integrating in the operator's core (AST SpaceMobile). As 3GPP NTN develops through future releases, the protocol will be further enhanced incorporating the use of terrestrial bands from space, facilitating improved inter-system mobility, handover and support for higher 5G New Radio (NR) bandwidths. Although Starlink has been able to move quickly launching their satellites, in the long-term their D2D network will be more cumbersome to integrate and manage as compared to a 3GPP NTN-compliant solution.

Additionally, regulatory challenges remain in most markets worldwide regarding the use of terrestrial frequencies to transmit the satellite signals as governments consider potential interference concerns.

Figure 3.1: categorisation of various satellite D2D network providers, according to their spectrum access and standardisation strategy
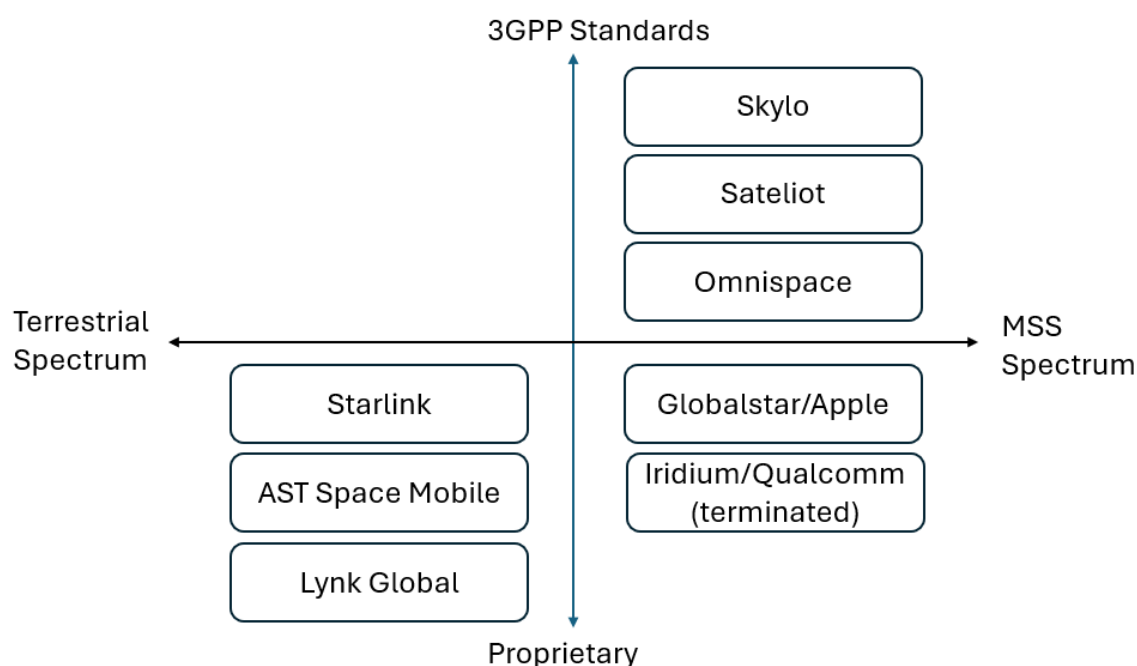
MSS-based players are split in their adoption of 3GPP standards. Globalstar's S-band services to Apple iPhones use a custom protocol stack that is deeply embedded into the iOS and therefore tightly coupled to the Apple ecosystem. Skylo's Android messaging service is based on 3GPP NTN standards and supported by the main chipset makers such as MediaTek, Qualcomm, Sony-Altair, Samsung, MLink and others. The use of standards ensures interoperability and future readiness with a path towards higher-throughput services over the 5G NR waveform on subsequent standard releases. Outside the consumer D2D market, startups such as Sateliot and Omnispace are developing LEO smallsat constellations that may adhere to 3GPP narrowband (NB) standards for internet of things (IoT) connectivity.

Tech giants such as Apple might be a risk for MNOs' role in the D2D value chain with spectrum and standards used being a key factor in determining the Business Model

The direct partnerships between Apple and Globalstar seem to threaten the involvement of MNOs in the D2D value chain. However, outside of the uniquely verticalized Apple ecosystem, MSS players such as Skylo are working closely with MNOs to offer carrier-integrated messaging and voice.

MNO partnerships are also critical for D2D players that plan to rely on terrestrial spectrum. D2D operators using terrestrial spectrum need to strike partnerships with MNOs around the world that secure local spectrum access for their constellations. Starlink has partnered with T-Mobile in the US, as well as several international partners such as Rogers, Telstra, OneNz and KDDI. Since February of this year, T-Mobile users have been beta-testing Starlink messaging in the US, with a commercial rollout anticipated in July. Early users have expressed

frustration, and long delays between sending and receiving the messages with many text messages sent failing to be delivered.

Apple has committed to D2D services from Globalstar, initially investing USD 450 million in the MSS operator in November 2022. In November 2024, Apple prepaid USD 1.1 billion for a next-generation Globalstar constellation and invested USD 400 million for 20% of the company. Globalstar's D2D emergency SOS services are exclusive to iPhone and are offered for free to the consumer with new devices. In the context of Apple's uniquely verticalized products, MNOs are cut out of the value chain completely, even for texting as Apple's iMessage feature allows for messaging over IP. Since its introduction, Apple has added functionality to its NTN solution every year and now includes roadside assistance and SMS in select countries.

In the Android ecosystem, OEMs control the device hardware, but not the mobile service layer. MSS D2D players can work directly with OEMs and chipset makers to provide an emergency SOS service over satellite, similar to the initial Apple/Globalstar offering. In the case of the Google Pixel 9 series in the US, Canada, and Europe, these SOS services are connected via Skylo and then Garmin Response handles the emergency management. For true two-way satellite texting, coordinated by the carrier network and tied to the user's phone number, D2D players must partner with an MNO. Skylo worked closely with Qualcomm to support L & S-band connectivity on their Snapdragon X80 5G Modem-RF system, which is integrated on flagship smartphones such as the Samsung Galaxy S25 series. The Google Pixel 9 series leverages Skylo's collaboration with Samsung Semiconductor on their Exynos Modem 5400 which Skylo certified in March 2024. For satellite texting, Skylo has partnered with Verizon, and their MVNOs, Xfinity Mobile and Spectrum Mobile, in the US. Mobile subscribers at Verizon with the Pixel 9 series and Galaxy S25 series devices gain access to universal-coverage satellite messaging. Not only does the MNO facilitate access to end-customers, but the carrier's core network handles key functions of SMS, including routing, device authentication and billing, once again, minimizing changes to user behavior.

Overall, MNOs are critical to the D2D value chain; either they are a necessary partner for some constellations to access terrestrial spectrum, or the MNO's commercial reach is needed to connect end users with compatible devices and D2D services.

Skylo offers uninterrupted service under its coverage while Starlink and Apple/Globalstar still have significant availability gaps

Uninterrupted service coverage from Low-Earth Orbit (LEO) satellites is a significant challenge. LEOs' much smaller footprint means dozens, even hundreds of satellites are needed for continuous and contiguous global coverage. Whilst GEO satellites have a constant view of a third of the Earth, offering uninterrupted service.

Starlink's D2D network spans two orbital shells, inclined 43° and 53°, respectively. This causes the capacity to "bunch" around those latitudes, which is ideal for the mainland US market but leaves no coverage at higher latitudes and thinner density at lower latitudes. Starlink's D2D payloads are in 320-370 km VLEO, which means that despite having 598 satellites, Starlink is unable to offer continuous coverage, especially over lower latitudes where capacity is sparser as compared to the 38° to 53° slice, and no coverage in higher latitudes. In contrast, Globalstar's network of 31 LEO satellites resides at a much higher 1400km LEO, providing a 20-25x greater coverage area per satellite.

Using the Analysys Mason's Non-GEO Constellation Analysis Toolkit (NCAT), it is possible to compare the coverage and uptime performance of Skylo, Starlink and Globalstar's D2D networks as of May 8th 2025, across four geographical locations in the United States: Anchorage AS, Honolulu HI, Portland ME, Lebanon KS.

NCAT simulated satellite visibility and wait time windows over a 24-hour period, generating data at defined intervals (every 10 seconds).

Figure 3.2: Results of NCAT simulations on Skylo, Starlink and Globalstar D2D, availability and average service gap

Location	Skylo Time Under Coverage	Skylo Avg. Gap	Starlink Time Under Coverage	Starlink Avg. Gap	Globalstar Time Under Coverage	Globalstar Avg. Gap
Anchorage, AK 61.2° lat.	100%	Uninterrupted service	0.0 %	No Service	98.8 %	62 seconds
Honolulu, HI 21.3° lat.	100%	Uninterrupted service	68.3 %	101 seconds	98.4 %	84 seconds
Portland, ME 43.7° lat.	100%	Uninterrupted service	94.2 %	46 seconds	99.8 %	37 seconds
Lebanon, KS 39.8° lat.	100%	Uninterrupted service	94.5 %	41 seconds	99.9 %	29 seconds

Source: Analysys Mason

These simulation results demonstrate the trade-offs inherent in D2D constellation design. Starlink's choice of a very low altitude drives performance benefits in terms of link budget and latency, but the availability performance suffers even with so many satellites. It is worth noting that the availability will improve as more satellites are launched. With no shell inclined more steeply than 53°, there is no service available in Anchorage, Alaska, which is at 61.2° latitude. The constellation's optimisation for mainland US is evident, given the higher availability in Maine and Kansas, but more intermittent coverage over Hawaii at 21° latitude. Service gaps are a concern for Starlink so far in its service rollout – beta testers in the US have noticed messages failing to deliver in demonstration of the service gaps simulated here. Regions and cities with similar latitudes will observe similar levels of availability.

Figure 3.3: Skylo service coverage
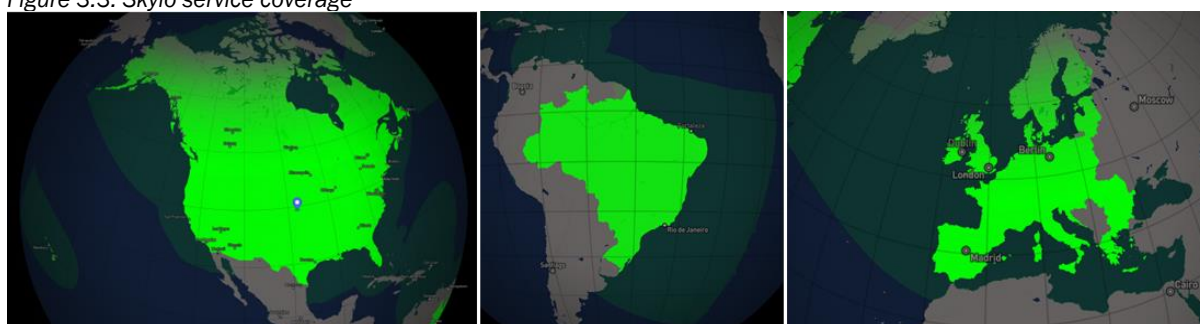
Source: Skylo (2025/05/26, *Geographical Coverage*)

In contrast, with the same inclination angle and far fewer satellites, Globalstar's coverage is much more consistent across geographies and generally superior to Starlink's with shorter gaps in service at every location. Taking this further, a Geostationary Earth Orbit (GEO) D2D service like Skylo's network can offer continuous coverage and service over the whole region. In the short- to medium-term, GEO and high-altitude LEO services

have a demonstrable advantage in providing always-on connectivity, which is crucial to the value proposition of emergency SOS messaging. GEO capacity allocation is much more discretionary than LEO which helps avoid any service outages, whereas the LEO advantage will be in total capacity from a large number of satellites.

Current service plans and pricing seem to be focused on competitive differentiation between MNOs and OEMs

Despite growing excitement around future voice and data capabilities, no D2D system currently delivers these services commercially beyond text messaging and location sharing. Narrowband services could include small transaction capabilities like texts, location, SOS, alerts, and even remote payments. The basic services that are currently available are largely un-monetized from the user perspective, which indicates MNOs and OEMs largely have an indirect revenue strategy currently and have plenty of room to add new user plans as service capabilities improve.

AST SpaceMobile, SpaceX/T-Mobile, and Lynk Global have all demonstrated early-stage voice and data connectivity in alpha or beta tests, but consumer availability is still years away. In the meantime, Skylo's carrier-integrated solution remains the only operational, standards-based D2D service available to users in 37 countries, including the U.S., for regular and emergency satellite messaging. AST is furthest along technically towards showcasing robust data and voice services in a series of demonstrations with top MNOs worldwide, in large part owing to the massive, phased arrays (64 m2) on their satellites. Yet despite real-world data demonstrations to multiple Mbps, AST is held back by having so few satellites in-orbit. Starlink, on the other hand, has massive infrastructure in terms of number of satellites, but this initial generation of D2D satellites seem to have certain limitations for scaling the offerings to voice and data services. Starlink is also limited by technical and regulatory conditions set by the FCC related to radio power emissions that restrict its service to text messaging at this time. This concern related to radio interference between terrestrial and satellite signals in the market with the most advanced regulatory regime further underscores regulatory and global scaling hurdles noted above.

Over time the 3GPP-compliant players such as Skylo will require substantially less custom engineering when expanding to a new MNO partner. Future standard releases will include expanded data rates, improved mobility support facilitating seamless handover with terrestrial networks and core integration through EPC/IMS interfaces. By aligning with these releases, standard-compliant satellite providers will be able to plug-and-play with MNOs' networks, and provide standard phone calls and cellular data over satellite.

In contrast, SMS traffic on Starlink D2D bypasses the MNO core and uses a custom Starlink-operated backend that uses a carrier-integrated messaging layer (via vendors like Syniverse) to connect to the MNO's SMSC (Short Message Service Center). This workaround requires custom APIs, custom routing paths and other arrangements for identity and billing. The President of Technology at T-Mobile USA, Ulf Ewaldsson, recently commented in a post on their Starlink integration effort: "Since partnering with SpaceX and Starlink in 2022, it has taken hundreds of thousands of people hours and the efforts of some of the world's brightest engineering minds to solve this giant technological puzzle." As these are not agreed standards between industry players, bespoke integration on a per-carrier basis will be required. Starlink's architecture is IP-based rather than cellular, which changes how voice or data capabilities would be implemented. Voice would have to be over IP (VoIP) rather than VoLTE. Data packets would be sent over a generic IP tunnel and not integrated with the phone number. Similarly, 'mobile' data would land at a Starlink gateway as non-prioritized IP traffic which lacks traditional cellular controls like throttling, QoS classes or charging rules. In this way, a Starlink mobile data service would act more like a mobile hotspot than integrated mobile broadband.

Most of the satellite messaging services today are 'free' alongside device purchases or existing mobile service plans. Apple bundles its Globalstar-supported satellite services including SOS, roadside assistance, off-grid texting and location sharing, for free with iPhone 14 series and later devices. These models come with a 2-year period of free service (extended through 2025 for iPhone 14), but as of May 2025 Apple has yet to announce post-trial pricing. Likewise, Verizon is currently offering SOS and SMS services free of charge to US subscribers with compatible devices (Pixel 9 series, Galaxy S25 series). T-Mobile's "Coverage Above and Beyond" service, provides unlimited SMS/MMS over Starlink D2D satellites. The commercial service is anticipated to begin in July 2025, after the free Beta phase is open to everyone. Commercial services are planned to be free for premium Verizon subscribers, and at $10 per month for everyone else, including AT&T and Verizon customers via eSIM. T-Mobile has suggested this rate could rise to $15 per month in due course. For now, most pricing plans seem focused on user adoption, habit formation and competitive differentiation between MNOs and OEMs. Even the T-Mobile service has just one price and service option for the time being. Plan and pricing diversity will accelerate as service rollout uncovers low- and high-demand areas, and operators add more capabilities such as voice and data packages.

4. Integration of D2D capabilities create huge value for MNOs and device OEMs

Adoption of D2D is a strategic imperative for MNOs and OEMs driving differentiation, enhancing retention and creating long-term value

D2D satellite connectivity is quickly shifting from a novel feature to a strategic necessity for MNOs and smartphone OEMs. It offers a timely opportunity to differentiate in a saturated market, enhance customer retention, and lay the foundation for long-term value creation. A global survey by Analysys Mason with 18,500 respondents in 18 different countries shows strong interest for D2D satellite messaging. The same survey found that of the mobile subscribers who are considering churning in the next 6 months, 82% are expressing interest in D2D messaging services. Early adoption of satellite D2D is crucial for attracting and retaining subscribers. Furthermore, 30% of the respondents expressed their willingness to pay for these services. There is a clear opportunity for monetization and growth.

Figure 4.1: Subscriber interest in satellite D2D messaging services, 2024, Analysys Mason survey
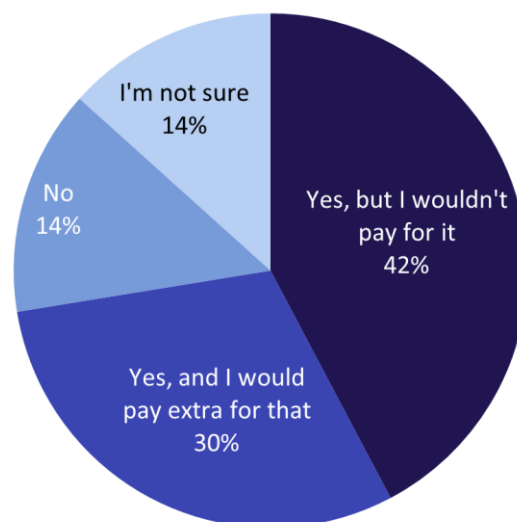
Source: Analysys Mason

One possible strategy for MNOs to implement satellite D2D services lies in bundling satellite messaging and SOS features into selected plans. This reinforces customer loyalty and boosts quality of service. It further provides a unique selling point attracting subscribers from competitors and driving users into premium plans. This is especially relevant in markets where features like unlimited data have become commoditized. While bundling strengthens customer value and supports ARPU uplift, it limits the direct revenue contribution of these services.

A complementary strategy is direct monetisation through usage-based pricing or paid add-ons, particularly for outdoor users, rural residents, or enterprise segments with more critical needs. However, this model faces certain limitations such as the currently limited user willingness to pay for emergency and messaging services.

Additionally, the total revenue potential remains constrained until the market matures with more advanced services like voice and data.

For device makers (OEMs), D2D unlocks new value-added product segments, from rugged devices for field professionals to premium models for safety-conscious consumers. Satellite-ready smartphones are increasingly seen as technologically advanced, resilient, and reliable, which are some of the key attributes for strengthening brand equity and long-term customer relationships.

Ultimately, MNOs and OEMs face a narrow window to lead this transformation. D2D is rapidly evolving into a core component of the mobile experience. Those who invest now in partnerships, standards alignment, and service bundling will be best positioned to capture new customers and build a lasting competitive advantage.

The growing consumer interest in satellite connectivity is grounded in real-world events. Recent disasters like wildfires in Maui, hurricanes in Florida and earthquakes in California have highlighted the fragility of terrestrial mobile networks. In these cases, satellite messaging has shifted from a premium feature to a critical lifeline. Apple's Emergency SOS via satellite has enabled several high-profile rescues, while Skylo-supported services are routing emergency requests and responses nearly every other day. In one documented case, Skylo's D2D solution enabled search-and-rescue operations during a network outage, underscoring the life-saving value of off-grid communication. These examples are driving a shift in perception. Satellite features are no longer seen as niche, they are becoming mainstream expectations. For MNOs and OEMs, the 2025-2026 timeframe offers a key window to lead. Those who act now can shape the next wave of growth in mobile communications.

Direct revenue from D2D remains limited in the short term but its impact on customer retention offers significant value

The satellite D2D capabilities are evolving through four stages, which are emergency alerts, messaging, voice, and eventually data. Each step opens new market segments and revenue potential. For MNOs, understanding this progression is key to making the right strategic moves now.

Emergency alerts have already delivered clear consumer value with multiple examples of life-saving use cases. For example, Skylo is currently routing satellite SOS messages from consumers in danger to emergency service providers nearly every other day, showcasing the real impact these services are having in subscriber's lives today. Messaging is now commercially viable with services gaining traction such as the ones offered by Verizon in partnership with Skylo as well as Apple's satellite messaging service. However, given the limited willingness to pay and the commoditized value of emergency alerts and messaging, the direct revenue opportunity for these services is limited to a couple of hundred million dollars per year globally. The real value opportunity for these is not in the direct revenue generation, but in reducing churn and attracting new subscribers.

QUANTIFYING THE RETENTION VALUE OF D2D SATELLITE SERVICES

Assume an MNO with 120 million subscribers and a USD50 monthly ARPU. Considering a 1% monthly churn, customer churn costs around USD720 million annually.

Analysys Mason's survey found that 82% of users considering switching carriers are interested in D2D satellite services.
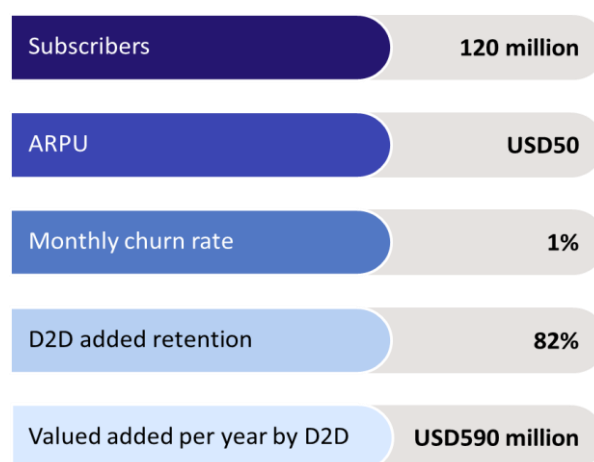
Assuming the MNO can enhance retention by adding satellite D2D by that same 82% (churn is reduced to 0.18%), the annual value created by D2D equals USD590 million!

Figure 4.2 Consumer D2D service revenue projections per application

Source: Analysys Mason
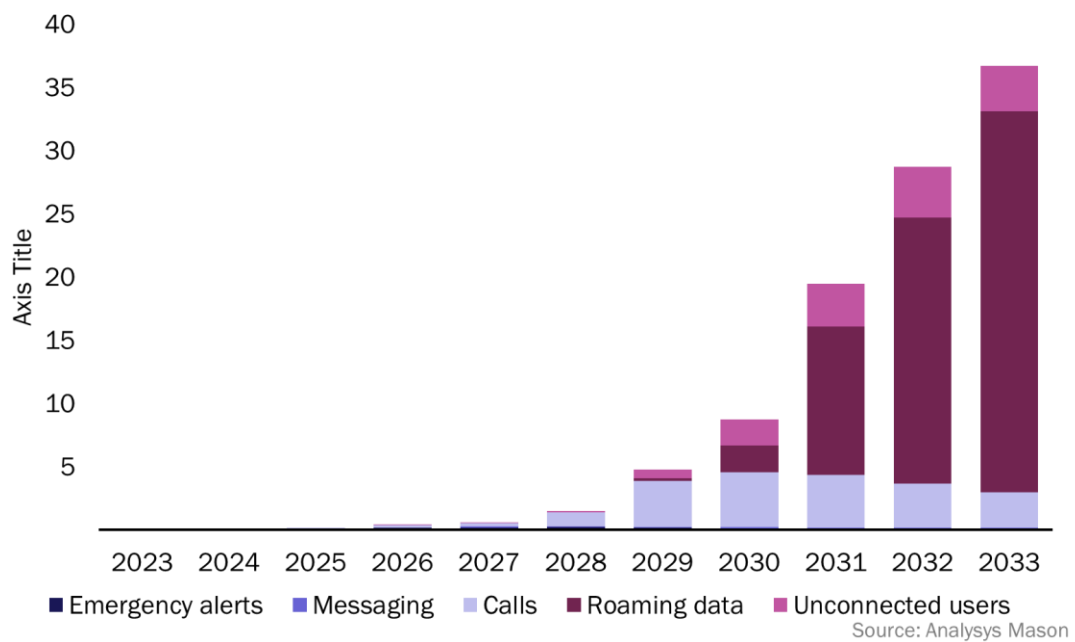
Analysys Mason's Satellite D2D market projections forecast that the direct revenue opportunity will grow to a multi-billion global market once voice and data services become widespread. But these capabilities are still years away. Scaling satellite D2D capabilities to offer voice and data still require massive investments into additional constellation launches. Other factors such as device readiness, technology maturity and development of standards still need to evolve to unlock these capabilities. MNOs and OEMs can start benefiting from satellite D2D by focusing on emergency alerts and messaging services now. MNOs and OEMs need to act now to establish partnerships, integrate early-stage services, and shape consumer expectations while the market is still being defined.

Figure 4.3: Quantifying the retention value of D2D satellite services

Subscribers	120 million
ARPU	USD50
Monthly churn rate	1%
D2D added retention	82%
Valued added per year by D2D	USD590 million

Source: Analysys Mason

5. Call to action

As satellite direct-to-device (D2D) transitions from early pilots to mainstream expectations, mobile network operators (MNOs) face a decisive moment. The operators that act now will shape the next generation of mobile connectivity. Those who don't act now risk losing high-value subscribers, falling behind in innovation, and allowing device manufacturers or satellite providers to take ownership of the customer relationship.

D2D is a key differentiator in a market where traditional services have become commoditized. It offers the ability to enhance customer loyalty, reduce churn, and deliver real value in moments that matter, when safety, reliability, and universal coverage are non-negotiable. But realizing this potential requires urgent and strategic action. MNOs must now make foundational decisions around spectrum strategy. One option is the regulatory certainty, capex avoidance, and scalability of MSS spectrum. The other is the promise of backward compatibility through terrestrial bands that bring greater interference and licensing risk. They must align on technology, whether to follow 3GPP standards to ensure openness and long-term scalability or accept the risks of fragmentation from proprietary approaches. They also need to establish the right partnerships with satellite networks and OEMs before those relationships and competitive advantages are locked in by others.

Equally important is how D2D services are positioned. Leading with premium plan integration and customer retention or waiting for voice and data phases while others define the market. The decisions made in 2025 will shape the industry's trajectory for years to come. D2D is evolving fast, and those who lead now will define its value, own the user experience, and set the standard for what always-on connectivity means in the next era of mobile connectivity.

About the authors

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