UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(Mark One)

☒**ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2019

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from ______ to ______

Commission File Number 001-33963

Iridium Communications Inc.
(Exact name of registrant as specified in its charter)

DE	**26-1344998**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

1750 Tysons Boulevard, Suite 1400, McLean, VA 22102
(Address of principal executive offices, including zip code)

703-287-7400
(Registrant's telephone number, including area code)

Securities Registered Pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol	Name of Each Exchange on Which Registered
Common Stock, $0.001 par value	**IRDM**	**The Nasdaq Stock Market LLC**
		(Nasdaq Global Select Market)

Securities Registered Pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large Accelerated Filer	☒	Accelerated Filer	☐
Non-Accelerated Filer	☐	Smaller Reporting Company	☐
		Emerging Growth Company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).
Yes ☐ No ☒

The aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was last sold as of June 28, 2019, the last business day of the registrant's most recently completed second fiscal quarter, was approximately $2,600.8 million.

The number of shares of the registrant's common stock, par value $0.001 per share, outstanding as of February 19, 2020 was 131,731,125.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement for its 2020 annual meeting of stockholders to be filed pursuant to Regulation 14A with the Securities and Exchange Commission not later than 120 days after the registrant's fiscal year end of December 31, 2019, are incorporated by reference into Part III of this Form 10-K.

IRIDIUM COMMUNICATIONS INC.

ANNUAL REPORT ON FORM 10-K
Year Ended December 31, 2019

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Forward-Looking Statements

This report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. For this purpose, any statements contained herein that are not statements of historical fact may be deemed to be forward-looking statements. Such forward-looking statements include those that express plans, anticipation, intent, contingencies, goals, targets or future developments or otherwise are not statements of historical fact. Without limiting the foregoing, the words “believes,” “anticipates,” “plans,” “expects,” “intends” and similar expressions are intended to identify forward-looking statements. These forward-looking statements are based on our current expectations and projections about future events, and they are subject to risks and uncertainties, known and unknown, that could cause actual results and developments to differ materially from those expressed or implied in such statements. The important factors discussed under the caption “Risk Factors” in this Form 10-K could cause actual results to differ materially from those indicated by forward-looking statements made herein. We undertake no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.

PART I

Item 1. Business

Corporate Background

We were formed as GHL Acquisition Corp., a special purpose acquisition company, in November 2007, for the purpose of effecting a merger, capital stock exchange, asset acquisition, stock purchase, reorganization or other similar business combination. On February 21, 2008, we consummated our initial public offering. On September 29, 2009, we acquired, directly and indirectly, all the outstanding equity of Iridium Holdings LLC, or Iridium Holdings, and changed our name from GHL Acquisition Corp. to Iridium Communications Inc.

Iridium Holdings was formed under the laws of Delaware in 2000, and on December 11, 2000, Iridium Holdings, through its wholly owned subsidiary Iridium Satellite LLC, or Iridium Satellite, acquired certain satellite assets from Iridium LLC, a non-affiliated debtor in possession, pursuant to an asset purchase agreement.

Business Overview

We are the only commercial provider of communications services offering true global coverage, connecting people, organizations and assets to and from anywhere, in real time. Our unique L-band satellite network provides reliable communications services to regions of the world where terrestrial wireless or wireline networks do not exist or are limited, including remote land areas, open ocean, airways, the polar regions and regions where the telecommunications infrastructure has been affected by political conflicts or natural disasters.

We provide voice and data communications services to businesses, the U.S. and foreign governments, non-governmental organizations and consumers via our satellite network, which has an architecture of 66 operational satellites with in-orbit and ground spares and related ground infrastructure. We utilize an interlinked mesh architecture to route traffic across our satellite constellation using radio frequency crosslinks between satellites. This unique architecture minimizes the need for local ground facilities to support the constellation, which facilitates the global reach of our services and allows us to offer services in countries and regions where we have no physical presence.

In February 2019, we completed our Iridium® NEXT program, the replacement of our first-generation satellites with a new satellite constellation that supports higher data speeds for new products, including Iridium Certus® broadband service. The new constellation maintains the same interlinked mesh architecture of our first-generation constellation and is compatible with all end-user equipment.

The Iridium constellation also hosts the Aireon® system, which provides a global air traffic surveillance service through a series of automatic dependent surveillance-broadcast, or ADS-B, receivers on our satellites. We formed Aireon LLC in 2011, with subsequent investments from the air navigation service providers, or ANSPs, of Canada, Italy, Denmark, Ireland and the United Kingdom, to develop and market this service. Aireon has contracted to provide the service to our co-investors in Aireon and to other ANSPs around the world, including the U.S. Federal Aviation Administration, or FAA. Aireon has also contracted to pay us a fee to host the ADS-B receivers on our satellites, as well as data service fees for the delivery of the air traffic surveillance data over the Iridium system. In addition, we have entered into an agreement with L3Harris Technologies, Inc., or L3Harris, the manufacturer of the Aireon hosted payload, pursuant to which L3Harris pays us fees to allocate the remaining hosted payload capacity to its customers and data service fees on behalf of these customers.

Our commercial business, which we view as our primary source of long-term growth, is diverse and serves markets such as emergency services, maritime, aviation, government, utilities, oil and gas, mining, recreation, forestry, heavy equipment, construction and transportation. Many of our end users view our products and services as critical to their daily operations and integral to their communications and business infrastructure. For example, multinational corporations in various sectors use our services for business telephony, e-mail and data transfer, including telematics, and to provide mobile communications services for employees in areas inadequately served by other telecommunications networks. Commercial enterprises use our services to track assets in remote areas and provide telematics information such as location and engine diagnostics. Ship crews and passengers use our services for ship-to-shore calling, as well as to send and receive e-mail and data files, and to receive electronic media, weather reports, emergency bulletins and electronic charts. Shipping operators use our services to manage operations on board ships and to transmit data, such as course, speed and fuel stock. Aviation end users use our services for air-to-ground telephony and data communications for position reporting, emergency tracking, weather information, electronic flight bag updates and airline operational communications. We expect that Iridium Certus, launched in January 2019, will continue to drive growth opportunities in our commercial business. With initial broadband services provided for the maritime and land-mobile industries, Iridium Certus offers the flexibility to scale device speeds, sizes and power requirements both up and down based on the needs of the end-user. It provides a platform for our partners to develop specialized broadband, narrowband and midband (a term we use to describe services between our legacy 2.4 Kbps narrowband and our 128 Kbps and higher broadband offerings) applications on our network.

The U.S. government, directly and indirectly, has been and continues to be our largest single customer, generating $124.7 million in service and engineering and support service revenue, or 22% of our total revenue, for the year ended December 31, 2019. This does not include revenue from the sale of equipment that may be ultimately purchased by U.S. or non-U.S. government agencies through third-party distributors, or airtime services purchased by U.S. or non-U.S. government agencies that are provided through our commercial gateway, as we lack specific visibility into these activities and the related revenue. We are operating under a multi-year, fixed-price contract with the U.S. government to provide specified satellite airtime services for an unlimited number of U.S. Department of Defense and other federal government subscribers. This contract has a total value of $738.5 million over its seven-year term, through September 2026. We may provide other services, such as Iridium Certus, to the U.S. government under separate arrangements for an additional fee. In addition, we intend to invest approximately $10-$12 million over the next three years in support of the U.S. government to implement enhanced services at its dedicated gateway, which will be accounted for as additional cost of services.

The U.S. government owns and operates a dedicated gateway that is only compatible with our satellite network. The U.S. armed services, State Department, Department of Homeland Security, Federal Emergency Management Agency, or FEMA, Customs and Border Protection, and other U.S. government agencies, as well as other nations' governmental agencies, use our voice and data services for a wide variety of applications. Our voice and data products are used for numerous primary and backup communications solutions, including logistical, administrative, morale and welfare, tactical, and emergency communications. In addition, our products are installed in ground vehicles, ships, and rotary- and fixed-wing aircraft and are used for command-and-control and situational awareness purposes. Our satellite network provides increased network security to the U.S. government because traffic is routed across our satellite constellation before being brought down to earth through the dedicated, secure U.S. government gateway. The U.S. government has made, and continues to make, significant investments to upgrade its dedicated gateway, to purchase our voice and data devices, and to invest directly and indirectly in research and development and implementation support for additional services on our network, such as Distributed Tactical Communications Services, or DTCS, and Iridium Certus.

We sell our products and services to commercial end users primarily through a wholesale distribution network, encompassing approximately 100 service providers, approximately 260 value-added resellers, or VARs, and approximately 90 value-added manufacturers, or VAMs, which create and sell technology that uses the Iridium network either directly to the end user or indirectly through other service providers, VARs or dealers. These distributors often integrate our products and services with other complementary hardware and software and have developed a broad suite of applications using our products and services to target specific lines of business. We expect that demand for our services will increase as more applications are developed and deployed that utilize our technology.

At December 31, 2019, we had approximately 1,300,000 billable subscribers worldwide, representing a 16% increase compared to December 31, 2018. Total revenue increased from $523.0 million in 2018 to $560.4 million in 2019.

Industry

We compete in the mobile satellite services sector of the global communications industry. Mobile satellite services operators provide voice and data services to people and machines using a network of satellites and ground facilities. Mobile satellite services are intended to meet users' needs for connectivity in all locations where terrestrial wireless and wireline communications networks do not exist, do not provide sufficient coverage, or are impaired. Further, many regions of the world benefit from satellite networks, such as rural and developing areas that lack adequate wireless or wireline networks, airways, ocean and polar regions where few alternatives exist, and regions where the telecommunications infrastructure has been affected by political conflicts or natural disasters.

Government organizations, including military and intelligence agencies and disaster response agencies, non-governmental organizations, and industrial operations and support teams depend on mobile and fixed voice and data satellite communications services on a regular basis. Businesses with global operations require reliable communications services when operating in remote locations around the world. Mobile satellite services users span many sectors, including emergency services, maritime, aviation, government, utilities, oil and gas, mining, recreation, forestry, heavy equipment, construction and transportation, among others. Many of our customers view satellite communications services as critical to their daily operations.

We believe that increasing mobile penetration creates additional demand for mobile satellite services. According to a 2019 study by the GSM Association, total mobile connections, excluding cellular Internet of Things, or IoT, reached 7.9 billion throughout the world as of the end of 2018 and are projected to reach 9.2 billion by 2025.

We believe that growth in the terrestrial wireless industry has increased awareness of the need for reliable mobile voice and data communications services. In addition, despite significant penetration and competition, terrestrial wireless systems do not cover a large majority of the earth’s surface and are focused mainly in those areas where people live, excluding oceans and other remote regions where ships, airplanes and other remote assets may travel or be located. By offering mobile communications services with global voice and data coverage, mobile satellite service providers address the demand from businesses, governments and individuals for connectivity and reliability in locations not consistently served by wireline and wireless terrestrial networks.

The mobile satellite services industry also benefits from the continued development of innovative, lower-cost technology and applications integrating mobile satellite products and services, including the continued advancement of IoT. We believe that growth in demand for mobile satellite services is driven in large part by the declining cost of these services, the diminishing size and lower costs of voice, data and IoT devices, the rollout of new applications tailored to the specific needs of customers across a variety of markets, and expansion into new international markets.

Communications industry sectors include:

- mobile satellite services, which provide customers with voice and data connectivity to mobile and fixed devices using ground facilities and networks of geostationary, or GEO, satellites, which are located approximately 22,300 miles above the equator, medium earth orbit satellites, which orbit between approximately 6,400 and 10,000 miles above the earth’s surface, or low earth orbit, or LEO, satellites, such as those in our constellation, which orbit between approximately 300 and 1,000 miles above the earth’s surface;

- fixed satellite services, which typically use GEO satellites to provide customers with broadband communications links between fixed points on the earth’s surface; and

- terrestrial services, which use a network of land-based equipment, including switching centers and radio base stations, to provide wireless or wireline connectivity and are complementary to satellite services.

Within the two major satellite sectors, fixed satellite services and mobile satellite services, operators differ significantly from each other with respect to size of antenna and types of services offered. Fixed satellite services providers, such as Intelsat S.A., Eutelsat Communications S.A. and SES S.A., are characterized by large, often stationary or fixed ground terminals that send and receive high-bandwidth signals to and from the satellite network for video and high-speed data customers and international telephone markets. By contrast, mobile satellite services providers, such as us, Inmarsat plc, Globalstar, Inc., and ORBCOMM Inc. focus more on voice and data services, where mobility and small-sized terminals are essential.

A LEO system, such as the system we operate, generally has lower transmission delays, or latency, than a GEO system, such as that operated by Inmarsat, due to the shorter distance signals have to travel, which also enables the use of smaller antennas on mobile devices. We believe the unique interlinked mesh architecture of our constellation, combined with the global footprint of our satellites, distinguishes us from regional LEO satellite operators such as Globalstar and ORBCOMM, by allowing us to route voice and data transmissions to and from anywhere on the earth’s surface without the need for local ground infrastructure. As a result, we are the only mobile satellite services operator offering real-time, low-latency services with true global coverage, including full coverage of the polar regions.

Our Competitive Strengths

- *Our Constellation.* Our recently upgraded satellite constellation enables our Iridium Certus offerings, empowers the development of a range of new global products and services, and supports Aireon’s aircraft tracking service, as well as other hosted payload missions.

- *Attractive and growing markets.* We believe that the mobile satellite services industry will continue to experience growth driven by the increasing awareness of the need for reliable mobile voice and data communications services, the lack of coverage of most of the earth's surface by terrestrial wireless systems, and the continued development of innovative, lower cost technology, applications integrating mobile satellite products and services, and the continued development of the IoT. Only satellite providers can offer global coverage, and the satellite industry is characterized by significant financial, technological and regulatory barriers to entry.

- *Strategic relationship with the U.S. government.* The U.S. government is our largest single customer, and we have provided airtime services to the U.S. government (particularly the Department of Defense) since our inception. We believe the U.S. government views our encrypted handset, IoT devices, DTCS and other products as mission-critical services and equipment. The U.S. government continues to make significant investments in a dedicated gateway on a U.S. government site to provide operational security and allow U.S. government handset and IoT users to communicate securely with other U.S. government communications equipment. This gateway is only compatible with our satellite network. In September 2019, we entered into a seven-year, fixed-price contract with the U.S. government to provide specific narrowband satellite airtime services for an unlimited number of U.S. government and other federal government subscribers, with a total contract value of $738.5 million. We have seen significant annual increases in the number of federal government subscribers during the last several years, and we expect this trend to continue, increasing the value of our services to U.S. government customers.

- *Wholesale distribution network.* The specialized needs of our global end users span many markets, including emergency services, maritime, aviation, government, utilities, oil and gas, mining, recreation, forestry, heavy equipment, construction and transportation. We sell our products and services to commercial end users through a wholesale distribution network of service providers, VARs and VAMs, which often specialize in a particular line of business. Our distributors use our products and services to develop innovative and integrated communications solutions for their target markets, embedding our technology in their products or combining our products with other technologies, such as GPS and terrestrial wireless technology. In addition to promoting innovation, our wholesale distribution model allows us to capitalize on the research and development expenditures of our distribution partners, while lowering overall customer acquisition costs and mitigating some risks, such as consumer relationship risks. By supporting these distributors as they develop new products, services and applications, we believe we create additional demand for our products and services and expand our target markets at a lower cost than would a more direct marketing model. We believe our distribution network can continue to grow with us and increase our market penetration. For example, we used our wholesale distribution approach to introduce Iridium Certus, with multiple VAMs developing Iridium Certus™ customer terminals for the maritime, aviation and terrestrial markets at their expense, and agreements with numerous service partners to sell, service and support Iridium Certus terminals and service to global customers across these markets.

- *True global coverage.* Our network provides true global coverage, which none of our competitors, whether LEO or GEO, can offer. Our network design of 66 operational satellites relies on an interlinked mesh architecture to transmit signals from satellite to satellite, which reduces the need for multiple local ground stations around the world and facilitates the global reach of our services. GEO satellites orbit above the earth's equator, limiting their visibility to far northern or southern latitudes and polar regions. LEO satellites from operators like Globalstar and ORBCOMM use an architecture commonly referred to as "bent pipe," which requires voice and data transmissions to be immediately routed to ground stations in the same region as the satellite and can only provide real-time service when they are within view of a ground station, limiting coverage to areas near where they have been able to license and locate ground infrastructure. The LEO design of our satellite constellation produces minimal voice and data transmission delays compared to GEO systems due to the shorter distance our signals have to travel, and LEO systems typically have smaller antenna and power requirements. As a result, we believe that we are well-positioned to capitalize on the growth in our industry from end users who require reliable, easy-to-use mobile communications services in all locations.

Our Business and Growth Strategies

- *Leverage our largely fixed-cost infrastructure by growing our service revenue*. Our business model is characterized by high capital costs, primarily incurred every 10 to 15 years, in connection with designing, building and launching new generations of our satellite constellation, like our recently completed Iridium NEXT program, and a low incremental cost of providing service to additional end users. We believe that service revenue will be our largest source of future growth and profits, and we intend to focus on growing both our commercial and government service revenue in order to leverage our largely fixed-cost infrastructure. In particular, we believe that competitive broadband, midband and narrowband data services through Iridium Certus and satellite IoT services, where we are engaging large, global enterprises as long-term customers for data and telematics solutions, represent our greatest opportunities for service revenue growth.

- *Expand our target markets through the development of new products and services*. We believe that we can expand our target markets by developing and offering a broader range of products and services, including a wider array of cost-effective and competitive broadband, midband and IoT data services using Iridium Certus technology to complement and expand on our existing legacy narrowband services. Iridium Certus is a multi-service platform that can deliver a range of services, from voice to a high-throughput L-band data connection, at a range of competitive price points, data speeds, and terminal dimensions to meet an expanding set of customer requirements. Iridium Certus services will include background IP data, streaming IP data, high quality voice, messaging, and safety services, including Global Maritime Distress Safety System, or GMDSS, and Aeronautical Mobile Satellite (Route) Service, or AMS(R)S. During 2019 we also introduced Iridium CloudConnect, a cloud-based solution with Amazon Web Services offering simpler development and truly global coverage for IoT applications, and announced a Memorandum of Understanding with OneWeb to work together toward a combined and complementary service offering.

- *Accelerate the development of personal communications capabilities*. Part of our strategy for the development of personal mobile satellite communications is to allow individuals to connect to our network in more ways, including from devices such as smartphones, tablets and laptops through our Iridium GO!® device or a variety of personal communication devices from VAMs and VARs like Garmin. We are making our technology more accessible and cost-effective for our distribution partners to integrate by licensing our core technologies; by adding functionality, such as push-to-talk, or PTT, capability, which allows multiple users to participate in talk groups worldwide; by providing rugged, dependable devices and services; and by developing new services that take advantage of the capabilities of our global constellation.

- *Continued growth in services provided to the U.S. government*. In September 2019, we executed a seven-year Enhanced Mobile Satellite Services, or EMSS, contract managed by Air Force Space Command. Under the terms of this agreement, we provide Iridium airtime services, including unlimited global standard and secure voice, paging, fax, Short Burst Data®, Iridium Burst®, RUDICS and DTCS services for an unlimited number of Department of Defense and other federal government subscribers. The service fee under the EMSS contract is $100 million for the current contract year and increases thereafter. Other services such as Iridium Certus and satellite time and location provide us with opportunities to offer new products and services to the U.S. government for an additional fee.

- *Continue to expand our distribution network*. We believe our wholesale distribution network lowers our costs and risks, and we plan to continue to selectively expand our network of service providers, VAMs and VARs, to expand our sales and distribution efforts geographically, and to add additional industries or lines of business. We expect that our current and future value-added partners will continue to develop customized products, services and applications targeted to the land mobile, IoT, maritime, aviation and government markets. We believe these markets and the new service providers, VAMs and VARs who join our network as a result of new product offerings represent an attractive opportunity for continued subscriber growth.

- C*ontinue to support Aireon in the execution of its business plan*. Aireon, which we formed in 2011, is our primary hosted payload customer. Aireon received subsequent investments from five ANSPs: NAV CANADA, Enav (Italy), NATS (United Kingdom), Naviair (Denmark) and the Irish Aviation Authority. Aireon has developed an ADS-B receiver payload which is hosted on our satellites and gathers ADS-B position information from aircraft to provide a global air traffic surveillance service. Aireon has contracted to offer its service to ANSPs and other commercial customers worldwide. The FAA recently signed an agreement to begin deploying the Aireon system in the Caribbean airspace beginning in 2020 and has stated it is evaluating plans to expand its usage of Aireon to other areas as well. Aireon has also contracted to pay us a fee to host their payloads on our satellites and pays us data service fees for the delivery of the air traffic surveillance data from those payloads over the Iridium system. We will also continue to hold a meaningful equity stake in Aireon.

Distribution Channels

We sell our products and services to customers through a wholesale distribution network of approximately 100 service providers, approximately 260 VARs and approximately 90 VAMs. These distributors sell our products and services to end users, either directly or indirectly through service providers, VARs or dealers. Of these distributors, 53 sell primarily to U.S. and international government customers. Our distributors often integrate our products and services with other complementary hardware and software and have developed individual solutions targeting specific lines of business. We also sell airtime services directly to the U.S. government, including the Department of Defense, for resale to other government agencies. The U.S. government and international government agencies may purchase additional services as well as our products and related applications through our network of distributors.

We provide our distributors with support services, including assistance with coordinating end user sales and marketing, strategic planning and training, and second-tier customer support, as well as helping them respond to new opportunities for our products and services. We have representatives covering three regions around the world to better manage our distributor relationships: the Americas, which includes North, South and Central America; Asia Pacific, which includes Australia and Asia; and Europe, the Middle East, Africa and Russia. We have also established a global service program to provide portside service for our maritime customers at major ports worldwide. In addition, we maintain various online management tools that allow us to communicate efficiently with our distributors, and allow them to manage their customers' Iridium devices from anywhere in the world. By relying on our distributors to manage end user sales, we believe that we reduce some of the risks and costs related to our business, such as consumer relationship risks and sales and marketing costs, while providing a broad and expanding distribution network for our products and services with access to diverse and geographically dispersed niche markets. We are also able to benefit from the specialized expertise of our distributors, who continue to develop innovative and improved solutions and applications integrating our product and service offerings, providing us with an attractive platform to support our growth.

Commercial Markets

We view our commercial business as our primary source of long-term growth. Service providers and VARs serve as our main distribution channel by purchasing our products and services and marketing them directly to their customers or indirectly through independent dealers. They are each responsible for customer billing, end user customer care, managing credit risk and maintaining all customer account information. If our service providers or VARs provide our services through dealers, these dealers will often provide such services directly to the end user. Service providers typically purchase our most basic products and services, such as mobile voice services and related satellite handsets, and offer additional services such as voice mail. Unlike service providers, our VARs typically focus more on data applications and provide a broader array of value-added services specifically targeted to the niche markets they serve, such as IoT, maritime, aviation and government markets, where high-use customers with specialized needs are concentrated. These VARs integrate our handsets, transceivers, high-speed data devices and Short Burst Data, or SBD®, modems with other hardware and software to create packaged solutions for end users. Examples of these applications include cockpit voice and data solutions for use by the aviation sector and voice, data and tracking applications for industrial customers, such as Caterpillar Inc., the Department of Defense, and other U.S. and foreign government agencies. Our service providers include satellite service providers such as Marlink AS, Applied Satellite Technology Limited and Network Innovations, as well as some of the largest telecommunications companies in the world, including Telstra Corporation Limited, KDDI Corporation and Singapore Telecommunications Limited. Our VARs include ARINC Incorporated, Blue Sky Network, LLC, Caterpillar Inc., Garmin Services Inc., General Dynamics Satellite Communication Services, Inc., Gogo Business Aviation LLC, Komatsu Ltd, Kore Telematics Inc., MetOcean Telematics Limited, Mix Telematics International (Pty) Ltd., NAL Research Corporation, OnixSat Rastreamento de Veículos Ltda. and Zunibal S.A.

We also sell our products to VAMs, who integrate our transceivers into their proprietary hardware. These VAMs produce specialized end-user equipment, including integrated ship, vehicular and aviation communications systems, and global asset tracking devices, which they offer to end users in IoT, maritime, aviation and government markets. As with our service providers and VARs, VAMs sell their products either directly or through other distributors, including some of our service providers and VARs. Our VAMs include Applied Satellite Engineering, Inc., Beam Communications Pty Ltd., Calamp Wireless Networks Corporation, Cobham plc, Garmin Services Inc., Gilat Telecom Ltd., Honeywell Global Tracking Limited and Quake Global, Inc.

In addition to VARs and VAMs, we maintain relationships with approximately 80 value-added developers, or VADs. We typically provide technical information to these companies on our products and services, which they then use to develop software and hardware that complements our products and services in line with the specifications of our VARs and VAMs. These products include handset docking stations, airline tracking and flight management applications and crew e-mail applications for the maritime industry. We believe that working with VADs allows us to create new platforms for our products and services and increases our market opportunity while reducing our overall research and development, marketing and support expenses. Our VADs include Global Marine Networks, LLC, Maxtena, Inc., TE Connectivity Corporation and Two10degrees Limited.

We maintain a pricing model for our commercial products and services with a wholesale rate structure. Under our distribution agreements, we charge our distributors wholesale rates for commercial products and services, subject to discount and promotional arrangements and geographic pricing. We also charge fixed monthly access fees per subscriber for some of our services. Our distributors are in turn responsible for setting their own pricing to their customers. Our agreements with distributors typically have terms of one year and are automatically renewable for additional one-year terms, subject to termination rights. We believe we benefit from the simplicity of this business model, which reduces back-office complexities and costs and allows distributors to remain focused on revenue generation, while also providing incentives for distributors to focus on selling our commercial product and service portfolio and developing additional applications.

Government Markets

We provide mission-critical mobile satellite products and services to all military branches of the Department of Defense as well as other U.S. government departments and agencies. These users require voice and two-way data capability with global coverage, low latency, mobility and security and often operate in areas where no other terrestrial or wireless means of communications are available. We believe we are well-positioned to satisfy demand from these users. Our 9575A handset is the only commercial, mobile handheld satellite phone that is capable of Type I encryption accredited by the U.S. National Security Agency for Top Secret voice communications. In addition, the U.S. government continues to make significant investments in a dedicated gateway that provides operational security and allows users of encrypted U.S. government handsets to communicate securely with other U.S. government communications equipment. These investments include upgrading the gateway to take advantage of the enhanced capabilities of our new network, including Iridium Certus and other enhanced services. This U.S. government gateway is only compatible with our satellite network.

We provide airtime and airtime support to U.S. government and other authorized customers pursuant to our seven-year EMSS contract managed by Air Force Space Command, which we entered into in September 2019. Under the terms of this agreement, authorized customers utilize our airtime services through the U.S. government's dedicated gateway. These services include unlimited global standard and secure voice, broadcast, netted or DTCS and select other services for an unlimited number of U.S. government subscribers. Other services may be purchased at an additional cost. The fixed-price rate for the contract is currently $100 million per contract year, with increases in annual value resulting in a total contract value of $738.5 million over the seven-year term. While we sell airtime directly to the U.S. government for resale to end users, our hardware products are sold to U.S. government customers through our network of distributors, which typically integrate them with other products and technologies. We may provide other services, such as Iridium Certus, to the U.S. government under separate arrangements for an additional fee. In addition, we intend to invest approximately $10-$12 million over the next three years in support of the U.S. government to implement enhanced services at its dedicated gateway, which will be accounted for as additional cost of services. Pursuant to federal acquisition regulations, the U.S. government may terminate the EMSS contract, in whole or in part, at any time.

We also provide maintenance services for the U.S. government gateway pursuant to our Gateway Maintenance and Support Services, or GMSS, contract managed by Air Force Space Command. This agreement, effective April 2019, provides for a six-month base term and four one-year options, the first of which has been exercised, for a total value of the contract to us of approximately $54 million. Pursuant to federal acquisition regulations, the U.S. government may terminate the GMSS contract, in whole or in part, at any time.

In October 2019, we were also awarded a five-year indefinite-delivery/indefinite-quantity, or IDIQ, contract managed by Air Force Space Command to enable ongoing innovation and enhancements for the U.S. government gateway. This contract has a one-year base period and four one-year options, with a value of up to $76 million to us over the five-year period. Pursuant to federal acquisition regulations, the U.S. government may terminate the IDIQ contract, in whole or in part, at any time.

U.S. government services accounted for approximately 22% of our total revenue for the year ended December 31, 2019. Our reported U.S. government revenue includes airtime revenue derived from the EMSS contract and services provided through the GMSS contract, the IDIQ contract, and other engineering and support contracts with the U.S. government. This revenue does not include airtime services purchased by U.S. or non-U.S. government agencies that are provided through our commercial gateway, which we report as commercial service revenue, or equipment purchased by government customers from third-party distributors. We are unable to determine the specific amount of U.S. government revenue derived from these commercial sources.

Lines of Business

The specialized needs of our global customers span many markets. Our system is able to offer our customers cost-effective communications solutions with true global coverage in areas unserved or underserved by existing telecommunications infrastructure. Our mission-critical communications solutions have become an integral part of the communications and business infrastructure of many of our end users. In many cases, our service is the only connectivity for these critical applications or is used to complement terrestrial communications solutions.

Our current principal vertical lines of business include land mobile, maritime, aviation, IoT, hosted payloads and other data services, and U.S. government. Land mobile, maritime and aviation are the principal contributors to the revenue we report as commercial voice and data. We report commercial voice and data service, IoT data service, hosted payload and other data service, and government service revenue separately. Since we introduced Iridium Certus broadband in January of 2019, Iridium Certus services have accounted for an increasing portion of our revenue, and we expect that trend to continue. As we continue to grow our Iridium Certus service revenue, we expect to begin separately reporting commercial Iridium Certus broadband revenue with Iridium OpenPort® service revenue as a broadband revenue line item. Currently, Iridium Certus broadband revenue and Iridium OpenPort service revenue are included in commercial voice and data revenue.

Commercial Voice and Data

Land Mobile

We are the leading provider of mobile satellite communications services to the land mobile sector, providing handset services to areas not served or inconsistently served by existing terrestrial communications networks. In a 2019 report, TMF Associates reported that there were approximately 849,000 land voice satellite units in service in 2018. Mining, forestry, construction, oil and gas, utilities, heavy industry and transport companies as well as the military, public safety and disaster relief agencies constitute the largest portion of our land mobile end users. Sales of Iridium GO! and Iridium PTT services also contribute to the land mobile sector. We believe that demand for mobile communications devices operating outside the coverage of terrestrial networks, combined with our small, lightweight, durable handsets with true global coverage, will allow us to capitalize on growth opportunities among these users.

In addition, we expect Iridium Certus land mobile units to be attractive in this market, as the combination of price, speeds, equipment, service costs and durability of equipment are expected to address a distinct market need.

Our land mobile end users utilize our satellite communications services for:

- *Voice and data*: Multinational corporations in various sectors use our services for business telephony, e-mail and data transfer services, location-based services, broadband and to provide telephony services for employees in areas inadequately served by terrestrial networks. Oil and gas and mining companies, for example, provide their personnel with our equipment solutions while surveying new drilling and mining opportunities and while conducting routine operations in remote areas that are not served by terrestrial wireless communications networks. In addition, a number of recreational, scientific and other outdoor users rely on our mobile handheld satellite phones and services for use when beyond terrestrial wireless coverage. Iridium PTT offers military, first responder, oil and gas, civil government and other users the ability to hold group calls using the Iridium Extreme® PTT handset or other devices developed by our VAMs and VARs using the Iridium 9523 PTT core transceiver. The Thales MissionLINK terminal, the first Iridium Certus offering in the land mobile area, allows rapid deployment and on-the-move communications, location tracking and telemetry.

- *Mobile and remote office connectivity*: A variety of enterprises use our services to make and receive voice calls and to establish data, e-mail, internet and corporate network connections.

- *Public safety and disaster relief*: Relief agencies, such as FEMA, and other agencies, such as the Department of Homeland Security, use our products and services in their emergency response plans, particularly in the aftermath of natural disasters such as Hurricane Harvey, Hurricane Irma, Hurricane Maria and the 2017 Mexico City area earthquake and in places like Puerto Rico after the 2017 hurricanes. These agencies generate significant demand for both our voice and data products, especially in advance of the hurricane season in North America.

- *Public telephone infrastructure*: Telecommunications service providers use our services to satisfy regulatory mandates and government expectations regarding the availability of communications services for rural populations currently not served by terrestrial infrastructure. Telstra Corporation, for example, uses our services to provide communications services in some of Australia's most remote locations.

Maritime

We serve the commercial maritime market with a variety of products, including broadband terminals, embedded devices and handsets. This market space includes merchant shipping, fishing, research vessels and specialized watercraft. Traditionally, the majority of our revenue from the maritime market has been derived from shipboard data terminals including the Iridium Pilot®, which uses the Iridium OpenPort high-speed voice and data service. Since we introduced Iridium Certus broadband in January of 2019, Iridium Certus services have accounted for an increasing portion of our revenue from this market, and we expect that trend to continue. Our products and services targeting the maritime market typically have high average revenue per subscriber. Once one of our maritime systems is installed on a vessel, it often generates a multi-year recurring revenue stream from the customer. As a consequence, from time to time we may offer promotions or rebates to accelerate new customer acquisitions and solidify this expected long-term revenue stream.

We believe demand for higher-speed, low-cost data services will allow us to capitalize on opportunities in this market. We believe Iridium Certus, which offers data speeds of up to 704 Kbps, presents a superior communication solution to users in the maritime market. We expect this offering to increase the addressable market for our maritime services.

Maritime end users utilize our satellite communications services for the following:

- *Business critical data applications*: Ship operators use our services to exchange e-mail and data files and to receive other information such as meteorological reports, emergency bulletins, cargo and voyage data and electronic chart updates. We believe Iridium Certus and Iridium OpenPort provide attractively priced options for shipping operators and fishing fleets seeking increased functionality, as well as for yachts, work boats and other vessels for which traditional marine satellite systems have typically been costly and underperforming.

- *Voice services*: Maritime global voice services are used for both vessel operations and communications for crew welfare. Merchant shipping companies use phone cards for crew use at preferential around-the-clock flat rates.

- *Vessel management and asset tracking*: Shipping operators, such as China Ocean Shipping Company, or COSCO, and Briese Schiffahrts GmbH, use our services to manage operations on ships and to transmit data, such as course, speed and fuel stock. Our services are commonly integrated with GPS to provide a real-time position reporting capability. Many fishing vessels are required by law to carry terminals using approved mobile satellite services for tracking purposes as well as to monitor catches and to ensure compliance with geographic fishing restrictions. European Union regulations, for example, require EU-registered fishing vessels of over 15 meters to carry terminals for the purpose of positional reporting of those vessels. Furthermore, new security regulations in some jurisdictions are expected to require tracking of merchant vessels in territorial waters, which would provide an additional growth opportunity for us.

- *Safety and Security applications*: Ships in distress, including as a result of potential piracy, hijack or terrorist activity, rely on mobile satellite voice and data services. The Ship Security and Alert Systems, or SSAS, and Long Range Identification Tracking, or LRIT, regulations were adopted by the International Maritime Organization, or IMO, to enhance maritime security in response to the threat from terrorism and piracy. Most deep-sea passenger and cargo ships must be fitted with a device that can send an alert message containing the ship's ID and position whenever the ship is under threat or has been compromised. In addition, the IMO and a NATO advisory group have recommended the installation of a safe room equipped with a standalone secure communication link the crew can use from inside the room to communicate with rescuing forces. Our distribution partners have developed several product solutions using our network to meet these requirements for merchant and fishing vessels.

The GMDSS is a maritime service built to alert a maritime rescue coordination center of each vessel's situation and position, information that can then be used to coordinate search and rescue efforts among ships in the area. GMDSS service is also used to distribute important navigational and meteorological information to vessels. The IMO requires all vessels flagged by signatories to the International Convention for the Safety of Life at Sea, or SOLAS, over 300 gross tons and certain passenger vessels, irrespective of size, that travel in international waters to carry distress and safety terminals that provide GMDSS services. We have been recognized by the IMO as a provider for the GMDSS. Our partners will offer maritime terminals that include GMDSS service capabilities to vessel operators, and we expect GMDSS service using our network to be available for those terminals later in 2020, once we have completed the implementation process.

Aviation

We are one of the leading providers of mobile satellite communications services to the aviation sector. Our services are increasingly used in commercial and global government aviation applications, principally by corporate jets, corporate and government helicopter fleets, specialized general aviation fleets, such as medevac companies and fire suppression fleets, and high-end personal aircraft. Our services are also employed by commercial airline operators for flight deck voice and data link services for aircraft operational and safety communications. As a result of authorizations by the FAA and U.S. Federal Communications Commission, or FCC, for us to provide air traffic datalink communications, commercial operators are installing avionics that use the Iridium network on the flight deck to comply with international air navigation communications requirements to operate in oceanic and remote airspace, including polar regions. Voice and data avionics platforms from our VAMs have been adopted as standard equipment and as factory options for a range of airframes in business aviation and air transport, such as Gulfstream Aerospace Corporation, Bombardier Inc., Cessna Aircraft Company, Boeing and Airbus. Avionics platforms that utilize our network are also retrofitted on thousands of corporate and commercial aircraft already in operation.

Aviation end users utilize our satellite communications services for:

- *Air traffic control communications and safety applications*: The International Civil Aviation Organization, or ICAO, has approved standards and recommended practices allowing us to provide AMS(R)S to commercial aircraft on long-haul routes. This allows member states to evaluate and approve our services for safety communications on flights in oceanic and remote airspace. The FAA has approved Iridium for use in the Future Air Navigation Services, or FANS, including Automatic Dependent Surveillance - Contract, or ADS-C, datalink communications and Controller-Pilot Data Link Communications, or CPDLC, with air traffic control. Aircraft crew and air traffic controllers use our services for data and voice communications between the aircraft flight deck and ground-based air traffic control facilities. We are the only satellite provider capable of offering these critical flight safety applications around the entire globe, including the polar regions. We believe this particular sector of the market provides us with significant growth opportunities, as our services and applications can serve as a cost-effective alternative to systems currently in operation.

- *Aviation operational communications*: Aircraft crew and ground operations use our services for air-to-ground telephony and data communications. This includes the automatic reporting of an aircraft’s position and mission-critical condition data to the ground and CPDLC for clearance and information services. We provide critical communications applications for numerous airlines and air transport customers including Hawaiian Airlines, United Airlines, UPS, Cathay Pacific Airways and El Al Airlines. These operators rely on our services because other forms of communication may be unaffordable or unreliable in areas such as the polar regions. Collins Aerospace (ARINC) and SITA, the two leading providers of voice and data link communications services and applications to the commercial airline industry, integrate our products and services into their offerings.

- *Aviation passenger communications*: Corporate and private fleet aircraft passengers use our services for air-to-ground telephony and data communications. We believe our distributors’ small, lightweight, cost-effective solutions offer an attractive option for aircraft operators, particularly small fleet operators; for example, some operators use our services to enable small-cabin passengers to e-mail using their own Wi-Fi-enabled mobile devices, including smartphones, without causing interference with aircraft operation. We expect that users in the corporate aviation market, and original equipment manufacturers, or OEMs, for business jets, will increase adoption of our services for in-flight passenger data communications using our network. We believe this presents a significant opportunity to increase market penetration and revenues in this market.

- *Rotary and general aviation applications*: The Iridium network is uniquely suited to these sectors, as we have small antenna designs that work under rotor blades and enable installation on smaller general aviation platforms. We are also a major supplier for rotary aviation applications to end users in a number of markets, including medevac, law enforcement, oil and gas, and corporate work fleets. Companies such as Air Logistics, EagleMed and Air Evac Lifeteam rely on applications from our distributors for traditional voice communications, fleet tracking and management, and real-time flight diagnostics. VARs and VAMs such as Flightcell International Ltd., Garmin Services Inc., Honeywell International, Inc., SkyTrac and Spider Tracks Limited incorporate Iridium products and services into their applications for these markets.

- *Unmanned Aerial Vehicles (UAVs)*: Our small antennas and system designs support a wide range of UAV platforms. In addition, our global footprint enables reliable beyond-line-of-sight communications for these UAV platforms regardless of their operational range. We operate as the communication link for remote-piloted aircraft for uses such as package delivery, medical supply, law enforcement, corporate surveying and even military applications.

We believe the benefits of Iridium Certus will enhance our ability to address aviation market needs across these sectors.

Commercial IoT Data

We are one of the leading providers of satellite-based IoT services. We believe this market continues to experience increasing penetration and presents opportunities for future growth. As with land mobile, our largest IoT users include mining, construction, oil and gas, utilities, heavy industry, maritime, forestry and transport companies, as well as the military, public safety and disaster relief agencies. We believe increasing demand for automated data collection processes from mobile and remote assets operating outside the coverage of terrestrial wireline and wireless networks, as well as the continued need to integrate the operation of such assets into enterprise management and information technology systems, will likewise increase demand for our IoT applications. For example, our IoT devices have been adopted as standard equipment and as factory options by heavy equipment manufacturers such as Caterpillar Inc., Hitachi, Komatsu and Doosan to provide telematics solutions for end users.

Our IoT services are used for:

- *Heavy equipment monitoring:* Large, global heavy equipment original equipment manufacturers, such as Caterpillar Inc., Komatsu Limited, Hitachi Construction Machinery Co. Ltd., CNH Global N.V. and AGCO Corporation, use our global IoT services to monitor their off-road heavy equipment in markets such as construction, mining, agriculture and forestry.

- *Fleet management*: Our global coverage permits our products and services to be used to monitor the location of vehicle fleets, hours of service and engine telemetry data, as well as to conduct two-way communications with drivers around the world. Fleet management companies, such as Trimble Transportation & Logistics, Mix Telematics and Zatix, use our service to provide distance drivers with reliable communication to their dispatchers and their destinations to coordinate changing business needs, and our satellite network provides continuous communications coverage while they are in transit. We expect that the need for more efficient, cost-effective and safer fleet operations, as well as the imposition of regulatory mandates related to driver safety, such as drive-time monitoring, will increase demand for our services in this area.

- *Fixed-asset monitoring*: Multinational corporations, such as oil-field service companies like Schlumberger Limited and ConocoPhillips Company, use our services to run applications that allow remote monitoring and operation of equipment and facilities around the globe, such as oil pipelines and offshore drilling platforms.

- *Asset tracking*: Leveraging IoT applications developed by several of our distributors, companies use our services and related devices to track assets, including personnel, for logistics, theft-prevention and safety purposes. Companies and organizations that have fleets of vehicles use IoT solutions from Iridium distributors to improve the efficiency of their operations. For example, customers use Trimble Transportation’s solution to provide global communication to transportation assets, and the Department of Homeland Security Office of Enforcement and Removal uses Fleet Management Solutions’ IoT solution to transmit position, direction, speed and other data for management of its vehicle fleet.

- *Resource management*: Our global coverage and data throughput capabilities support natural resource management applications, such as fisheries management systems. CLS, MetOcean Telematics and Rock Seven, three of our VARs, have developed applications for the fishing industry that enable regulatory compliance of fishing practices in a number of countries around the world.

- *Scientific data monitoring*: The global coverage of our network supports many scientific data collection applications such as the Argo float program of the National Oceanographic and Atmospheric Administration, or NOAA, the Global Ocean Observation project Challenger, operated by Rutgers University, and the anti-poaching programs of organizations such as Smithsonian National Zoo & Conservation Institute, Zoological Society of London, and Veterans Empowered to Protect African Wildlife, or VETPAW. These programs rely on our IoT services to collect scientific data from buoys and ocean gliders located throughout the world’s oceans and from wildlife habitats for monitoring and analysis. We believe the increased need for monitoring climate and environmental data associated with global climate change and human impact on the planet will increase demand for these services.

- *Personal Tracking Devices and Location-Based Services*: Several of our VAMs and VARs, such as Garmin, NAL Research and Somewear Labs, market small, portable personal tracking devices that provide personal tracking and data communications services to consumers and commercial end users. In addition, Iridium GO! and the Iridium Extreme handsets offer personal tracking and location-based services. These devices use IoT data services to send location information and other data to web-based portals for tracking of and messaging with users.

In the future, we expect our value-added partners to develop new IoT solutions with increased capabilities based on our Iridium Certus 9770 transceiver and other future midband devices we plan to provide across all of our key IoT vertical markets.

Hosted Payload and Other Data Services

Our Iridium satellites also host customer payloads. We generate revenue from these customers both from the hosted payload capacity and from data service fees. Because these revenues are based on a contractual commitment for the life of the Iridium constellation, we recognize revenue from these customers over the expected life of the system.

In addition to access and usage fees in the vertical lines of business described above, we generate revenue from several ancillary services related to our core service offerings. In conjunction with Satelles, Inc., we offer Satellite Time and Location services, which helps augment GPS and provides reliable location, timing and positioning data. We provide inbound connections from the public switched telephone network, or PSTN, short message services, or SMS, subscriber identity module, or SIM, activation, customer reactivation, and other peripheral services. We also provide research and development services to assist customers in developing new technologies compatible with our system, which we may leverage for use in service and product offerings in the future. We charge our distributors fees for these services.

U.S. Government

We are one of the leading providers of mobile satellite communications services to the U.S. government, principally the Department of Defense. We provide mobile satellite products and services to all branches of the U.S. armed forces. Our voice products are used for a variety of primary and backup communications solutions, including tactical operations, logistical, administrative, morale and welfare, and emergency communications. In addition, our products and related applications are installed on ground vehicles, ships, rotary- and fixed-wing aircraft, embedded in unattended sensors and used for command and control and situational awareness purposes. Global security concerns are among the factors driving demand for our products and services in this sector. See "—U.S. Government Services" for more information.

Seasonality

Our business is subject to seasonal usage changes for commercial customers, and we expect it to be affected by similar seasonality going forward. March through October are typically the peak months for commercial voice traffic and related subscriber equipment sales, given the predominance of population and outdoor activity in the northern hemisphere. U.S. government usage and commercial IoT usage have been less subject to seasonal changes.

Services and Products

At December 31, 2019, we had approximately 1,300,000 billable subscribers worldwide. Our principal services are mobile satellite services, including mobile voice and data services, high-speed data services, IoT services, hosted payload and other data services and engineering services. Sales of our commercial services collectively accounted for approximately 63% of our total revenue for the year ended December 31, 2019. We also sell related voice and data equipment to our customers, which accounted for approximately 15% of our total revenue for the year ended December 31, 2019. In addition, we offer services to U.S. government customers, including the Department of Defense. U.S. government services, including engineering services, accounted for approximately 22% of our total revenue for the year ended December 31, 2019.

Commercial Services

Postpaid Mobile Voice and Data Satellite Communications Services

We sell our mobile voice and data services to service providers and VARs who in turn offer such services to end users, either directly or indirectly through dealers, using various packaged solutions such as seasonal or annual plans with differing price levels that vary depending upon expected usage. In exchange for these services, we typically charge service providers and VARs a monthly access fee per subscriber, as well as usage fees for airtime resources consumed by their respective subscribers.

Prepaid Mobile Voice Satellite Communications Services

We also offer mobile voice services to service providers and VARs through prepaid plans. Service providers and VARs pay us in advance for defined blocks of airtime minutes with expiration periods in various configurations, ranging from 30 days to two years. These services are then generally sold to subscribers in the form of prepaid e-vouchers and scratch cards that enable subscribers to use our services on a per-minute basis. We believe service providers and VARs are drawn to these services because they enable greater cost control by eliminating the need for monthly billings and reducing collection costs, and can be sold in countries where credit may not be readily available for end users. Our distributors often offer our prepaid voice services through fixed devices to subscribers in rural villages, at remote industrial, commercial and residential sites, and on ships at sea, among other places. Fixed voice services are in many cases an attractive alternative to handheld mobile satellite communications services in situations where multiple users will access the service within a defined geographic area and terrestrial wireline or wireless service is not available. Fixed phones, for example, can be configured as pay phones that accept prepaid scratch cards and can be installed at a central location, for example in a rural village or on a maritime vessel.

Iridium PTT Service

Building on the foundation of DTCS technology, which provides regional tactical radio service to U.S. government users, our Iridium PTT service enables regional or global PTT calls among users on the same talkgroup in up to 10 geographically disparate locations around the world, providing a fast and robust communication experience. Iridium PTT can be used via the Iridium Extreme PTT satellite phone or the Iridium 9523 PTT core transceiver, which gives our VAMs the ability to build Iridium PTT into existing land mobile, maritime and aviation communications platforms. We and our partners are also developing interoperability solutions for existing terrestrial land mobile radio systems, which will further extend the utility of the service. For example, Icom Inc. of Japan has developed the first purpose-built satellite PTT radio handheld unit for use on the Iridium network.

Broadband Data Services

Our new broadband data offering, Iridium Certus, was launched in January 2019. Iridium Certus is a new suite of products and services enabled by our upgraded satellite constellation. Iridium Certus is a multi-service platform capable of offering higher quality voice, enterprise-grade broadband functionality, SBD, streaming, PTT and safety services on a global basis, with speeds currently available up to 704 Kbps. Ultimately, Iridium Certus is designed to support a variety of cost points, antenna types and data speeds ranging from midband to broadband speeds as high as 1.4 Mbps. We have licensed the Iridium Certus technology to an initial group of VAMs who have introduced products for the maritime and land mobile markets and are developing additional products for those markets and the aviation and government markets, as well as distribution partners for the Iridium Certus service in each of these vertical markets. We believe Iridium Certus provides a competitive, cost-effective and reliable range of narrowband and broadband services to the market, in standalone applications or as a complement to other wireless technologies for critical applications and safety services.

We also offer Iridium OpenPort, which provides maritime, aviation and terrestrial users speeds of up to 134 Kbps and three independent voice lines. For our Iridium OpenPort service, we typically charge service providers usage fees for airtime consumed by the respective subscribers for voice and data communications. In conjunction with our distributors, we also offer additional services that permit service providers and VARs to offer complete integrated solutions for prepaid calling, e-mail and IP-based data communications. For example, one of our distribution partners, KVH Industries, Inc., has been integrating Iridium Pilot with its miniature Very Small Aperture Terminal, or mini-VSAT℠, broadband service to provide backup connectivity when the mini-VSAT terminal is out of its coverage area or out of service. In the future, as Iridium Certus products provide improved speed and price points, we expect our distributors to focus on selling Iridium Certus and eventually transition many ships that use Iridium OpenPort services to Iridium Certus services.

Internet of Things Services

Our IoT services are designed to address the market need for a small and cost-effective solution for sending and receiving data, such as location, from fixed and mobile assets in remote locations to a central monitoring station. Most of our IoT services operate through a two-way SBD transmission or circuit-switched data, between our network and a transceiver, which may be located, for example, on a container in transit or a buoy monitoring oceanographic conditions. The small size of our devices and their low-cost, omnidirectional antennas make them attractive for use in applications such as tracking asset shipments and monitoring unattended remote assets, including oil and gas assets, as well as vehicle tracking and mobile security. We sell our IoT services to our distributors, who incorporate them and in turn provide a solution package to commercial and government customers. Increasingly, our IoT transceivers are being built into products for consumer markets, such as personal location devices that provide two-way messaging. In the future, we expect our IoT partners to develop new offerings with increased capabilities based on our Iridium Certus 9770 transceiver and other future midband devices we plan to create that have optimized size, speed, power, and antenna characteristics for various applications. As with our mobile voice and data offerings, we typically charge service providers and VARs a monthly access fee per subscriber as well as usage fees for data used by their respective subscribers.

U.S. Government Services

We provide U.S. government customers bulk access to our services, including voice, netted voice, data, messaging and paging services, as well as maintenance services for the U.S. government's dedicated gateway. We provide airtime to U.S. government subscribers through the U.S. government's gateway under the EMSS contract, which is a fixed-price contract covering voice, low-speed data, paging, broadcast and DTCS services. Additional services, such as broadband capabilities utilizing Iridium Certus technology, would be provided at an additional fee. To comply with U.S. government requirements, we ensure handsets sold for use by the U.S. government are manufactured in the United States. U.S. government customers procure our voice and data devices through specific, approved distributors from our network of service providers and VARs. Our VARs and VAMs typically integrate our products with other products, which they then offer to U.S. government customers as customized products, typically provisioned by Defense Information Systems Agency, or DISA. Our voice and data solutions for the U.S. government include:

- personnel tracking devices;
- asset tracking devices for equipment, vehicles and aircraft;
- beyond-line-of-sight aircraft communications applications;
- maritime communications applications;
- specialized communications solutions for high-value individuals; and
- specialized, secure, mobile communications and data devices for the military and other government agencies, such as secure satellite handsets with U.S. National Security Agency Type I encryption capability.

With funding support from the U.S. government, we continue to invest in research and development to develop new products and applications for use by all branches of the U.S. armed forces. For example, in conjunction with DISA, we and select distribution partners offer DTCS, which provides critical, secure, PTT, netted communications using lightweight, handheld tactical radios, or add-ons to existing government tactical radios. In addition, we offer a secure satellite phone based on the Iridium Extreme, which we also developed with funding support from the U.S. government and which has been accredited by the National Security Agency, or NSA, to provide Type-1 encryption, enabling communications up to Top Secret from anywhere in the world.

Our Products

We offer a broad array of voice and data products for customers that work worldwide. In most cases, our devices or an antenna must be located outside and within view of a satellite to be able to access our network.

Satellite Handsets

Our principal handset offerings are the Iridium 9555 and Iridium Extreme satellite handsets, which are similar in functionality to ordinary cellular phones but with the solid, durable feel that satellite phone users demand. We believe our reputation for industrial-strength products is critical for customers, many of whom are located in the most inhospitable spots on the planet and require rugged and reliable communications equipment.

Iridium 9555. The Iridium 9555 provides voice, SMS and data connectivity. This model features a large, bright screen, SMS and e-mail capabilities, an integrated antenna and a speakerphone. The Iridium 9555 weighs 9.4 ounces and offers up to 3.1 hours of talk time. The Iridium 9555 has an industrial feel, with a rugged housing to protect its sophisticated satellite transceiver.

Iridium Extreme. The Iridium Extreme adds to the Iridium 9555's capabilities by providing a rugged exterior that meets Military Standard 810F for durability, a dedicated, two-way emergency SOS button, and fully integrated GPS and location-based services. These extra features are provided in a handset that is even smaller than the Iridium 9555, weighing 8.7 ounces and offering up to four hours of talk time. An emergency response service provided by GEOS Travel Safety Group, or GEOS, is included with the purchase of the phone and airtime usage. The two-way emergency SOS button initiates a phone call and an emergency message via SMS to GEOS, which then coordinates with local emergency responders.

Iridium Extreme PTT. We also offer the Iridium Extreme PTT, which enhances the Iridium Extreme with an intelligently designed push-to-talk mode, expanded speakerphone, reinforced PTT button, and extended capacity battery. The user interface provides access to multiple communication services, including voice calling, SMS and SOS, allowing users to connect to a talkgroup located in up to 10 geographic regions worldwide. The Iridium Extreme PTT weighs 9.5 ounces and offers up to 6.5 hours of talk time in phone mode and five hours of talk time in PTT mode.

We expect these devices to maintain our competitive position as premium offerings in the market due to their capabilities, mobility, reliability and global coverage. In addition to these devices, we offer variants of the Iridium 9555 handset and the Iridium Extreme handset that are qualified for sale to U.S. government customers.

Broadband Data Devices

Iridium Certus terminals are specifically designed for the maritime, aviation, land mobile or government markets and ultimately will offer a variety of significantly enhanced data speeds and antenna types. Iridium Certus terminals provide enterprise-grade broadband functionality alongside high quality voice capabilities that can be used on a global basis, with speeds currently available up to 704 Kbps. Ultimately, Iridium Certus is designed to support a variety of cost points, antenna types and data speeds ranging from midband to broadband speeds as high as 1.4 Mbps. We have licensed the Iridium Certus technology to an initial group of VAMs who have introduced products for the maritime and land mobile markets and are developing additional products for those markets as well as the aviation and government markets.

Iridium Certus is ideal for maritime operational and safety services. These terminals deliver the satellite communications technology that the industry demands, combining all the benefits of L-Band with broadband and truly global coverage. Iridium Certus terminals offer superior connectivity for maritime customers whether used as a standalone service or as a complement to VSAT services. Our principal end users for Iridium Certus in the maritime market are merchant shipping, commercial fishing, large leisure vessels, and work boats. The terminals in this market are the Cobham Sailor 4300 and Thales VesseLINK. In addition, Intellian, a Korean maritime terminal manufacturer has been licensed to introduce an Iridium Certus terminal to the market in 2020.

In aviation, Iridium Certus will deliver critical safety services and in-flight communications. Our principal end users for Iridium Certus in the aviation market include commercial, corporate and government users, general aviation, rotorcraft and unmanned aircraft. The initial terminal in this market will be the FlytLINK by Thales. A number of other VAMs have been licensed to create aviation terminals using Iridium Certus services as well.

In the land mobile market, we expect enterprises, governments, and individuals that want to extend their use of mobile networks into remote areas without having to deploy ground-based infrastructure or expensive terminals will utilize Iridium Certus. Iridium Certus devices may be integrated with internet, cellular, land mobile radio, and location-based applications to keep users connected, offering global push-to-talk, situational awareness, email, messaging and voice-over-IP. We believe our principal end users for Iridium Certus in the land mobile market will be military users, first responders, non-governmental organizations, oil and gas users, remote fleets and media users. The initial terminal in this market is the Thales MissionLINK.

In the government market, Iridium Certus terminals will provide beyond-line-of-sight communications critical to mission success. The initial terminal in this market is the Thales MissionLINK.

Our legacy terminal, the Iridium Pilot, provides up to three independent voice lines and an internet connection for data communications of up to 134 Kbps, using our Iridium OpenPort service. All voice and data capabilities can be used simultaneously. Our principal customers for Iridium Pilot are service providers who integrate the device with their own hardware and software products to provide a suite of customer-focused voice and IP-based data packages for ship operation, crew calling and e-mail. We believe our Iridium Pilot terminal, with its flexible service options, provides an excellent low-cost option to the maritime market, including market sectors such as luxury yachts, tug boats, and other fishing and cruising vessels. Iridium Pilot also offers a low-cost solution as a complement to maritime Ku- and Ka- Band VSAT systems providing broadband and data services for ships, where Iridium Pilot can fill in coverage gaps and operate during significant rain fade events that impair K-band service, provide services where the VSAT terminal is not licensed to operate, and provide an alternate channel during VSAT maintenance and configuration. We also offer Iridium Pilot Land Station, which allows remote individuals and businesses from off-the-grid terrestrial locations to obtain reliable internet connections and voice calling no matter where they are located. In the future, as Iridium Certus products provide improved speed and price points, we expect our distributors to focus on selling Iridium Certus and eventually transition many users with Iridium Pilot units to Iridium Certus terminals.

Voice and Data Modems

We also offer a combined voice transceiver and data modem, which our distributors integrate into a variety of communications solutions that are deployed in different applications around the world. Our principal offering in this space is the Iridium Core 9523 L-Band transceiver, which utilizes the transceiver core of our Iridium Extreme satellite handset. The Iridium Core 9523 provides a small voice and data module that can be integrated with other components to create a modem tailored for typical VAM applications as well as specific applications, such as a dual-mode terrestrial radio and satellite phone or IoT applications that require more efficient data throughput through circuit-switched data transmission. The Iridium 9523 PTT adds PTT capability, allowing development partners to design and build land mobile, fixed, aviation and maritime devices with Iridium PTT. We also offer the 9522B L-Band transceiver, which utilizes the same transceiver core that is used in our Iridium 9555 satellite handset to provide voice and circuit-switched data services. In the future, we expect our value-added partners to develop new products based on our Iridium Certus 9770 transceiver and other optimized midband devices. Our principal customers for our L-Band transceivers are VAMs and VARs, who integrate them into specialized devices that access our network.

Internet of Things Data Devices

Our principal IoT devices are the Iridium 9602 and 9603 full-duplex SBD transceivers. The Iridium 9602 is a small data device with two-way transmission, capable of sending packet data to and from any point in the world with low latency. The principal customers for our Iridium 9602 data modems are VARs and VAMs, who embed the device into their tracking, sensor, and data applications and systems, such as asset tracking systems. Our partners often combine the Iridium 9602 with a GPS receiver to provide location information to customer applications. We also offer the Iridium 9603, an even smaller transceiver that is functionally identical to the Iridium 9602. In addition, a number of VARs and VAMs include a cellular modem as part of their Iridium applications to provide low-cost cellular data transmission when available. These types of multimode applications are adopted by end users who require the ability to regularly transfer data but operate in areas with inconsistent cellular coverage. We provide gap-filler coverage for these applications, allowing users to operate anywhere on the globe.

We also offer Iridium Burst, our one-to-many global data broadcast service, which enables enterprises to send data to an unlimited number of devices anywhere in the world, even inside buildings, vehicles or aircraft, and Iridium Edge®, an off-the-shelf, environmentally sealed, rugged device that complements existing cellular solutions to create dual-mode connectivity for the most remote and inaccessible areas of the world. Iridium Edge reduces the cost and complications associated with hardware development, manufacture and certification of satellite-specific terminals, which we expect to enable greater adoption of our IoT services. In the future, we expect our IoT partners to develop new products with increased capabilities based on Iridium Certus midband devices.

Iridium GO!

We also offer Iridium GO!, a small, rugged, personal connectivity device that connects to the Iridium network to create a Wi-Fi hotspot, enabling the use of smartphones and tablets for voice calls, text messages and emails, posts to social networking sites, and limited use of optimized mobile websites. Iridium GO! also has an emergency SOS button and GPS and location-based services. Smartphone or tablet access is provided through special applications downloaded for free from the Apple App Store or through Google Play for Android smartphones or tablets. A software development kit is available to enable the creation of additional applications or integrate Iridium GO! connectivity into existing applications.

Device Development and Manufacturing

We contract with Cambridge Consulting Ltd. and other suppliers to develop our devices, with Benchmark Electronics Inc., or Benchmark, to manufacture most of our devices in a facility in Thailand, and with Hybrid Design Associates to manufacture a portion of our devices in the U.S. Pursuant to our contract with Benchmark, we may be required to purchase excess materials at cost plus a contractual markup if the materials are not used in production within the periods specified in the agreement. Benchmark generally repurchases the materials from us at the same price we paid, as required for the production of the devices. Our agreement with Benchmark is automatically renewable for additional one-year terms unless terminated by either party.

We selected several VAMs to manufacture terminals for use with our Iridium Certus broadband service. Iridium Certus terminals are specifically designed for the maritime, aviation or land mobile markets, and certain of these VAMs were given limited exclusivity in those markets, in exchange for sales commitments.

We generally provide our distributors with a warranty on subscriber equipment for one to two years from the date of activation, depending on the product. We also utilize other suppliers, some of which are the sole source, to manufacture some of the component parts of our devices.

In addition to our principal products, we also offer a selection of accessories for our devices, including extended-life batteries, holsters, earbud headphones, portable auxiliary antennas, antenna adaptors, USB data cables and charging units, among others. We purchase these products from several third-party suppliers either pursuant to contractual agreements or off the shelf at market prices.

Our Spectrum

We hold licenses to use 8.725 MHz of contiguous spectrum in the L-Band, which operates at 1.6 GHz, and allows for two-way communication between our devices and our satellites. In addition, we are authorized to use 200 MHz of K-Band (23 GHz) spectrum for satellite-to-satellite communications, known as inter-satellite links, and 400 MHz of Ka-Band spectrum (19.4 GHz to 19.6 GHz and 29.1 GHz to 29.3 GHz) for two-way communication between our satellites and our ground stations, known as feeder links. We are also authorized to use the 156.0125-162.0375 MHz spectrum for reception of Automatic Identification System transmissions from maritime vessels and the 1087.7-1092.3 MHz spectrum for reception of Automatic Dependent Surveillance-Broadcast transmissions from aircraft. Access to this spectrum enables us to design satellites, network and terrestrial infrastructure enhancements cost effectively because each product and service can be deployed and sold worldwide. Our products and services are offered in over 100 countries, and we and our distributors continue to seek authorizations in additional countries.

Our use of spectrum is globally coordinated and recorded by, and subject to the frequency rules and regulations of, the International Telecommunication Union, or ITU. The ITU is the United Nations organization responsible for worldwide co-operation in the telecommunications sector. In order to protect satellite systems from harmful radio frequency interference from other satellite systems, the ITU maintains a Master International Frequency Register of radio frequency assignments. Each ITU administration is required to give notice of, coordinate and record its proposed use of radio frequency assignments with the ITU’s Radiocommunication Bureau. The coordination negotiations are conducted by the national administrations with the assistance of satellite operators. When the coordination process is completed, the ITU formally notifies all proposed users of frequencies and orbital locations in order to protect the recorded assignments from subsequent nonconforming or interfering uses by member states of the ITU. Only member states have full standing within this inter-governmental organization. Filings to the ITU were made on our behalf by the United States.

The ITU also controls the assignment of country codes used for placing telephone calls between different countries. Our network has been assigned the 8816 and 8817 country codes and uses these numbers for calling and communications between terminals.

Domestic and Foreign Revenue

We supply services and products to customers in a number of foreign countries. We allocate revenue geographically based on where we invoice our distributors, whom we bill for mobile satellite services and related equipment sales, and not according to the location of the end user. These distributors sell services directly or indirectly to end users, who may be located elsewhere. It is not possible for us to determine the geographical distribution of revenue from end users, as we do not contract directly with them. Substantially all of our revenue is invoiced in U.S. dollars. The table below sets forth the percentage of our revenue by country for the last three years.

	Year Ended December 31,		
	2019	2018	2017
United States	54%	53%	51%
Canada	9%	9%	10%
United Kingdom	9%	10%	10%
Other Countries (1)	28%	28%	29%

(1) No single country in this group represented more than 10% of our revenue for any of the periods indicated.

For more information about our revenue from sales to foreign and domestic customers, see Note 16 to our consolidated financial statements included in this annual report.

Traffic Originating Outside the United States

A significant portion of our voice and data traffic originates outside the United States. The table below sets forth the percentage of our commercial voice and data traffic originating outside the United States, excluding Iridium OpenPort and Iridium Certus broadband traffic, for the last three years.

	Year Ended December 31,		
	2019	2018	2017
Commercial voice traffic (minutes)	90%	90%	88%
Commercial data traffic (kilobytes)	71%	72%	75%

Our Network

Our satellite network has an architecture of 66 operational LEO satellites in six orbital planes of eleven vehicles each in nearly circular polar orbits, in addition to in-orbit spares and related ground infrastructure, as well as ground spares. We recently completed the process of replacing our first-generation constellation, which we refer to as the Iridium NEXT program. We deployed a total of 75 satellites on eight Falcon 9 rockets launched by Space Exploration Technologies Corp., or SpaceX, as part of this program. These replacement satellites support new services and higher data speeds for new products.

Our operational satellites orbit at an altitude of approximately 483 miles (778 kilometers) above the earth and travel at approximately 16,689 miles per hour, resulting in a complete orbit of the earth approximately every 100 minutes. The design of our constellation ensures that generally at least one satellite is visible to subscribers from any point on the earth's surface, covering all of the world's population. While our constellation offers true global coverage, most of our devices and antennas must have a direct line of sight to a satellite to transmit or receive a signal, and services on those devices are not available in locations where a satellite signal cannot be transmitted or received, which for some devices includes inside a building.

During 2017, we began de-orbiting our first-generation satellites on an individual basis after they were replaced by new satellites. We completed the required de-orbit initiation process for our first-generation satellites during 2019.

Our constellation is unique among commercial constellations in the usage of radio frequency crosslinks between our satellites, which eliminates the need for local ground infrastructure. These crosslinks enable each satellite to communicate with up to four other satellites in space, two in the same orbital plane and two in adjacent planes. Our traffic is routed on a preplanned route between satellites to a predetermined satellite that is in contact with one of the Iridium teleport network, or TPN, locations. The TPN sites then transmit and receive the traffic to and from the gateways, which in turn provide the interface to terrestrial-based networks such as the PSTN, a public land mobile network, or PLMN, and the internet. The use of a TPN allows grounding traffic at multiple locations within our ground network infrastructure. This and other design elements provide flexibility that allows for rapid reconfiguration of grounding traffic from the satellites in the event of a space, antenna or ground routing anomaly and results in greater reliability of our network. The design of our space and ground control system also facilitates the real-time monitoring and management of the satellite constellation and facilitates service upgrades via software enhancements. We also upgraded our ground infrastructure, including gateway and teleport technology and satellite control systems, in advance of the completion of the Iridium NEXT program.

We believe our interlinked satellite infrastructure provides several advantages over low-earth-orbiting “bent-pipe” satellite networks that rely on multiple terrestrial gateways, such as Globalstar’s and ORBCOMM’s networks. We have the only satellite network with true global coverage, and our constellation is less vulnerable to single points of failure, as traffic can be routed around any one satellite problem to complete the communications path to the ground. In addition, the small number of ground stations increases the security of our constellation, a factor that makes our network particularly attractive to government institutions and large enterprises. The low orbit of our constellation also allows our network to operate with low latency and with smaller antennas due to the proximity of our satellites to the earth.

Our constellation is designed to provide significant coverage overlap for mitigation of service gaps from individual satellite outages, particularly at higher northern and southern latitudes. Each satellite in our constellation was designed with a high degree of on-board subsystem robustness, an on-board fault detection system, and isolation and recovery capabilities for safe and quick risk mitigation. Our ability to reposition our satellites provides us with operating flexibility and enhances our ability to maintain a commercially acceptable level of service. If a satellite should fail or become unusable, in most cases we will be able to reposition one of our in-orbit spare satellites to take over its functions within days, with minimal impact on our services.

Our primary commercial gateway is located in Tempe, Arizona, with a second dedicated commercial gateway located in Russia. A gateway processes and terminates calls and generates and controls user information pertaining to registered users, such as geo-location and call detail records. The U.S. government owns and operates a dedicated gateway for U.S. government users, which provides an interface between voice and data devices and the Defense Information Systems Network and other terrestrial infrastructure, providing U.S. government users with secure communications capabilities. Our network has multiple antennas located at the TPN facilities, including the Tempe gateway, that communicate with our satellites and pass calls and data between the gateway and the satellites as the satellites pass above our antennas, thereby connecting signals from the terminals of end users to our gateways. This system, together with our satellite crosslinks, enables communications that are not dependent on a ground station in the region where the end user is using our services.

We operate our satellite constellation from our satellite network operations center, or SNOC, in Leesburg, Virginia. This facility manages the performance and status of each of our satellites, developing and distributing routing tables for use by the satellites, TPN facilities and gateways, directing traffic routing through the network and controlling the formation of coverage areas by the satellites’ main mission antennas. We also operate TPN facilities in Fairbanks, Alaska and Tempe, Arizona in the United States, in Svalbard, Norway, and in Punta Arenas, Chile, that perform telemetry, tracking and control functions and route commercial services.

From time to time, individual satellites in our constellation experience operating problems that may result in a satellite outage, but due to the overlapping coverage within our constellation and the dynamic nature of our LEO system, the individual satellite outages typically do not negatively affect our customers’ use of our system for a prolonged period. In addition, most system processing related to our service is performed using software on board each satellite instead of on the ground. We believe this provides us with significant flexibility and contributes to the longevity of the constellation by enabling engineers to develop additional functionality and software-based solutions to occasional faults and anomalies in the system.

We selectively replace parts for our gateway and TPN facilities as necessary and maintain an inventory of spare parts, which we continuously monitor. When we do not have necessary spares in inventory or our spares become obsolete, we rely on third parties to develop necessary parts.

We hold a space station license for the launch and operation of our constellation, which expires February 23, 2032. Our U.S. gateway earth station and the U.S. government customer and commercial subscriber earth station licenses expire between October 2021 and 2026. We must file renewal applications for earth station licenses between 30 and 90 days prior to expiration.

The Iridium constellation also hosts the Aireon system. The Aireon system was developed by Aireon LLC, which we formed in 2011, with subsequent investments from the ANSPs of Canada, Italy, the United Kingdom, Denmark and Ireland, to provide a global air traffic surveillance service through a series of ADS-B receivers on our satellites. Aireon has contracted to offer this service to our co-investors in Aireon, as well as other ANSPs, including the FAA. These ANSPs will use the service to provide improved air traffic control services over the oceans, as well as polar and remote regions. Aireon also plans to market the data to airlines and other users. Under our agreements with Aireon, Aireon will pay us fees of $200.0 million to host the ADS-B receivers on our satellites, of which they have paid us $54.1 million as of December 31, 2019, as well as power and data services fees of up to approximately $23.5 million per year in the aggregate for the delivery of the air traffic surveillance data over the Iridium system.

While the Aireon ADS-B receivers are the primary hosted payload on our satellites, we have also entered into an agreement with L3Harris for it to utilize the remaining space for payloads it has constructed for its customers. We expect this agreement to result in an additional $74.1 million in hosting and data service fees, all of which L3Harris has paid as of December 31, 2019.

We obtained in-orbit insurance covering losses from satellite failures for one year after launch with respect to our satellites, but all satellites have now been in orbit for more than one year. Following the expiration of those policies, we do not maintain and do not expect to obtain in-orbit insurance covering losses from satellite failures or other operational problems affecting our constellation.

Full Scale Development and Launch Services Agreements

In June 2010, we executed a primarily fixed price full scale development contract, or FSD, with Thales Alenia Space for the design and manufacture of satellites for the Iridium NEXT program. The total price under the FSD was approximately $2.3 billion. As of December 31, 2019, we had paid all amounts owed to Thales Alenia Space under this agreement, of which $1.5 billion were from borrowings under a $1.8 billion loan facility insured by Bpifrance Assurance Export S.A.A., or BPIAE, which we refer to as the BPIAE Facility. We used the BPIAE Facility to pay 85% of each invoice received from Thales Alenia Space under the FSD, with the remaining 15% funded from cash on hand until the BPIAE Facility was fully drawn. In November 2019, we prepaid the BPIAE Facility in full using the proceeds of a $1,450.0 million term loan, or Term Loan, along with our debt service reserve account, or DSRA, and cash on hand. See “Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations - Term Loan” for more information.

In March 2010, we entered into an agreement with SpaceX as the primary launch services provider for the Iridium NEXT program. The contract price under the SpaceX agreement was $448.9 million for seven launches. In November 2016, we entered into an additional agreement with SpaceX for an eighth Falcon 9 launch for a contract price of $61.9 million. Although we were the customer of record with SpaceX, we contracted separately with GFZ German Research Centre for Geosciences, or GFZ, for $29.8 million to share the launch of NASA’s two Gravity Recovery and Climate Experiment Follow-On satellites on a specially designed dispenser on the Falcon 9 rocket. All contracted launches with SpaceX were completed, and as of December 31, 2019, we had paid all amounts owed to SpaceX under these agreements and received the full $29.8 million from GFZ.

Aireon Holdings LLC Agreement

In November 2012, we, through our Iridium Satellite subsidiary, and Aireon entered into an Amended and Restated Limited Liability Company Agreement with NAV CANADA, the ANSP of Canada, and a wholly owned subsidiary of NAV CANADA. In February 2014, we entered into a Second Amended and Restated Limited Liability Company Agreement, or the Aireon LLC Agreement, with NAV CANADA; Enav S.p.A., the ANSP of Italy; Naviair, the ANSP of Denmark; Irish Aviation Authority Limited, the ANSP of Ireland, or IAA; and wholly owned subsidiaries of NAV CANADA, Enav and Naviair. In May 2018, we entered into a Third Amended and Restated Limited Liability Company Agreement, or the Aireon LLC Agreement, with NAV CANADA; Enav; NATS (Services) Limited, the ANSP of the United Kingdom; Naviair; IAA; and wholly owned subsidiaries of NAV CANADA, Enav, NATS, Naviair, and IAA. In December 2018, in connection with Aireon’s entry into a debt facility, we and the other Aireon investors contributed our interests in Aireon into a new holding company, Aireon Holdings LLC, and entered into an Amended and Restated Aireon Holdings LLC Agreement. Aireon Holdings holds 100% of the membership interests in Aireon LLC, which remains the operating entity.

Under the Aireon Holdings LLC Agreement, we hold a common membership interest, and the other investors hold preferred membership interests resulting from their investments in Aireon for an aggregate purchase price of approximately $339 million. If and when funds are available, Aireon Holdings is required to redeem a portion of our ownership interest for a payment of $120 million, following which NAV CANADA’s subsidiary will hold a 45% interest in Aireon Holdings, and the other ANSP subsidiaries will collectively hold a 33% interest, with Iridium retaining a 22% interest. Based on Aireon’s business plan and restrictions under Aireon’s debt facility, we do not expect this redemption of our ownership interest to occur before early 2022.

The Aireon Holdings LLC Agreement provides for Aireon Holdings to be managed by a board of directors consisting of 11 members. Currently, we may nominate two directors, NAV CANADA may nominate five directors, Enav and NATS may each nominate one director, and Naviair and IAA may together nominate one director. The chief executive officer of Aireon

Holdings serves as the eleventh director. The Aireon Holdings LLC Agreement also provides the minority-interest holders with several protective provisions.

Constellation De-Orbiting Obligations

We have certain de-orbit obligations under our FCC licenses. Specifically, pursuant to an orbital debris mitigation plan incorporated into our FCC satellite constellation license in 2002, we were required to lower each of our first-generation satellites to an orbit with a perigee of approximately 250 kilometers as it reached the end of its useful life and to coordinate these orbit-lowering maneuvers with the U.S. Combined Space Operations Center. In August 2014, we received a license modification from the FCC permitting us to operate up to ten of our first-generation satellites pursuant to the less stringent 25 year de-orbit standards for non-geostationary satellites that the FCC acknowledged in 2004 would serve the public interest and has been utilized for other satellite constellations since that time. All of our new satellites are subject to the less stringent 25 year de-orbit standard.

Our FCC license required us to de-orbit a first-generation satellite following its replacement with a new satellite and to notify the FCC within 30 days following removal of a first-generation satellite from its operational orbit for purposes of de-orbit. We began de-orbiting individual satellites as they were replaced with new satellites. We completed the required de-orbit initiation process for our first-generation satellites during 2019. We plan to de-orbit our new satellites pursuant to and within the 25 year de-orbit standard consistent with the FCC authorization of our new constellation.

Competition

The mobile satellite services industry is highly competitive but has significant barriers to entry, including the cost and difficulty associated with obtaining spectrum licenses and successfully building and launching a satellite network. In addition to cost, there is a significant amount of lead time associated with obtaining the required licenses, building and launching the satellite constellation, and deploying the ground network technology. We currently face substantial competition from other service providers that offer a range of mobile and fixed communications options. Currently, our principal mobile satellite services competitors are Inmarsat, Globalstar, ORBCOMM, and Thuraya Telecommunications Co., or Thuraya. We compete primarily on the basis of coverage, quality, mobility and pricing of services and products.

Inmarsat owns and operates a fleet of GEO satellites. Unlike LEO satellites, GEO satellites orbit the earth at approximately 22,300 miles above the equator. GEO systems require substantially larger and more expensive antennas, and typically have higher transmission delays than LEO systems. Due to its GEO system, Inmarsat's coverage area covers most bodies of water except for a majority of the polar regions. Inmarsat is the leading provider of satellite communications services to the maritime sector. Inmarsat also offers land-based and aviation communications services.

Globalstar owns and operates a fleet of LEO satellites. Globalstar's service is available only on a multi-regional basis as a result of its "bent pipe" architecture, which requires that voice and data transmissions be routed from satellites immediately to nearby ground stations. This design requires the use of multiple ground stations, which are impractical in extreme latitudes or over oceans.

ORBCOMM also provides commercial services using a fleet of LEO satellites. Like Globalstar, ORBCOMM's network also has a "bent pipe" architecture, which constrains its real-time coverage area. ORBCOMM's principal focus is low-cost data and IoT services, where it directly competes with our IoT offerings. Because a ground station may not be within view of a satellite, ORBCOMM's services may have a significant amount of latency, which may limit their use in some mission-critical applications. It does not offer voice service or high-speed data services.

We also compete with regional mobile satellite communications services in several geographic markets. In these cases, the majority of our competitors' customers require regional, not global, mobile voice and data services, so our competitors may present a viable alternative to our services. All of these regional competitors operate or plan to operate GEO satellites. Our regional mobile satellite services competitors currently include Thuraya, principally in Europe, the Middle East, Africa, Australia and several countries in Asia. In addition, there are a number of new entrants to the mobile satellite services industry, with varying constellation designs and business models, primarily providing commodity broadband services similar to existing GEO-based fixed satellite services operators. While their announced Ka and Ku-band operations and business plans are different from, and even complementary to, Iridium's L-band services, some may in the future provide services that compete with us.

While we view our services as largely complementary to terrestrial wireline and wireless communications networks, we also compete with them indirectly. We provide service in areas that are inadequately covered by these ground systems. To the extent that terrestrial communications companies invest in underdeveloped areas, we will face increased competition in those areas. We believe that local telephone companies currently are reluctant to invest in new switches, landlines and cellular towers to expand their networks in rural and remote areas due to high costs and limited usage. Many of the underdeveloped areas are sparsely populated, making it difficult to generate the necessary returns on the capital expenditures required to build terrestrial wireless networks in those areas. We believe that our solutions offer a cost-effective and reliable alternative to terrestrial-based wireline and wireless systems in these remote regions.

Research and Development

Our research and development efforts have focused on the development, design and testing of our new constellation and new products, such as Iridium Certus, Iridium Edge, Iridium PTT, Iridium Burst, Iridium GO!, transceiver modules and chipsets. We also develop product enhancements and new applications for our existing products. Our research and development expenses were $14.3 million, $22.4 million and $15.2 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Employees

As of December 31, 2019, we had 497 full-time employees and 15 part-time employees, none of whom are subject to any collective bargaining agreement. We consider our employee relations to be good.

Intellectual Property

At December 31, 2019, we held 27 U.S. patents. These patents cover several aspects of our satellite system, our global network, our communications services, and our devices.

In addition to our owned intellectual property, we also license critical intellectual property from Motorola Solutions to operate and maintain our network and related ground infrastructure and services as well as to design and manufacture our devices. This intellectual property is essential to our ability to continue to operate our constellation and sell our services and devices. We maintain our licenses with Motorola Solutions pursuant to several agreements, which can be terminated by Motorola Solutions upon the commencement by or against us of any bankruptcy proceeding or other specified liquidation proceedings or upon our material failure to perform or comply with any provision of the agreements. If Motorola Solutions were to terminate any such agreement, it may be difficult or, under certain circumstances, impossible to obtain the technology from alternative vendors. Motorola Solutions has assigned a portion of the patents covered by some of these licenses to one or more third parties.

We license additional intellectual property and technology from other third parties and expect to do so in the future in connection with our network and related ground infrastructure and services as well as our devices. If any such third party were to terminate its agreement with us or cease to support and service such intellectual property or technology, or if we are unable to renew such licenses on commercially reasonable terms or at all, it may be difficult, more expensive or impossible to obtain substitute intellectual property or technology from alternative vendors. Any substitute intellectual property or technology may also have lower quality or performance standards, which would adversely affect the quality of our devices and services. For more information, see “Risk Factors—We are dependent on intellectual property licensed from third parties to operate our constellation and sell our devices and for the enhancement of our existing devices and services.”

Available Information

Copies of our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments, if any, to those reports filed pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, are available free of charge through our website at www.iridium.com and on the website of the Securities and Exchange Commission, or SEC, at www.sec.gov. A request for any of these reports may also be submitted to us by writing: Investor Relations, Iridium Communications Inc., 1750 Tysons Boulevard, Suite 1400, McLean, VA 22102, or by calling our Investor Relations line at 703-287-7570.

Item 1A. Risk Factors

<u>Risks related to our satellites and network</u>

Our satellites may experience operational problems, which could affect our ability to provide an acceptable level of service to our customers.

From time to time, we experience temporary intermittent losses of signal cutting off calls in progress, preventing completions of calls when made or disrupting the transmission of data. If the magnitude or frequency of such problems increase and we are no longer able to provide a commercially acceptable level of service, our business and financial results and our reputation would be hurt and our ability to pursue our business plan would be compromised.

We may be required in the future to make changes to our constellation to maintain or improve its performance. Any such changes may require prior FCC approval, and the FCC may subject the approval to other conditions that could be unfavorable to our business. In addition, from time to time we may reposition our satellites within the constellation in order to optimize our service, which could result in degraded service during the repositioning period. Although we have some ability to remedy some types of problems affecting the performance of our satellites remotely from the ground, the physical repair of our satellites in space is not feasible.

Our products could fail to perform or could perform at reduced levels of service because of technological malfunctions or deficiencies, regulatory compliance issues, or events outside of our control, which would seriously harm our business and reputation.

Our products and services are subject to the risks inherent in a large-scale, complex telecommunications system employing advanced technology and heavily regulated by, among others, the FCC and similar authorities internationally. Any disruption to our satellites, services, information systems or telecommunications infrastructure, or regulatory compliance issues, could result in the inability or reduced ability of our customers to receive our services for an indeterminate period of time. These customers include government agencies conducting mission-critical work throughout the world, as well as consumers and businesses located in remote areas of the world and operating under harsh environmental conditions where traditional telecommunications services may not be readily available. Any disruption to our services or extended periods of reduced levels of service could cause us to lose customers or revenue, result in delays or cancellations of future implementations of our products and services, result in failure to attract customers, or result in litigation, customer service or repair work that would involve substantial costs and distract management from operating our business. The failure of any of the diverse elements of our system, including our satellites, our commercial gateway, our satellite teleport network facilities or our satellite network operations center, to function as required could render our system unable to perform at the quality and capacity levels required for success. Any system failures, repeated product failures or shortened product life, or extended reduced levels of service could reduce our sales, increase costs, or result in warranty or liability claims or litigation, cause us to extend our warranty period, and seriously harm our business.

We do not maintain in-orbit satellite insurance for our satellites, as a result of which we may be subject to increased costs.

We obtained insurance for our satellites covering launch and in-orbit failures of our satellites for a period of twelve months from the date of launch. All of our satellites were launched more than twelve months ago, and we have no plans to purchase further in-orbit insurance. As a result, a failure of one or more of our satellites, or the occurrence of equipment failures and other related problems, would constitute an uninsured loss and could harm our financial condition.

Our satellites have a limited life and may fail prematurely, which would cause our network to be compromised and materially and adversely affect our business, prospects and profitability.

We may experience in-orbit malfunctions of our satellites, which could adversely affect the reliability of their service or result in total failure of the satellite. In-orbit failure of a satellite may result from various causes, including component failure, loss of power or fuel, inability to control positioning of the satellite, solar or other astronomical events, including solar radiation and flares, and space debris. Other factors that could affect the useful lives of our satellites include the quality of construction, gradual degradation of solar panels and the durability of components. Radiation-induced failure of satellite components may result in damage to or loss of a satellite before the end of its expected life. Although we do not incur any direct cash costs related to the failure of a satellite, if a satellite fails, we record an impairment charge in our statement of operations to reduce the remaining net book value of that satellite to zero, and any such impairment charges could depress our net income for the period in which the failure occurs.

If we experience operational disruptions with respect to our commercial gateways or operations center, we may not be able to provide service to our customers.

Our commercial satellite network traffic is supported by gateways in Tempe, Arizona, and Izhevsk, Russia, for traffic within Russian boundaries, and we operate our satellite constellation from our satellite network operations center in Leesburg, Virginia. Currently, we do not have a backup facility for our primary gateway in Arizona, and our facilities are subject to the risk of significant malfunctions or catastrophic loss due to unanticipated events and would be difficult to replace or repair and could require substantial lead-time to do so. Material changes in the operation of these facilities may be subject to prior FCC approval, and the FCC might not give such approval or may subject the approval to other conditions that could be unfavorable to our business. Our gateways and operations center may also experience service shutdowns or periods of reduced service in the future as a result of equipment failures, delays in deliveries or regulatory issues. Any such failure would impede our ability to provide service to our customers.

Our customized hardware and software may be difficult and expensive to service, upgrade or replace.

Some of the hardware and software we use in operating our gateways is significantly customized and tailored to meet our requirements and specifications and could be difficult and expensive to service, upgrade or replace. Although we maintain inventories of some spare parts, it nonetheless may be difficult, expensive or impossible to obtain replacement parts for the hardware due to a limited number of those parts being manufactured to our requirements and specifications. In addition, our business plan contemplates updating or replacing some of the hardware and software in our network as technology advances, but the complexity of our requirements and specifications may present us with technical and operational challenges that complicate or otherwise make it expensive or infeasible to carry out such upgrades and replacements. If we are not able to suitably service, upgrade or replace our equipment, our ability to provide our services and therefore to generate revenue could be harmed.

Rapid and significant technological changes in the satellite communications industry may impair our competitive position and require us to make significant additional capital expenditures.

The satellite communications industry is subject to rapid advances and innovations in technology. We may face competition in the future from companies using new technologies and new satellite systems. New technology could render our system obsolete or less competitive by satisfying customer demand in more attractive ways or through the introduction of incompatible standards. Particular technological developments that could adversely affect us include the deployment by our competitors of new satellites with greater power, flexibility, efficiency or capabilities than ours, as well as continuing improvements in terrestrial wireless technologies. For us to keep up with technological changes and remain competitive, we may need to make significant capital expenditures, including capital to design and launch new products and services. Customer acceptance of the products and services that we offer will continually be affected by technology-based differences in our product and service offerings compared to those of our competitors. New technologies may also be protected by patents or other intellectual property laws and therefore may not be available to us. Any failure on our part to implement new technology within our system may compromise our ability to compete.

Our networks and those of our third-party service providers may be vulnerable to security risks.

We expect the secure transmission of confidential information over public networks to continue to be a critical element of our ability to compete for business, manage our risks, and protect our customers and our reputation. Our network and those of our third-party service providers and our customers may be vulnerable to unauthorized access, computer attacks, viruses and other security problems. Persons who circumvent security measures could wrongfully access and obtain or use information on our network or cause service interruptions, delays or malfunctions in our devices, services or operations, any of which could harm our reputation, cause demand for our products and services to fall, and compromise our ability to pursue our business plans. Recently, there have been reported a number of significant, widespread security attacks and breaches that have compromised network integrity for many companies and governmental agencies, in some cases reportedly originating from outside the United States. In addition, there are reportedly private products available in the market today which may attempt to unlawfully intercept communications made using our network. We may be required to expend significant resources to respond to, contain, remediate, and protect against these attacks and threats, including compliance with applicable data breach and security laws and regulations, and to alleviate problems, including reputational harm and litigation, caused by these security incidents. In addition, in the event of such a security incident, our customer contracts may not adequately protect us against liability to third parties with whom our customers conduct business. Although we have implemented and intend to continue to implement security measures, these measures may prove to be inadequate. These security incidents could have a significant effect on our systems, devices and services, including system failures and delays that could limit network availability, which could harm our business and our reputation and result in substantial liability.

Our satellites may collide with space debris or another spacecraft, which could adversely affect the performance of our constellation.

In February 2009, we lost an operational satellite as a result of a collision with a non-operational Russian satellite. Although we have some ability to actively maneuver our satellites to avoid potential collisions with space debris or other spacecraft, this ability is limited by, among other factors, uncertainties and inaccuracies in the projected orbit location of and predicted conjunctions with debris objects tracked and cataloged by the U.S. government. Additionally, some space debris is too small to be tracked and therefore its orbital location is completely unknown; nevertheless, this debris is still large enough to potentially cause severe damage or a failure of our satellites should a collision occur. If our constellation experiences additional satellite collisions with space debris or other spacecraft, our service could be impaired.

The space debris created by the February 2009 satellite collision may cause damage to other spacecraft positioned in a similar orbital altitude.

The 2009 collision of one of our satellites with a non-operational Russian satellite created a space debris field concentrated in the orbital altitude where the collision occurred, and thus increased the risk of space debris damaging or interfering with the operation of our satellites, which travel in this orbital altitude, as well as satellites owned by third parties, such as U.S. or foreign governments or agencies and other satellite operators. Although there are tools used by us and providers of tracking services, such as the U.S. Combined Space Operations Center, to detect, track and identify space debris, we or third parties may not be able to maneuver the satellites away from such debris in a timely manner. Any such collision could potentially expose us to significant losses and liability if we were found to be at fault.

Risks related to our business operations

Our business plan depends on increased demand for mobile satellite services, among other factors.

Our business plan is predicated on growth in demand for mobile satellite services. Demand for mobile satellite services may not grow, or may even contract, either generally or in particular geographic markets, for particular types of services or during particular time periods. A lack of demand could impair our ability to sell products and services, develop and successfully market new products and services and could exert downward pressure on prices. Any decline in prices would decrease our revenue and profitability and negatively affect our ability to generate cash to pay down our debt or for capital expenditures, investments and other working capital needs.

Our ability to successfully implement our business plan will also depend on a number of other factors, including:

- our ability to maintain the health, capacity and control of our satellite constellation;
- the level of market acceptance and demand for our products and services;
- our ability to introduce innovative new products and services that satisfy market demand;
- our ability to expand our business using our existing spectrum resources both in the United States and internationally;
- our ability to sell our products and services in additional countries;
- our ability to comply with all applicable regulatory requirements both in the United States and internationally;
- our ability to maintain our relationship with U.S. government customers, particularly the Department of Defense;
- the ability of our distributors to market and distribute our products, services and applications effectively and their continued development of innovative and improved solutions and applications for our products and services;
- the effectiveness of our competitors in developing and offering similar services and products; and
- our ability to maintain competitive prices for our products and services and to control our costs.

Our agreements with U.S. government customers, particularly the Department of Defense, which represent a significant portion of our revenue, are subject to termination.

The U.S. government, through a dedicated gateway owned and operated by the Department of Defense, has been and continues to be, directly and indirectly, our largest customer, representing 22% and 20% of our revenue for the years ended December 31, 2019 and 2018, respectively. We provide the majority of our services to the U.S. government pursuant to our GMSS and EMSS contracts. We entered into these contracts in April 2019 and September 2019, respectively. The GMSS contract provides for a six-month base term and up to four one-year options exercisable at the election of the U.S. government, one of which has been exercised so far, and the EMSS contract provides for a seven-year term. The U.S. government may terminate these agreements, in whole or in part, at any time for its convenience. Our relationship with the U.S. government is also subject to the overall U.S. government budget and appropriation decisions and processes. U.S. government budget decisions, including with respect to defense spending, are based on changing government priorities and objectives, which are driven by numerous factors, including geopolitical events and macroeconomic conditions, and are beyond our control. If the U.S. government terminates either of these agreements, we would lose a significant portion of our revenue.

We are dependent on intellectual property licensed from third parties to operate our constellation and sell our devices and for the enhancement of our existing devices and services.

We license critical intellectual property and technology to operate and maintain our network and related ground infrastructure and services as well as to design, manufacture, and sell our devices. This intellectual property and technology is essential to our ability to continue to operate our constellation and sell our services and devices. In addition, we are dependent on third parties to develop enhancements to our current products and services even in circumstances where we own the intellectual property. If any third-party owner of such intellectual property or technology were to terminate any license agreement with us or cease to support and service such intellectual property or technology or perform development on our behalf, or if we are unable to renew such licenses on commercially reasonable terms or at all, it may be difficult, more expensive or impossible to obtain such intellectual property, technology, or services from alternative vendors. Any substitute intellectual property or technology may also be costly to develop and integrate, or could have lower quality or performance standards, which would adversely affect the quality of our devices and services. In connection with the development of new devices and services, we may be required to obtain additional intellectual property rights from third parties. We can offer no assurance that we will be able to obtain such intellectual property rights on commercially reasonable terms or at all. If we are unable to obtain such intellectual property rights on commercially reasonable terms, we may not be able to develop some new devices and services.

Our failure to effectively manage the expansion of our portfolio of products and services could impede our ability to execute our business plan, and we may experience increased costs or disruption in our operations.

In order to achieve the substantial future revenue growth we have projected, we must develop and market new products and services, such as Iridium Certus. We currently face a variety of challenges, including maintaining the infrastructure and systems necessary for us to manage the growth of our business. As our product and service portfolio continues to expand, the responsibilities of our management team and demands on other company resources also increase. Consequently, we may further strain our management and other company resources with the increased complexities and administrative burdens associated with a larger, more complex portfolio of products and services. For example, we have in the past experienced quality issues and incorrect market assessments in connection with the introduction of new products and services, and we may experience such issues in the future. Our failure to meet these challenges as a result of insufficient management or other resources could significantly impede our ability to execute our business plan, which relies in part on our ability to leverage our largely fixed-cost infrastructure. To properly manage our growth, we may need to hire and retain additional personnel, upgrade our existing operational management and financial and reporting systems, and improve our business processes and controls. Failure to effectively manage the expansion of our portfolio of products and services in a cost-effective manner could result in declines in product and service quality and customer satisfaction, disruption of our operations, or increased costs, any of which would reduce our ability to increase our profitability.

We could lose market share and revenue as a result of increasing competition from companies in the wireless communications industry, including cellular and other satellite operators, and from the extension of land-based communications services.

We face intense competition in all of our markets, which could result in a loss of customers and lower revenue and make it more difficult for us to enter new markets. We compete primarily on the basis of coverage, quality, portability, and pricing of services and products.

The provision of satellite-based services and products is subject to downward price pressure when capacity exceeds demand or as a result of aggressive discounting by some operators under financial pressure to expand their respective market share. In addition, we may face competition from new competitors, new technologies or new equipment, including proposed new LEO constellations. For example, we may face competition for our land-based services in the United States from incipient ancillary terrestrial component, or ATC, service providers who are designing a satellite operating business and a terrestrial component around their spectrum holdings. In addition, some of our competitors have announced plans for the launch of additional satellites. As a result of competition, we may not be able to successfully retain our existing customers and attract new customers.

In addition to our satellite-based competitors, terrestrial voice and data service providers, both wireline and wireless, could further expand into rural and remote areas and provide the same general types of services and products that we provide through our satellite-based system. Although satellite communications services and terrestrial communications services are not perfect substitutes, the two compete in some markets and for some services. Consumers generally perceive terrestrial wireless voice communication products and services as cheaper and more convenient than those that are satellite-based. Many of our terrestrial competitors have greater resources, wider name recognition and newer technologies than we do. In addition, industry consolidation could hurt us by increasing the scale or scope of our competitors, thereby making it more difficult for us to compete.

We are dependent on third parties to market and sell our products and services.

We select third-party distributors, in some cases on an exclusive basis, and rely on them to market and sell our products and services to end users and to determine the prices end users pay. We also depend on our distributors to develop innovative and improved solutions and applications integrating our product and service offerings. As a result of these arrangements, we are dependent on the performance of our distributors to generate most of our revenue. Our distributors operate independently of us, and we have limited control over their operations, which exposes us to significant risks. Distributors may not commit the necessary resources to market and sell our products and services and may also market and sell competitive products and services. In addition, our distributors may not comply with the laws and regulatory requirements in their local jurisdictions, which could limit their ability to market or sell our products and services. If our distributors develop faulty or poorly performing products using our technology or services, we may be subject to claims, and our reputation could be harmed. If current or future distributors do not perform adequately, or if we are unable to locate competent distributors in particular countries and secure their services on favorable terms, we may be unable to increase or maintain our revenue in these markets or enter new markets, we may not realize our expected growth, and our brand image and reputation could be hurt.

In addition, we may lose distributors due to competition, consolidation, regulatory developments, business developments affecting our distributors or their customers, or for other reasons. In 2009, one of our largest competitors, Inmarsat, acquired our then largest distributor, Stratos Global Wireless, Inc., and in January 2014, Inmarsat acquired Globe Wireless, one of our service providers. Following each acquisition, Inmarsat essentially stopped promoting sales of our products and services, and they may further reduce their efforts in the future. Any future consolidation of our distributors would further increase our reliance on a few key distributors of our services and the amount of volume discounts that we may have to give those distributors. Our two largest distributors, Applied Satellite Technology LTD and Marlink Group, represented approximately 10% of our revenue for the year ended December 31, 2019, and our ten largest distributors represented, in the aggregate, 31% of our revenue for the year ended December 31, 2019. The loss of any of these distributors, or a decrease in the level of effort expended by any of them to promote our products and services, could reduce the distribution of our products and services as well as the development of new products and applications.

We rely on a limited number of key vendors for supply of equipment and services.

We currently rely on two manufacturers of our devices, including our mobile handsets, L-Band transceivers, SBD devices and Iridium Pilot terminals. We also utilize sole source suppliers for some of the component parts of our devices. If any of our suppliers were to terminate its relationship with us, we may not be able to find a replacement supplier in a timely manner, at an acceptable price or at all.

Our manufacturers and suppliers may become capacity-constrained as a result of a surge in demand, a natural disaster or other event, or one or more component suppliers may decide to cease production of various components of our products, resulting in a shortage or interruption in supplies or an inability to meet increased demand. Although we may be able to replace sole source suppliers, there could be a substantial period of time in which our products would not be available; any new relationship may involve higher costs and delays in development and delivery, and we may encounter technical challenges in successfully replicating the manufacturing processes. If our manufacturers or suppliers terminate their relationships with us, fail to provide equipment or services to us on a timely basis, or fail to meet our performance expectations, we may be unable to provide products or services to our customers in a competitive manner, which could in turn negatively affect our financial results and our reputation.

In November 2016, we entered into a development services contract with Boeing, which will dedicate key Boeing personnel to continue the design and growth required for bringing new services and capabilities to our network. Technological competence is critical to our business and depends, to a significant degree, on the work of technically skilled personnel, such as these Boeing contractors. If Boeing's performance falls below expected levels or if Boeing has difficulties retaining the personnel servicing our network development, the development of new products and services could be compromised. In addition, if Boeing terminates its agreement with us, we may not be able to find a replacement provider on favorable terms or at all, which could impair our operations and performance.

Conducting and expanding our operations outside the United States creates numerous risks, which may harm our operations and compromise our ability to expand our international operations.

We have significant operations outside the United States. We estimate that commercial data traffic originating outside the United States, excluding our Iridium OpenPort broadband data service traffic, accounted for 71% and 72% of total commercial data traffic for the years ended December 31, 2019 and 2018, respectively, while commercial voice traffic originating outside the United States, excluding Iridium OpenPort traffic, accounted for 90% of total commercial voice traffic for the years ended December 31, 2019 and 2018. We cannot provide the precise geographical distribution of revenue from end users because we do not contract directly with them. Instead, we determine the country in which we earn our revenue based on where we invoice our distributors. These distributors sell services directly or indirectly to end users, who may be located or use our products and services elsewhere. We and our distributors are also seeking authorization to sell our services in additional countries.

Conducting operations outside the United States involves numerous risks and, while expanding our international operations would advance our growth, it would also increase our exposure to these risks. For example, in 2013 we commenced the provision of satellite communications services in Russia through a local subsidiary and its authorized Russian service providers and subsequently constructed a dedicated gateway in Russia. The U.S. government has imposed economic and diplomatic sanctions on certain Russian corporations, banks, and citizens and might impose additional sanctions in the future. If such sanctions, or any Russian response to such sanctions, affects our operations in Russia, it could limit our growth in Russia or prevent us from continuing to operate there at all, which would reduce our revenues.

Other risks associated with the proposed expansion of our international operations include:

- difficulties in penetrating new markets due to established and entrenched competitors;
- difficulties in developing products and services that are tailored to the needs of local customers;
- lack of local acceptance or knowledge of our products and services;
- lack of recognition of our products and services;
- unavailability of, or difficulties in establishing, relationships with distributors;
- significant investments, including the development and deployment of dedicated gateways, as some countries require physical gateways within their jurisdiction to connect the traffic coming to and from their territory;
- instability of international economies and governments;
- changes in laws and policies affecting trade and investment in other jurisdictions, including the United Kingdom's exit from the European Union;
- exposure to varying legal standards, including data privacy, security and intellectual property protection in other jurisdictions;
- difficulties in obtaining required regulatory authorizations;
- difficulties in enforcing legal rights in other jurisdictions;
- local domestic ownership requirements;

- requirements that operational activities be performed in-country;
- changing and conflicting national and local regulatory requirements;
- foreign currency exchange rates and exchange controls; and
- ongoing compliance with the U.S. Foreign Corrupt Practices Act, U.S. export controls, anti-money laundering and trade sanction laws, and similar anti-corruption and international trade laws in other countries.

If any of these risks were to materialize, it could affect our ability to successfully compete and expand internationally.
Government organizations, foreign military and intelligence agencies, natural disaster aid associations, and event-driven response agencies use our commercial voice and data satellite communications services. Accordingly, we may experience reductions in usage due to changing global circumstances.

The prices for our products and services are typically denominated in U.S. dollars. Any appreciation of the U.S. dollar against other currencies will increase the cost of our products and services to our international customers and, as a result, may reduce the competitiveness of our international offerings and make it more difficult for us to grow internationally. Conversely, in some locations, primarily Russia, we conduct business in the local currency, and a depreciation of the local currency against the U.S. dollar will reduce the U.S. dollar value of our revenues from those countries. In recent years, Russia has experienced significant currency depreciation against the U.S. dollar.

Pursuing strategic transactions may cause us to incur additional risks.

We may pursue acquisitions, joint ventures or other strategic transactions from time to time. We may face costs and risks arising from any such transactions, including integrating a new business into our business or managing a joint venture. These risks may include adverse legal, organizational and financial consequences, loss of key customers and distributors, and diversion of management's time.

In addition, any major business combination or similar strategic transaction may require significant additional financing, and our ability to obtain such financing may be restricted by the credit agreement governing our currently outstanding Term Loan. Further, depending on market conditions, investor perceptions of our company and other factors, we might not be able to obtain financing on acceptable terms, in acceptable amounts, or at appropriate times to implement any such transaction. Any such financing, if obtained, may dilute existing stockholders.

Spectrum values historically have been volatile, which could cause the value of our business to fluctuate.

Our business plan is evolving, and it may in the future include forming strategic partnerships to maximize value for our spectrum, network assets and combined service offerings in the United States and internationally. Values that we may be able to realize from such partnerships will depend in part on the value placed on our spectrum authorizations. Valuations of spectrum in other frequency bands historically have been volatile, and we cannot predict at what amount a future partner may be willing to value our spectrum and other assets. In addition, to the extent that the FCC takes action that makes additional spectrum available or promotes the more flexible use or greater availability of existing satellite or terrestrial spectrum allocations, for example by means of spectrum leasing or new spectrum sales, the availability of such additional spectrum could reduce the value of our spectrum authorizations and, as a result, the value of our business.

We may be negatively affected by global economic conditions.

Our operations and performance depend significantly on worldwide economic conditions. Uncertainty about global economic conditions poses a risk as individual consumers, businesses and governments may postpone spending in response to tighter credit, negative financial news, declines in income or asset values, or budgetary constraints. Reduced demand would cause a decline in our revenue and make it more difficult for us to operate profitably, potentially compromising our ability to pursue our business plan. While we expect the number of our subscribers and revenue to continue to grow, we expect the future growth rate will be slower than our historical growth and may not continue in every quarter of every year. We expect our future growth rate will be affected by the condition of the global economy, increased competition, maturation of the satellite communications industry, and the difficulty in sustaining high growth rates as we increase in size. Any substantial appreciation of the U.S. dollar may also negatively affect our growth by increasing the cost of our products and services in foreign countries.

Our ability to operate our company effectively could be impaired if we lose members of our senior management team or key technical personnel.

We depend on the continued service of key managerial and technical personnel and personnel with security clearances, as well as our ability to continue to attract and retain highly qualified personnel. We compete for such personnel with other companies, government entities, academic institutions and other organizations. The unexpected loss or interruption of the services of such personnel could compromise our ability to effectively manage our operations, execute our business plan and meet our strategic objectives.

Risks related to our capital structure

We have a considerable amount of debt which may limit our ability to fulfill our obligations and/or to obtain additional financing.

As of December 31, 2019, we had $1,810.0 million of consolidated gross indebtedness on an actual basis, consisting of $1,450.0 million of indebtedness outstanding under our Term Loan and $360.0 million of indebtedness outstanding under our senior unsecured notes, or the Notes. In February 2020, we borrowed an additional $200.0 million under the Term Loan and redeemed the Notes in full.

Our capital structure and reliance on indebtedness can have several important consequences, including, but not limited to, the following:

- If future cash flows are insufficient, we may not be able to make principal or interest payments on our debt obligations, which could result in the occurrence of an event of default under one or more of those debt instruments.

- Our leverage level could increase our vulnerability to adverse economic and industry conditions.

- Our indebtedness requires us to dedicate a substantial portion of our cash flow from operations to payments on our debt, thereby reducing the availability of our cash flow for operations and other purposes.

- Our leverage level could make it more difficult for us to satisfy our obligations to our lenders, resulting in possible defaults on and acceleration of such indebtedness.

- Our leverage level could place us at a competitive disadvantage compared to any competitors that have less debt or comparable debt at more favorable interest rates and that, as a result, may be better positioned to withstand economic downturns.

- Our consolidated indebtedness has the general effect of reducing our flexibility to react to changing business and economic conditions insofar as they affect our financial condition. The interest rates at which we might secure additional financings may be higher than our currently outstanding debt instruments or higher than forecasted at any point in time, which could adversely affect our business, financial condition, results of operations and cash flows.

- Market conditions could affect our access to capital markets, restrict our ability to secure financing to make planned capital expenditures and investments and pay other expenses, which could adversely affect our business, financial condition, cash flows and results of operations.

Further, despite our substantial levels of indebtedness, we and our subsidiaries have the ability to incur substantially more indebtedness, which could further intensify the risks described above.

If we do not generate sufficient cash flows, we may be unable to service all of our indebtedness.

To service our indebtedness, we will require a significant amount of cash. Our ability to generate cash, make scheduled payments or to refinance our debt obligations depends on our successful financial and operating performance, which may be affected by a range of economic, competitive and business factors, many of which are outside of our control and some of which are described elsewhere in the “Risk Factors” section of this Form 10-K.

If our cash flows and capital resources are insufficient to fund our debt service obligations, or to repay the Term Loan when it matures, we may have to undertake alternative financing plans, such as refinancing or restructuring our debt, selling assets or operations, reducing or delaying capital investments, or seeking to raise additional capital. We may not be able to refinance our debt, or any refinancing of our debt could be at higher interest rates and may require us to comply with more restrictive covenants that could further restrict our business operations. Our ability to implement successfully any such alternative financing plans will depend on a range of factors, including general economic conditions, the level of activity in capital markets generally, and the terms of our various debt instruments then in effect.

The credit agreement governing our Term Loan contains cross-default or cross-acceleration provisions that may cause all of the debt issued under that instrument to become immediately due and payable because of a default under an unrelated debt instrument.

Our failure to comply with the obligations contained in the credit agreement governing our Term Loan or other current or future instruments of indebtedness could result in an event of default under the applicable instrument, which could result in the related debt and the debt issued under other instruments (together with accrued and unpaid interest and other fees) becoming immediately due and payable. In such event, we would need to raise funds from alternative sources, which funds may not be available to us on favorable terms, on a timely basis, or at all. Alternatively, such a default could require us to sell our assets and otherwise curtail our operations in order to pay our creditors. These alternative measures could have a material adverse effect on our business, financial position, results of operations and/or cash flows, which could cause us to become bankrupt or insolvent or otherwise impair our ability to make payments in respect of our indebtedness.

Adverse changes in our credit ratings or withdrawal of the ratings assigned to our debt securities by rating agencies may negatively affect us.

Our ability to access capital markets is important to our ability to operate our business. Increased scrutiny of the satellite industry and the impact of regulation, as well as changes in our financial performance and unfavorable conditions in the capital markets could result in credit agencies reexamining our credit ratings. A downgrade in our credit ratings could restrict or discontinue our ability to access capital markets at attractive rates and increase our borrowing costs. Furthermore, any rating assigned could be lowered or withdrawn entirely by a rating agency if, in that rating agency’s judgment, future circumstances relating to the basis of the rating, such as adverse changes, so warrant. Any future lowering of our ratings likely would make it more difficult or more expensive for us to obtain additional debt financing.

If we default under the Term Loan, the lenders may require immediate repayment in full of amounts borrowed or foreclose on our assets.

The credit agreement governing our Term Loan contains events of default, including cross-default with other indebtedness, bankruptcy, and a change in control (as defined in the credit agreement). If we experience an event of default, the lenders may require repayment in full of all principal and interest outstanding under the Term Loan. If we fail to repay such amounts, the lenders may foreclose on the assets we have pledged under the Term Loan, which includes substantially all of the assets of our domestic subsidiaries, including our principal operating subsidiary, Iridium Satellite.

Certain provisions in the credit agreement governing our Term Loan limit our financial and operating flexibility.

The credit agreement governing our Term Loan contains covenants that place restrictions on, among other things, our ability to:

- incur liens,
- engage in mergers or asset sales,
- pay dividends,
- repay subordinated indebtedness,
- incur indebtedness,
- make investments and loans, and
- engage in other transactions as specified in the credit agreement.

While the credit agreement provides for exceptions, complying with these restrictions may make it more difficult for us to successfully execute our business plan and compete against companies who are not subject to such restrictions.

The LIBOR calculation method may change, and LIBOR is expected to be phased out after 2021.

Our Term Loan bears interest at a rate based on the London Interbank Offered Rate, or LIBOR. On July 27, 2017, the U.K. Financial Conduct Authority, or the FCA, announced that it will no longer require banks to submit rates for the calculation of LIBOR after 2021. In the meantime, actions by the FCA, other regulators, or law enforcement agencies may result in changes to the method by which LIBOR is calculated. If changes to LIBOR result in an increase in rates, our interest expense under the Term Loan would increase. Further, if LIBOR is no longer available, our Term Loan provides a process to determine a substitute rate, and if such substitute rate is higher than LIBOR, our interest expense under the Term Loan would increase.

The market price of our common stock may be volatile.

The trading price of our common stock may be subject to substantial fluctuations. Factors affecting the trading price of our common stock may include:

- failure in the performance of our satellites;
- actual or anticipated variations in our operating results, including termination or expiration of one or more of our key contracts, or a change in sales levels under one or more of our key contracts;
- failure of Aireon to successfully carry out its business plan;
- failure to comply with the terms of the credit agreement governing our Term Loan;
- sales of a large number of shares of our common stock or the perception that such sales may occur;
- the dilutive effect of outstanding stock options and other equity awards;
- changes in financial estimates by industry analysts, or our failure to meet or exceed any such estimates, or changes in the recommendations of any industry analysts that elect to follow our common stock or the common stock of our competitors;
- impairment of intangible assets;
- actual or anticipated changes in economic, political or market conditions, such as recessions or international currency fluctuations;
- actual or anticipated changes in the regulatory environment affecting our industry;
- changes in the market valuations of our competitors;
- low trading volume; and
- announcements by our competitors regarding significant new products or services or significant acquisitions, strategic partnerships, divestitures, joint ventures or other strategic initiatives.

The trading price of our common stock might also decline in reaction to events that affect other companies in our industry even if these events do not directly affect us. If our stock, the market for other stocks in our industry, or the stock market in general experiences a loss of investor confidence, the trading price of our common stock could decline for reasons unrelated to our business, financial condition or results of operations.

We may not pay dividends on our common stock in the foreseeable future.

We do not currently pay cash dividends on our common stock, and we may elect to retain all cash we generate to fund the growth of our business, fund acquisitions, pay down our existing debt, or for other purposes. Accordingly, we may not pay dividends on our common stock in the foreseeable future.

Risks related to legal and regulatory matters

Our business is subject to extensive government regulation, which mandates how we may operate our business and may increase our cost of providing services and slow our expansion into new markets.

Our ownership and operation of a satellite communications system and the sale of products that operate on that system are subject to significant regulation in the United States, including by the FCC, the U.S. Department of Commerce and others, and in foreign jurisdictions by similar local authorities. The rules and regulations of these U.S. and foreign authorities may change, and such authorities may adopt regulations that limit or restrict our operations as presently conducted or currently contemplated. Such authorities may also make changes in the licenses of our competitors that affect our spectrum. Such changes may significantly affect our business. Further, because regulations in each country are different, we may not be aware if some of our distribution partners or persons with whom we or they do business do not hold the requisite licenses and approvals. Our failure to provide services in accordance with the terms of our licenses or our failure to operate our satellites or ground stations as required by our licenses and applicable laws and government regulations could result in the imposition of government sanctions on us, including the suspension or cancellation of our licenses. Our failure or delay in obtaining the approvals required to operate in other countries would limit or delay our ability to expand our operations into those countries. Our failure to obtain industry-standard or government-required certifications for our products could compromise our ability to generate revenue and conduct our business in other countries. Any imposition of sanctions, loss of license or failure to obtain the authorizations necessary to use our assigned radio frequency spectrum and to distribute our products in the United States or foreign jurisdictions could cause us to lose sales, hurt our reputation and impair our ability to pursue our business plan.

In addition, one of our subsidiaries, Iridium Carrier Services LLC, holds a common carrier radio license and is thus subject to regulation as a common carrier, including limitations and prior approval requirements with respect to direct or indirect foreign ownership. A change in the manner in which we provide service, or a failure to comply with any common carrier regulations that apply to us or to pay required fees, could result in sanctions including fines, loss of authorizations, or the denial of applications for new authorizations or the renewal of existing authorizations.

Use by our competitors of L-band spectrum for terrestrial services could interfere with our services.

In February 2003, the FCC adopted ATC rules that permit satellite service providers to establish terrestrial wireless networks in previously satellite-only bands, subject to certain requirements intended to ensure that terrestrial services remain ancillary to primary satellite operations. In 2011, Ligado Networks (then known as Lightsquared) was granted a waiver at the FCC to convert Ligado Network’s L-band satellite spectrum to terrestrial use including a 10 MHz band close to the spectrum that we use for all of our services. That waiver was subsequently suspended in 2012 due to concerns about potential interference to GPS operations. Ligado Networks sought another waiver in 2015 to modify the ATC of its L-band mobile satellite service network with a new proposal to address GPS industry concerns. We oppose this waiver out of concern for the interference that Ligado Network’s proposed operations would cause to our operations in the L-band.

The implementation of ATC services by satellite service providers in the United States or other countries may result in terrestrial use of L-band spectrum in the 1.6 GHz band, which we use to provide our services, and such implementation may make it difficult for us to utilize the spectrum resources we require for our existing and future services. In addition, the FCC’s decision to permit ATC services was based on assumptions relating to the level of interference that the provision of ATC services would likely cause to other satellite service providers that use the L-band spectrum. If the FCC’s assumptions prove inaccurate, or the level of ATC services provided exceeds those estimated by the FCC, such as the proposed use by Ligado Networks, ATC services could substantially interfere with our satellites and devices, which would adversely affect our services. Outside the United States, other countries have implemented, or are considering implementing, regulations to facilitate ATC-like services.

If the FCC revokes, modifies or fails to renew our licenses, or fails to grant a new license or modification, our ability to operate will be harmed or eliminated.

We hold FCC licenses, specifically a license for our satellite constellation, licenses for our U.S. gateway and other ground facilities, and blanket earth station licenses for U.S. government customers and commercial subscribers, that are subject to revocation if we fail to satisfy specified conditions. The FCC licenses are also subject to modification by the FCC. Our satellite constellation license expires on February 23, 2032. Our U.S. gateway earth station and the U.S. government customer and commercial subscriber earth station licenses expire between October 2021 and 2026. There can be no assurance that the FCC will renew the FCC licenses we hold or grant new ones or modifications. If the FCC revokes, modifies or fails to renew the FCC licenses we hold, or fails to grant a new license or modification, or if we fail to satisfy any of the conditions of our respective FCC licenses, we may not be able to continue to provide mobile satellite communications services.

As we and our distributors expand our offerings to include more consumer-oriented devices, we are more likely to be subject to product liability claims, recalls or litigation, which could adversely affect our business and financial performance.

Through our distributors, we offer several devices and services aimed at individual consumers, and we and our distributors continue to introduce additional devices and services. These devices and services, such as satellite handsets, personal locator devices and location-based services, can contain design and manufacturing defects. Defects may also occur in components and devices that we purchase from third parties. There can be no assurance we will be able to detect and fix all defects in the hardware, software and services that we sell. These devices and services may be used in isolated and dangerous locations, including emergency response situations, and users who suffer property damage, personal injury or death while using such devices or services may seek to assert claims or bring lawsuits against us. Further, it is possible that our devices could become the subject of consumer protection investigations, enforcement actions, or litigation, including class actions. We seek to limit our exposure to all of these claims by maintaining a consumer protection compliance program, and through appropriate notices, disclosures, indemnification provisions and disclaimers, but these steps may not be effective. We also maintain product liability insurance, but this insurance may not cover any particular claim or litigation, or the amount of insurance may be inadequate to cover the claims brought against us. Product liability insurance could become more expensive and difficult to maintain and might not be available on acceptable terms or at all. In addition, it is possible that our devices could become the subject of a product recall as a result of a device defect. We do not maintain recall insurance, so any recall could have a significant effect on our financial results. In addition to the direct expenses of product liability claims, investigations, recalls and litigation, a claim, investigation, recall or litigation might cause us adverse publicity, which could harm our reputation and compromise our ability to sell our devices in the future.

The collection, storage, transmission, use and disclosure of user data and personal information could give rise to liabilities or additional costs as a result of laws, governmental regulations, and evolving views of personal privacy rights and information security standards.

We transmit, process, and in some cases store in the normal course of our business, end user data, including personal information. Many jurisdictions around the world have adopted laws and regulations regarding the collection, storage, transmission, use and disclosure of personal information. The legal standards for processing, storing and using this personal information continue to evolve, impose additional obligations and risk on our business, and have the potential to make some of our business processes more costly or less feasible. For example, the California Consumer Privacy Act, or the CCPA, went into effect on January 1, 2020 and gives California residents expanded rights to access and delete their personal information, opt out of certain personal information sharing and receive detailed information about how their personal information is used by requiring companies to provide new disclosures to California consumers (as that term is broadly defined) and provide such consumers new ways to opt out of certain sales of personal information. In Europe, the European Commission enacted the General Data Protection Regulation, or GDPR, which became effective in May 2018. The GDPR superseded prior EU data protection legislation, imposes more stringent EU data protection requirements, and provides for greater penalties for noncompliance.

In addition, the interpretation of privacy and data protection laws and regulations regarding the collection, storage, transmission, use and disclosure of such information in some jurisdictions remains unclear. These laws may be interpreted, applied and enforced in conflicting ways from country to country and in a manner that is not consistent with our current business practices. Complying with these varying privacy and data security legal requirements could cause us to incur additional costs and change our business practices. Further, our services are accessible in many foreign jurisdictions, and some of these jurisdictions may claim that we are required to comply with their laws, even where we have no operating entity, employees or infrastructure located in that jurisdiction. We could face direct expenses related to a variety of enforcement actions, government investigations, or litigation, and an interruption to our business and adverse publicity because of such enforcement actions, government investigations, or litigation. Such enforcement actions, government investigations, or litigation could also cause us to incur significant expenses if we were required to modify our products, our services, our infrastructure, or our existing security and privacy procedures in order to comply with new or expanded privacy and security regulations.

In addition, if end users allege that their personal information is not collected, stored, transmitted, used or disclosed by us or our business partners appropriately or in accordance with our policies or applicable laws, or that our failure to adequately secure their personal information compromised its security, we could have liability to them or to consumer protection agencies, including claims, investigations and litigation related to such allegations. Any failure on our part to protect end users' personal information could result in a loss of user confidence, hurt our reputation, result in the loss of users, and cause us to incur significant expenses.

We have been and may in the future become subject to claims that our devices or services violate the patent or intellectual property rights of others, which could be costly and disruptive to us.

We operate in an industry that is susceptible to significant intellectual property litigation. As a result, we or our devices or services may become subject to intellectual property infringement claims or litigation. The defense of intellectual property suits is both costly and time-consuming, even if ultimately successful, and may divert management's attention from other business concerns. An adverse determination in litigation to which we may become a party could, among other things:

- subject us to significant liabilities to third parties, including treble damages;
- require disputed rights to be licensed from a third party for royalties that may be substantial;
- require us to cease using technology that is important to our business; or
- prohibit us from selling some or all of our devices or offering some or all of our services.

We may be unable to offer one or more services in important regions of the world due to regulatory requirements, which could limit our growth.

While our constellation is capable of providing service globally, our ability to sell one or more types of service in some regions may be limited by local regulations. Some countries have specific regulatory requirements such as local domestic ownership requirements or requirements for physical gateways within their jurisdiction to connect traffic coming to and from their territory. In some countries, we may not be able to find an acceptable local partner or reach an agreement to develop additional gateways, or the cost of developing and deploying such gateways may be prohibitive, which could impair our ability to expand our product and service offerings in such areas and undermine our value for potential users who require service in these areas. Also, other countries where we already provide service may impose similar requirements in the future, which could restrict our ability to continue to sell service in those countries. The inability to offer to sell our products and services in all major international markets could impair our international growth. In addition, the construction of such gateways in foreign countries may trigger and require us to comply with various U.S. regulatory requirements that could conflict with or contravene the laws or regulations of the local jurisdiction. Any of these developments could limit, delay or otherwise interfere with our ability to construct gateways or other infrastructure or network solutions around the world.

Security and emergency services regulations in the U.S. and other countries may affect our ability to operate our system and to expand into new markets.

Our operations are subject to regulations of the U.S. Department of Commerce's Bureau of Industry and Security relating to the export of satellites and related technical data as well as our subscriber equipment, the U.S. Treasury Department's Office of Foreign Assets Control relating to transactions involving entities sanctioned by the United States, and the U.S. State Department's Office of Defense Trade Controls relating to satellite launch. We are also required to provide U.S. and some foreign government law enforcement and security agencies with call interception services and related government assistance, in respect of which we face legal obligations and restrictions in various jurisdictions. Given our global operations and unique network architecture, these requirements and restrictions are not always easy to comply with or harmonize. In addition, some countries require providers of telecommunications services to connect specified emergency numbers to local emergency services. We have discussed and continue to discuss with authorities in various countries the procedures used to satisfy our obligations, and have had to, and may in the future need to, obtain amendments or waivers to licenses or obligations in various countries. Countries are not obligated to grant requested amendments or waivers, and there can be no assurance that relevant authorities will not suspend or revoke our licenses or take other legal actions to attempt to enforce the requirements of their respective jurisdictions.

These U.S. and foreign obligations and regulations may limit or delay our ability to offer products and services in a particular country. As new laws and regulations are issued, we may be required to modify our business plans or operations. In addition, changing and conflicting national and local regulatory requirements may cause us to be in compliance with local requirements in one country, while not being in compliance with the laws and regulations of another. If we fail to comply with regulations in the United States or any other country, we could be subject to substantial fines or sanctions that could make it difficult or impossible for us to operate in the United States or such other country, or we may need to make substantial additional expenditures to bring our systems, products and services into compliance with the requirements.

We may be unable to obtain and maintain contractually required liability insurance, and the insurance we obtain may not cover all liabilities to which we may become subject.

Under our agreements with Motorola Solutions and the U.S. government, we are required to maintain an in-orbit liability insurance policy with a de-orbiting endorsement. The current policy, together with the de-orbiting endorsement, covers amounts that we and other specified parties may become liable to pay for bodily injury and property damages to third parties related to processing, maintaining, and de-orbiting our first-generation satellites. Our current policy has a one-year term, which expires on December 8, 2020, and excludes coverage for all third-party damages relating to the 2009 collision of our satellite with a non-operational Russian satellite. The price, terms and availability of insurance have fluctuated significantly since we began offering commercial satellite services. The cost of obtaining insurance can vary as a result of either satellite failures or general conditions in the insurance industry. Higher premiums on insurance policies would increase our cost. In-orbit liability insurance policies on satellites may not continue to be available on commercially reasonable terms or at all. In addition to higher premiums, insurance policies may provide for higher deductibles, shorter coverage periods and additional policy exclusions. For example, our current de-orbit insurance covers only twelve months from attachment and therefore would not cover losses arising outside that timeframe. In addition, even if we continue to maintain an in-orbit liability insurance policy, the coverage may not protect us against all third-party losses, which could be material.

Our current in-orbit liability insurance policy contains, and we expect any future policies would likewise contain, specified exclusions and material change limitations customary in the industry. These exclusions may relate to, among other things, losses resulting from in-orbit collisions such as the one we experienced in 2009, acts of war, insurrection, terrorism or military action, government confiscation, strikes, riots, civil commotions, labor disturbances, sabotage, unauthorized use of the satellites, and nuclear or radioactive contamination, as well as claims directly or indirectly occasioned as a result of noise, pollution, electrical and electromagnetic interference, and interference with the use of property.

In addition to our in-orbit liability insurance policy, we are required to purchase product liability insurance to cover the potential liability of Motorola Solutions, as the successor to the manufacturer of our first-generation satellites. We may not in the future be able to renew this product liability coverage on reasonable terms and conditions, or at all. Our failure to maintain this insurance could increase our exposure to third-party damages that may be caused by any of our satellites.

Wireless devices' radio frequency emissions are the subject of regulation and litigation concerning their environmental effects, which includes alleged health and safety risks. As a result, we may be subject to new regulations, demand for our services may decrease, and we could face liability based on alleged health risks.

There has been adverse publicity concerning alleged health risks associated with radio frequency transmissions from portable hand-held telephones that have transmitting antennas. Lawsuits have been filed against participants in the wireless industry alleging a number of adverse health consequences, including cancer, as a result of wireless phone usage. Other claims allege consumer harm from failures to disclose information about radio frequency emissions or aspects of the regulatory regimes governing those emissions. Although we have not been party to any such lawsuits, we may be exposed to such litigation in the future. While we comply with applicable standards for radio frequency emissions and power and do not believe that there is valid scientific evidence that use of our devices poses a health risk, courts or governmental agencies could determine otherwise. Any such finding could reduce our revenue and profitability and expose us and other communications service providers or device sellers to litigation, which, even if frivolous or unsuccessful, could be costly to defend.

If consumers' health concerns over radio frequency emissions increase, they may be discouraged from using wireless handsets or other wireless consumer devices. Further, government authorities might increase regulation of wireless handsets and other wireless consumer devices as a result of these health concerns. Any actual or perceived risk from radio frequency emissions could reduce the number of our subscribers and demand for our products and services.

Our ability to use our net operating loss carryforwards to offset future taxable income may be subject to certain limitations.

Our ability to utilize U.S. net operating loss carryforwards and other tax attributes may be limited if we experience an "ownership change" under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code, which generally occurs if one or more stockholders or groups of stockholders who own at least 5% of our common stock increase their ownership in the aggregate by more than 50% over their lowest ownership percentage within a rolling period that begins on the later of three years prior to the testing date and the date of the last ownership change. Similar rules may apply under state tax laws. If an "ownership change" were to occur, Section 382 of the Code would impose an annual limit on the amount of pre-ownership change net operating loss carryforwards and other tax attributes we could use to reduce our taxable income. It is possible that such an ownership change could materially reduce our ability to use our net operating loss carryforwards or other tax attributes to offset taxable income, which could impact our profitability.

We could be subject to adverse determinations by taxing authorities or changes to tax laws.

We are subject to regular review and audit by both domestic and foreign tax authorities. As a result, we have received, and may in the future receive, assessments in multiple jurisdictions on various tax-related assertions, including transfer pricing adjustments or permanent establishment. Any adverse outcome of such a review or audit could have a negative effect on our operating results and financial condition. In addition, the determination of our provision for income taxes and other tax liabilities requires significant judgment, including transactions and calculations where the ultimate tax determination is uncertain. Although we believe our estimates are reasonable, the ultimate tax outcome may differ from the amounts recorded in our financial statements and may materially affect our financial results in the period or periods for which such determination is made. Furthermore, tax policies, laws or rates in various jurisdictions may be subject to significant change, which could materially and adversely affect our financial position and results of operations.

Changes in tax laws could increase our worldwide tax rate and materially affect our financial position and results of operations.

Many U.S. states and foreign countries have adopted or proposed changes to current tax laws. Further, organizations such as the Organization for Economic Cooperation and Development have published action plans that, if adopted by countries where we do business, could increase our tax obligations in these countries. Due to our U.S. and international business activities, certain of these enacted and proposed changes to the taxation of our activities could increase our worldwide effective tax rate, which in turn could harm our financial position and results of operations.

If we fail to maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired.

We are subject to the reporting requirements of the Securities Exchange Act of 1934, the Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, and the rules and regulations of the SEC and The Nasdaq Global Select Market. The Sarbanes-Oxley Act requires, among other things, that we maintain effective disclosure controls and procedures and internal controls over financial reporting. We perform system and process evaluation and testing of our internal controls over financial reporting to allow management to report on the effectiveness of our internal controls over financial reporting in our Annual Reports on Form 10-K, as required by Section 404 of the Sarbanes-Oxley Act. If we are not able to comply with the requirements of Section 404 of the Sarbanes-Oxley Act in a timely manner, or if we are unable to maintain proper and effective internal controls, we may not be able to produce timely and accurate financial statements, and we may conclude that our internal controls over financial reporting are not effective. If that were to happen, the market price of our stock could decline, and we could be subject to sanctions or investigations by the Nasdaq Global Select Market, the SEC or other regulatory authorities.

Maintaining effective internal controls over financial reporting is necessary for us to produce reliable financial statements. If we fail to maintain such controls, it could result in a material misstatement of our financial statements that would not be prevented or detected on a timely basis, which could cause investors and other users to lose confidence in our financial statements.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

We own or lease the facilities described in the following table:

Location	Country	Approximate Square Feet	Facilities	Owned/Leased
McLean, Virginia	USA	30,600	Corporate Headquarters	Leased
Chandler, Arizona	USA	197,000	Technical Support Center, Distribution Center, Warehouse and Satellite Teleport Network Facility	Leased
Leesburg, Virginia	USA	40,000	Satellite Network Operations Center	Owned
Tempe, Arizona	USA	31,000	System Gateway and Satellite Teleport Network Facility	Owned Building on Leased Land
Tempe, Arizona	USA	25,000	Operations and Finance Office Space	Leased
Fairbanks, Alaska	USA	4,000	Satellite Teleport Network Facility	Owned
Svalbard	Norway	1,800	Satellite Teleport Network Facility	Owned Building on Leased Land
Izhevsk, Udmurtia	Russia	8,785	System Gateway and Satellite Teleport Network Facility	Leased
Moscow	Russia	2,158	Sales and Administration Offices	Leased
Punta Arenas	Chile	3,200	Satellite Teleport Network Facility	Owned Building on Leased Land

Item 3. Legal Proceedings

Neither we nor any of our subsidiaries are currently subject to any material legal proceeding, nor, to our knowledge, is any material legal proceeding threatened against us or any of our subsidiaries.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

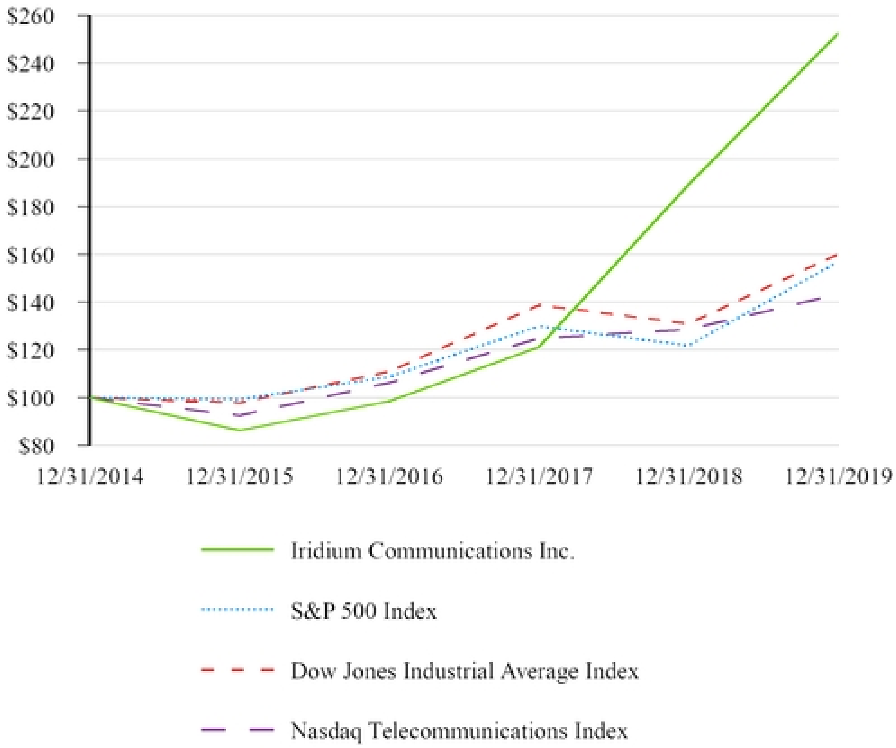
Our common stock is currently listed on the Nasdaq Global Select Market under the symbol “IRDM.” As of February 19, 2020 there were 111 holders of record of our common stock.

Dividend Policy

We have not paid any dividends on our common stock to date.

Stock Price Performance Graph

The graph below compares the cumulative total return of our common stock from December 31, 2014 through December 31, 2019 with the comparable cumulative return of three indices, the S&P 500 Index, the Dow Jones Industrial Average Index and the Nasdaq Telecommunications Index. The graph plots the growth in value of an initial investment of $100 in each of our common stock, the S&P 500 Index, the Dow Jones Industrial Average Index and the Nasdaq Telecommunications Index over the indicated time periods. The stock price performance shown on the graph is not necessarily indicative of future price performance. The following stock price performance graph shall not be deemed to be “filed” for purposes of Section 18 of the Exchange Act, nor shall this information be incorporated by reference into any future filing under the Securities Act or the Exchange Act or any other document, except to the extent that we specifically incorporate it by reference into such filing or document.



Item 6. Selected Financial Data

Iridium Communications Inc.

The following selected historical financial data as of and for the years ended December 31, 2019, 2018, 2017, 2016 and 2015 was derived from our audited financial statements. The selected financial data below should be read in conjunction with our financial statements and related notes, and "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this Form 10-K. The selected financial data is historical data and is not necessarily indicative of our future results of operations.

	For the Year Ended December 31,				
Statement of Operations Data	**2019**	**2018**	**2017**	**2016**	**2015**
	(In thousands, except per share amounts)				
Revenue:					
Services	$ 447,158	$ 406,757	$ 349,735	$ 334,822	$ 317,022
Subscriber equipment	82,856	97,848	77,119	74,211	73,615
Engineering and support services	30,430	18,403	21,192	24,607	20,741
Total revenue	$ 560,444	$ 523,008	$ 448,046	$ 433,640	$ 411,378
Total operating expenses [1]	$ 550,324	$ 481,355	$ 346,759	$ 257,269	$ 337,575
Operating income [2]	$ 10,120	$ 41,653	$ 115,476	$ 176,371	$ 73,803
Net income (loss) [3]	$ (161,999)	$ (13,384)	$ 233,856	$ 111,032	$ 7,123
Comprehensive income (loss)	$ (160,069)	$ (18,385)	$ 235,506	$ 114,649	$ 980
Weighted average shares outstanding - basic	125,167	108,975	97,934	95,967	95,097
Weighted average shares outstanding - diluted	125,167	108,975	128,130	124,875	95,097
Net income (loss) per share - basic	$ (1.33)	$ (0.22)	$ 2.23	$ 1.00	$ (0.09)
Net income (loss) per share - diluted	$ (1.33)	$ (0.22)	$ 1.82	$ 0.89	$ (0.09)

	As of December 31,				
Balance Sheet Data	**2019**	**2018**	**2017**	**2016**	**2015**
	(In thousands)				
Total current assets	$ 342,935	$ 390,384	$ 411,072	$ 516,770	$ 481,718
Total assets [1][3]	$ 3,623,557	$ 4,014,271	$ 3,782,051	$ 3,499,625	$ 3,071,174
Total long-term liabilities [3]	$ 2,050,524	$ 2,149,975	$ 1,971,356	$ 2,072,673	$ 1,740,839
Total stockholders' equity	$ 1,459,282	$ 1,601,577	$ 1,596,469	$ 1,343,758	$ 1,228,721

(1) Includes accelerated depreciation of $36.8 million in the fourth quarter of 2017 associated with the write-off of amounts previously paid to International Space Company Kosmotras ("Kosmotras") and a goodwill impairment charge of $87.0 million in the fourth quarter of 2015, both of which decreased operating income and total assets by those amounts.

(2) Includes the impact of $14.2 million related to the gain on the transaction with Boeing, effective January 3, 2017.

(3) Includes the impact of $111.7 million loss on extinguishment of debt in November 2019 and the impact of the Tax Act enacted in December 2017 on our deferred tax assets and liabilities.

	For the Year Ended December 31,				
Cash Flow Data	**2019**	**2018**	**2017**	**2016**	**2015**
	(In thousands)				
Cash provided by (used in):					
Operating activities	$ 198,143	$ 263,709	$ 259,621	$ 225,199	$ 217,479
Investing activities	$ (127,819)	$ (378,912)	$ (372,680)	$ (242,360)	$ (439,374)
Financing activities	$ (313,280)	$ 193,503	$ 16,866	$ 224,178	$ 202,075

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

Background

We were initially formed in 2007 as GHL Acquisition Corp., a special purpose acquisition company. In 2009, we acquired all the outstanding equity in Iridium Holdings LLC and changed our name to Iridium Communications Inc.

Overview of Our Business

We are engaged primarily in providing mobile voice and data communications services using a constellation of orbiting satellites. We are the only commercial provider of communications services offering true global coverage, connecting people, organizations and assets to and from anywhere, in real time. Our unique L-band satellite network provides reliable communications services to regions of the world where terrestrial wireless or wireline networks do not exist or are limited, including remote land areas, open ocean, airways, the polar regions and regions where the telecommunications infrastructure has been affected by political conflicts or natural disasters.

We provide voice and data communications services to businesses, the U.S. and foreign governments, non-governmental organizations and consumers via our recently completed upgraded satellite network, which has an architecture of 66 operational satellites with in-orbit and ground spares and related ground infrastructure. We utilize an interlinked mesh architecture to route traffic across the satellite constellation using radio frequency crosslinks between satellites. This unique architecture minimizes the need for ground facilities to support the constellation, which facilitates the global reach of our services and allows us to offer services in countries and regions where we have no physical presence. Our upgraded satellite constellation is compatible with all of our end-user equipment and supports more bandwidth and higher data speeds for our new products, including our recently introduced Iridium Certus broadband service.

We sell our products and services to commercial end users through a wholesale distribution network, encompassing approximately 100 service providers, 260 value-added resellers, or VARs, and 90 value-added manufacturers, or VAMs, who either sell directly to the end user or indirectly through other service providers, VARs or dealers. These distributors often integrate our products and services with other complementary hardware and software and have developed a broad suite of applications for our products and services targeting specific lines of business.

At December 31, 2019, we had approximately 1,300,000 billable subscribers worldwide, an increase of 179,000, or 16%, from approximately 1,121,000 billable subscribers at December 31, 2018. We have a diverse customer base, including end users in land-mobile, Internet of Things, or IoT, maritime, aviation and government.

We recognize revenue from both the provision of services and the sale of equipment. Service revenue represented 80% and 78% of total revenue for the years ended December 31, 2019 and 2018, respectively. Voice and data and IoT data service revenues have historically generated higher margins than subscriber equipment revenue, and we expect this trend to continue. We also recognize revenue from our hosted payloads, principally Aireon, including fees for hosting the payloads and fees for transmitting data from the payloads over our network, as well as revenue from other services, such as satellite time and location services.

Services Agreements for Upgrade of Satellite Constellation

In 2019, we completed the full replacement of our first-generation satellites with our upgraded constellation at a cost of approximately $3 billion.

In June 2010, we executed a primarily fixed price full scale development contract, or FSD, with Thales Alenia Space for the design and manufacture of satellites for the upgraded constellation. The total price under the FSD was $2.3 billion. Final payments under this contract were made during the second quarter of 2019. These costs were capitalized as construction in progress within property and equipment, net in the accompanying condensed consolidated balance sheets.

To complete the upgraded constellation, we launched a total of 75 satellites into low earth orbit using eight Falcon 9 rockets under two contracts with Space Exploration Technologies Corp., or SpaceX, with a total price of $510.8 million. Final payments to SpaceX for these launches were made during the second quarter of 2019. These costs were capitalized as construction in progress within property and equipment, net in the accompanying condensed consolidated balance sheets. We shared one launch with GFZ German Research Centre for Geosciences for which we received $29.8 million from them.

Term Loan

On November 4, 2019, pursuant to a new loan agreement, or the Credit Agreement, we entered into a $1,450.0 million term loan, or the Term Loan, and an accompanying $100.0 million revolving loan, or the Revolving Facility. We used the proceeds of the Term Loan along with our debt service reserve account, or DSRA, and cash on hand to repay in full all of the indebtedness outstanding under the credit facility with a syndicate of bank lenders guaranteed by Bpifrance Assurance Export S.A.S., or the BPIAE Facility, as well as related expenses. The Term Loan was issued at a price equal to 99.5% of its face value and bears interest at an annual rate of LIBOR plus 3.75%, with a 1.0% LIBOR floor and has a seven-year maturity. The Revolving Facility bears interest at the same rate (but without a LIBOR floor) if and as drawn, with no original issue discount, a commitment fee of 0.5% per year on the undrawn amount, and a five-year maturity. See Note 7 for further discussion of our early extinguished BPIAE Facility as well as our new Term Loan.

The Credit Agreement restricts our ability to incur liens, engage in mergers or asset sales, pay dividends, repay subordinated indebtedness, incur indebtedness, make investments and loans, and engage in other transactions as specified in the Credit Agreement, and also contains a mechanism to sweep a portion of our excess cash flow (as defined in the Credit Agreement). The Credit Agreement provides for specified exceptions, baskets measured as a percentage of trailing twelve months of earnings before interest, taxes, depreciation and amortization, or EBITDA, and unlimited exceptions in the case of incurring indebtedness and liens and making investments, dividend payments, and payments of subordinated indebtedness, as well as a phase-out of the excess cash flow sweep, based on achievement and maintenance of specified leverage ratios. The Credit Agreement permits repayment, prepayment, and repricing transactions, subject to a 1% penalty in the event the facility is prepaid or repriced within the first six months.

The Credit Agreement contains no financial maintenance covenants with respect to the Term Loan. With respect to the Revolving Facility, the Credit Agreement requires the maintenance of a consolidated first lien net leverage ratio (as defined in the Credit Agreement) of no greater than 6.25 to 1 if more than 35% of the Revolving Facility has been drawn. The Credit Agreement also contains other customary representations and warranties, affirmative and negative covenants, and events of default.

On February 7, 2020, we amended the Term Loan to borrow an additional $200.0 million in principal. The proceeds, along with cash on hand, were used to prepay all of the indebtedness outstanding under our senior unsecured notes, or the Notes, as described below, including premiums for early prepayment. The early prepayment of the Notes occurred on February 13, 2020. The additional amount is fungible with the original $1,450.0 million, having the same maturity date, interest rate and other terms, but were issued at a 1.0% premium to face value.

Senior Unsecured Notes

On March 21, 2018, we issued $360.0 million in aggregate principal under the Notes, before $9.0 million of deferred financing costs, for a net principal balance of $351.0 million in borrowings from the Notes. The Notes bore interest at 10.25% per annum and were due to mature on April 15, 2023. Interest was payable semi-annually on April 15 and October 15, beginning on October 15, 2018, and principal would have been repaid in full upon maturity. As noted above, we redeemed all of the $360.0 million outstanding under the Notes on February 13, 2020.

In 2018, the proceeds of the Notes were used to prepay outstanding bills of exchange owed to Thales Alenia Space, including premiums paid, in the amount of approximately $59.9 million issued pursuant to the FSD, replenish the DSRA under the BPIAE Facility to $189.0 million, and to pay approximately $44.4 million in Thales Alenia Space milestones previously expected to be satisfied by the issuance of bills of exchange. The proceeds of the Notes also provided us with sufficient cash to meet our liquidity needs, including principal and interest payments under the BPIAE Facility. The Notes contained covenant requirements that applied to certain permitted financing actions. We were in compliance with all covenant requirements related to the Notes as of December 31, 2019.

Total Debt

Total interest incurred during the years ended December 31, 2019, 2018 and 2017 was $140.1 million, $142.7 million and $114.4 million, respectively. Interest incurred includes amortization of deferred financing fees of $21.6 million, $26.5 million and $27.3 million, for the years ended December 31, 2019, 2018 and 2017, respectively. Interest capitalized during the year ended December 31, 2019 and 2018 was $15.1 million and $76.7 million, respectively. During 2017, all interest was capitalized. Interest accrued for the years ended December 31, 2019 and 2018 was $7.8 million and $29.4 million, respectively. As part of the repayment of the BPIAE Facility, noted above, we incurred a loss of approximately $111.7 million for the early extinguishment which falls within other income (expense) on our consolidated statements of operations and comprehensive income (loss).

Derivative Financial Instruments

On November 27, 2019, we executed a long-term interest rate swap, or the Swap, effective through November 2021 to mitigate variability in forecasted interest payments on a portion of our borrowings under our Term Loan. We receive variable interest payments based on one-month LIBOR from the counterparty. We also entered into an interest rate swaption agreement, or the Swaption, that, if executed on November 22, 2021, would extend our Swap through November 2026. We pay a fixed annual rate of 0.50% for the Swaption, and a fixed rate of 1.565% on the Swap. Both the Swap and the Swaption derivative instruments carry a notional amount of $1,000.0 million. We designated both the Swap and Swaption as qualifying hedging instruments and accounted for these derivatives as cash flow hedges. Gains and losses resulting from fair value adjustments to the Swap and Swaption are recorded within accumulated other comprehensive loss within our consolidated balance sheets and reclassified to interest expense on the dates that interest payments become due. Cash flows related to the interest rate swaps are included in cash flows from operating activities on the consolidated statements of cash flows. See Note 8 for further discussion of our derivative financial instruments.

Recent Developments

U.S. Government Contracts

Effective September 15, 2019, we entered into a multi-year, fixed price contract with the U.S. Air Force Space Command, or AFSPC, for Enhanced Mobile Satellite Services, or the EMSS Contract. Under the EMSS Contract, we will provide satellite airtime services, including unlimited global standard and secure voice, paging, fax, Short Burst Data, Iridium Burst, RUDICS and Distributed Tactical Communications System, or DTCS, services for an unlimited number of U.S. Department of Defense, or DoD, and other federal government subscribers. We may provide other services, such as Iridium Certus, to the U.S. government under separate arrangements for an additional fee. While we sell airtime directly to the U.S. government for resale to end users, our hardware products are sold to U.S. government customers through our network of distributors, which typically integrate them with other products and technologies. In addition, we intend to invest approximately $10-$12 million over the next three years in support of the U.S. government to implement enhanced services at its dedicated gateway, which we will account for as additional cost of services. Pursuant to federal acquisition regulations, the U.S. government may terminate the EMSS Contract, in whole or in part, at any time. The fixed-price rate in each of the seven contract years is as follows:

Contract Year		Fixed Price Rate
		(in millions)
Year 1: 2019/2020	$	100.0
Year 2: 2020/2021		103.0
Year 3: 2021/2022		106.0
Year 4: 2022/2023		106.0
Year 5: 2023/2024		106.0
Year 6: 2024/2025		107.0
Year 7: 2025/2026		110.5
Total Contract Value	$	738.5

We provide maintenance services for the U.S. government's dedicated gateway pursuant to our Gateway Maintenance and Support Services contract, or the GMSS Contract, which was most recently entered into in March 2019 and is also managed by the AFSPC. This agreement provided for an initial six-month base term which expired on September 30, 2019. The U.S. government exercised the first of four available one-year options which extends the GMSS Contract service term to September 30, 2020. If the U.S. government elects to exercise all of the remaining one-year options, the total value of the GMSS Contract to us will be approximately $54.1 million. Pursuant to federal acquisition regulations, the U.S. government may terminate the GMSS Contract, in whole or in part, at any time.

In October 2019, we were also awarded a five-year indefinite-delivery/indefinite-quantity, or IDIQ, contract managed by Air Force Space Command to enable ongoing innovation and enhancements for the U.S. government gateway. This contract has a one-year base period and four one-year options, with a value of up to $76 million to us over the five-year period. Pursuant to federal acquisition regulations, the U.S. government may terminate the IDIQ contract, in whole or in part, at any time.

Material Trends and Uncertainties

Our industry and customer base has historically grown as a result of:

- demand for remote and reliable mobile communications services;
- a growing number of new products and services and related applications;
- a broad wholesale distribution network with access to diverse and geographically dispersed niche markets;
- increased demand for communications services by disaster and relief agencies, and emergency first responders;
- improved data transmission speeds for mobile satellite service offerings;
- regulatory mandates requiring the use of mobile satellite services;
- a general reduction in prices of mobile satellite services and subscriber equipment; and
- geographic market expansion through the ability to offer our services in additional countries.

Nonetheless, we face a number of challenges and uncertainties in operating our business, including:

- our ability to maintain the health, capacity, control and level of service of our satellites;
- our ability to develop and launch new and innovative products and services;
- changes in general economic, business and industry conditions, including the effects of currency exchange rates;
- our reliance on a single primary commercial gateway and a primary satellite network operations center;
- competition from other mobile satellite service providers and, to a lesser extent, from the expansion of terrestrial-based cellular phone systems and related pricing pressures;
- market acceptance of our products;
- regulatory requirements in existing and new geographic markets;
- rapid and significant technological changes in the telecommunications industry;
- our ability to generate sufficient internal cash flows to repay our debt;
- reliance on our wholesale distribution network to market and sell our products, services and applications effectively;
- reliance on single-source suppliers for the manufacture of most of our subscriber equipment and for some of the components required in the manufacture of our end-user subscriber equipment and our ability to purchase parts that are periodically subject to shortages resulting from surges in demand, natural disasters or other events; and
- reliance on a few significant customers, particularly agencies of the U.S. government, for a substantial portion of our revenue, as a result of which the loss or decline in business with any of these customers may negatively impact our revenue and collectability of related accounts receivable.

Critical Accounting Policies and Estimates

The discussion and analysis of our financial condition and results of operations is based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States, or U.S. GAAP. The preparation of these financial statements requires the use of estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expenses, and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates, including those related to revenue recognition, income taxes, useful lives of property and equipment, loss contingencies, and other estimates. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. Actual results may differ from these estimates under different assumptions or conditions.

The accounting policies we believe to be most critical to understanding our financial results and condition and that require complex and subjective management judgments are discussed below. Our accounting policies are more fully described in Note 2 in Item 8 "Financial Statements and Supplementary Data" included in this report. Please see the notes to our consolidated financial statements for a full discussion of these significant accounting policies.

Revenue Recognition

We sell services and equipment through contracts with our customers. We evaluate whether a contract exists as it relates to collectibility of the contract. Once a contract is deemed to exist, we evaluate the transaction price including both fixed and variable consideration. The variable consideration contained within our contracts with customers may include discounts, credits and other similar items. When a contract includes variable consideration, we evaluate the estimate of the variable consideration to determine whether the estimate needs to be constrained. Therefore, we include constrained consideration in the transaction price only to the extent that it is probable that a significant reversal of the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration or collectibility is subsequently resolved. Variable consideration estimates are updated at the end of each quarter and collectibility assessments are evaluated with new customers, or on an ongoing basis if initially deemed not probable, and updated as facts and circumstances change.

We sell prepaid services in the form of e-vouchers and prepaid cards. A liability is established equal to the cash paid upon purchase for the e-voucher or prepaid card. We recognize revenue from the prepaid services upon the use of the e-voucher or prepaid card by the customer. While the terms of prepaid e-vouchers can be extended by the purchase of additional e-vouchers, prepaid e-vouchers may not be extended beyond three or four years, dependent on the initial term when purchased.

Revenue associated with some of our fixed-price engineering services arrangements is recognized over time using costs incurred to date relative to total estimated costs at completion to measure progress toward satisfying our performance obligation. We recognize revenue on cost-plus-fixed-fee arrangements to the extent of estimated costs incurred plus the applicable fees earned. If actual results are not consistent with our estimates or assumptions, we may be exposed to changes to earned and unearned revenue that could be material to our results of operations.

Income Taxes

We account for income taxes using the asset and liability approach. This approach requires that we recognize deferred tax assets and liabilities based on differences between the financial statement bases and tax bases of our assets and liabilities. Deferred tax assets and liabilities are recorded based upon enacted tax rates for the period in which the deferred tax items are expected to reverse. Changes in tax laws or tax rates in various jurisdictions are reflected in the period of change. Significant judgment is required in the calculation of our tax provision and the resulting tax liabilities as well as our ability to realize our deferred tax assets. Our estimates of future taxable income and any changes to such estimates can significantly affect our tax provision in a given period. Significant judgment is required in determining our ability to realize our deferred tax assets related to federal, state and foreign tax attributes within their carryforward periods including estimating the amount and timing of the future reversal of deferred tax items in our projections of future taxable income. A valuation allowance is established to reduce deferred tax assets to the amounts we expect to realize in the future. We also recognize tax benefits related to uncertain tax positions only when we estimate that it is "more likely than not" that the position will be sustainable based on its technical merits. If actual results are not consistent with our estimates and assumptions, this may result in material changes to our income tax provision.

The Tax Act, enacted in December 2017, introduced significant changes to U.S. income tax law that have a meaningful impact on our provision for income taxes. Due to the timing of the enactment and the complexity involved in applying the provisions of the Tax Act, we made reasonable estimates of the effects and recorded these estimates in our financial statements. Accounting for the income tax effects of the Tax Act requires significant judgments and estimates in the interpretation and calculations of the various provisions. During 2018 and 2019, the U.S. Treasury Department, as well as the Internal Revenue Service, or IRS, and other standard-setting bodies issued some guidance related to certain provisions in the Tax Act. These same standard-setting bodies may issue additional guidance on how the provisions of the Tax Act will be applied or otherwise administered that is different from our interpretation. As we collect and prepare necessary data, interpret the Tax Act and analyze any additional guidance issued by the IRS or other standard-setting bodies, we may need to make adjustments to prior estimates, which could materially affect our financial statements in the period in which the adjustments are made.

Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation and amortization. Property and equipment are depreciated or amortized over their estimated useful lives. We apply judgment in determining the useful lives based on factors such as engineering data, our long-term strategy for using the assets, the manufacturer's estimated design life for the assets, laws and regulations that could impact the useful lives of the assets and other economic factors. In evaluating the useful lives of our satellites, we assess the current estimated operational life of the satellites, including the potential impact of environmental factors on the satellites, ongoing operational enhancements and software upgrades. Additionally, we review engineering data relating to the operation and performance of our satellite network.

We depreciate our satellites over the shorter of their potential operational life or the period of their expected use. The appropriateness of the useful lives is evaluated on a quarterly basis or as events occur that require additional assessment. The upgraded satellites that have been placed into service are depreciated using the straight-line method over their respective estimated useful lives. If the estimated useful lives of our upgraded satellites change, it could have a material impact on the timing of the recognition of depreciation expense.

During the construction period for our upgraded satellite constellation, assets under construction primarily consisted of costs incurred associated with the design, development and launch of the upgraded satellites, upgrades to our current infrastructure and ground systems and internal software development costs. We capitalized a portion of the interest on the BPIAE Facility during the construction period of the upgraded satellite constellation. Capitalized interest was added to the cost of the upgraded satellites. Once these assets were placed in service, they are depreciated using the straight-line method over their respective estimated useful lives. During each year end, we evaluate the useful lives of all assets under construction. In 2017, we determined that the Kosmotras launch services would no longer be used or further developed. As such, we wrote-off the full amount previously paid to Kosmotras, by recording accelerated depreciation of $36.8 million in the fourth quarter of 2017. No such charges were recorded for the years ended December 31, 2019 or 2018.

Comparison of Our Results of Operations for the Year Ended December 31, 2019 and the Year Ended December 31, 2018

($ In thousands)	Year Ended December 31, 2019	% of Total Revenue	2018	% of Total Revenue	Change Dollars	Change Percent
Revenue:						
Service revenue						
Commercial	$ 350,026	63 %	$ 318,757	61 %	$ 31,269	10 %
Government	97,132	17 %	88,000	17 %	9,132	10 %
Total service revenue	447,158	80 %	406,757	78 %	40,401	10 %
Subscriber equipment	82,856	15 %	97,848	19 %	(14,992)	(15)%
Engineering and support services	30,430	5 %	18,403	3 %	12,027	65 %
Total revenue	560,444	100 %	523,008	100 %	37,436	7 %
Operating expenses:						
Cost of services (exclusive of depreciation and amortization)	94,958	17 %	86,016	16 %	8,942	10 %
Cost of subscriber equipment	50,186	9 %	56,857	11 %	(6,671)	(12)%
Research and development	14,310	2 %	22,429	4 %	(8,119)	(36)%
Selling, general and administrative	93,165	17 %	97,846	19 %	(4,681)	(5)%
Depreciation and amortization	297,705	53 %	218,207	42 %	79,498	36 %
Total operating expenses	550,324	98 %	481,355	92 %	68,969	14 %
Operating income	10,120	2 %	41,653	8 %	(31,533)	(76)%
Other expense:						
Interest expense, net	(115,396)	(21)%	(55,149)	(11)%	(60,247)	109 %
Loss on extinguishment of debt	(111,710)	(20)%	(7,292)	(1)%	(104,418)	1,432 %
Other income (expense), net	(1,133)	0 %	139	0 %	(1,272)	(915)%
Total other expense	(228,239)	(41)%	(62,302)	(12)%	(165,937)	266 %
Loss before income taxes	(218,119)	(39)%	(20,649)	(4)%	(197,470)	956 %
Income tax benefit	56,120	10 %	7,265	1 %	48,855	672 %
Net loss	$ (161,999)	(29)%	$ (13,384)	(3)%	$ (148,615)	1,110 %

Commercial Service Revenue

	Year Ended December 31, 2019 Revenue	2019 Billable Subscribers (1)	2019 ARPU (2)	2018 Revenue	2018 Billable Subscribers (1)	2018 ARPU (2)	Change Revenue	Change Billable Subscribers	Change ARPU
	(Revenue in millions and subscribers in thousands)								
Commercial voice and data	$ 203.6	363	$ 47	$ 193.2	361	$ 45	$ 10.4	2	$ 2
Commercial IoT data	96.4	802	$ 11.10	85.1	647	$ 12.26	11.3	155	$ (1.16)
Hosted payload and other data services	50.0	N/A		40.4	N/A		9.6	N/A	
Total Commercial	$ 350.0	1,165		$ 318.7	1,008		$ 31.3	157	

(1) Billable subscriber numbers are shown as of the end of the respective period.

(2) Average monthly revenue per unit, or ARPU, is calculated by dividing revenue in the respective period by the average of the number of billable subscribers at the beginning of the period and the number of billable subscribers at the end of the period and then dividing the result by the number of months in the period. Billable subscriber and ARPU data is not applicable for hosted payload and other data service revenue items.

For the year ended December 31, 2019, total commercial revenue increased $31.3 million, or 10%, due to increased revenue across all commercial services compared to the prior period. Commercial IoT data revenue increased $11.3 million, or 13%, from the prior year period primarily due to a 24% increase in commercial IoT data billable subscribers primarily from continued strength in consumer personal communications devices. This higher volume of new personal communication subscribers caused overall IoT ARPU to be lower. Commercial voice and data revenue increased $10.4 million, or 5%, from the prior year period. This increase was principally due to price increases in access and roaming fees that were implemented during the second quarter of 2018. The increase in commercial voice and data revenue was also due to increased broadband subscribers. Hosted payload and other data service revenue increased $9.6 million, or 24%, primarily due to revenue recognition from hosting services and increased data services due to an increase in the number of upgraded satellites in service, both related to Aireon and L3Harris.

Government Service Revenue

	Year Ended December 31,					
	2019		2018		Change	
	Revenue	Billable Subscribers [1]	Revenue	Billable Subscribers [1]	Revenue	Billable Subscribers
	(Revenue in millions and subscribers in thousands)					
Government service revenue	$ 97.1	135	$ 88.0	113	$ 9.1	22

(1) Billable subscriber numbers shown are at the end of the respective period.

We provide airtime and airtime support to U.S. government and other authorized customers pursuant to our EMSS Contract. Under the terms of this agreement, authorized customers utilize certain Iridium airtime services provided through the U.S. government's dedicated gateway. The fee is not based on subscribers or usage, allowing an unlimited number of users access to the services. Immediately prior to entering into the EMSS Contract in September 2019, we were providing airtime service at varying monthly rates to the U.S. government under month-to-month extensions of our previous EMSS contract, following the expiration of a six-month extension on April 21, 2019. For the year ended December 31, 2019, government service revenue increased $9.1 million from the prior year period as a result of the month-to-month extensions we agreed to with the U.S. government while the EMSS Contract was being negotiated and the higher monthly rate once the EMSS Contract was executed and became effective on September 15, 2019.

Subscriber Equipment Revenue

Subscriber equipment revenue decreased $15.0 million, or 15%, to $82.9 million for the year ended December 31, 2019 compared to the prior year. This decrease was primarily due to a decrease in volume of handset sales and Iridium Pilot unit sales, partially offset by an increase in the volume of Short Burst Data devices and Iridium Certus devices. Handset sales in 2018 were abnormally strong.

Engineering and Support Service Revenue

	Year Ended December 31,		
	2019	2018	Change
	(In millions)		
Commercial	$ 2.8	$ 0.7	$ 2.1
Government	27.6	17.7	9.9
Total	$ 30.4	$ 18.4	$ 12.0

Engineering and support service revenue increased by $12.0 million, or 65%, for the year ended December 31, 2019 compared to the prior year primarily as a result of an increase in the volume of contracted work to enable services for the U.S. government.

Operating Expenses

Cost of Services (exclusive of depreciation and amortization)

Cost of services (exclusive of depreciation and amortization) includes the cost of network engineering and operations staff, including contractors, software maintenance, product support services, and cost of services for government and commercial engineering and support service revenue.

Cost of services (exclusive of depreciation and amortization) increased by $8.9 million, or 10%, for the year ended December 31, 2019 compared to the prior year, primarily as a result of an increase in the volume of contracted engineering and support services as noted above. This increase was also driven by higher satellite operations support associated with a greater number of upgraded satellites in service during the current period, corresponding with higher levels of activity directed towards operating the completed system. These increases were partially offset by a decrease in in-orbit insurance costs, which are amortized over a one-year period from the launch date, as we have completed the placement of new satellites in-orbit.

Cost of Subscriber Equipment

Cost of subscriber equipment includes the direct costs of equipment sold, which consist of manufacturing costs, allocation of overhead, and warranty costs.

Cost of subscriber equipment decreased $6.7 million, or 12%, for the year ended December 31, 2019 compared to the prior year period primarily due to the decreased volume of handset and Iridium Pilot unit sales, partially offset by an increase in the volume of Short Burst Data devices and Iridium Certus devices.

Research and Development

Research and development expenses decreased by $8.1 million, or 36%, for the year ended December 31, 2019 compared to the prior year period primarily due to decreased spend on devices for our upgraded network.

Selling, General and Administrative

Selling, general and administrative expenses that are not directly attributable to the sale of services or products include sales and marketing costs as well as employee-related expenses (such as salaries, wages, and benefits), legal, finance, information technology, facilities, billing and customer care expenses.

Selling, general and administrative expenses decreased by $4.7 million, or 5%, for the year ended December 31, 2019 compared to the prior year, primarily due to a decrease in professional fees, including lower consulting and regulatory fees, as well as a decrease in sales and marketing costs.

Depreciation and Amortization

Depreciation and amortization expense increased by $79.5 million, or 36%, for the year ended December 31, 2019 compared to the prior year, primarily due to the increased number of new satellites in service during the current period as we completed the replacement of our first-generation satellites.

Other Expense

Interest Expense, net

Interest expense, net, for the year ended December 31, 2019 was $115.4 million, compared to $55.1 million for the prior year period. The increase in interest expense is primarily related to a decrease in interest being capitalized as the average balance of satellites in construction decreased as upgraded satellites were completed. In addition, during the years ended December 31, 2019 and 2018, we incurred approximately $34.1 million and $26.3 million, respectively, in interest on the Notes that were issued in March 2018, resulting in only nine months of interest in 2018.

Loss on Extinguishment of Debt

During November 2019, we issued our Term Loan, and used the proceeds of the Term Loan, along with the our DSRA and cash on hand to repay in full all of the indebtedness outstanding under the BPIAE Facility, including premiums for early prepayment. In conjunction with the prepayment of the BPIAE Facility, we wrote off the remaining unamortized debt issuance costs. We also used proceeds received from Aireon and our Notes to extinguish debt. These prepayments resulted in a loss on extinguishment of debt of $111.7 million and $7.3 million for the years ended December 31, 2019 and 2018, respectively. The 2018 amount was previously included within interest expense.

Income Tax Benefit

For the year ended December 31, 2019, our income tax benefit was $56.1 million, compared to an income tax benefit of $7.3 million for the prior year. Our effective tax rate was approximately 25.7% for the year ended December 31, 2019 compared to 35.4% for the prior year. The increase in income tax benefit was primarily related to an increase in loss before income taxes compared to the prior year, stock compensation, tax credits as well as nonrecurring adjustments to our deferred tax assets and liabilities related to state law changes. If our current estimates change in future periods, the impact on the deferred tax assets and liabilities may change correspondingly. See Note 13 to our condensed consolidated financial statements for more detail on the individual items impacting our effective tax rate for the years.

Net Loss

Net loss was $162.0 million for the year ended December 31, 2019, compared to net loss of $13.4 million during the prior year period. This increase in net loss was primarily the result of the $104.4 million increase in loss on extinguishment of debt, the $79.5 million increase in depreciation and amortization expense and the $60.2 million increase in interest expense, net, as described above, partially offset by the $37.4 million increase in total revenues and the $48.9 million increase in income tax benefit, as described above.

Comparison of Our Results of Operations for the Year Ended December 31, 2018 and the Year Ended December 31, 2017

($ In thousands)	Year Ended December 31, 2018	% of Total Revenue	2017	% of Total Revenue	Change Dollars	Percent
Revenue:						
Service revenue						
Commercial	$ 318,757	61 %	$ 261,735	58 %	$ 57,022	22 %
Government	88,000	17 %	88,000	20 %	—	0 %
Total service revenue	406,757	78 %	349,735	78 %	57,022	16 %
Subscriber equipment	97,848	19 %	77,119	17 %	20,729	27 %
Engineering and support services	18,403	3 %	21,192	5 %	(2,789)	(13)%
Total revenue	523,008	100 %	448,046	100 %	74,962	17 %
Operating expenses:						
Cost of services (exclusive of depreciation and amortization)	86,016	16 %	80,396	18 %	5,620	7 %
Cost of subscriber equipment	56,857	11 %	44,445	10 %	12,412	28 %
Research and development	22,429	4 %	15,247	3 %	7,182	47 %
Selling, general and administrative	97,846	19 %	84,405	19 %	13,441	16 %
Depreciation and amortization	218,207	42 %	122,266	27 %	95,941	78 %
Total operating expenses	481,355	92 %	346,759	77 %	134,596	39 %
Gain on Boeing transaction	—	0 %	14,189	3 %	(14,189)	(1)%
Operating income	41,653	8 %	115,476	26 %	(73,823)	(64)%
Other income (expense):						
Interest income (expense), net	(55,149)	(11)%	4,328	1 %	(59,477)	(1,374)%
Loss on extinguishment of debt	(7,292)	(1)%	—	0 %	(7,292)	100 %
Other income (expense), net	139	0 %	(232)	0 %	371	(160)%
Total other income (expense)	(62,302)	(12)%	4,096	1 %	(66,398)	(1,621)%
Income (loss) before income taxes	(20,649)	(4)%	119,572	27 %	(140,221)	(117)%
Income tax benefit	7,265	1 %	114,284	25 %	(107,019)	(94)%
Net income (loss)	$ (13,384)	(3)%	$ 233,856	52 %	$ (247,240)	(106)%

Commercial Service Revenue

	Year Ended December 31, 2018 Revenue	2018 Billable Subscribers [1]	2018 ARPU [2]	2017 Revenue	2017 Billable Subscribers [1]	2017 ARPU [2]	Change Revenue	Change Billable Subscribers	Change ARPU
	(Revenue in millions and subscribers in thousands)								
Commercial voice and data	$ 193.2	361	$ 45	$ 177.7	359	$ 42	$ 15.5	2	$ 3
Commercial IoT data	85.1	647	$ 12.26	74.1	510	$ 13.39	11.0	137	$ (1.13)
Hosted payload and other data services	40.4	N/A		9.9	N/A		30.5	N/A	
Total Commercial	$ 318.7	1,008		$ 261.7	869		$ 57.0	139	

(1) Billable subscriber numbers are shown as of the end of the respective period.

(2) Average monthly revenue per unit, or ARPU, is calculated by dividing revenue in the respective period by the average of the number of billable subscribers at the beginning of the period and the number of billable subscribers at the end of the period and then dividing the result by the number of months in the period. Billable subscriber and ARPU data is not applicable for hosted payload and other data service revenue items.

For the year ended December 31, 2018, total commercial revenue increased $57.0 million, or 22%, due to strong revenue growth within each of our service categories. The increase was primarily due to the increase in hosted payload and other data services revenue of $30.5 million, or 308%, which was attributable to revenue from hosting services related to Aireon, increased hosted payload data services due to an increase in the number of new satellites in service and increased satellite time and location service revenue. In addition, commercial voice and data revenue increased by $15.5 million, or 9%, from the prior year period principally due to an increase in average revenue per unit resulting from certain price increases in access fees and growth in Iridium OpenPort subscribers. Commercial IoT data revenue increased by $11.0 million, or 15%, from the prior year period primarily due to a 27% increase in commercial IoT data billable subscribers, partially offset by a decline in related ARPU.

Government Service Revenue

	Year Ended December 31,					
	2018		2017		Change	
	Revenue	Billable Subscribers [1]	Revenue	Billable Subscribers [1]	Revenue	Billable Subscribers
	(Revenue in millions and subscribers in thousands)					
Government service revenue	$ 88.0	113	$ 88.0	100	$ —	13

[1] Billable subscriber numbers shown are at the end of the respective period.

We provide Iridium airtime and airtime support to U.S. government and other authorized customers pursuant to a five-year EMSS contract executed in October 2013 and managed by Air Force Space Command. Under the terms of this agreement, authorized customers utilize Iridium airtime services provided through the U.S. government's dedicated gateway. These services include unlimited global standard and secure voice, low and high-speed data, paging, broadcast, and DTCS services for an unlimited number of DoD and other federal subscribers. The service fee under the EMSS contract was fixed at $88 million per year for the years ended December 31, 2018 and 2017, and was not based on subscribers or usage, allowing an unlimited number of users access to existing services.

Subscriber Equipment Revenue

Subscriber equipment revenue increased $20.7 million, or 27%, to $97.8 million for the year ended December 31, 2018 compared to the prior year. This increase was primarily due to an increase in volume of handset sales, short-burst data device sales and L-band transceiver unit sales.

Engineering and Support Service Revenue

	Year Ended December 31,		
	2018	2017	Change
	(In millions)		
Commercial	$ 0.7	$ 3.1	$ (2.4)
Government	17.7	18.1	(0.4)
Total	$ 18.4	$ 21.2	$ (2.8)

Engineering and support service revenue decreased by $2.8 million, or 13%, for the year ended December 31, 2018 compared to the prior year primarily as a result of a decrease in the volume of contracted work.

Operating Expenses

Cost of Services (exclusive of depreciation and amortization)

Cost of services (exclusive of depreciation and amortization) includes the cost of network engineering and operations staff, including contractors, software maintenance, product support services, and cost of services for government and commercial engineering and support service revenue.

Cost of services (exclusive of depreciation and amortization) increased by $5.6 million, or 7%, for the year ended December 31, 2018 compared to the prior year, primarily as a result of in-orbit insurance costs from new satellites placed into service during 2017 and 2018. The increase was partially offset by a decrease in volume of contracted work for engineering and support services.

Cost of Subscriber Equipment

Cost of subscriber equipment includes the direct costs of equipment sold, which consist of manufacturing costs, allocation of overhead, and warranty costs.

Cost of subscriber equipment increased $12.4 million, or 28%, for the year ended December 31, 2018 compared to the prior year period primarily due to the increased volume of subscriber equipment described above.

Research and Development

Research and development expenses increased by $7.2 million, or 47%, for the year ended December 31, 2018 compared to the prior year period primarily due to increased spend on the development of Iridium Certus broadband to expand service functionality on our new satellites.

Selling, General and Administrative

Selling, general and administrative expenses include sales and marketing costs as well as legal, finance, information technology, facilities, billing and customer care expenses.

Selling, general and administrative expenses increased by $13.4 million, or 16%, for the year ended December 31, 2018 compared to the prior year, primarily due to an increase in employee-related expenses and professional fees, including an increase in stock appreciation rights expense resulting from an increase in the share price of our common stock over the course of the year.

Depreciation and Amortization

Depreciation and amortization expense increased by $95.9 million, or 78%, for the year ended December 31, 2018 compared to the prior year, primarily due to an increase in the average number of new satellites placed into service during 2018 compared to 2017. We expect depreciation to increase until all satellites are placed into service in the first quarter of 2019.

Gain on Boeing Transaction

On January 3, 2017, pursuant to an Insourcing Agreement with Boeing, we hired the majority of Boeing employees and third party contractors who had previously been responsible for the operations and maintenance of our satellite constellation and ground infrastructure. As a result, we and Boeing terminated our previous Operations and Maintenance Agreement, or O&M Agreement, and our previous Iridium NEXT Support Service Agreement and entered into a new Development Services Agreement, or DSA, with a $6.0 million annual take-or-pay commitment through 2021.

In the first quarter of 2017, we recognized a $14.2 million gain consisting of (i) the derecognition of a purchase accounting liability of $11.0 million created when GHL Acquisition Corp. acquired Iridium in 2009 related to the fair value of the contractual arrangement with Boeing as of that date and (ii) the remainder of a credit, equal to $3.2 million, resulting from an O&M Agreement amendment in July 2010. No such transactions occurred in 2018.

Other Income (Expense)

Interest Income (Expense), net

Interest expense, net, for the year ended December 31, 2018 was $55.1 million, compared to interest income, net, of $4.3 million for the prior year period. The increase in interest expense was the result of less interest from the BPIAE Facility being capitalized as the average balance of satellites under construction decreased as satellites were launched and placed into service. Additional interest expense was also incurred as a result of the issuance of the Notes in March 2018.

Income Tax Benefit

For the year ended December 31, 2018, our income tax benefit was $7.3 million, compared to an income tax benefit of $114.3 million for the prior year. Our effective tax rate was approximately 35.4% for the year ended December 31, 2018 compared to (95.6)% for the prior year. The decrease in income tax benefit was primarily related to the one-time benefit in the prior year for the lower U.S. Federal corporate tax rate as a result of the Tax Act enacted in that period. See Note 13 to our condensed consolidated financial statements for more detail on our assessment of the Tax Act and the individual items impacting our effective tax rate for the year.

Net Income (Loss)

Net loss was $13.4 million for the year ended December 31, 2018, compared to net income of $233.9 million during the prior year period. This decrease in net income was primarily the result of the reduced income tax benefit compared to the prior year, as described above, and the $95.9 million increase in depreciation and amortization expense. For the year ended December 31, 2018, the decrease in net income was also driven by the $66.8 million increase in interest expense, net, the $38.7 million increase in other operating expenses and the non-recurrence of the $14.2 million gain from the Boeing Insourcing Agreement in 2017. These reductions in income were partially offset by the $75.0 million increase in our total revenue, including the $57.0 million increase in service revenue.

Liquidity and Capital Resources

In November 2019, we issued our Term Loan totaling $1,450.0 million, with an accompanying $100.0 million Revolving Facility. We used the proceeds of the Term Loan, cash in our DSRA and cash on hand to repay in full all of the indebtedness outstanding under the BPIAE Facility, including premiums for early prepayment.

As of December 31, 2019, we reported an aggregate balance of $1,450.0 million in borrowings under the Term Loan in our consolidated balance sheet, net of $26.6 million of net deferred financing costs for a net balance of $1,423.4 million outstanding. We have not drawn on our Revolving Facility.

Our Term Loan contains no financial maintenance covenants. With respect to the Revolving Facility, we are required to maintain a consolidated first lien net leverage ratio of no greater than 6.25 to 1 if more than 35% of the Revolving Facility has been drawn. The Credit Agreement contains other customary representations and warranties, affirmative and negative covenants, and events of default.

In February 2020, we issued an additional $200.0 million under our Term Loan and used the proceeds and approximately $183.5 million of cash on hand to repay in full all of the indebtedness outstanding under our Notes, including premiums for early repayment. These additional funds have all of the same terms as the initial borrowing under the Term Loan and were issued at a premium of 1.0%.

As of December 31, 2019, our total cash and cash equivalents balance was $223.6 million, and we had $100.0 million of borrowing availability under our Revolving Facility. Our principal sources of liquidity are cash, cash equivalents and internally generated cash flows. Our principal liquidity requirements over the next twelve months are primarily principal and interest on the Term Loan.

We believe our liquidity sources will provide sufficient funds for us to meet our liquidity requirements for at least the next 12 months.

Cash Flows** - **Comparison of the Year Ended December 31, 2019 and the Year Ended December 31, 2018

The following table shows our consolidated cash flows:

	Year Ended December 31,		
	2019	2018	Change
Statement of Cash Flows	(in thousands)		
Net cash provided by operating activities	$ 198,143	$ 263,709	$ (65,566)
Net cash used in investing activities	$ (127,819)	$ (378,912)	$ 251,093
Net cash (used in) provided by financing activities	$ (313,280)	$ 193,503	$ (506,783)

Cash Flows from Operating Activities

Net cash provided by operating activities for the year ended December 31, 2019 decreased $65.6 million from the prior year period primarily due to a decrease in working capital of approximately $65.5 million. This is primarily the result of less interest from the Credit Facility being capitalized as the average balance of satellites under construction decreased as satellites were launched and placed into service, which would have been recorded as an investing activity and is now recorded as an operating activity. Additionally, in November of 2019, we refinanced our Credit Facility resulting in monthly interest payments compared to previous semi-annual payments. As such, there is no interest payable in the 2019 working capital balance for the new Term Loan.

Cash Flows from Investing Activities

Net cash used in investing activities for the year ended December 31, 2019 decreased $251.1 million from the prior year period primarily due to a decrease in capital expenditures as we completed payments for the construction of our upgraded constellation.

Cash Flows from Financing Activities

Net cash used in financing activities was $313.3 million for the year ended December 31, 2019, compared to net cash provided by financing activities of $193.5 million for the year ended December 31, 2018. The increase in cash used in financing activities is a direct result of our deleveraging of our outstanding debt. In 2019, the combination of scheduled principal payments and the refinancing resulted in net payments of $313.8 million. In 2018, the issuance of the Notes and scheduled principal payments resulted in net borrowings of $198.5 million. See Note 7 to our condensed consolidated financial statements included in this report for further discussion of our indebtedness.

Cash Flows** - **Comparison of the Year Ended December 31, 2018 and the Year Ended December 31, 2017

The following table shows our consolidated cash flows:

Statement of Cash Flows	Year Ended December 31, 2018	Year Ended December 31, 2017	Change
	(in thousands)		
Net cash provided by operating activities	$ 263,709	$ 259,621	$ 4,088
Net cash used in investing activities	$ (378,912)	$ (372,680)	$ (6,232)
Net cash provided by financing activities	$ 193,503	$ 16,866	$ 176,637

Cash Flows from Operating Activities

Net cash provided by operating activities for the year ended December 31, 2018 increased by $4.1 million from the prior year. This increase was primarily due to a decrease in working capital related to timing of cash flows provided by prepaid and other current assets, accrued expenses and deferred revenues. Working capital provided by operations is primarily driven by launch related activities, including utilization of prepaid expenses related to launch services and receipt of payments for milestones related to hosted payloads.

Cash Flows from Investing Activities

Net cash used in investing activities for the year ended December 31, 2018 increased $6.2 million from the prior year period primarily due to an increase in net purchases of marketable securities, partially offset by a decrease in capital expenditures related to the timing of payments of our Iridium NEXT construction and launch.

Cash Flows from Financing Activities

Net cash provided by financing activities for the year ended December 31, 2018 increased by $176.6 million primarily due to the issuance of the Notes, offset in part by the related deferred financing fees, prepayments to extinguish amounts owed to Thales Alenia Space, as well as principal repayments on the BPIAE Facility and the payment of cumulative preferred dividends as described above.

Contractual Obligations and Commitments

The following table summarizes our outstanding contractual obligations as of December 31, 2019 (in millions):

Contractual Obligations	Less than 1 year	1-3 Years	3-5 years	More than 5 years	Total
Payment obligations:					
Boeing [1]	$ 6.0	$ 6.0	$ —	$ —	$ 12.0
Debt obligations: [2]					
Principal	10.9	389.0	29.0	1,381.1	1,810.0
Contractual interest	120.8	314.9	162.1	146.4	744.2
Operating lease obligations [3]	5.5	10.4	9.9	13.2	39.0
Uncertain tax positions [4]	—	—	—	—	1.0
Unconditional purchase obligations [5]	15.7	3.1	—	—	18.8
Total	$ 158.9	$ 723.4	$ 201.0	$ 1,540.7	$ 2,625.0

(1) Represents a five-year take-or-pay commitment under the Boeing DSA.

(2) Debt obligations include repayment of the Term Loan and the Notes. As mentioned above, the $360 million outstanding under the Notes, shown as Principal to be repaid in the 1-3 year period, was prepaid in February 2020. Giving effect to the additional $200 million in Term Loans incurred in February 2020 and repayment of the Notes, excluding any extinguishment premiums, as if they had occurred on December 31, 2019, the Principal payments in the table above would be: Less than 1 year - $372.4 million, 1-3 years - $33.0 million, 3-5 years - $33.0 million, and More than 5 years - $1,571.6 million, for a Total of $2,010.0 million; the contractual interest payments would be: Less than 1 year - $106.5 million, 1-3 years - $186.8 million, 3-5 years - $183.4 million, and More than 5 years - $165.7 million, for a Total of $642.4 million. The repayment schedule excludes amounts that may be required to be prepaid pursuant to the excess cash flow sweep provision of the Credit Agreement, as those amounts are not determinable in advance.

(3) Operating lease obligations do not include payments to landlords covering real estate taxes, common area maintenance and other charges, as such fees are not determinable based upon the provisions of our lease agreements.

(4) As of December 31, 2019, we estimated our uncertain tax positions to be $1.0 million, including penalties and interest. However, we are unable to reasonably estimate the period of the possible future payments for the remaining balance, and therefore the remaining balance has not been reflected in a specified period.

(5) Unconditional purchase obligations include our agreement with a supplier for the manufacturing of our devices and various commitments with other vendors that are enforceable, legally binding and have specified terms, including fixed or minimum quantities, minimum or variable price provisions, and a fixed timeline. Unconditional purchase obligations do not include agreements that are cancelable by us without penalty.

Off-Balance Sheet Arrangements

We do not currently have, nor have we had in the last three years, any relationships with unconsolidated entities or financial partnerships, such as entities referred to as structured finance or special purpose entities, which would have been established for the purpose of facilitating off-balance sheet arrangements or other contractually narrow or limited purposes.

Seasonality

Our results of operations have been subject to seasonal usage changes for commercial customers, and our results will be affected by similar seasonality going forward. March through October are typically the peak months for commercial voice services revenue and related subscriber equipment sales. U.S. government revenue and commercial IoT revenue have been less subject to seasonal usage changes.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We have an outstanding aggregate balance of $1,450.0 million under the Term Loan as of December 31, 2019. We have executed a long-term interest rate swap, or the Swap, for $1,000.0 million of the Term Loan, through November 2021. We also entered into an interest rate swaption, or the Swaption, that if executed on November 22, 2021, would extend our Swap through November 2026. For the portion of the Term Loan not covered under the Swap, we pay interest at an annual rate equal to the London Interbank Offered Rate, or LIBOR, plus 3.75%, with a 1.0% LIBOR floor, which will, accordingly, subject us to interest rate fluctuations in future periods. Had the currently outstanding borrowings under the Term Loan been outstanding throughout the year ended December 31, 2019, a one-half percentage point increase or decrease in the LIBOR would not have had a material impact on our interest cost for the period.

We have no borrowings under our Revolving Facility as of December 31, 2019. Accordingly, although the Revolving Facility bears interest at the same LIBOR plus 3.75% rate, but without a LIBOR floor, if and as drawn, we were not exposed to fluctuations in interest rates with respect to our Revolving Facility.

The interest rate under the Notes is fixed, and as a result, prior to their redemption in February 2020, we were not exposed to fluctuations in interest rates with respect to our obligations under the Notes.

Financial instruments that potentially subject us to concentrations of credit risk consist primarily of cash and cash equivalents, as well as accounts receivable. We maintain our cash and cash equivalents with financial institutions with high credit ratings and at times maintain the balance of our deposits in excess of federally insured limits. The majority of our cash is swept nightly into a money market fund invested in U.S. treasuries, Agency Mortgage Backed Securities and/or U.S. government guaranteed debt. Accounts receivable are due from both domestic and international customers. We perform credit evaluations of our customers’ financial condition and record reserves to provide for estimated credit losses. Accounts payable are owed to both domestic and international vendors.

Item 8. Financial Statements and Supplementary Data

Report of Ernst & Young LLP, Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Iridium Communications Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Iridium Communications Inc. (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations and comprehensive income (loss), changes in stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2019 and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 25, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of the critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing separate opinions on the critical audit matter or in the account or disclosures to which it relates.

Useful life of upgraded satellites

Description of the Matter	At December 31, 2019, the Company had $3.2 billion in Property and Equipment related to its upgraded satellites. As discussed in Note 2 to the consolidated financial statements, the Company's upgraded satellites are depreciated on a straight-line basis over their estimated useful life, which is currently estimated to be 12.5 years. The Company's useful life estimate is based on judgments made by management using the manufacturer's estimated design life for the assets, engineering data relating to the operation and performance of its satellite network, and the Company's long-term strategy for use of the assets. Auditing the Company's estimate of the useful life of the upgraded satellites involved a high degree of subjectivity due to the application of management's judgment when evaluating the available information to determine the estimated useful life. The resulting estimated useful life has a significant effect on the timing of recognition of depreciation expense given the magnitude of the carrying amount of the upgraded satellites.
How We Addressed the Matter in Our Audit	We tested the design and operating effectiveness of controls over the Company's processes to determine the estimated useful life of its upgraded satellites, including controls over management's evaluation of the available information to determine the estimated useful life. To test the Company's estimated useful life of the upgraded satellites, our audit procedures included, among others, evaluating the application of available information to determine the estimated useful life of the upgraded satellites. For example, we compared management's useful life estimate to the manufacturer's estimated design life, publicly available information on the estimated useful life of similar assets, satellite operation and performance, and the life of its first-generation satellite constellation. Additionally, we evaluated the effect of changes, if any, in the Company's long-term strategy for use of the assets on the useful life estimate.

/s/ Ernst & Young LLP

We have served as Company's auditor since 2001.
Tysons, Virginia
February 25, 2020

Iridium Communications Inc.
Consolidated Balance Sheets
(In thousands, except per share data)

	December 31, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 223,561	$ 273,352
Accounts receivable, net	68,697	71,210
Inventory	39,938	27,538
Prepaid expenses and other current assets	10,739	18,284
Total current assets	342,935	390,384
Property and equipment, net	3,180,799	3,370,855
Restricted cash and cash equivalents	—	191,935
Other assets	52,846	12,557
Intangible assets, net	46,977	48,540
Total assets	$ 3,623,557	$ 4,014,271
Liabilities and stockholders' equity		
Current liabilities:		
Short-term secured debt	$ 10,875	$ 126,000
Accounts payable	6,713	12,869
Accrued expenses and other current liabilities	49,293	56,990
Interest payable	7,790	29,431
Deferred revenue	39,080	37,429
Total current liabilities	113,751	262,719
Long-term secured debt, net	1,412,501	1,478,739
Long-term senior unsecured notes, net	352,994	350,998
Deferred income tax liabilities, net	188,653	241,422
Deferred revenue, net of current portion	67,092	74,656
Other long-term liabilities	29,284	4,160
Total liabilities	2,164,275	2,412,694
Commitments and contingencies		
Stockholders' equity:		
Series B preferred stock, $0.0001 par value, 500 shares authorized and issued; zero and 497 shares outstanding at December 31, 2019 and 2018, respectively	—	—
Common stock, $0.001 par value, 300,000 shares authorized, 131,632 and 112,200 shares issued and outstanding at December 31, 2019 and 2018, respectively	132	112
Additional paid-in capital	1,134,048	1,108,550
Retained earnings	331,969	501,712
Accumulated other comprehensive loss, net of tax	(6,867)	(8,797)
Total stockholders' equity	1,459,282	1,601,577
Total liabilities and stockholders' equity	$ 3,623,557	$ 4,014,271

See notes to consolidated financial statements

Iridium Communications Inc.
Consolidated Statements of Operations and Comprehensive Income (Loss)
(In thousands, except per share amounts)

	Year Ended December 31,		
	2019	2018	2017
Revenue:			
Services	$ 447,158	$ 406,757	$ 349,735
Subscriber equipment	82,856	97,848	77,119
Engineering and support services	30,430	18,403	21,192
Total revenue	560,444	523,008	448,046
Operating expenses:			
Cost of services (exclusive of depreciation and amortization)	94,958	86,016	80,396
Cost of subscriber equipment	50,186	56,857	44,445
Research and development	14,310	22,429	15,247
Selling, general and administrative	93,165	97,846	84,405
Depreciation and amortization	297,705	218,207	122,266
Total operating expenses	550,324	481,355	346,759
Gain on Boeing transaction	—	—	14,189
Operating income	10,120	41,653	115,476
Other income (expense):			
Interest income (expense), net	(115,396)	(55,149)	4,328
Loss on extinguishment of debt	(111,710)	(7,292)	—
Other income (expense), net	(1,133)	139	(232)
Total other income (expense)	(228,239)	(62,302)	4,096
Income (loss) before income taxes	(218,119)	(20,649)	119,572
Income tax benefit	56,120	7,265	114,284
Net income (loss)	(161,999)	(13,384)	233,856
Series A preferred stock dividends, declared and paid excluding cumulative dividends	—	1,750	1,750
Series B preferred stock dividends, declared and paid excluding cumulative dividends	4,194	2,109	2,109
Series A preferred stock dividends, undeclared	—	—	5,250
Series B preferred stock dividends, undeclared	—	6,290	6,327
Net income (loss) attributable to common stockholders	$ (166,193)	$ (23,533)	$ 218,420
Weighted average shares outstanding - basic	125,167	108,975	97,934
Weighted average shares outstanding - diluted	125,167	108,975	128,130
Net income (loss) attributable to common stockholders per share - basic	$ (1.33)	$ (0.22)	$ 2.23
Net income (loss) attributable to common stockholders per share - diluted	$ (1.33)	$ (0.22)	$ 1.82
Comprehensive income (loss):			
Net income (loss)	$ (161,999)	$ (13,384)	$ 233,856
Foreign currency translation adjustments, net of tax	2,051	(5,017)	1,664
Unrealized loss on cash flow hedges, net of tax (see Note 8)	(121)	—	—
Unrealized gain (loss) on marketable securities, net of tax	—	16	(14)
Comprehensive income (loss)	$ (160,069)	$ (18,385)	$ 235,506

See notes to consolidated financial statements

Iridium Communications Inc.
Consolidated Statements of Changes in Stockholders' Equity
(In thousands)

	Series A Convertible Preferred Stock		Series B Convertible Preferred Stock		Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Income (Loss)	Retained Earnings	Total Stockholders' Equity
	Shares	Amount	Shares	Amount	Shares	Amount				
Balance at December 31, 2016	1,000	—	500	—	95,879	96	1,060,311	(5,446)	288,797	1,343,758
Stock-based compensation	—	—	—	—	—	—	18,694	—	—	18,694
Stock options exercised and awards vested	—	—	—	—	2,537	2	4,233	—	—	4,235
Stock withheld to cover employee taxes	—	—	—	—	(213)	—	(1,865)	—	—	(1,865)
Net income	—	—	—	—	—	—	—	—	233,856	233,856
Dividends on Series A preferred stock	—	—	—	—	—	—	—	—	(1,750)	(1,750)
Dividends on Series B preferred stock	—	—	—	—	—	—	—	—	(2,109)	(2,109)
Cumulative translation adjustments, net of tax	—	—	—	—	—	—	—	1,664	—	1,664
Unrealized loss on marketable securities, net of tax	—	—	—	—	—	—	—	(14)	—	(14)
Balance at December 31, 2017	1,000	—	500	—	98,203	98	1,081,373	(3,796)	518,794	1,596,469
Stock-based compensation	—	—	—	—	—	—	16,727	—	—	16,727
Stock options exercised and awards vested	—	—	—	—	3,443	4	12,441	—	—	12,445
Stock withheld to cover employee taxes	—	—	—	—	(148)	(1)	(1,980)	—	—	(1,981)
Net loss	—	—	—	—	—	—	—	—	(13,384)	(13,384)
Dividends on Series A preferred stock	—	—	—	—	—	—	—	—	(7,000)	(7,000)
Dividends on Series B preferred stock	—	—	—	—	—	—	—	—	(8,427)	(8,427)
Cumulative translation adjustments, net of tax	—	—	—	—	—	—	—	(5,017)	—	(5,017)
Changes from adoption of ASC 606, net of tax	—	—	—	—	—	—	—	—	11,729	11,729
Unrealized gain on marketable securities, net of tax	—	—	—	—	—	—	—	16	—	16
Preferred stock converted to common	(1,000)	—	(3)	—	10,702	11	(11)	—	—	—
Balance at December 31, 2018	—	—	497	—	112,200	112	1,108,550	(8,797)	501,712	1,601,577
Stock-based compensation	—	—	—	—	—	—	16,641	—	—	16,641
Stock issued in connection with employee stock plan	—	—	—	—	3,003	3	13,468	—	—	13,471
Stock withheld to cover employee taxes	—	—	—	—	(199)	—	(4,594)	—	—	(4,594)
Net loss	—	—	—	—	—	—	—	—	(161,999)	(161,999)
Dividends on Series B Preferred Stock	—	—	—	—	—	—	—	—	(7,744)	(7,744)
Cumulative translation adjustments, net of tax	—	—	—	—	—	—	—	2,051	—	2,051
Unrealized loss on cash flow hedges, net of tax	—	—	—	—	—	—	—	(121)	—	(121)
Preferred stock converted to common	—	—	(497)	—	16,628	17	(17)	—	—	—
Balance at December 31, 2019	—	$ —	—	$ —	131,632	$ 132	$ 1,134,048	$ (6,867)	$ 331,969	$ 1,459,282

See notes to consolidated financial statements

Iridium Communications Inc.
Consolidated Statements of Cash Flows
(In thousands)

	Year Ended December 31,		
	2019	2018	2017
Cash flows from operating activities:			
Net income (loss)	$ (161,999)	$ (13,384)	$ 233,856
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Deferred income taxes	(53,897)	(8,334)	(115,812)
Depreciation and amortization	297,705	218,207	122,266
Loss on extinguishment of debt and Thales Alenia Space bills of exchange	111,710	7,292	—
Stock-based compensation (net of amounts capitalized)	15,138	14,490	15,958
Gain from contract liability write-off	—	—	(14,189)
Amortization of deferred financing fees	18,904	10,145	—
All other items, net	952	174	45
Changes in operating assets and liabilities:			
Accounts receivable	2,509	(12,783)	(10,343)
Inventory	(12,951)	(7,579)	(1,946)
Prepaid expenses and other current assets	7,973	5,705	2,875
Other assets	3,097	(1,417)	2,823
Accounts payable	(4,300)	(732)	896
Accrued expenses and other current liabilities	(4,174)	17,560	8,166
Interest payable	(12,919)	20,237	—
Deferred revenue	(6,435)	13,530	15,129
Other long-term liabilities	(3,170)	598	(103)
Net cash provided by operating activities	198,143	263,709	259,621
Cash flows from investing activities:			
Capital expenditures	(117,819)	(391,390)	(400,107)
Purchase of other investments	(10,000)	—	—
Purchases of marketable securities	—	(235,528)	(7,013)
Sales and maturities of marketable securities	—	248,006	34,440
Net cash used in investing activities	(127,819)	(378,912)	(372,680)
Cash flows from financing activities:			
Borrowings under the Credit Facility	—	—	22,207
Repayments on the Credit Facility, including extinguishment costs	(1,734,965)	(80,359)	—
Borrowings under the Term Loan B	1,450,000	—	—
Borrowings under the senior unsecured notes	—	360,000	—
Repayment of the Thales Alenia Space bills of exchange	—	(59,936)	—
Payment of deferred financing fees	(28,803)	(21,239)	(3,852)
Proceeds from exercise of stock options	13,471	12,445	4,235
Tax payment upon settlement of stock awards	(4,596)	(1,981)	(1,865)
Payment of Series A preferred stock dividends	—	(7,000)	(1,750)
Payment of Series B preferred stock dividends	(8,387)	(8,427)	(2,109)
Net cash (used in) provided by financing activities	(313,280)	193,503	16,866
Effect of exchange rate changes on cash and cash equivalents	1,230	(1,270)	144
Net increase (decrease) in cash and cash equivalents and restricted cash	(241,726)	77,030	(96,049)
Cash, cash equivalents and restricted cash, beginning of period	465,287	388,257	484,306
Cash, cash equivalents and restricted cash, end of period	$ 223,561	$ 465,287	$ 388,257

See notes to consolidated financial statements

Iridium Communications Inc.
Consolidated Statements of Cash Flows, continued
(In thousands)

	Year Ended December 31,		
	2019	2018	2017
Supplemental cash flow information:			
Interest paid, net of amounts capitalized	$ 119,464	$ 35,690	$ —
Income taxes paid (refund received), net	$ (606)	$ 931	$ 1,660
Supplemental disclosure of non-cash investing and financing activities:			
Property and equipment received but not paid for yet	$ 3,975	$ 11,900	$ 90,748
Interest capitalized but not paid	$ —	$ 9,194	$ 15,021
Capitalized amortization of deferred financing fees	$ 2,416	$ 16,306	$ 27,304
Capitalized stock-based compensation	$ 1,503	$ 2,237	$ 2,736
Credit Facility repayment in exchange for the settlement of hosting (Note 15)	$ —	$ 35,000	$ —
Cost basis investment in exchange for the settlement of accounts receivable	$ —	$ 3,300	$ —

See notes to consolidated financial statements

1. Organization and Business

Iridium Communications Inc. (the "Company"), a Delaware corporation, offers voice and data communications services and products to businesses, U.S. and international government agencies and other customers on a global basis. The Company is a provider of mobile voice and data communications services via a constellation of low earth orbiting satellites. The Company holds various licenses and authorizations from the U.S. Federal Communications Commission (the "FCC") and from foreign regulatory bodies that permit the Company to conduct its business, including the operation of its satellite constellation.

2. Significant Accounting Policies and Basis of Presentation

Principles of Consolidation and Basis of Presentation

The Company has prepared the consolidated financial statements in accordance with accounting principles generally accepted in the United States ("U.S. GAAP"). The accompanying consolidated financial statements include the accounts of (i) the Company, (ii) its wholly owned subsidiaries, and (iii) all less than wholly owned subsidiaries that the Company controls. All material intercompany transactions and balances have been eliminated.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosures of contingent assets and liabilities at the date of the financial statements and the reported amounts of income and expenses during the reporting period. Actual results could differ materially from those estimates.

Adopted Accounting Pronouncements

Effective January 1, 2019, the Company adopted Accounting Standards Update ("ASU") No. 2016-02, Leases ("ASU 2016-02") using the required modified retrospective approach. ASU 2016-02 requires lessees to record most leases on their balance sheets but recognize expenses on their income statements in a manner similar to previous accounting. See discussion below under the caption "Leases" in this Note 2 and in Note 6 for more detail on the Company's accounting policy with respect to lease accounting.

Effective January 1, 2019, the Company adopted ASU No. 2018-07, Compensation - Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting ("ASU 2018-07"), which aligns accounting for share-based payments issued to nonemployees to that of employees under the existing guidance of Topic 718, with certain exceptions. This update supersedes previous guidance for equity-based payments to nonemployees under Subtopic 505-50, Equity - Equity-Based Payments to Non-Employees. The adoption of ASU 2018-07 did not have a material impact on the Company's condensed consolidated financial statements.

In August 2017, the FASB issued ASU No. 2017-12, Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities ("ASU 2017-12"). This guidance amends the existing accounting standards for derivatives and hedging. The amendment improves the financial reporting of hedging relationships to better represent the economic results of an entity's risk management activities in its financial statements and made certain targeted improvements to simplify the application of the hedge accounting guidance in current U.S. GAAP. The amendments in this update also ease the administrative burden of hedge documentation requirements and assessing hedge effectiveness. During the fourth quarter of 2019, the Company adopted ASU 2017-12. As the Company did not have any hedging activities prior to adoption, adoption did not have an impact on the Company's condensed consolidated financial statements. The change in fair value of the Company's new cash flow hedges, entered into in November 2019 (see Note 8), will be recorded in accumulated other comprehensive loss and subsequently reclassified into earnings when the hedged item impacts earnings.

Recent Accounting Developments Not Yet Adopted

In June 2016, the FASB issued ASU No. 2016-13, Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments ("ASU 2016-13"). This guidance is intended to introduce a revised approach to the recognition and measurement of credit losses, emphasizing an updated model based on expected losses rather than incurred losses. The

Company intends to apply the new guidance on the effective date of January 1, 2020. Adoption of ASU 2016-13 will not have a material impact on the Company's consolidated financial statements and related disclosures.

In December 2019, the FASB issued ASU No. 2019-12, Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes (“ASU 2019-12”). This guidance amends certain aspects of the accounting for income taxes. The Company intends to apply the new guidance effective January 1, 2021, as required. The Company is currently evaluating the effect ASU 2019-12 may have on its consolidated financial statements and related disclosures.

Fair Value Measurements

The Company evaluates assets and liabilities subject to fair value measurements on a recurring and non-recurring basis to determine the appropriate level to classify them for each reporting period. This determination requires significant judgments to be made by management of the Company. Fair value is the price that would be received from the sale of an asset or paid to transfer a liability assuming an orderly transaction in the most advantageous market at the measurement date. U.S. GAAP establishes a hierarchical disclosure framework which prioritizes and ranks the level of observability of inputs used in measuring fair value.

The fair value hierarchy consists of the following tiers:

- Level 1, defined as observable inputs such as quoted prices in active markets for identical assets or liabilities;

- Level 2, defined as observable inputs other than Level 1 prices such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities; and

- Level 3, defined as unobservable inputs in which little or no market data exists, therefore requiring an entity to develop its own assumptions.

The fair value estimates are based upon certain market assumptions and information available to the Company. The carrying value of the following financial instruments approximated their fair values as of December 31, 2019 and 2018: cash and cash equivalents, prepaid expenses and other current assets, accounts receivable, accounts payable, and accrued expenses and other current liabilities. Fair values approximate their carrying values because of their short-term nature. The Level 2 cash equivalents include money market funds, commercial paper and short-term U.S. agency securities. The Company also classifies its derivative financial instruments as Level 2.

Concentrations of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk consist primarily of cash and cash equivalents and receivables. The majority of cash is invested into a money market fund with U.S. treasuries, Agency Mortgage Backed Securities and/or U.S. government guaranteed debt. While the Company maintains its cash and cash equivalents with financial institutions with high credit ratings, it often maintains those deposits in federally insured financial institutions in excess of federally insured limits. The Company performs credit evaluations of its customers’ financial condition and records reserves to provide for estimated credit losses. Accounts receivable are due from both domestic and international customers.

Cash and Cash Equivalents

The Company considers all highly liquid investments with original maturities of ninety days or less to be cash equivalents. These investments, along with cash deposited in institutional money market funds, regular interest bearing depository accounts and non-interest bearing depository accounts, are classified as cash and cash equivalents on the accompanying consolidated balance sheets.

Accounts Receivable

Trade accounts receivable are recorded at the invoiced amount and are subject to late fee penalties. Management develops its estimate of an allowance for uncollectible receivables based on the Company's experience with specific customers, aging of outstanding invoices, its understanding of customers' current economic circumstances and its own judgment as to the likelihood that the Company will ultimately receive payment. The Company writes off its accounts receivable when balances ultimately are deemed uncollectible. The allowance for doubtful accounts was not material as of December 31, 2019 and 2018.

Foreign Currencies

Generally, the functional currency of the Company's foreign consolidated subsidiaries is the local currency. Assets and liabilities of its foreign subsidiaries are translated to U.S. dollars based on exchange rates at the end of the reporting period. Income and expense items are translated at the weighted-average exchange rates prevailing during the reporting period. Translation adjustments are accumulated in a separate component of stockholders' equity. Transaction gains or losses are classified as other income (expense), net in the accompanying consolidated statements of operations and comprehensive income (loss). In instances where the financial statements of a foreign entity in a highly inflationary economy are material, they are remeasured as if the functional currency were the reporting currency. In these instances, the financial statements of those entities are remeasured into the reporting currency. A highly inflationary economy is one that has cumulative inflation of approximately 100% or more over a three-year period.

Deferred Financing Costs

Direct and incremental costs incurred in connection with securing debt financing are deferred and are amortized as additional interest expense using the effective interest method over the term of the related debt.

Capitalized Interest

Interest costs associated with financing the Company's assets during the construction period of the upgraded satellite constellation have been capitalized.

Inventory

Inventory consists primarily of finished goods, although the Company at times also maintains an inventory of raw materials from third-party manufacturers. The Company outsources manufacturing of subscriber equipment to a third-party manufacturer and purchases accessories from third-party suppliers. The Company's cost of inventory includes an allocation of overhead, including payroll and payroll-related costs of employees directly involved in bringing inventory to its existing condition, and freight. Inventories are valued using the average cost method and are carried at the lower of cost or net realizable value. Accordingly, the Company recorded expense of $0.8 million, $0.3 million and $0.4 million for the years ended December 31, 2019, 2018 and 2017, respectively, which are included within the cost of subscriber equipment for excess and obsolete inventory. The expenses for the years ended December 31, 2019, 2018 and 2017 were primarily related to certain handset parts and accessories.

The Company has a manufacturing agreement with Benchmark Electronics Inc. ("Benchmark") to manufacture most of its subscriber equipment. Pursuant to the agreement, the Company may be required to purchase excess materials at cost plus a contractual markup if the materials are not used in production within the periods specified in the agreement. Benchmark will then repurchase such materials from the Company at the same price paid by the Company, as required for the production of the subscriber equipment.

Stock-Based Compensation

The Company accounts for stock-based compensation at fair value. The fair value of stock options is determined at the grant date using the Black-Scholes option pricing model. The fair value of restricted stock units ("RSUs") is equal to the closing price of the underlying common stock on the grant date. The fair value of an award that is ultimately expected to vest is recognized on a straight-line basis over the requisite service or performance period and is classified in the consolidated statements of operations and comprehensive income in a manner consistent with the classification of the recipient's compensation. The expected vesting of the Company's performance-based RSUs is based upon the probability that the Company achieves the defined performance goals. The level of achievement of performance goals, if any, is determined by the Compensation Committee. Stock-based awards to non-employee consultants are expensed at their grant-date fair value as services are provided according to the terms of their agreements and are classified in selling, general and administrative expenses in the accompanying consolidated statements of operations and comprehensive income. Classification of stock-based compensation by line item on the balance sheet and statement of operations is presented below:

	Year Ended December 31,	
	2019	2018
	(In thousands)	
Property and equipment, net	$ 1,187	$ 1,865
Inventory	237	234
Prepaid and other current assets	79	138
Cost of subscriber equipment	23	26
Cost of services (exclusive of depreciation and amortization)	4,326	3,600
Research and development	243	340
Selling, general and administrative	10,546	10,524
Total stock-based compensation	$ 16,641	$ 16,727

Property and Equipment

Property and equipment is carried at cost less accumulated depreciation. Depreciation is calculated using the straight-line method over the following estimated useful lives:

Satellites	12.5 years
Ground system	5-7 years
Equipment	3-5 years
Internally developed software and purchased software	3-7 years
Building	39 years
Building improvements	5-39 years
Leasehold improvements	shorter of useful life or remaining lease term

The Company calculates depreciation expense using the straight-line method and evaluates the appropriateness of the useful life used in this calculation on a quarterly basis or as events occur that require additional assessment.

Repairs and maintenance costs are expensed as incurred.

Leases

Upon transition under ASU 2016-02, the Company elected the suite of practical expedients as a package applied to all of its leases, including (i) not reassessing whether any expired or existing contracts are or contain leases, (ii) not reassessing the lease classification for any expired or existing leases, and (iii) not reassessing initial direct costs for any existing leases. For new leases, the Company will determine if an arrangement is or contains a lease at inception. Leases are included as right-of-use ("ROU") assets within other assets and ROU liabilities within accrued expenses and other liabilities and within other long-term liabilities on the Company's condensed consolidated balance sheets.

ROU assets and liabilities are recognized at commencement date based on the present value of lease payments over the lease term. Certain leases contain variable contractual obligations as a result of future base rate escalations which are estimated based on observed trends and included within the measurement of present value. The Company's leases do not provide an implicit rate. The Company uses its incremental borrowing rate based on the information available at commencement date in determining the present value of lease payments. The ROU asset also includes any lease payments made and excludes lease incentives. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

The Company has lease agreements with lease and non-lease components, which are generally accounted for separately. For certain leases, such as teleport network ("TPN") facilities, the Company elected the practical expedient to combine lease and non-lease components as a single lease component. Taxes assessed on leases in which the Company is either a lessor or lessee are excluded from contract consideration and variable payments when measuring new lease contracts or remeasuring existing lease contracts.

Adoption of ASU 2016-02 on January 1, 2019 had an impact of approximately $27.1 million and $30.1 million on the Company's opening assets and liabilities, respectively.

Long-Lived Assets

The Company assesses its long-lived assets for impairment when indicators of impairment exist. Recoverability of assets is measured by comparing the carrying amounts of the assets to the future undiscounted cash flows expected to be generated by the assets. Any impairment loss would be measured as the excess of the assets' carrying amount over their fair value.

In June 2011, the Company entered into an agreement with International Space Company Kosmotras ("Kosmotras"), as a supplemental launch services provider for the upgraded satellite constellation. The original cost under the Kosmotras agreement was $51.8 million. Kosmotras to date has been unable to obtain the permits or authorizations to launch the Company's satellites on a Dnepr rocket as planned, and Kosmotras has proposed no satisfactory alternative launch plan. As the Company believed the construction-in-progress associated with the Kosmotras launch services will no longer be used or further developed, the Company wrote-off the full amount previously paid to Kosmotras, by recording accelerated depreciation expense of $36.8 million, in the fourth quarter of 2017. There were no similar write-offs during the years ended December 31, 2019 and 2018.

Intangible Assets

The Company's intangible assets with finite lives are amortized over their useful lives and reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of the asset may not be recoverable. If any indicators were present, the Company would test for recoverability by comparing the carrying amount of the asset to the net undiscounted cash flows expected to be generated from the asset. If those net undiscounted cash flows do not exceed the carrying amount (i.e., the asset is not recoverable), the Company would perform the next step, which is to determine the fair value of the asset and record an impairment loss, if any. The Company evaluates the useful lives for these intangible assets each reporting period to determine whether events and circumstances warrant a revision in their remaining useful lives.

Amortization is calculated using the straight-line method over the following estimated useful lives:

Intellectual property	20 years
Assembled workforce	7 years
Patents	14 - 20 years

Revenue Recognition

The Company derives its revenue primarily as a wholesaler of satellite communications products and services. The primary types of revenue include (i) service revenue (access and usage-based airtime fees), (ii) subscriber equipment revenue, and (iii) revenue generated by providing engineering and support services to commercial and government customers. In addition to the discussion immediately below, see Note 12 for further discussion of the Company's revenue recognition.

Wholesaler of satellite communications products and services

Pursuant to wholesale agreements, the Company sells its products and services to service providers who, in turn, sell the products and services to other distributors or directly to the end users. The Company recognizes revenue when an arrangement exists, services or equipment are transferred, the transaction price is determined, the arrangement has commercial substance, and collection of consideration is probable.

Contracts with multiple performance obligations

At times, the Company sells services and equipment through arrangements that bundle equipment, airtime and other services. For these revenue arrangements when the Company sells services and equipment in bundled arrangements and determines that it has separate distinct performance obligations, the Company allocates the bundled contract price among the various performance obligations based on each deliverable’s stand-alone selling price. If the stand-alone selling price is not directly observable, the Company estimates the amount to be allocated for each performance obligation based on observable market transactions or the residual approach. When the Company determines the performance obligations are not distinct, the Company recognizes revenue on a combined basis as the last obligation is satisfied. To the extent the Company's contracts include variable consideration, the transaction price includes both fixed and variable consideration. The variable consideration contained within the Company's contracts with customers may include discounts, credits and other similar items. When a contract includes variable consideration, the Company evaluates the estimate of the variable consideration to determine whether the estimate needs to be constrained; therefore, the Company includes the variable consideration in the transaction price only to the extent that it is probable that a significant reversal of the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. Variable consideration estimates are updated at the end of each quarter.

Service revenue sold on a stand-alone basis

Service revenue is generated from the Company’s service providers through usage of its satellite system and through fixed monthly access fees per user charged to service providers. Revenue for usage is recognized when usage occurs. Revenue for fixed-per-user access fees is recognized over the usage period in which the services are provided to the end user. The Company sells prepaid services in the form of e-vouchers and prepaid cards. A liability is established equal to the cash paid upon purchase for the e-voucher or prepaid card. On January 1, 2018, upon the adoption of ASU 2014-09, the Company now recognizes revenue from (i) the prepaid services upon the use of the e-voucher or prepaid card by the customer and (ii) the estimated pattern of use. Prior to January 1, 2018, revenue from unused prepaid services was recognized upon expiration of the prepaid card. The Company does not offer refunds for unused prepaid services.

Services sold to the U.S. government

The Company provides airtime and airtime support to U.S. government and other authorized customers pursuant to the Enhanced Mobile Satellite Services (“EMSS”) contract managed by Air Force Space Command. Under the terms of this agreement, authorized customers continue to utilize airtime services, provided through the U.S. government’s dedicated gateway. These services include unlimited global standard and secure voice, low and high-speed data, paging, broadcast and Distributed Tactical Communications Services (“DTCS”) services for an unlimited number of Department of Defense (“DoD”) and other federal subscribers. Under this contract, revenue is based on the annual fee for the fixed-price contract with unlimited subscribers, and is recognized on a straight-line basis over each contractual year. The U.S. government purchases its subscriber equipment from third-party distributors and not directly from the Company.

Subscriber equipment sold on a stand-alone basis

The Company recognizes subscriber equipment sales and the related costs when title to the equipment (and the risks and rewards of ownership) passes to the customer, typically upon shipment. Customers do not have rights of return without prior consent from the Company.

Government engineering and support services

The Company provides maintenance services to the U.S. government’s dedicated gateway. This revenue is recognized ratably over the periods in which the services are provided; the related costs are expensed as incurred.

Other government and commercial engineering and support services

The Company also provides engineering services to assist customers in developing new technologies for use on the Company’s satellite system. The revenue associated with fixed-fee contracts is recognized over time using costs incurred to date relative to total estimated costs at completion to measure progress toward satisfying its performance obligation. The Company does not include purchases of goods from a third party in its evaluation of costs incurred. Incurred costs represent work performed, which corresponds with, and thereby best depicts, the transfer of control to the customer. Revenue on cost-plus-fixed-fee contracts is recognized to the extent of estimated costs incurred plus the applicable fees earned. The Company considers fixed fees under cost-plus-fixed-fee contracts to be earned in proportion to the allowable costs incurred in performance of the contract.

Research and Development

Research and development costs are charged to expense in the period in which they are incurred.

Advertising Costs

Costs associated with advertising and promotions are expensed as incurred. Advertising expenses were $0.9 million, $0.4 million and $0.3 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Income Taxes

The Company accounts for income taxes using the asset and liability approach, which requires the recognition of tax benefits or expenses for temporary differences between the financial reporting and tax bases of assets and liabilities. A valuation allowance is established when necessary to reduce deferred tax assets to the amounts expected to be realized. The Company also recognizes a tax benefit from uncertain tax positions only if it is “more likely than not” that the position is sustainable based on its technical merits. The Company’s policy is to recognize interest and penalties on uncertain tax positions as a component of income tax expense.

Derivative Financial Instruments

The Company uses interest rate swap agreements to manage its exposures to fluctuating interest rate risk on variable rate debt. Derivatives are measured at fair value and are recorded on the balance sheet within other assets and other long-term liabilities. The Company’s derivatives are designated as cash flow hedges, with the effective portion of the changes in fair value of the derivatives recorded in accumulated other comprehensive loss within the Company’s consolidated balance sheets and subsequently recognized in earnings when the hedged items impact earnings. Any ineffective portion of cash flow hedges would be recorded in current earnings. Within the consolidated statement of operations and comprehensive income, the gains and losses related to cash flow hedges are recognized within interest income (expense), net, as this is the same financial statement line item used for any gains or losses associated with the hedged items. Cash flows from hedging activities are included operating activities within the company’s consolidated statements of cash flows, which is the same category as the items being hedged. See Note 8 for further information.

Net Income (Loss) Per Share

The Company calculates basic net income (loss) per share by dividing net income (loss) attributable to common stockholders by the weighted-average number of shares of common stock outstanding during the period. Diluted net income (loss) per share takes into account the effect of potential dilutive common shares when the effect is dilutive. The effect of potentially dilutive common shares, including common stock issuable upon exercise of outstanding stock options, is computed using the treasury stock method. The effect of potentially dilutive common shares from the conversion of the outstanding convertible preferred securities was computed using the as-if converted method at the stated conversion rate. The Company’s unvested RSUs awarded to the board of directors contain non-forfeitable rights to dividends and therefore are considered to be participating securities in periods of net income. The calculation of basic and diluted net income (loss) per share excludes net income attributable to these unvested RSUs from the numerator and excludes the impact of these unvested RSUs from the denominator.

3. Cash and Cash Equivalents and Restricted Cash

Cash and Cash Equivalents

The following table summarizes the Company’s cash and cash equivalents:

	December 31, 2019	December 31, 2018	Recurring Fair Value Measurement
	(In thousands)		
Cash and cash equivalents:			
Cash	$ 13,943	$ 20,879	
Money market funds	209,618	252,473	Level 2
Total cash and cash equivalents	$ 223,561	$ 273,352	

Restricted Cash and Cash Equivalents

The Company was required to maintain a minimum cash reserve within a debt service reserve account (“DSRA”) for debt service related to its $1.8 billion loan facility with Bpifrance Assurance Export S.A.A. (“BPIAE Facility”) (see Note 7) which was extinguished in November 2019. As of December 31, 2019 and 2018, the Company’s restricted cash and cash equivalents balances, which included the minimum cash reserve for debt service and the interest earned on those amounts, was zero and $191.9 million, respectively.

4. Property and Equipment

Property and equipment consisted of the following:

	December 31, 2019	December 31, 2018
	(In thousands)	
Satellite system	$ 3,197,460	$ 2,766,627
Ground system	66,789	60,656
Equipment	45,406	42,152
Internally developed software and purchased software	241,793	215,252
Building and leasehold improvements	31,050	30,517
Total depreciable property and equipment	3,582,498	3,115,204
Less: accumulated depreciation	(682,130)	(453,463)
Total depreciable property and equipment, net of accumulated depreciation	2,900,368	2,661,741
Land	8,037	8,037
Ground spares	225,254	—
Construction-in-process:		
Upgraded satellite systems under construction	—	658,395
Other construction-in-process	47,140	42,682
Total property and equipment, net of accumulated depreciation	$ 3,180,799	$ 3,370,855

Other construction-in-process consisted of the following:

	December 31, 2019	December 31, 2018
	(In thousands)	
Internally developed software	$ 38,064	$ 27,725
Equipment	8,983	12,841
Ground system	93	2,116
Total other construction-in-process	$ 47,140	$ 42,682

Depreciation expense was $296.1 million, $216.6 million and $120.7 million for the years ended December 31, 2019, 2018 and 2017, respectively. The increase in depreciation from 2018 to 2019 is primarily due to the increased number of upgraded satellites in service during the current period as the Company completed the replacement of its first-generation satellites in the first quarter of 2019.

5. Intangible Assets

The Company had identifiable intangible assets as follows:

	December 31, 2019			
	Useful Life (years)	Gross Carrying Value	Accumulated Amortization	Net Carrying Value
	(In thousands)			
Indefinite life intangible assets:				
Trade names	Indefinite	$ 21,195	$ —	$ 21,195
Spectrum and licenses	Indefinite	14,030	—	14,030
Total		35,225	—	35,225
Definite life intangible assets:				
Intellectual property	20 years	16,439	(8,217)	8,222
Assembled workforce	7 years	5,678	(2,433)	3,245
Patents	14 - 20	324	(39)	285
Total		22,441	(10,689)	11,752
Total intangible assets		$ 57,666	$ (10,689)	$ 46,977

	December 31, 2018			
	Useful Life (years)	Gross Carrying Value	Accumulated Amortization	Net Carrying Value
	(In thousands)			
Indefinite life intangible assets:				
Trade names	Indefinite	$ 21,195	$ —	$ 21,195
Spectrum and licenses	Indefinite	14,030	—	14,030
Total		35,225	—	35,225
Definite life intangible assets:				
Intellectual property	20 years	16,439	(7,434)	9,005
Assembled workforce	7 years	5,678	(1,622)	4,056
Patents	14 - 20	274	(20)	254
Total		22,391	(9,076)	13,315
Total intangible assets		$ 57,616	$ (9,076)	$ 48,540

Amortization expense was $1.6 million for each of the years ended December 31, 2019, 2018 and 2017. See Note 9 for further details on the Boeing assembled workforce, added in 2017.

Future amortization expense with respect to intangible assets existing at December 31, 2019, by year and in the aggregate, was as follows:

Year ending December 31,	Amount
	(In thousands)
2020	$ 1,616
2021	1,616
2022	1,616
2023	1,616
2024	805
Thereafter	4,483
Total estimated future amortization expense	$ 11,752

6. Leases

The Company has operating leases for land, office space, satellite network operations center ("SNOC") facilities, system gateway facilities, a warehouse and a distribution center. The Company also has operations and maintenance ("O&M") agreements that include leases associated with two TPN facilities. Some of Company's leases include options to extend the leases for up to 10 years and some include options to terminate the lease within 1 year. The Company does not include term extension options as part of its present value calculation of lease liabilities unless those options have a high likelihood of being exercised. The Company's weighted-average remaining lease term relating to its operating leases is 7.5 years. The weighted-average discount rate used to calculate the operating lease liability payment is 6.7%.

The table below summarizes the Company's lease-related assets and liabilities:

Leases	Classification	12/31/2019
		(in thousands)
Operating lease assets		
Noncurrent	Other assets	$ 27,007
Total lease assets		$ 27,007
Operating lease liabilities		
Current	Accrued expenses and other current liabilities	$ 3,397
Noncurrent	Other long-term liabilities	26,859
Total lease liabilities		$ 30,256

During the years ended December 31, 2019, 2018 and 2017, the Company incurred lease expense of $5.1 million, $5.1 million and $4.7 million, respectively. A portion of rent expense during these comparable periods is derived from leases that are not included within the ROU asset and liability balances shown above as they have terms shorter than twelve months and are therefore excluded from balance sheet recognition under ASU 2016-02.

Future payment obligations with respect to the Company's operating leases in which it is the lessee existing at December 31, 2019, by year and in the aggregate, are as follows:

Year Ending December 31,	Amount
	(in thousands)
2020	$ 5,477
2021	5,382
2022	4,992
2023	4,983
2024	4,944
Thereafter	13,213
Total lease payments	$ 38,991

Lessor Arrangements

Operating leases in which the Company is a lessor consist primarily of hosting agreements with Aireon LLC (see Note 15) and L3Harris Technologies, Inc. (“L3Harris”) for space on the Company’s upgraded satellites. These agreements provide for a fee that will be recognized over the life of the satellites, currently expected to be approximately 12.5 years. Lease income related to these agreements was $21.6 million and $17.1 million during the years December 31, 2019 and 2018, respectively. Lease income is recorded as hosted payload and other data service revenue within service revenue on the Company’s condensed consolidated statements of operations and comprehensive income (loss).

Both Aireon and L3Harris have made payments for their hosting agreements and will continue to do so. Future income with respect to the Company's operating leases in which it is the lessor existing at December 31, 2019, by year and in the aggregate, is as follows:

Year Ending December 31,	Amount
	(in thousands)
2020	$ 21,445
2021	21,445
2022	21,445
2023	21,445
2024	21,445
Thereafter	120,352
Total lease income	$ 227,577

7. Debt

Term Loan

On November 4, 2019, pursuant to a new loan agreement (the “Credit Agreement”) the Company entered into a $1,450.0 million term loan with Deutsche Bank AG (the “Term Loan”) and an accompanying $100.0 million revolving loan (the “Revolving Facility”). The Company used the proceeds of the Term Loan, along with its DSRA and cash on hand, to prepay all of the indebtedness outstanding under the BPIAE Facility, as well as related expenses. The Term Loan was issued at a price equal to 99.5% of its face value and bears interest at an annual rate of LIBOR plus 3.75%, with a 1.0% LIBOR floor and has a seven-year maturity. Interest is paid monthly on the last business day of the month. Principal is paid quarterly, beginning with the quarter ending June 30, 2020, at a rate of one percent per annum, with the remaining principal due upon maturity. The Revolving Facility bears interest at the same rate (but without a LIBOR floor) if and as drawn, with no original issue discount, a commitment fee of 0.5% per year on the undrawn amount, and a five-year maturity. As of December 31, 2019, the Company reported an aggregate of $1,450.0 million in borrowings under the Term Loan, before $26.6 million of net unamortized deferred financing costs, for a net principal balance of $1,423.4 million in borrowings in the accompanying consolidated balance sheet. As of December 31, 2019, based upon recent trading prices (Level 2 - market approach), the fair value of the Company's $1,450.0 million in borrowings under the Term Loan due in 2026 was $1,468.1 million.

The Credit Agreement restricts the Company's ability to incur liens, engage in mergers or asset sales, pay dividends, repay subordinated indebtedness, incur indebtedness, make investments and loans, and engage in other transactions as specified in the Credit Agreement, and also contains a mechanism to sweep a portion of the Company's excess cash flow (as defined in the

Credit Agreement. The Credit Agreement provides for specified exceptions, baskets measured as a percentage of trailing twelve months of earnings before interest, taxes, depreciation and amortization (“EBITDA”), and unlimited exceptions in the case of incurring indebtedness and liens and making investments, dividend payments, and payments of subordinated indebtedness, as well as a phase-out of the excess cash flow sweep, based on achievement and maintenance of specified leverage ratios. The Credit Agreement permits repayment, prepayment, and repricing transactions, subject to a 1% penalty in the event the facility is prepaid or repriced within the first six months.

The Credit Agreement contains no financial maintenance covenants with respect to the Term Loan. With respect to the Revolving Facility, the Credit Agreement requires the Company to maintain a consolidated first lien net leverage ratio (as defined in the Credit Agreement) of no greater than 6.25 to 1 if more than 35% of the Revolving Facility has been drawn. The Credit Agreement contains other customary representations and warranties, affirmative and negative covenants, and events of default.

The effective interest rate on outstanding principal of the Term Loan was 6.0% during the year ended December 31, 2019.

BPIAE Facility

In October 2010, the Company entered into its $1.8 billion BPIAE Facility with a syndicate of bank lenders, which was repaid in November 2019. Upon entering the Term Loan Credit Agreement, the Company paid the gross outstanding principal balance on its BPIAE Facility in the amount of $1,547.9 million. Overall, the Company incurred a loss on extinguishment of debt in the amount of approximately $111.7 million related to all early extinguishments of the BPIAE Facility in 2019, representing premiums paid, net of a refund received for insurance premiums previously paid to BPIAE, and the write-off of unamortized debt issuance costs.

Senior Unsecured Notes

On March 21, 2018, the Company issued senior unsecured notes (the “Notes”) which bear interest at 10.25% per annum and mature on April 15, 2023. Interest is payable semi-annually on April 15 and October 15 and principal is repaid in full upon maturity. Interest payments began on October 15, 2018. As of December 31, 2019, the Company reported an aggregate of $360.0 million in borrowings under the Notes, before $7.0 million of net unamortized deferred financing costs, for a net principal balance of $353.0 million in borrowings in the accompanying consolidated balance sheet. As of December 31, 2019, based upon recent trading prices (Level 2 - market approach), the fair value of the Company's $360.0 million in borrowings under the Notes due in 2022 was $385.9 million. The Notes contain covenant requirements that apply to certain permitted financing actions. The Company was in compliance with all covenant requirements under the Notes as of December 31, 2019.

Total Debt

Total interest incurred during the years ended December 31, 2019, 2018 and 2017 was $140.1 million, $142.7 million and $114.4 million, respectively. Interest incurred includes amortization of deferred financing fees of $21.6 million, $26.5 million and $27.3 million for the years ended December 31, 2019, 2018 and 2017, respectively. Interest capitalized during the years ended December 31, 2019 and 2018 was $15.1 million and $76.7 million, respectively. During 2017, all interest was capitalized. Interest accrued for the years ended December 31, 2019 and 2018 was $7.8 million and $29.4 million, respectively.

Future minimum principal repayments with respect to the Company's debt balances existing at December 31, 2019 by year and in the aggregate, are as follows:

Year ending December 31,		**Amount**
		(In thousands)
2020	$	10,875
2021		14,500
2022		374,500
2023		14,500
2024		14,500
Thereafter		1,381,125
Total debt commitments	$	1,810,000
Less: Original issuance discount		33,630
Less: Total short-term debt		10,875
Total long-term debt, net	$	1,765,495

The repayment schedule above excludes amounts that may be required to be prepaid pursuant to the excess cash flow sweep provision of the Credit Agreement, as those amounts are not determinable in advance. The repayment schedule also excludes the impact of the early repayment of the Notes and the proceeds under the additional $200.0 million in Term Loans, which closed in February 2020, as discussed further in Note 19.

8. Derivative Financial Instruments

The Company is exposed to interest rate fluctuations related to its variable rate debt instruments. The Company may reduce its exposure to fluctuations in the cash flows associated with changes in the variable interest rates by entering into offsetting positions through the use of interest rate swap contracts which result in recognizing a fixed interest rate for the portion of the Company’s variable rate debt to be hedged. This will reduce the negative impact of increases in the variable rates over the term of the contracts. These financial instruments are not used for trading or other speculative purposes. Historically, the Company has not incurred, and does not expect to incur in the future, any losses as a result of counterparty default.

Hedge effectiveness of interest rate swap contracts is based on a long-haul hypothetical derivative methodology and includes all changes in value. The Company formally assesses, both at the hedge’s inception and on an ongoing quarterly basis, whether the designated derivative instruments are highly effective in offsetting changes in the cash flows of the hedged items. When the hedging instrument is sold, expires, is terminated or is exercised, or no longer qualifies for hedge accounting, or is no longer probable, hedge accounting is discontinued prospectively.

Interest Rate Swaps

On November 27, 2019, the Company executed a long-term interest rate swap (“Swap”) effective through November 2021 to mitigate variability in forecasted interest payments on a portion of the Company’s borrowings under its Term Loan. On the last business day of each month, the Company receives variable interest payments based on one-month LIBOR from the counterparty. The Company also entered into an interest rate swaption agreement (“Swaption”) that, if executed on November 22, 2021, would extend the Company's Swap through November 2026. The Company pays a fixed annual rate of 0.50% for the Swaption and a fixed rate of 1.565% on the Swap. Both the Swap and the Swaption derivative instruments carry a notional amount of $1,000.0 million as of December 31, 2019. The Company designated both the Swap and Swaption as qualifying hedging instruments and accounted for these derivatives as cash flow hedges.

At inception, the Swap and Swaption were designated as cash flow hedges for hedge accounting. The unrealized changes in market value are recorded in accumulated other comprehensive income (loss) and reclassified into earnings during the period in which the hedged transaction affects earnings. Over the next 12 months, the Company expects any gains or losses for cash flow hedges reclassified from accumulated other comprehensive income (loss) into earnings to have an immaterial impact on the Company’s condensed consolidated financial statements.

Fair Value of Derivative Instruments

As of December 31, 2019, the Company recorded a long-term asset of $0.8 million to recognize the fair value of the Swap, and a long-term liability of $0.9 million to recognize the fair value of the Swaption. The company did not enter into any cash flow hedges in the prior periods. The fair value of derivative assets was recorded in other long-term assets and the fair value of derivative liabilities was recorded in other long-term liabilities.

During the year ended December 31, 2019, the Company incurred $0.3 million in net interest expense for both the Swap and the Swaption. Gains and losses resulting from fair value adjustments to the Swap and Swaption are recorded within accumulated other comprehensive loss within the Company's consolidated balance sheets and reclassified to interest expense on the dates that interest payments become due. Cash flows related to the interest rate swaps are included in cash flows from operating activities on the consolidated statements of cash flows. The amount of unrealized loss, net of tax, recognized in accumulated other comprehensive income (loss) in the consolidated balance sheets related to the Company's derivative financial instruments was $0.1 million during the year ended December 31, 2019. There were no gains or losses related to derivative financial instruments during the years ended December 31, 2018 and 2017.

9. Boeing Insourcing Agreement

On January 3, 2017, the Company hired the majority of the employees and third-party contractors who were responsible for the operations and maintenance of the Company's satellite constellation and ground infrastructure pursuant to an Insourcing Agreement with The Boeing Company ("Boeing"). The Company paid Boeing $5.5 million, of which $2.75 million was paid in each of December 2016 and December 2017. As a result, the Company and Boeing terminated their previous Operations and Maintenance Agreement ("O&M Agreement") and Support Service Agreement for the upgraded satellite constellation and entered into a new DSA with a $6.0 million minimum annual commitment through 2021. Boeing no longer has a unilateral right to commence the de-orbit of the Company's first-generation satellites. The acquisition of this assembled workforce was recorded as a definite-lived intangible asset in January 2017 and is being amortized over an estimated useful life of seven years. Additionally, by terminating the O&M Agreement, the Company recognized a $14.2 million gain in the first quarter of 2017, consisting of (i) the derecognition of a purchase accounting liability created when GHL Acquisition Corp. acquired Iridium Holdings LLC in 2009 related to the fair value of the contractual arrangement with Boeing as of that date, and (ii) the remainder of a credit resulting from a July 2010 Boeing contract amendment.

10. Stock-Based Compensation

In May 2019, the Company's stockholders approved the amendment and restatement of the Company's 2015 Equity Incentive Plan (as so amended and restated, the "Amended 2015 Plan"), primarily to increase the number of shares available under the plan. The Company registered with the SEC an additional 2,542,664 shares of common stock made available for issuance pursuant to the Amended 2015 Plan, bringing the total to 30,944,912 shares registered. Through December 31, 2019, the remaining aggregate number of shares of the Company's common stock available for future grants under the Amended 2015 plan was 13,529,137. The Amended 2015 Plan provides for the grant of stock-based awards, including nonqualified stock options, incentive stock options, restricted stock, RSUs, stock appreciation rights and other equity securities as incentives and rewards for employees, consultants and non-employee directors of the Company and its affiliated entities. The number of shares of common stock available for issuance under the Amended 2015 Plan is reduced by (i) one share for each share of common stock issued pursuant to an appreciation award, such as a stock option or stock appreciation right with an exercise or strike price of at least 100% of the fair market value of the underlying common stock on the date of grant, and (ii) 1.8 shares for each share of common stock issued pursuant to any stock award that is not an appreciation award, also known as a "full value award." The Amended 2015 Plan allows the Company to utilize a broad array of equity incentives and performance cash incentives in order to secure and retain the services of its employees, directors and consultants, and to provide long-term incentives that align the interests of its employees, directors and consultants with the interests of the Company's stockholders. The Company accounts for stock-based compensation at fair value.

Stock Option Awards

The fair value of stock options is determined at the grant date using the Black-Scholes option pricing model. The stock option awards granted to employees generally (i) have a term of ten years, (ii) vest over a four-year period with 25% vesting after the first year of service and the remainder vesting ratably on a quarterly basis thereafter, (iii) are contingent upon employment on the vesting date, and (iv) have an exercise price equal to the fair value of the underlying shares at the date of grant.

Fair Value Determination

We have used the Black-Scholes-Merton option pricing model to determine fair value of our stock option awards on the date of grant. We will reconsider the use of the Black-Scholes-Merton model if additional information becomes available in the future that indicates another model would be more appropriate or if grants issued in future periods have characteristics that cannot be reasonably estimated under this model.

The following weighted-average assumptions were used for option grants during the years ended December 31, 2019, 2018 and 2017:

- *Volatility* - The expected volatility of the options granted was estimated based upon historical volatility of the Company's share price of its common stock through daily observations of its trading history.

- *Expected life of options* - The expected life of options granted to employees was determined from the simplified method.

- *Risk-free interest rate* - The yield on zero-coupon U.S. Treasury strips was used to extrapolate a forward-yield curve. This “term structure” of future interest rates was then input into a numeric model to provide the equivalent risk-free rate to be used in the Black-Scholes-Merton model based on the expected term of the underlying grants.

- *Dividend yield* - The Black-Scholes-Merton valuation model requires an expected dividend yield as an input. The Company does not anticipate paying dividends during the expected term of the grants; therefore, the dividend rate is assumed to be zero.

The Company historically granted stock options to newly hired and promoted employees. During 2019, 2018 and 2017, the Company granted approximately 139,000, 364,000 and 209,000 stock options, respectively, with an estimated aggregate grant date fair value of $1.3 million, $2.4 million and $0.9 million, respectively.

The following table summarizes weighted-average assumptions used in the Company's calculations of fair value:

	Year Ended December 31,		
	2019	2018	2017
Expected volatility	40.78%	39.53%	41.11%
Expected term (years)	6.11	6.11	6.25
Expected dividends	—%	—%	—%
Risk free interest rate	2.59%	2.68%	1.92%

A summary of the activity of the Company's stock options is as follows:

	Shares	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value
	(In thousands, except years and per share data)			
Options outstanding at December 31, 2016	7,202	$ 7.87		
Granted	209	10.50		
Cancelled or expired	(2)	7.24		
Exercised	(534)	7.93		
Forfeited	(19)	9.13		
Options outstanding at December 31, 2017	6,856	$ 7.94	4.63	$ 26,459
Granted	364	15.56		
Cancelled or expired	(1)	8.59		
Exercised	(1,477)	8.42		
Forfeited	(39)	9.97		
Options outstanding at December 31, 2018	5,703	$ 8.29	4.38	$ 57,956
Granted	139	21.12		
Cancelled or expired	(1)	11.80		
Exercised	(1,670)	8.11		
Forfeited	(18)	11.74		
Options outstanding at December 31, 2019	4,153	$ 8.78	4.03	$ 65,887
Options exercisable at December 31, 2019	3,710	$ 7.85	3.51	$ 62,279
Options exercisable and expected to vest at December 31, 2019	4,143	$ 8.75	4.02	$ 65,815

The Company recognized $1.4 million, $1.5 million and $1.8 million of stock-based compensation expense related to stock options in the years ended December 31, 2019, 2018 and 2017, respectively.

The weighted-average grant date fair value of options granted during the years ended December 31, 2019, 2018 and 2017 was $9.18, $6.63 and $4.51 per share, respectively. The total fair value of the shares vested during the years ended December 31, 2019, 2018 and 2017 was $1.4 million, $1.4 million and $2.0 million, respectively.

As of December 31, 2019, the total unrecognized cost related to non-vested options was approximately $2.7 million. This cost is expected to be recognized over a weighted-average period of 2.4 years.

Restricted Stock Units

The RSUs granted to newly hired and promoted employees, as well as to employees for on-going service, vest over a four-year period, with 25% vesting on the first anniversary of the grant date and the remainder vesting ratably on a quarterly basis thereafter, subject to continued employment. The RSUs granted to non-employee directors generally vest in full on the first anniversary of the grant date. The RSUs granted to non-employee consultants generally vest 50% on the first anniversary of the grant date and ratably on a quarterly basis through the second anniversary of the grant date. Some RSUs granted to employees for performance vest upon the completion of defined performance goals, subject to continued employment. The Company's RSUs are generally classified as equity awards because the RSUs will be paid in the Company's common stock upon vesting. The related compensation expense is recognized over the service period and is based on the grant date fair value of the Company's common stock and the number of shares expected to vest. The fair value of the awards is not remeasured at the end of each reporting period. The awards do not carry voting rights until they are vested and released in accordance with the terms of the award.

Service-Based Awards

The majority of the annual compensation the Company provides to members of its board of directors is paid in the form of RSUs. In addition, certain members of the Company's board of directors elect to receive the remainder of their annual compensation, or a portion thereof, in the form of RSUs. An aggregate amount of approximately 76,000, 110,000 and 96,000 service-based RSUs were granted to its directors as a result of these elections during the years ended December 31, 2019, 2018 and 2017, respectively, with an estimated grant date fair value of $1.4 million, $1.3 million and $1.0 million, respectively.

During the years ended December 31, 2019, 2018 and 2017, the Company granted approximately 740,000, 900,000 and 964,000 service-based RSUs, respectively, to its employees, with an estimated grant date fair value of $16.9 million, $10.7 million and $8.5 million, respectively.

During the years ended December 31, 2019, 2018 and 2017, the Company granted approximately 11,000, 14,000 and 8,000 service-based RSUs, respectively, to non-employee consultants with an estimated grant date fair value of $0.2 million, $0.2 million and $0.1 million, respectively.

Performance-Based Awards

In March 2019, 2018 and 2017, the Company awarded approximately 125,000, 474,000 and 1,190,000 performance-based RSUs, respectively, to the Company's executives and employees (the "Bonus RSUs"), with an estimated grant date fair value of $2.9 million, $5.6 million and $10.5 million, respectively. Vesting of the Bonus RSUs is and was dependent upon the Company's achievement of defined performance goals over the respective fiscal year. The Company records stock-based compensation expense related to performance-based RSUs when it is considered probable that the performance conditions will be met. Management believes it is probable that substantially all of the 2019 Bonus RSUs will vest. The level of achievement, if any, of performance goals will be determined by the compensation committee of the Company's board of directors and, if such goals are achieved, the 2019 Bonus RSUs will vest, subject to continued employment, in March 2020. A portion of the March 2018 Bonus RSUs vested in March 2019 upon the determination of the level of achievement of the performance goals.

Additionally, during 2019, 2018 and 2017, the Company awarded approximately 96,000, 134,000 and 173,000 performance-based RSUs, respectively, to the Company's executives (the "Executive RSUs"). The estimated aggregate grant date fair values of the Executive RSUs granted in 2019, 2018 and 2017 was $2.2 million, $1.6 million and $1.5 million, respectively. Vesting of the Executive RSUs is and was dependent upon the Company's achievement of defined performance goals over a two-year period. Management believes it is probable that the Executive RSUs will vest at least in part. The vesting of Executive RSUs will ultimately range from 0% to 150% of the number of shares underlying the Executive RSU grant based on the level of achievement of the performance goals. If the Company achieves the performance goals, 50% of the Executive RSUs will vest on the second anniversary of the grant date and the remaining 50% will vest on the third anniversary of the grant date, in each case, subject to the executive's continued service as of the vesting date. During 2019 and 2018, the Company awarded additional shares underlying performance-based RSUs to the Company's executives for over-achievement of performance goal targets related to the 2017 and 2016 Executive RSUs in the amounts of 11,000 shares and 1,000 shares, respectively. During 2017, 53,000 shares of performance-based RSUs were forfeited as a result of under-achievement of performance goal targets related to the 2015 Executive RSUs.

Award Summary

A summary of the Company's activity for outstanding RSUs is as follows:

	RSUs	Weighted-Average Grant Date Fair Value Per RSU
	(In thousands)	
Outstanding at December 31, 2016	3,323	$ 7.40
Granted	2,431	8.89
Forfeited	(203)	8.42
Released	(2,003)	7.16
Outstanding at December 31, 2017	3,548	$ 8.50
Granted	1,632	11.87
Forfeited	(163)	9.69
Released	(1,940)	8.64
Outstanding at December 31, 2018	3,077	$ 10.13
Granted	1,058	22.50
Forfeited	(102)	14.86
Released	(1,331)	10.52
Outstanding at December 31, 2019	2,702	$ 14.62
Vested and unreleased at December 31, 2019 (1)	727	

(1) These RSUs were granted to the Company's board of directors as a part of their compensation for board and committee service and had vested but had not yet been issued and released.

As of December 31, 2019, the total unrecognized cost related to non-vested RSUs was approximately $14.7 million. This cost is expected to be recognized over a weighted-average period of 1.44 years. The Company recognized $15.2 million, $15.2 million and $17.0 million of stock-based compensation expense related to RSUs in the years ended December 31, 2019, 2018 and 2017, respectively.

11. Equity Transactions

Preferred Stock

The Company is authorized to issue 2.0 million shares of preferred stock with a par value of $0.0001 per share. As described below, the Company issued 1.0 million shares of preferred stock in the fourth quarter of 2012 and 0.5 million shares of preferred stock in the second quarter of 2014. The remaining 0.5 million authorized shares of preferred stock were undesignated and unissued as of December 31, 2019.

Series A Cumulative Perpetual Convertible Preferred Stock

In the fourth quarter of 2012, the Company issued 1.0 million shares of its 7.00% Series A Cumulative Perpetual Convertible Preferred Stock (the "Series A Preferred Stock") in a private offering. During the three months ended March 31, 2018, the Company's daily volume-weighted average stock price remained at or above $12.26 per share for a period of 20 out of 30 trading days, thereby allowing for the conversion of the Series A Preferred Stock at the election of the Company. On March 20, 2018, the Company converted all outstanding shares of its Series A Preferred Stock into shares of common stock, resulting in the issuance of 10,599,974 shares of common stock. The Company declared and paid all current and cumulative dividends to holders of record of Series A Preferred Stock as of March 8, 2018. As such, the Company paid cash dividends of $7.0 million to the holders of the Series A Preferred Stock. The Company paid cash dividends of $1.8 million to the holders of the Series A Preferred Stock during the year ended December 31, 2017.

Series B Cumulative Perpetual Convertible Preferred Stock

In May 2014, the Company issued 500,000 shares of its Series B Cumulative Perpetual Convertible Preferred Stock (the "Series B Preferred Stock") in an underwritten public offering at a price to the public of $250 per share.

During the three months ended June 30, 2019, the Company's daily volume-weighted average stock price remained at or above $11.21 per share for a period of 20 out of 30 trading days, allowing for the conversion of the Series B Preferred Stock at the election of the Company. On May 15, 2019, the Company converted all outstanding shares of its Series B Preferred Stock into shares of common stock, resulting in the issuance of 16,627,632 shares of common stock. To convert the stock, the Company declared and paid all current and cumulative dividends to holders of record of Series B Preferred Stock as of May 8, 2019, resulting in a dividend payment of $8.4 million.

12. Revenue

Effective January 1, 2018, the Company adopted ASU No. 2014-09. Under the new standard, the Company performs the following steps to determine the amount of revenue to be recognized: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations; and (v) recognition of revenue when (or as) the Company satisfies each performance obligation. The Company only applies the five-step model to contracts when it is probable that it will collect the consideration it is entitled to in exchange for the goods or services it transfers to the customer.

In addition, the standard requires disclosure of the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers. The Company adopted the standard using the modified retrospective method with a cumulative effect adjustment recorded to reduce opening retained earnings by $15.7 million. This method required application of the new guidance at the beginning of the earliest comparative period presented for revenue agreements that were not substantially complete as of the date of adoption. The Company does not disclose the value of unsatisfied performance obligations because the majority of its contracts have expected lengths of one year or less. The Company did not retrospectively restate contracts with modifications prior to the earliest period presented, but instead reflected the aggregate effect of all modifications at transition.

The Company derives its revenue primarily as a wholesaler of satellite communications products and services. Pursuant to wholesale agreements, the Company sells its products and services to service providers who, in turn, sell the products and services to other distributors or directly to the end users. The primary types of revenue include (i) service revenue (access and usage-based airtime fees), (ii) subscriber equipment revenue, and (iii) revenue generated by providing engineering and support services to commercial and government customers. See Note 2 for a description of the Company's accounting policies in connection with each of these types of arrangements.

The following table summarizes the Company's services revenue:

	Year Ended December 31,		
	2019	2018	2017
	(in thousands)		
Commercial voice and data services	$ 203,622	$ 193,176	$ 177,685
Commercial IoT data services	96,435	85,054	74,142
Hosted payload and other data services	49,969	40,527	9,908
Total commercial	350,026	318,757	261,735
Government services[1]	97,132	88,000	88,000
Total services	$ 447,158	$ 406,757	$ 349,735

(1) Effective September 15, 2019, the Company entered into a multi-year, fixed price contract with the U.S. Air Force Space Command, or AFSPC, for Enhanced Mobile Satellite Services, or the EMSS Contract. Under the EMSS Contract, the Company will provide satellite airtime services, including unlimited global standard and secure voice, paging, fax, Short Burst Data, Iridium Burst, RUDICS and Distributed Tactical Communications System, or DTCS, services for an unlimited number of U.S. Department of Defense, or DoD, and other federal government subscribers. This replaces the previous EMSS contract signed in 2013.

The following table summarizes the Company's engineering and support services revenue:

	Year Ended December 31,		
	2019	2018	2017
		(in thousands)	
Commercial	$ 2,852	$ 716	$ 3,109
Government	27,578	17,687	18,083
Total	$ 30,430	$ 18,403	$ 21,192

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled receivables (contract assets), and deferred revenue (contract liabilities) on the condensed consolidated balance sheets. The Company bills amounts under its agreed-upon contractual terms at periodic intervals (for services), upon shipment (for equipment), or upon achievement of contractual milestones or as work progresses (for engineering and support services). Billing may occur subsequent to revenue recognition, resulting in accounts receivable (contract assets). The Company may also receive payments from customers before revenue is recognized, resulting in deferred revenue (contract liabilities). The Company recognized revenue that was previously recorded as deferred revenue in the amounts of $43.0 million and $18.0 million for the years ended December 31, 2019 and 2018, respectively. The Company has also recorded costs of obtaining contracts expected to be recovered in prepaid expenses and other assets (contract assets or commissions), that are not separately disclosed on the condensed consolidated balance sheets. The commissions are recognized over the estimated prepaid usage period. The contract assets not separately disclosed are as follows:

	Year Ended December 31,	
	2019	2018
	(in thousands)	
Contract Assets:		
Commissions	$ 1,116	$ 1,010
Other contract costs	$ 3,231	$ 3,631

The primary impact of adopting ASU 2014-09 related to the Company's prepaid service revenue and related amounts that expired unused. The Company now estimates the expected revenue that will expire unused on an ongoing basis and recognizes this revenue in a manner consistent with the usage period.

13. Income Taxes

U.S. and foreign components of income before income taxes are presented below:

	Year Ended December 31,		
	2019	2018	2017
		(In thousands)	
U.S. income (loss)	$ (218,391)	$ (22,147)	$ 120,281
Foreign income (loss)	272	1,498	(709)
Total income (loss) before income taxes	$ (218,119)	$ (20,649)	$ 119,572

The components of the Company's income tax provision were as follows:

	Year Ended December 31,		
	2019	2018	2017
		(In thousands)	
Current taxes:			
Federal tax (benefit) expense	$ (3,796)	$ 17	$ 13
State tax (benefit) expense	37	(91)	422
Foreign tax expense	1,481	1,163	863
Total current tax (benefit) expense	(2,278)	1,089	1,298
Deferred taxes:			
Federal tax expense (benefit)	(50,690)	(9,159)	(110,811)
State tax expense (benefit)	(1,850)	904	(4,851)
Foreign tax expense (benefit)	(1,302)	(99)	80
Total deferred tax expense (benefit)	(53,842)	(8,354)	(115,582)
Total income tax expense (benefit)	$ (56,120)	$ (7,265)	$ (114,284)

On December 22, 2017, the Tax Cuts and Jobs Act of 2017 (the "Tax Act") was signed into law making significant changes to the Internal Revenue Code. Changes include, but are not limited to, a corporate tax rate decrease from 35% to 21% effective for tax years beginning after December 31, 2017, the transition of U.S international taxation from a worldwide tax system to a territorial system, and a one-time transition tax on the mandatory deemed repatriation of cumulative foreign earnings as of December 31, 2017.

The Securities and Exchange Commission issued Staff Accounting Bulletin No. 118 ("SAB 118") to address the application of U.S. GAAP in situations when a registrant does not have the necessary information available, prepared, or analyzed (including computations) in reasonable detail to complete the accounting for certain income tax effects of the Tax Act. SAB 118 was effective for reporting periods that include December 22, 2017. Due to the timing of the enactment and the complexity involved in applying the provisions of the Tax Act, the Company made reasonable estimates of the effects of the Tax Act and recorded provisional amounts in its December 31, 2017 financial statements including the remeasurement of its deferred tax assets/liabilities for an estimated net tax benefit of $150.9 million. In the fourth quarter of 2018, the Company completed its accounting for the income tax effects of the Tax Act. No material adjustments were required to the provisional amounts initially recorded.

A reconciliation of the U.S. federal statutory income tax expense to the Company's effective income tax provision is below. Any amounts that do not have a meaningful impact on this reconciliation are not separately disclosed.

	Year Ended December 31,		
	2019	2018	2017
		(In thousands)	
Expected tax expense (benefit) at U.S. federal statutory tax rate	$ (45,790)	$ (4,336)	$ 41,850
State taxes, net of federal benefit	(15,608)	(3,361)	5,133
State tax valuation allowance	16,216	10,651	582
Deferred impact of state tax law changes and elections	(2,414)	(6,481)	(10,217)
Tax Act - deferred tax effects	—	—	(150,903)
Equity-based compensation	(8,227)	(3,807)	(977)
Limitation on executive compensation deduction	792	1,568	26
Other nondeductible items	873	298	110
Tax credits	(995)	(2,872)	(528)
Foreign taxes and other adjustments	(967)	1,075	640
Total income tax expense (benefit)	$ (56,120)	$ (7,265)	$ (114,284)

The components of deferred tax assets and liabilities are as follows:

	December 31,	
	2019	2018
	(In thousands)	
Deferred tax assets		
Long-term contracts	$ 69,188	$ 70,518
Federal, state and foreign net operating losses, other carryforwards and tax credits	382,392	277,678
Other	24,137	20,002
Total deferred tax assets	475,717	368,198
Valuation allowance	(29,554)	(14,174)
Net deferred tax assets	446,163	354,024
Deferred tax liabilities		
Fixed assets, intangibles and research and development expenditures	(565,897)	(529,037)
Investment in joint venture	(60,374)	(57,686)
Other	(7,095)	(8,357)
Total deferred tax liabilities	(633,366)	(595,080)
Net deferred income tax liabilities	$ (187,203)	$ (241,056)

Pursuant to ASC 740, the Company nets deferred tax assets and liabilities within the same jurisdiction. As of December 31, 2019, the Company had a net deferred tax asset of $1.5 million that is included in other assets on the balance sheet and a net deferred tax liability of $188.7 million.

The Company recognizes valuation allowances to reduce deferred tax assets to the amount that is more likely than not to be realized. In assessing the likelihood of realization, management considers: (i) future reversals of existing taxable temporary differences; (ii) future taxable income exclusive of reversing temporary differences and carryforwards; (iii) taxable income in prior carryback year(s) if carryback is permitted under applicable tax law; and (iv) tax planning strategies.

The Company had deferred tax assets related to cumulative U.S. federal net operating loss carryforwards of approximately $280.5 million and $219.6 million as of December 31, 2019 and 2018, respectively. The pre-2018 U.S. federal net operating loss carryforwards if unutilized, will expire in various amounts from 2031 through 2037. Pursuant to the Tax Act, the post-2017 U.S. federal net operating loss carryforwards do not expire. The Company believes that the U.S. federal net operating losses will be utilized before the expiration dates and, as such, no valuation allowance has been established for these deferred tax assets. The Company had deferred tax assets related to the state net operating loss carryforwards of approximately $54.5 million and $36.7 million as of December 31, 2019 and 2018, respectively, that expire from 2025 through 2039. The Company does not expect to fully utilize all of its state net operating losses within the respective carryforward periods and as such reflects a partial valuation allowance of $27.7 million and $11.4 million as of December 31, 2019 and 2018, respectively, against these deferred tax assets on its consolidated balance sheet. The Company had deferred tax assets related to the foreign net operating loss carryforwards of approximately $0.9 million, for each of December 31, 2019 and 2018, that begin to expire in 2023. The Company does not expect to fully utilize all of its foreign net operating losses within the carryforward periods and as such reflects a partial valuation allowance of $0.8 million for each of December 31, 2019 and 2018, against these deferred tax assets on its consolidated balance sheet. The timing and manner in which the Company will utilize the net operating loss carryforwards in any year, or in total, may be limited in the future as a result of changes in the Company’s ownership and any limitations imposed by the jurisdictions in which the Company operates.

The Company has approximately $9.5 million and $8.4 million of deferred tax assets related to research and development tax credits as of December 31, 2019 and 2018, respectively, that expire in various amounts from 2029 through 2039. The Company has approximately $5.2 million of deferred tax assets related to foreign tax credits for each of December 31, 2019 and 2018, that expire in various amounts from 2020 through 2029. The Company does not expect to utilize all of its foreign tax credits within the respective carryforward periods. As such, the Company has a partial valuation allowance of $1.1 million as of December 31, 2019, which is unchanged from December 31, 2018. The Company had $3.6 million of deferred tax assets related to Alternative Minimum Tax (“AMT”) credits as of December 31, 2018. Pursuant to the Tax Act, the Company received a partial refund in 2019 and expects the remaining amount to be refunded by 2021. The remaining balance of the AMT credit was reclassed from a deferred tax asset to a receivable.

The Company has provided for U.S. income taxes on all undistributed earnings of its significant foreign subsidiaries since the Company does not indefinitely reinvest these undistributed earnings. The Company measures deferred tax assets and liabilities using tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The Company recognizes the effect on deferred tax assets and liabilities of a change in tax rates in income in the period that includes the enactment date.

Uncertain Income Tax Positions

The Company is subject to income taxes in the U.S. and various state and foreign jurisdictions. Significant judgment is required in evaluating tax positions and determining the provision for income taxes. The Company establishes liabilities for tax-related uncertainties based on estimates of whether, and the extent to which, additional taxes may be due. These liabilities are established when the Company believes that certain positions might be challenged despite its belief that its tax return positions are fully supportable. The Company adjusts these liabilities in light of changing facts and circumstances, such as the outcome of a tax audit. The provision for income taxes includes the impact of changes to these liabilities.

The amount of unrecognized tax benefits was $1.0 million and $1.1 million at December 31, 2019 and 2018, respectively. Any changes in the next twelve months are not anticipated to have a significant impact on the results of operations, financial position or cash flows of the Company. All of the Company's uncertain tax positions, if recognized, would affect its income tax expense.

The Company has elected an accounting policy to classify interest and penalties related to unrecognized tax benefits as a component of income tax expense. As of December 31, 2019 and 2018, potential interest and penalties on unrecognized tax benefits were not significant.

The Company is subject to tax audits in all jurisdictions for which it files tax returns. Tax audits by their very nature are often complex and can require several years to complete. Currently, there are no U.S. federal, state or foreign jurisdiction tax audits pending. The Company's corporate U.S. federal and state tax returns from 2010 to 2018 remain subject to examination by tax authorities and the Company's foreign tax returns from 2012 to 2018 remain subject to examination by tax authorities.

The following is a tabular reconciliation of the total amounts of unrecognized tax benefits which includes related interest and penalties:

	2019	2018
	(In thousands)	
Balance at January 1,	$ 1,112	$ 1,046
Change attributable to tax positions taken in a prior period	38	50
Change attributable to final assessment	(176)	—
Change attributable to tax positions taken in the current period	—	16
Decrease attributable to lapse of statute of limitations	(21)	—
Balance at December 31,	$ 953	$ 1,112

14. Net Income (Loss) Per Share

The computations of basic and diluted net income (loss) per share are set forth below:

	Year Ended December 31,		
	2019	2018	2017
	(In thousands, except per share data)		
Numerator:			
Net income (loss) attributable to common stockholders - basic and diluted	$ (166,193)	$ (23,533)	$ 218,420
Dividends on Series A preferred stock, declared and undeclared	—	—	7,000
Dividends on Series B preferred stock, declared and undeclared	—	—	8,436
Numerator for diluted net income (loss) per share	$ (166,193)	$ (23,533)	$ 233,641
Denominator:			
Denominator for basic net income (loss) per share - weighted average outstanding common shares	125,167	108,975	97,934
Dilutive effect of stock options	—	—	1,558
Dilutive effect of Performance RSUs	—	—	1,308
Dilutive effect of Series A preferred stock	—	—	10,602
Dilutive effect of Series B preferred stock	—	—	16,728
Denominator for diluted net income (loss) per share	125,167	108,975	128,130
Net income (loss) per share attributable to common stockholders - basic	$ (1.33)	$ (0.22)	$ 2.23
Net income (loss) per share attributable to common stockholders - diluted	$ (1.33)	$ (0.22)	$ 1.82

Due to the Company's net loss for the year ended December 31, 2019, all potential common stock equivalents were anti-dilutive and therefore excluded from the calculation of diluted net loss per share. For the year ended December 31, 2019, 0.3 million unvested performance-based RSUs were not included in the computation of basic and diluted net loss per share as certain performance criteria had not been satisfied, and options to purchase 0.2 million shares of common stock were not included in the computation of diluted net loss per share, as the effect would be anti-dilutive.

Due to the Company's net loss for the year ended December 31, 2018, all potential common stock equivalents were anti-dilutive. For the year ended December 31, 2018, 0.3 million unvested performance-based RSUs were not included in the computation of basic and diluted net income per share, as certain performance criteria have not been satisfied, and options to purchase 0.1 million shares of common stock were not included in the computation of basic and diluted net loss per share, as the effect would be anti-dilutive. For the year ended December 31, 2018, 16.7 million as-if converted shares of the Series B Preferred Stock were not included in the computation of diluted net loss per share, as the effect would be anti-dilutive. For the year ended December 31, 2018, $6.3 million in cumulative unpaid dividends to holders of the Series B Preferred Stock was not declared or accrued as a result of all cash dividends being suspended in connection with the amendments to the BPIAE Facility described in Note 7, but such amounts were deducted to arrive at net loss attributable to common stockholders.

For the year ended December 31, 2017, 2.1 million unvested service-based RSUs were excluded from the computation of basic net income per share and not included in the computation of diluted net income per share, as the effect would be anti-dilutive, and 0.2 million unvested performance-based RSUs were not included in the computation of basic and diluted net income per share, as certain performance criteria have not been satisfied. For the year ended December 31, 2017, $5.3 million and $6.3 million in cumulative unpaid dividends to holders of the Series A Preferred Stock and Series B Preferred Stock, respectively, were not declared or accrued as a result of all cash dividends being suspended, but such amounts were deducted to arrive at net income attributable to common stockholders.

15. Related Party Transactions

Aireon LLC and Aireon Holdings LLC

The Company's satellite constellation hosts the Aireon® system, which provides a global air traffic surveillance service through a series of automatic dependent surveillance-broadcast ("ADS-B") receivers. The Company formed Aireon in 2011, with subsequent investments from the air navigation service providers ("ANSPs") of Canada, Italy, Denmark, Ireland and the United Kingdom, to develop and market this service. Aireon has contracted to pay the Company a fee to host the ADS-B receivers on its constellation, as well as fees for power and data services in connection with the delivery of the air traffic surveillance data. Pursuant to agreements with Aireon, Aireon will pay the Company fees of $200.0 million to host the ADS-B receivers, of which $54.1 million had been paid as of December 31, 2019. Aireon also pays power fees of up to approximately $3.7 million per year (the "Hosting Agreement"), as well as data services fees of up to approximately $19.8 million per year for the delivery of the air traffic surveillance data (the "Data Services Agreement"). The Aireon ADS-B receivers were activated on an individual basis as the satellite on which the receiver is hosted began carrying traffic. Pursuant to ASU 2016-02, the Company considers the agreement with Aireon related to the hosting as an operating lease. The Company had previously determined there was not sufficient support that Aireon would be able to make the payments due under the Hosting Agreement. Beginning in the second quarter of 2018, the Company began receiving payments due under the Hosting Agreement and recognizing the related revenue. During the years ended December 31, 2019 and 2018, the Company recorded $16.0 million and $13.9 million related to this agreement, respectively.

In December 2018, in connection with Aireon's entry into a debt facility, the Company and the other Aireon investors contributed their respective interests in Aireon into a new holding company, Aireon Holdings LLC, and entered into an Amended and Restated Aireon Holdings LLC Agreement. Aireon Holdings LLC holds 100% of the membership interests in Aireon LLC, which remains the operating entity. At December 31, 2019, the Company had a fully diluted ownership stake in Aireon Holdings LLC of approximately 35.7%, subject to certain redemption provisions contained in the Amended and Restated Limited Liability Company Agreement.

Under the Data Services Agreement, Aireon pays the Company monthly data service payments on a per satellite basis. The Company recorded data service revenue from Aireon of $12.6 million and $9.1 million for the years ended December 31, 2019 and 2018, respectively.

Under two services agreements, the Company also provides administrative services and support services, including services relating to Aireon's hosted payload operations center to Aireon, which are paid monthly. Aireon receivables due to the Company under all agreements totaled $1.4 million and $1.0 million at December 31, 2019 and 2018, respectively.

16. Segments, Significant Customers, Supplier and Service Providers and Geographic Information

The Company operates in one business segment, providing global satellite communications services and products.

The Company derived approximately 22%, 20% and 24% of the Company's total revenue in the years ended December 31, 2019, 2018 and 2017, respectively, from prime contracts or subcontracts with agencies of the U.S. government. For the years ended December 31, 2019, 2018 and 2017, no single commercial customer accounted for more than 10% of the Company's total revenue.

Approximately 39% and 34% of the Company's accounts receivable balance at December 31, 2019 and 2018, respectively, was due from prime contracts or subcontracts with agencies of the U.S. government. As of December 31, 2019 and 2018, no single commercial customer accounted for more than 10% of the Company's total accounts receivable balance.

The Company contracts for the manufacture of its subscriber equipment primarily from a limited number of manufacturers and utilizes other sole source suppliers for certain component parts of its devices. Should events or circumstances prevent the manufacturer or the suppliers from producing the equipment or component parts, the Company's business could be adversely affected until the Company is able to move production to other facilities of the manufacturer or secure a replacement manufacturer or an alternative supplier for such component parts.

Net property and equipment by geographic area was as follows:

	December 31,	
	2019	2018
	(In thousands)	
United States	$ 421,253	$ 188,203
Satellites in orbit	2,744,356	2,504,734
Upgraded satellite systems under construction (United States)	—	658,395
All others [(1)]	15,190	19,523
Total	$ 3,180,799	$ 3,370,855

(1) No single country in this group represented more than 10% of property and equipment, net.

Revenue by geographic area was as follows:

	Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
United States	$ 300,494	$ 276,398	$ 229,741
Canada	53,199	48,511	44,107
United Kingdom	50,401	51,344	46,245
Other countries [(1)]	156,350	146,755	127,953
Total	$ 560,444	$ 523,008	$ 448,046

(1) No single country in this group represented more than 10% of revenue.

Revenue is attributed to geographic area based on the billing address of the distributor. Service location and the billing address are often not the same. The Company's distributors sell services directly or indirectly to end users, who may be located or use the Company's products and services elsewhere. The Company cannot provide the geographical distribution of end users because it does not contract directly with them. The Company is exposed to foreign currency exchange fluctuations as foreign currency exchange rate movements create a degree of risk by affecting the U.S. dollar value of sales made and costs incurred in foreign currencies.

17. Employee Benefit Plan

The Company sponsors a defined-contribution 401(k) retirement plan (the "Plan") that covers all employees. Employees are eligible to participate in the Plan on the first day of the month following the date of hire, and participants are 100% vested from the date of eligibility. The Company matches employees' contributions equal to 100% of the salary deferral contributions up to 5% of the employees' eligible compensation each pay period. Company-matching contributions to the Plan were $3.1 million, $3.0 million and $2.5 million for the years ended December 31, 2019, 2018 and 2017, respectively.

18. Selected Quarterly Information (Unaudited)

The following represents the Company's unaudited quarterly results:

	Quarter Ended			
	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
	(In thousands, except per share data)			
Revenue	$ 133,685	$ 143,100	$ 144,785	$ 138,874
Operating income (loss)	$ (1,633)	$ 3,741	$ 8,011	$ 1
Net loss	$ (18,024)	$ (18,106)	$ (18,012)	$ (107,857)
Net loss per common share - basic and diluted	$ (0.18)	$ (0.16)	$ (0.14)	$ (0.82)

	Quarter Ended			
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
	(In thousands, except per share data)			
Revenue	$ 119,148	$ 134,931	$ 136,764	$ 132,165
Operating income (loss)	$ 19,439	$ 16,345	$ 6,011	$ (142)
Net income (loss)	$ 11,472	$ (4,418)	$ (12,856)	$ (7,582)
Net income (loss) per common share - basic	$ 0.08	$ (0.06)	$ (0.13)	$ (0.09)
Net income (loss) per common share - diluted	$ 0.07	$ (0.06)	$ (0.13)	$ (0.09)

The sum of the per share amounts does not equal the annual amounts due to changes in the weighted-average number of common shares outstanding during the year.

19. Subsequent Events

On February 7, 2020, the Company closed on an additional $200.0 million under its Term Loan B. On February 13, 2020, the Company used these proceeds, together with cash on hand, to prepay all of the indebtedness outstanding under the Notes, including premiums for early prepayment. The additional amount is fungible with the original $1,450.0 million, having the same maturity date, interest rate and other terms, but were issued at a 1.0% premium to face value. To prepay the Notes, the Company paid a call price equal to the present value of (i) 105.125% of the $360.0 million principal amount of the Notes plus (ii) all interest due through the first call date in April 2020, representing a total call premium of $23.5 million, plus all accrued and unpaid interest to the redemption date.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including our chief executive officer, who is our principal executive officer, and our chief financial officer, who is our principal financial officer, we conducted an evaluation of our disclosure controls and procedures, as such term is defined in Rule 13a-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act, as of the end of the period covered by this report. In evaluating the disclosure controls and procedures, management recognized that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply its judgment in evaluating the benefits of possible controls and procedures relative to their costs. In addition, the design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a control system, misstatements due to error or fraud may occur and not be detected.

Based on this evaluation, our chief executive officer and our chief financial officer concluded that our disclosure controls and procedures were effective to provide reasonable assurance that information required to be disclosed by us in reports we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the U.S. Securities and Exchange Commission's rules and forms, and is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosures.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rules 13a-15(f) and 15d-15(f) promulgated under the Exchange Act as a process designed by, or under the supervision of, our principal executive and principal financial officers and effected by our board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles. Such internal control includes those policies and procedures that:

- Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of our company;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of our company; and
- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2019. In making this assessment, our management used the criteria set forth in *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 Framework). Based on its assessment, our management has determined that, as of December 31, 2019, our internal control over financial reporting was effective based on those criteria.

Our independent registered public accounting firm, Ernst & Young LLP, has audited our 2019 financial statements. Ernst & Young LLP was given unrestricted access to all financial records and related data, including minutes of all meetings of stockholders, the Board of Directors and committees of the Board. Ernst & Young LLP has issued an unqualified report on our 2019 financial statements as a result of the audit and also has issued an unqualified report on our internal controls over financial reporting which is attached hereto.

Changes in Internal Control Over Financial Reporting

During the quarter ended December 31, 2019, there were no changes in our internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Report of Ernst & Young LLP, Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Iridium Communications Inc.

Opinion on Internal Control over Financial Reporting

We have audited Iridium Communications Inc.'s internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Iridium Communications Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of Iridium Communications Inc. as of December 31, 2019 and 2018, the related consolidated statements of operations and comprehensive income (loss), changes in stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes and our report dated February 25, 2020 expressed an unqualified report thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definitions and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Tysons, Virginia
February 25, 2020

Item 9B. Other Information

None.

PART III

We will file a definitive Proxy Statement for our 2020 Annual Meeting of Stockholders (the “2020 Proxy Statement”) with the SEC, pursuant to Regulation 14A, not later than 120 days after the end of our fiscal year. Accordingly, certain information required by Part III has been omitted as permitted by General Instruction G (3) to Form 10-K. Only those sections of the 2020 Proxy Statement that specifically address the items set forth herein are incorporated by reference.

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item is incorporated by reference to the sections of our 2020 Proxy Statement entitled “Board of Directors and Committees,” “Election of Directors,” “Management” and “Delinquent Section 16(a) Reports.”

Item 11. Executive Compensation

The information required by this Item is incorporated by reference to the sections of our 2020 Proxy Statement entitled “Compensation Discussion and Analysis,” “Executive Compensation” and “Director Compensation.”

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this Item is incorporated by reference to the sections of our 2020 Proxy Statement entitled “Security Ownership of Certain Beneficial Owners and Management” and “Securities Authorized for Issuance under Equity Compensation Plans.”

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this Item is incorporated by reference to the sections of our 2020 Proxy Statement entitled “Transactions with Related Parties” and “Director Independence.”

Item 14. Principal Accountant Fees and Services

The information required by this Item is incorporated by reference to the section of our 2020 Proxy Statement entitled “Independent Registered Public Accounting Firm Fees.”

PART IV

Item 15. Exhibits, Financial Statement Schedules

(a) The following documents are filed as part of this Form 10-K:

(1) Financial Statements

Iridium Communications Inc.:

(2) Financial Statement Schedules

The financial statement schedules are not included here because required information is included in the consolidated financial statements.

(3) Exhibits

The following list of exhibits includes exhibits submitted with this Form 10-K as filed with the Securities and Exchange Commission.

Exhibit No.	Document
3.1	Amended and Restated Certificate of Incorporation dated September 29, 2009, incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed with the SEC on September 29, 2009.
3.2	Certificate of Designations of Iridium Communications Inc. filed on October 3, 2012 with the Secretary of State of the State of Delaware designating the preferences, limitations, voting powers and relative rights of the 7% Series A Cumulative Perpetual Convertible Preferred Stock, incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed with the SEC on October 3, 2012.
3.3	Certificate of Designations of Iridium Communications Inc. filed on May 14, 2014 with the Secretary of State of the State of Delaware designating the preferences, limitations, voting powers and relative rights of the 6.75% Series B Cumulative Perpetual Convertible Preferred Stock, incorporated by reference to Exhibit 3.1 to the Registrant's Registration Statement on Form 8-A filed with the SEC on May 14, 2014.
3.4	Certificate of Amendment to Amended and Restated Certificate of Incorporation dated May 12, 2015, incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.
3.5	Amended and Restated Bylaws, incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.
4.1	Specimen Common Stock Certificate, incorporated by reference to Exhibit 4.2 of the Registrant's Registration Statement on Form S-1 (Registration No. 333-147722) filed with the SEC on February 4, 2008.
4.2	Description of the Registrant's securities registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended.
10.1#	Credit Agreement dated November 4, 2019 among Iridium Holdings LLC, Iridium Communications Inc., Iridium Satellite LLC, Various Lenders, and Deutsche Bank AG New York Branch, as Administrative Agent and Collateral Agent, incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed with the SEC on November 4, 2019.
10.2	Security Agreement dated November 4, 2019 among Iridium Carrier Holdings LLC, Iridium Carrier Services LLC, Iridium Constellation LLC, Iridium Government Services LLC, Iridium Holdings LLC, Iridium Satellite LLC, and Deutsche Bank AG New York Branch, as Collateral Agent, incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K filed with the SEC on November 4, 2019.

Exhibit No.	Document
10.3	Guaranty Agreement dated November 4, 2019 among Iridium Holdings LLC, Iridium Satellite LLC, Iridium Carrier Holdings LLC, Iridium Carrier Services LLC, Iridium Constellation LLC, Iridium Government Services LLC, and Deutsche Bank AG New York Branch, as Administrative Agent, incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8-K filed with the SEC on November 4, 2019.
10.4	Amended and Restated Transition Services, Products and Asset Agreement, between Iridium Satellite LLC, Iridium Holdings LLC and Motorola, Inc., dated as of September 30, 2010, incorporated by reference to Exhibit 10.9 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.5	Amendment No. 1 to Amended and Restated Transition Services, Products and Asset Agreement, between Iridium Satellite LLC, Iridium Holdings LLC and Motorola, Inc., dated as of December 30, 2010, incorporated by reference to Exhibit 10.10 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.6†	System Intellectual Property Rights Amendment and Agreement, between Iridium Satellite LLC and Motorola, Inc., dated as of September 30, 2010, incorporated by reference to Exhibit 10.11 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.7	Supplemental Subscriber Equipment Technology Amendment and Agreement, between Iridium Satellite LLC and Motorola, Inc., dated as of September 30, 2010, incorporated by reference to Exhibit 10.12 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.8	Intellectual Property Rights Agreement, dated December 11, 2000, among Motorola Inc. and Iridium Satellite LLC, incorporated by reference to Exhibit 10.3 of the Registrant's Current Report on Form 8-K filed with the SEC on September 29, 2009.
10.9	Subscriber Equipment Technology Agreement (Design), dated as of September 30, 2002, by and among Motorola Inc. and SE Licensing LLC, incorporated by reference to Exhibit 10.4 of the Registrant's Current Report on Form 8-K filed with the SEC on September 29, 2009.
10.10	Subscriber Equipment Technology Agreement (Manufacturing), dated as of September 30, 2002, by and among Motorola Inc. and SE Licensing LLC, incorporated by reference to Exhibit 10.5 of the Registrant's Current Report on Form 8-K filed with the SEC on September 29, 2009.
10.11††	Contract for Enhanced Satellite Services between Iridium LLC and Air Force Space Command, effective September 15, 2019, incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on October 29, 2019.
10.12	Form of Registration Rights Agreement, incorporated by reference to Annex D of the Registrant's Proxy Statement filed with the SEC on August 28, 2009.
10.13	Amendment No. 1 to Registration Rights Agreement, dated as of March 29, 2011, by and among Iridium Communications Inc. and the parties listed on the signature pages thereto, incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K, filed with the SEC on March 30, 2011.
10.14*	Amended and Restated Employment Agreement, dated as of March 30, 2011, by and between the Registrant and Matthew J. Desch, incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed with the SEC on April 5, 2011.
10.15*	Employment Agreement, dated as of March 31, 2010, by and between the Registrant and Thomas J. Fitzpatrick, incorporated by reference to Exhibit 10.1 of the Registrant's Quarterly Report on Form 10-Q filed with the SEC on May 10, 2010.
10.16*	Amendment to Employment Agreement by and between the Registrant and Thomas J. Fitzpatrick, dated as of December 31, 2010, incorporated by reference to Exhibit 10.34 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.17*	Executive Employment Agreement between the Registrant and Suzanne E. McBride, dated as of February 11, 2019, incorporated by reference to Exhibit 10.5 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on April 23, 2019.
10.18*	Employment Agreement between the Registrant and Bryan J. Hartin, dated as of December 10, 2012, incorporated by reference to Exhibit 10.69 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 4, 2014.
10.19*	Employment Agreement between the Registrant and Thomas D. Hickey, dated as of April 29, 2011, incorporated by reference to Exhibit 10.70 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 4, 2014.
10.20*	2009 Iridium Communications Inc. Stock Incentive Plan, incorporated by reference to Annex E of the Registrant's Proxy Statement filed with the SEC on August 28, 2009.
10.21	Form of Indemnity Agreement between the Registrant and each of its directors and officers, incorporated by reference to Exhibit 10.5 to the Registrant's Form S-1/A filed with the SEC on February 4, 2008.

Exhibit No.	Document
10.22*	Form of Stock Option Award Agreement for use in connection with the 2009 Iridium Communications Inc. Stock Incentive Plan, incorporated by reference to Exhibit 10.42 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.23*	Form of Restricted Stock Unit Agreement for use in connection with the 2009 Iridium Communications Inc. Stock Incentive Plan, incorporated by reference to Exhibit 10.48 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 6, 2012.
10.24*	Amended and Restated Performance Share Program established under the Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on April 23, 2019.
10.25*	Form of Performance Share Award Grant Notice and Performance Share Award Agreement for use in connection with the Performance Share Program established under the Iridium Communications Inc. 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K filed with the SEC on March 3, 2016.
10.26*	Form of Stock Option Agreement for Non-Employee Directors for use in connection with the 2009 Iridium Communications Inc. Stock Incentive Plan, incorporated by reference to Exhibit 10.46 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.27*	Form of Restricted Stock Award Agreement for Non-Employee Directors for use in connection with the 2009 Iridium Communications Inc. Stock Incentive Plan, incorporated by reference to Exhibit 10.47 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.28*	Form of Restricted Stock Unit Agreement for Non-Employee Directors for use in connection with the 2009 Iridium Communications Inc. Stock Incentive Plan, incorporated by reference to Exhibit 10.48 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 7, 2011.
10.29*	Iridium Communications Inc. 2012 Equity Incentive Plan, incorporated by reference to Appendix A to the Registrant's Proxy Statement filed with the SEC on April 10, 2012.
10.30*	Forms of Stock Option Grant Notice and Stock Option Agreement for use in connection with the Iridium Communications Inc. 2012 Equity Incentive Plan, incorporated by reference to Exhibit 99.2 to the Registrant's Current Report on Form 8-K filed with the SEC on May 23, 2012.
10.31*	Forms of Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement for use in connection with the Iridium Communications Inc. 2012 Equity Incentive Plan, incorporated by reference to Exhibit 99.3 to the Registrant's Current Report on Form 8-K filed with the SEC on May 23, 2012.
10.32*	Non-Employee Director Compensation Plan dated December 11, 2018, incorporated by reference to Exhibit 10.83 to the Registrant's Annual Report on Form 10-K filed with the SEC on February 28, 2019.
10.33*	Iridium Communications Inc. 2019 Performance Bonus Plan, incorporated herein by reference to Exhibit 10.2 of the Registrant's Quarterly Report on Form 10-Q filed with the SEC on April 23, 2019.
10.34*	Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated herein by reference to Exhibit 10.1 to the Registrant's registration statement on Form S-8 filed on May 23, 2019.
10.35*	Forms of Option Grant Notice and Option Agreement for use in connection with the Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.2 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.
10.36*	Forms of Restricted Stock Unit Award Grant Notice and Restricted Stock Unit Award Agreement for use in connection with the Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.3 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.
10.37*	Forms of Non-Employee Director Option Grant Notice and Non-Employee Director Option Agreement for use in connection with the Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.4 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.
10.38*	Forms of Non-Employee Director Restricted Stock Unit Award Grant Notice and Non-Employee Director Restricted Stock Unit Award Agreement for use in connection with the Iridium Communications Inc. 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.5 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.
10.39*	UK Sub-Plan of the Iridium Communications Inc. 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.6 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.
10.40*	Forms of UK Option Grant Notice and UK Option Agreement for use in connection with the Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.7 of the Registrant's Current Report on Form 8-K filed with the SEC on May 15, 2015.

Exhibit No.	Document
10.41*	Forms of UK Restricted Stock Unit Award Grant Notice and UK Restricted Stock Unit Award Agreement for use in connection with the Iridium Communications Inc. 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.8 of the Registrant’s Current Report on Form 8-K filed with the SEC on May 15, 2015.
10.42*	Forms of UK Non-Employee Director Option Grant Notice and UK Non-Employee Director Option Agreement for use in connection with the Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.9 of the Registrant’s Current Report on Form 8-K filed with the SEC on May 15, 2015.
10.43*	Forms of UK Non-Employee Director Restricted Stock Unit Award Grant Notice and UK Non-Employee Director Restricted Stock Unit Award Agreement for use in connection with the Iridium Communications Inc. Amended and Restated 2015 Equity Incentive Plan, incorporated by reference to Exhibit 10.10 of the Registrant’s Current Report on Form 8-K filed with the SEC on May 15, 2015.
21.1	List of Subsidiaries.
23.1	Consent of Ernst & Young LLP, independent registered public accounting firm.
31.1	Certification of Chief Executive Officer pursuant to Section 302 of The Sarbanes-Oxley Act of 2002.
31.2	Certification of Chief Financial Officer pursuant to Section 302 of The Sarbanes-Oxley Act of 2002.
32.1**	Certification of Chief Executive Officer and Chief Financial Officer pursuant to Section 906 of The Sarbanes-Oxley Act of 2002.
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema
101.CAL	XBRL Taxonomy Extension Calculation Linkbase
101.DEF	XBRL Taxonomy Extension Definition Linkbase
101.LAB	XBRL Taxonomy Extension Label Linkbase
101.PRE	XBRL Taxonomy Extension Presentation Linkbase
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101).

Exhibits and schedules have been omitted pursuant to Item 601(a)(5) of Regulation S-K and will be furnished on a supplemental basis to the Securities and Exchange Commission upon request.

† Confidential treatment has been granted for certain portions omitted from this exhibit pursuant to Rule 24b-2 under the Securities Exchange Act of 1934, as amended. Confidential portions of this exhibit have been separately filed with the Securities and Exchange Commission.

† † Certain confidential portions of this exhibit, marked by asterisks, were omitted because the identified confidential portions (i) are not material and (ii) would be competitively harmful if publicly disclosed.

* Denotes management contract or compensatory plan or arrangement.

** These certifications are being furnished solely to accompany this Annual Report pursuant to 18 U.S.C. Section 1350, and are not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and are not to be incorporated by reference into any filing of the registrant, whether made before or after the date hereof, regardless of any general incorporation language in such filing.

Item 16. Form 10-K Summary

Not applicable.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

IRIDIUM COMMUNICATIONS INC.

Date: February 25, 2020

By: /s/ Thomas J. Fitzpatrick

Thomas J. Fitzpatrick

Chief Financial Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

Name	Title	Date
/s/ Matthew J. Desch **Matthew J. Desch**	Chief Executive Officer and Director (Principal Executive Officer)	February 25, 2020
/s/ Thomas J. Fitzpatrick **Thomas J. Fitzpatrick**	Chief Financial Officer, Chief Administrative Officer and Director (Principal Financial Officer)	February 25, 2020
/s/ Timothy P. Kapalka **Timothy P. Kapalka**	Vice President and Corporate Controller, Iridium Satellite LLC (Principal Accounting Officer)	February 25, 2020
/s/ Robert H. Niehaus **Robert H. Niehaus**	Director and Chairman of the Board	February 25, 2020
/s/ Thomas C. Canfield **Thomas C. Canfield**	Director	February 25, 2020
/s/ Jane L. Harman **Jane L. Harman**	Director	February 25, 2020
/s/ Alvin B. Krongard **Alvin B. Krongard**	Director	February 25, 2020
/s/ Eric T. Olson **Eric T. Olson**	Director	February 25, 2020
/s/ Steven B. Pfeiffer **Steven B. Pfeiffer**	Director	February 25, 2020
/s/ Parker W. Rush **Parker W. Rush**	Director	February 25, 2020
/s/ Henrik O. Schliemann **Henrik O. Schliemann**	Director	February 25, 2020
/s/ Barry J. West **Barry J. West**	Director	February 25, 2020

Exhibit 4.2

DESCRIPTION OF CERTAIN OF REGISTRANT'S SECURITIES

General

The following is a summary of information concerning the capital stock of Iridium Communications Inc. References to "Iridium" and the "Company" herein are, unless the context otherwise indicates, only to Iridium Communications Inc. and not to any of its subsidiaries. The summaries and descriptions below do not purport to be complete statements of the relevant provisions of the Company's amended and restated certificate of incorporation, as amended to date, or collectively our restated certificate, and the Company's amended and restated bylaws, or our restated bylaws, and are entirely qualified by reference to the provisions of these documents, which are incorporated by reference as Exhibits 3.1, 3.4 and 3.5, respectively, of the Company's Annual Report on Form 10-K to which this description is also an exhibit.

Authorized Capital Stock

Our restated certificate authorizes us to issue up to 300,000,000 shares of common stock, $0.001 par value per share, and 2,000,000 shares of preferred stock, $0.0001 par value per share. As of December 31, 2019, there were 131,632,085 shares of common stock outstanding. We previously authorized and issued 1,000,000 shares of Series A Preferred Stock and 500,000 shares of Series B Preferred Stock, none of which shares are currently outstanding. The remaining 500,000 shares of preferred stock are undesignated. Our board of directors may establish the rights and preferences of the preferred stock from time to time.

Restrictions on Stock Ownership and Transfer

Under our restated certificate, we may restrict the ownership, or proposed ownership, of our common stock or preferred stock by any person if such ownership or proposed ownership is or could be inconsistent with, or in violation of, any provision of the Communications Act of 1934, as amended, and the rules, regulations or policies promulgated thereunder, or collectively the Federal Communications Laws, or such ownership or proposed ownership limits or impairs, or could limit or impair, our business activities or our proposed business activities under the Federal Communications Laws.

Description of Common Stock

Voting Rights

Each holder of our common stock is entitled to one vote for each share on all matters submitted to a vote of the stockholders, including the election of directors. Under our restated certificate and our restated bylaws, our stockholders do not have cumulative voting rights. Because of this, the holders of a majority of the shares of common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they should so choose.

Dividends

Subject to preferences that may be applicable to any then-outstanding preferred stock, holders of common stock are entitled to receive ratably those dividends, if any, as may be declared from time to time by the board of directors out of legally available funds.

Liquidation

In the event of our liquidation, dissolution or winding up, holders of common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then-outstanding shares of preferred stock.

Rights and Preferences

Holders of common stock have no preemptive, conversion or subscription rights and there are no redemption or sinking fund provisions applicable to the common stock. The rights, preferences and privileges of the holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that we may designate in the future.

Description of Preferred Stock

Our board of directors has the authority, without further action by our stockholders, to issue up to 2,000,000 shares of preferred stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the rights, preferences and privileges of the shares of each series and any qualifications, limitations or restrictions thereon, and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding.

Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of our common stock. The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change of control of our company and may adversely affect the market price of our common stock and the voting and other rights of the holders of our common stock. It is not possible to state the actual effect of the issuance of any shares of preferred stock on the rights of holders of common stock until the board of directors determines the specific rights attached to that preferred stock.

Anti-Takeover Provisions

Our restated certificate provides that all stockholder actions must be effected at a duly called meeting of stockholders and has eliminated the right of stockholders to act by written consent without a meeting. Our restated bylaws provide that only our chairman of the board or a majority of the entire board of directors may call a special meeting of stockholders. Our restated bylaws also provide that stockholders seeking to present proposals before a meeting of stockholders to nominate candidates for election as directors at a meeting of stockholders must provide timely advance notice in writing and must comply with specific requirements as to the form and content of the stockholder’s notice.

The combination of these provisions may make it more difficult for our existing stockholders to replace our board of directors as well as for another party to obtain control of us by replacing our board of directors. Since our board of directors has the power to retain and discharge our officers, these provisions could also make it more difficult for existing stockholders or another party to effect a change in management. In addition, the authorization of undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede any attempt to effect a change of control of our company.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company. The transfer agent’s address is 6201 15th Street, Brooklyn, NY 11219.

Listing

Our common stock is listed on the Nasdaq Global Select Market under the ticker symbol “IRDM.”

EXHIBIT 21.1

SUBSIDIARIES OF IRIDIUM COMMUNICATIONS INC.

Subsidiary	Jurisdiction of Organization
Iridium Blocker-B Inc.	Delaware
Syncom-Iridium Holdings Corp.	Delaware
Iridium Holdings LLC	Delaware
Iridium Satellite LLC	Delaware
Iridium Constellation LLC	Delaware
Iridium Carrier Holdings LLC	Delaware
Iridium Carrier Services LLC	Delaware
Iridium Government Services LLC	Delaware
Iridium Satellite SA LLC	Delaware
OOO Iridium Services	Russia
OOO Iridium Communications	Russia
Iridium Chile SpA	Chile

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the Registration Statements (Form S-3 Nos. 333-162206 and 333-165513 and Form S-8 Nos. 333-165508, 333-181744, 333-204236, 333-218073 and 333-231699) of Iridium Communications Inc. of our reports dated February 25, 2020, with respect to the consolidated financial statements of Iridium Communications Inc. and the effectiveness of internal control over financial reporting of Iridium Communications Inc. included in this Annual Report (Form 10-K) of Iridium Communications Inc. for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Tysons, Virginia
February 25, 2020

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
Pursuant to Section 302 of The Sarbanes-Oxley Act of 2002

I, Matthew J. Desch, certify that:

1. I have reviewed this annual report on Form 10-K of Iridium Communications Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ Matthew J. Desch

Matthew J. Desch
Chief Executive Officer
(principal executive officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER
Pursuant to Section 302 of The Sarbanes-Oxley Act of 2002

I, Thomas J. Fitzpatrick, certify that:

1. I have reviewed this annual report on Form 10-K of Iridium Communications Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ Thomas J. Fitzpatrick

Thomas J. Fitzpatrick
Chief Financial Officer
(principal financial officer)

Exhibit 32.1

CERTIFICATIONS OF
PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, the Chief Executive Officer and the Chief Financial Officer of Iridium Communications Inc. (the “Company”) each hereby certifies that, to the best of his knowledge:

1. The Company’s Quarterly Report on Form 10-K for the fiscal year ended December 31, 2019, to which this Certification is attached as Exhibit 32.1 (the “Form 10-K”), fully complies with the requirements of Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934, as amended; and

2. The information contained in the Form 10-K fairly presents, in all material respects, the financial condition of the Company at the end of the period covered by the Form 10-K and results of operations of the Company for the periods covered in the financial statements in the Form 10-K.

Dated: February 25, 2020

/s/ Matthew J. Desch	/s/ Thomas J. Fitzpatrick
Matthew J. Desch	Thomas J. Fitzpatrick
Chief Executive Officer	Chief Financial Officer

This certification accompanies the Form 10-K and shall not be deemed “filed” by the Company for purposes of Section 18 of the Securities Exchange Act of 1934, as amended.