



SATELLITE COMMUNICATIONS

INCREASED CONNECTIVITY, APPLICATIONS
AND AFFORDABILITY

GREENWICH CAPITAL GROUP



With increased affordability (driven by reductions in cost to launch, increased bandwidth, and competition among satellite providers), as well as improved hardware and software interfaces from a customer-use perspective, satellite communication applications continue to grow. While satellite voice and data services have been available for decades, end-use cases are rapidly increasing across markets such as telecommunication, aviation, maritime, energy, and government & defense. In addition, satellite usage from the Internet of Things (IoT) continues to emerge across numerous industries.

Market Size and Opportunity

Despite powerful LTE and 5G terrestrial wireless networks, more than 20% of the land area in the United States and 90% of the entire Earth remain uncovered by wireless. As the world becomes more connected, the demand for reliable and affordable satellite communications will continue to grow. A new range of opportunities could propel the overall market to nearly \$1.6 trillion by 2030 with demand for remote communications on the rise from governments, businesses, and individuals alike.

According to data from Viasat and Inmarsat, the fastest growth is expected to come from mobile premium services including commercial air, business aviation, maritime, and connected cars, trains, and buses, with an anticipated compounded annual growth rate (CAGR) of 12% between 2020 and 2030, reaching \$108 billion by the end of the decade. By far the largest market, consumer services (residential internet, community internet, smart homes, and small-and-medium businesses) are forecasted to reach \$900 billion during the same period, representing a 3% CAGR. Fixed and enterprise premium services as well as defense and government premium services are also expected to increase significantly to \$445 billion and \$130 billion, respectively.

Within the IoT market, there is increased demand for automated data collection and integration of remote assets into enterprise management systems, driven by applications such as personal tracking devices & location-based services, heavy equipment monitoring, fleet management, fixed-asset monitoring, asset tracking, and resource management. IoT use cases in these markets rely on delivering large volumes of real-time data at a low cost. IoT Analytics forecasts a CAGR of 14% within satellite IoT between 2021 and 2026.

Some of the companies who are well-placed to benefit from the increasing opportunities in the satellite communication market are a mix of established players such as Iridium, Inmarsat, INTELSAT, EchoStar, Globalstar, ORBCOMM, Singtel, and Telstra, as well as emerging integrated players such as SpaceX's Starlink and Amazon's Project Kuiper.



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Figure 1: Satellite Communications Market Sectors and Growth (\$ in B)

Government Premium Services						2020A	2030E
US DoD Comms	US DoD Cyber	US Gov. Cyber	Internet of Battlefield Things	US DoD Command & Control	International MILCOM & Cyber	\$81	~\$130 +5% CAGR
Mobile Premium Services						2020A	2030E
Commercial Air	Business Aviation	Maritime	Value Added Services	Connected Cars	Connected Trains & Buses	\$36	~\$108 +12% CAGR
Fixed & Enterprise Premium Services						2020A	2030E
Energy	Enterprise	Ground Segment	IoT	Cybersecurity		\$218	~\$445 +7% CAGR
Consumer Services						2020A	2030E
Residential Internet	Community Internet	Smart Home	Small-Medium Business			\$650	~\$900 +3% CAGR
Total Addressable Market						\$985	~\$1,583

Source: Viasat and Inmarsat



Spotlight Overview: Iridium Communications

Iridium is one example of a global satellite communications company that provides access to voice and data services anywhere on Earth. The company caters to a wide range of industries including personal communications, transportation and delivery, industrial, aviation, maritime, research, autonomous systems, and energy.

Iridium’s competitive advantage is the interlinked mesh architecture of its 66 satellites in low-earth orbit (LEO), enabling weather-resilient real-time transit of data without requiring abundant ground stations. This helps the company extend its services to regions with no physical presence.

In aviation, Iridium caters to applications including air traffic control and safety applications, aviation operational communications, aviation passenger communications, general aviation applications, and UAVs. In maritime, its services can be used for business-critical data applications, voice services, vessel management and asset tracking, safety, and security applications. Deploying satellite communication systems in disaster-prone areas can help save lives as communication is not disrupted by damage to ground-based infrastructure. A more detailed overview of Iridium markets is highlighted on the following page.

Figure 2: Iridium Markets

Personal Communication	Transportation and Delivery	Industrial	Global Governments	Research	Autonomous System	IoT Services
Travel and Outdoor Adventure	Rail	Lone Worker	Federal Government	Oceanic	UAV	Personal Tracking Devices
Extreme sports	Air Cargo	Construction	State and Local Governments	Wildlife	Autonomous Vehicles	Location-based Services
Leisure Boating	UAV	Agribusiness	Militaries	Climatic	Autonomous Vessels	Heavy Equipment Monitoring
Climate Research	Merchant Shipping	Mining	Humanitarian			Fleet Management
Polar Expedition	Trucking	Autonomous Vehicles				Fixed-Asset Monitoring
General Aviation						Resource Management
Lone Worker						Scientific Data Monitoring

US Government	Aviation	Maritime	Emergency	Polar	Energy
Defense, Intelligence, and National Security	General Aviation	Merchant Shipping	First Responders	Scientific Research	Onshore
Arctic	Business Jet	Workboat	Disaster Response and Relief	Expedition	Offshore
Research	Commercial	Autonomous Vessels	Business Continuity		Renewables
	UAV	Leisure Boating			Utilities
	Rotocraft	Fisheries and Commercial Fishing			
	Air Cargo	Cruise			

Source: Iridium, Greenwich Capital Group

The launch of Certus in recent years was a key milestone for Iridium to embark on a new era of globally available connectivity. With speed capabilities ranging from 22 Kbps to 704 Kbps, Certus offers the highest speed, weather-resilient L-band connectivity, and the only truly global mobile satellite service on the market. Iridium Certus is a flexible, evolving platform that provides a combination of devices and service speeds to match customer needs.

A strong partner ecosystem helps Iridium to continuously add new capabilities and deliver reliable and wide-ranging solutions to end customers. The company leverages a broad network of value-added resellers (VARs), value-added manufacturers (VAMs), and value-added developers (VADs) to reach new markets and drive innovation from and through its satellite constellation. Blue Sky Network is one Iridium partner which offers turn-key solutions for mobile assets, providing hardware, cloud-based software, satellite service, and 24/7 technical support to aviation, marine, and land-based customers. Among other solutions, Blue Sky Network's SkyLink family of products provides global solutions based on Iridium's Certus network, blending cellular and satellite service to offer cost-optimized solutions anywhere in the world. Highlighting ongoing M&A activity in the sector, Blue Sky Network was acquired by ACR Group in May 2022.

DEVELOPMENTS TO WATCH

Qualcomm's Snapdragon: At CES 2023, Qualcomm announced Snapdragon Satellite – a solution based on an agreement with Iridium to bring satellite-based connectivity to next-generation premium Android smartphones and beyond. Snapdragon would provide global coverage and support two-way messaging for emergency use as well as SMS texting, and other messaging applications. Emergency messaging on Snapdragon is planned to be available on next-generation smartphones, to be launched in select regions starting in the second half of 2023. The move follows Apple's unveiling of Emergency SOS satellite capabilities on iPhone 14 models which began in November 2022 in partnership with Globalstar.

SpaceX's Starlink: Starlink is a satellite internet constellation operated by SpaceX, which started launching Starlink satellites in 2019. As of December 2022, Starlink consists of over 3,300 mass-produced small satellites in LEO, which communicate with designated ground transceivers. In total, nearly 12,000 satellites are planned to be deployed with the possibility of expansion. SpaceX announced reaching more than one million subscribers in December 2022. SpaceX and T-Mobile have partnered to provide satellite-to-cellular service across the US without the need for any other equipment and post its proposed beta launch by the end of 2023, SpaceX aims to extend mobile phone service globally.

Amazon's Project Kuiper: Kuiper Systems is a subsidiary of Amazon that was set up in 2019 to deploy an internet constellation of nearly 3,300 satellites to provide broadband internet connectivity. Two initial prototype satellites are expected to be launched in 2023 using the Vulcan Centaur rocket in partnership with United Launch Alliance (ULA). Project Kuiper has also previously announced a strategic collaboration with Verizon Communications.

Additive Manufacturing: The satellite communications industry is increasingly embracing the innovation of additive manufacturing. California-based aerospace manufacturing company Relativity Space has developed its Terran 1 launch vehicle which is unique in that most structures and components are manufactured with 3D printing processes. The company claims to have achieved higher reliability (fewer subassemblies due to 100x fewer moving parts), up to 10x faster production time, and higher flexibility through additive manufacturing. Terran 1 is expected to make its first flight in January 2023.

Flexible Launch Services: Due to increasing use cases and a surging small satellite market, satellite owners are seeking flexible and on-demand launches. To that end, innovative start-ups are working on launch techniques such as air launch to orbit, use of reusable rockets, launch using spacecraft, and containerization of "smallsats". Colorado-based Aphelion Aerospace, which develops dedicated nanosatellite launch services, has built a low-cost, dedicated nanosatellite launch vehicle called Helios that can put spacecraft in any orbit suited to the mission, including polar and high inclination orbits.

IN CONCLUSION

The combination of increased affordability, higher bandwidth, and advancements in technology will continue to drive growth and end-use applications in the satellite communications market. While large industry participants continue to invest heavily into establishing, growing, or improving their space-based satellite networks, there is a large ecosystem of middle market partners who are developing and selling end-user facing hardware and software to leverage these advancements. M&A activity is expected to continue in this area as market participants evaluate competing with international competitors, additional investments required into technology and scale, and the ability to potentially cross-sell as part of a larger platform.

Relevant Transaction



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