

Written Testimony for Patricia A. Cooper
President, Satellite Industry Association (SIA)
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Subcommittee on Space
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Introduction

Mister Chairman, Ranking Member Edwards, distinguished members of the Subcommittee, thank you for inviting the Satellite Industry Association (SIA) to testify today on Commercial Space. I commend Chairman Palazzo and Ranking Member Edwards for their leadership, and thank the members of the Subcommittee for your continued focus on the commercial space industry.

As the President of SIA¹, I am pleased to represent here the unified voice of the nation's satellite industry. Our Association's members build and launch spacecraft for both commercial and government customers, operate hundreds of commercial satellites that connect the world with voice, video, and data, and manage satellite ground facilities across the nation and the world to link the communications network. Our customers range from the U.S. military, first responders, the world's entertainment industry, Fortune 500 enterprises, leading retailers and financial institutions, and individual consumers in every corner of the world.

The satellite sector pioneered the commercialization of space. Just over 50 years ago, Telstar 1 was launched as the first commercial satellite, marking the starting point for the commercialization of space. Today, fleets of satellites ring the globe, owned and operated by private companies from around the world. Commercial satellite operators control more than one third of all operational satellites on orbit. In fact, the members of the Satellite Industry Association collectively operate the largest fleet of spacecraft in the world.

¹ SIA Executive Members include: Artel, LLC; The Boeing Company; The DIRECTV Group; EchoStar Satellite Services LLC; Harris CapRock Communications; Hughes Network Systems, LLC; Intelsat S.A.; Iridium Communications Inc.; Kratos Defense & Security Solutions; LightSquared; Lockheed Martin Corporation.; Northrop Grumman Corporation; Rockwell Collins Government Systems; SES Americom, Inc.; and SSL. SIA Associate Members include: AIS Engineering, Inc.; Astrium Services Government, Inc.; ATK Inc.; Cisco; Cobham SATCOM Land Systems; Comtech EF Data Corp.; DigitalGlobe; DRS Technologies, Inc.; Encompass Government Solutions; Eutelsat, Inc.; Globecom Systems, Inc.; Inmarsat, Inc.; ITT Exelis; Marshall Communications Corporation.; MTN Government; NewSat America, Inc.; O3b Networks; Orbital Sciences Corporation; Panasonic Avionics Corporation; Row 44, Inc.; Spacecom, Ltd.; Spacenet Inc.; TeleCommunication Systems, Inc.; Telesat Canada; The SI Organization, Inc.; TrustComm, Inc.; Ultisat, Inc.; ViaSat, Inc., and XTAR, LLC.

For the past sixteen years, SIA has been tracking the performance of the global satellite industry in our annual State of the Satellite Industry Report. Our most recent report, updated in October, looked at 2012 trends, and showed a global commercial satellite industry posting nearly \$190 billion in revenue. This figure represented more than 60 percent of all space spending worldwide. All four segments of the industry – satellite services, manufacturing, launch, and ground equipment – grew in 2012, as the industry as a whole posted growth of seven percent. Services provided directly to consumers, and in particular satellite TV, continued to be the engine driving the industry’s overall growth. Satellite TV services alone earned nearly \$90 billion in global revenue last year. The U.S. portion of the global industry continues to be substantial, as roughly 44 percent of global revenues can be attributed to the domestic U.S. market. Satellite sector employment also continues to be substantial, though it has declined slightly in recent years due to the effects of the recession. Private companies in the satellite industry employ more than 225,000 Americans, and this workforce is among the most technically skilled and well-compensated of any U.S. industry.²

At the outset of the space age, outer space was the provenance of only a handful of the most advanced countries. Today, more than 50 countries operate satellites, either on their own or as part of a regional consortium. Interest in joining the community of satellite operators has been particularly strong in recent years, with twelve new countries joining this fraternity since 2008. New entrants are attracted not only by the prestige of becoming a space player, but by the proven value of tapping space-enabled services to meet the real-world demands of citizens everywhere for more connectivity, more bandwidth, more entertainment, and more security.

Commercial satellite operators are driven to innovate by building new spacecraft, by delivering ever-more flexible and mobile applications, and by engineering more resilient networks. This drive is rooted in the explosion in demand for communications – on-demand and high-resolution media, more bandwidth for broadband to homes, cars, aircraft, ships, and phones, and more flexible and resilient enterprise networks for business and government. Satellite service providers are focusing on information assurance, managed services, and reaching consumers on the go. Satellite operators are continuing to update and expand their fleets to meet this surge in requirements. Satellite manufacturers are rolling out ever more capable technologies to reduce costs, enhance on-orbit operations and carry the high-throughput services demanded by today’s communications environment. And satellite launch service providers are investing in next-generation launch capabilities to carry these satellites into orbit reliably and efficiently. The satellite sector’s track record demonstrates that commercial space actors are innovative, adaptive, and driven to serve a competitive marketplace that has experienced tectonic shifts in demand and in technology.

² Satellite Industry Association, “State of the Satellite Industry Report,” October 2013, http://www.sia.org/wp-content/uploads/2013/10/2013_SSIR_Final_Oct.pdf

The essence of commercialization is the ability of private industry to deliver goods and services that are valued by another party. Private companies flourish when marketplace conditions encourage competition and growth. In the satellite sector, these conditions include a stable regulatory, financial, and policy environment, secure access to radiofrequency spectrum, and predictable methods for managing risk. Confidence in these conditions will allow commercial satellite companies to continue the success of the first half century of the commercial space age through the next 50 years.

Historical Trends in Commercial Space

At the outset of the space age in the early 1960s, commercial companies were expected to play a limited role in the nascent satellite sector. Satellites were seen as too expensive, too technically complex and too risky for any one country or company to pursue. So, in 1964, the United States and more than a dozen other countries established an intergovernmental organization tasked with providing international telecommunications links using satellites, mostly for the transmission of basic telephone calls and brief video feeds. This organization, which became known as INTELSAT, was joined in 1979 by a second intergovernmental organization, INMARSAT, established by the International Maritime Organization to provide communications and safety services to ships at sea. Together, these two intergovernmental organizations were intended to ensure that all countries were able to reap the benefits of space-based communications services by having their telecommunications networks linked in order to support international calling, including across the Atlantic, Indian, and Pacific Oceans.

By the 1970s, new private companies in the United States and elsewhere began to enter the satellite arena. The Federal Communications Commission (FCC) issued its first licenses to commercial satellite companies for domestic telecommunications services in 1973. By 1980, there were nine commercial communications spacecraft in orbit serving the United States, and by 1988, there were nearly five times as many privately-owned satellites over the United States. The private sector had established an abiding role to play in satellites, and by the end of 2001, both INTELSAT and INMARSAT had privatized, and commercial satellites were proliferating to meet the burgeoning demand for international telephone links, to carry television channels, and to provide capacity for the nascent data industry. Today, there are more than 330 commercial communications satellites ringing the globe in a highly competitive and creative environment. The meteoric rise of the commercial satellite industry was fueled by the proven ability of satellites to meet the explosive demand generated by the global telecommunications industry.

Throughout this period, satellite technology has continued to evolve and advance, while spacecraft, services and networks have become ever more cost-efficient. The first commercial satellite, Telstar 1, had solar panels capable of generating 14 Watts of power, handled roughly 100 transmissions a month during its four month lifespan, and required earth stations so large that shelters the size of a 16-story building were built to protect them. Today's satellites have solar panels that can generate one thousand times more power, can transmit as much as 140

gigabits of data per second, last fifteen years or more, and communicate with small ground terminals that are mounted on rooftops, embedded in the dashboards of cars, or installed as a chipsets in smart phones.

Today's Commercial Satellite Industry

These technological breakthroughs, when placed at the disposal of ever-growing numbers of commercial satellite companies, have allowed today's commercial satellite industry as a whole to triple in size over the past decade, and to remain at the cutting edge of communications, a far cry from the rotary phones and black and white television signals that were the norm in the 1960s.

Satellite Infrastructure

The manufacturers of satellite spacecraft and the companies that launch those spacecraft into orbit can be thought of as the satellite industry's "space infrastructure" segments. Satellite manufacturers build satellites for commercial and government customers. Once delivered by a launch vehicle to the required orbital location, these spacecraft provide the platforms used by satellite operators and service providers to connect the world.

The United States' satellite manufacturers are global leaders in producing satellites used for communications, earth observation, navigation, and intelligence functions. Their technical merits and track record of reliability have won about half of the global marketplace for satellites in the past few years, even with robust competition from European satellite manufacturers, and, to a lesser extent, their Asian counterparts. Between 2001 and 2010, prime U.S. manufacturers produced 264 spacecraft, with half sold to commercial customers and the other half produced for military or civil government clients. This trend continues today, as 61 percent of U.S. satellite manufacturing revenues in 2012 came from U.S. government contracts. Given the prominence of the government in this market, it's worth noting the significant role it has played historically in developing advanced satellite capabilities and in establishing acquisition and regulatory policies that support the industry.

The launch services segment has also seen shifts in the international diversification and customer mix over time. Government customers worldwide continue to represent the major driver for global launch revenues, accounting for 64 percent of revenues earned by the sector in 2012. For the past decade, the bulk of U.S. launches have been for U.S. government payloads, and most commercial satellites have been launched by European or Russian vehicles. This is changing, with the unparalleled reliability of existing U.S. launch vehicles, notable innovation over the past five years, and several U.S. companies winning orders to launch commercial satellites in the near term.

Combined, the cost of manufacturing and launching a satellite represents a significant, up-front, fixed investment for both established and new satellite operators. Because this

investment must be made years before the satellite is launched and before any revenues are realized, commercial satellite operators and their financial backers demand exacting quality control and reliability standards from their suppliers in the satellite manufacturing and launch services sectors. More than in other industries, reliability and flight heritage are often as important as price and delivery schedule for commercial satellite operators. U.S. satellite space infrastructure companies have long historical involvement and deep expertise in satellite manufacturing and space launch technologies. These characteristics, along with the ability and talent to innovate, help American companies remain in the forefront of the satellite infrastructure business.

Satellite Services

The commercial satellite industry is recognized as a critical piece of the world's communications backbone, and satellite-delivered services reach every corner of the globe. The industry provides consumers with broadband internet, satellite radio, and direct-to-home television; delivers media and broadcasting content everywhere; links businesses, and cellular and telecom networks; provides weather and early warning information; and powers emergency communications for first responders and military communications for national security.

Broadband internet: Today, satellites deliver high-speed internet services directly to consumers across America, at speeds of up to 15 megabits per second and at cost-effective rates. These direct-to-consumer satellite broadband providers are increasing competition for customers in populous ex-urban areas, putting pressure on terrestrial competitors to improve service quality and reduce prices. Additionally, satellites allow internet service providers to push their coverage areas out to include the most rural and remote portions of the country, extending internet access to customers that terrestrial wired or wireless networks may never reach. For example, Alaska's largest telecommunications company relies on satellite to connect Alaskans in the farthest reaches of American soil. Satellite is now taking broadband mobile, allowing in-flight internet for passengers on commercial airlines and enabling Wi-Fi for cruise ship passengers.

Direct-to-home Television and Radio: Since the early 1990s, satellite has been delivering subscription television and radio services to millions of consumers across the United States, creating competition with cable and other TV service providers at cost-effective prices. Today, there are more than 33 million U.S. subscribers to satellite TV, about one third of all American pay-TV subscribers. Outside the United States, an additional 130 million consumers in the Americas, Europe, Africa, and Asia also choose satellite technology to deliver TV directly to their homes. Another 24 million Americans subscribe to satellite radio.

Video transmission: Since the late 1960s, satellites have emerged as the most efficient technology to deliver television content, first carrying TV programming to local network affiliates. With the cable age, satellites carried even more media content, capturing breaking

news and live sports “live via satellite,” delivering thousands of channels of programming to cable companies in every corner of the globe. Satellite technology made the proliferation of hundreds of channels and pay-TV platforms possible – which is one of the reasons why the *Financial Times* recently listed “Satellites” as one of the “Fifty ideas that shaped business today.”³

Private business networks: Satellite technology has long linked far-flung offices of private enterprises, offering a reliable, cost-effective approach to carrying business data among business locations across the country and between countries and continents. Satellite-based corporate communications networks are integral to all kinds of retail, corporate, natural resource and transportation businesses, as well as government organizations. For example, satellite-linked corporate networks are used to transmit inventory, back office and accounting data, allow credit card transactions at rural gas stations or remote hotels, link the U.S. Postal Service’s offices, and keep the maritime shipping industry connected at sea.

Public safety voice and data: Satellite technology has come to the rescue during the country’s worst days – when terrestrial infrastructure is damaged or disabled or when emergencies happen away from communications hubs. From Hurricane Katrina, to the earthquake in Haiti, to Hurricane Sandy, to the tragic impact of last week’s Typhoon Haiyan in the Philippines, the satellite industry has supported the efforts of first responders and humanitarian organizations by providing mobile health care and in-field communications for recovery efforts. During the times when our nation needs communications most – satellite is on the spot and always reliable.

Military products and services: The satellite industry builds and launches communications, intelligence, navigation, and weather satellites for the U.S. national security community. Commercial satellite companies also provide communications services linking military units and nearly every type of military platform, from satellite manpacks for warfighters, to small Unmanned Aerial Vehicles (UAVs), to Humvees, to aircraft carriers. The most recent available Department of Defense figures indicate that the U.S. military purchases more than \$1 billion worth of commercial satellite communications a year. Government and industry are also working together to find innovative ways to meet the unique requirements of the military and to develop new capabilities, including through the use of hosted payloads.

Remote sensing imagery and products: Beyond communications, commercial companies are also providing remote sensing and imagery, taking advantage of the long heritage of satellite manufacturing capabilities built for military and intelligence users. With imagery archives capturing billions of square kilometers of the surface of the earth, commercial remote sensing companies provide rich data sets used for environmental monitoring, natural resource

³ Lionel Barber, ed., “The fifty ideas that shaped business today,” June 2013, p. 22, <http://www.ft.com/reports/50ideas>.

management, and humanitarian assistance, as well as by companies in the agriculture, insurance, mining, and engineering sectors.

Across the board, U.S. consumers, families, businesses, first responders, and government agencies rely on satellites to meet their communications and information requirements across the United States and its territories. It is an instant infrastructure that is reliably available every day, everywhere around the world.

The Role of Government

The commercial satellite sector has unique features that require certain policy and market conditions to provide a firm foundation on which to build their businesses. The commercial satellite industry looks to the U.S. government to help maintain these conditions in order to continue providing the services we offer today, to pave the way for future innovation, and to allow the further development and growth of the industry.

The first notable characteristic of the satellite industry is its long business time horizons. Business cycles in the satellite industry are often measured in terms of decades, and therefore benefit from a stable regulatory and policy environment over a longer time arc. An order for a satellite is typically placed at least two or three years before launch and, once in orbit, the satellite is typically expected to be operational for about fifteen years. Therefore, when a company considers ordering a satellite, it is planning for the future. While economic and competitive conditions shift constantly, satellite companies look for stable regulatory and business environments for a longer duration than most other types of companies. In particular, swift and effective FCC licensing processes for satellites and ground terminals and stable regulatory fees are important for ensuring stability and predictability in the long term. Should government regulations and policies, tax rules, or service conditions change dramatically in the intervening time, the combination of changing competitive conditions and policy shifts could put at risk the hundreds of millions of dollars required to finance the manufacture and launch of a commercial satellite.

The second unique characteristic of the industry is its inherently international nature. Most satellites can serve an entire continent or hemisphere, and so the satellite services environment is inherently reliant on international policies and market access rules. Additionally, satellites are regularly manufactured in one country with parts and components sourced both domestically and internationally, are launched in another country, and are insured by yet another. This international collaboration requires pro-competitive trade and export control policies to operate effectively and efficiently. We note that the Congress took an important step to safeguard the U.S. satellite sector's competitiveness in passing the 2013 National Defense Authorization Act, which included provisions that enable and encourage needed reforms to U.S. export controls for satellites and related technologies. These reforms, which are now being implemented by the

Executive Branch, are a crucial step towards ensuring the long-term competitiveness of the U.S. satellite manufacturing industry, and for that we offer our appreciation.

We expect this action to directly support the U.S. space industrial base, which has recently become a well-documented national security concern. Numerous studies by government agencies and private entities dating back to 2005 have linked satellite export control policies to erosion of the U.S. industrial base, and particularly the third, fourth and fifth tiers of the industry. These suppliers of input materials, parts, and components are relied upon by manufacturers of commercial, military, civil space, and intelligence spacecraft alike, and their health has been of increasing concern to the U.S. national security community. Once the reformed regulations for satellites and related components come into effect, likely in mid-2014, U.S. companies will once again be able to compete on a level playing field for international contracts.

The third key characteristic of the commercial satellite industry is our reliance on radiofrequency spectrum. It is the lifeblood of satellite-based communications services and is essential to control and operate the satellites themselves. Spectrum-based command and control links are essential for ensuring that the space platform remains stable and correctly positioned. Spectrum is also used to transmit data gathered by space-based sensors back to ground stations for analysis – the days when photographs from reconnaissance satellites were returned to earth on a parachute have long since passed.

Spectrum is perhaps most important to the communications delivered by the satellite industry. Communications satellites bring in a vast majority of all revenues earned by the satellite industry and represent a majority of all operational satellites. Without spectrum, these satellites simply could not function. The telecommunications industry, with which the satellite industry intersects, is currently being consumed by high-profile discussions about how to allocate radiofrequency spectrum, and frequencies that are relied upon by the satellite industry are increasingly being considered for possible sharing with or wholesale repurposing for use by terrestrial communications providers. While the satellite industry supports efficient and sensible allocations of spectrum, the unique technical requirement of communicating with spacecraft tens of thousands of miles away and the long-term design implications of satellites require careful analysis and respect for existing critical services. Experience has taught the satellite industry that shifts in spectrum use could have serious implications when applied to satellite spectrum, thus requiring objective and fact-driven analysis. The satellite industry continues to be strongly focused on working with the FCC, non-U.S. regulatory agencies, and the International Telecommunications Union to maintain the viability of satellite spectrum for delivering today's reliable, high-performance satellite services as well as to continue to innovate and evolve new applications.

Finally, the satellite industry is keenly focused on managing risk. The deployment and operation of satellites in space is more challenging than is the case for terrestrial infrastructure. Deployment requires a robust spacecraft, significant expertise, and a technically intricate and

challenging launch campaign. Once deployed, satellites must survive in the harsh environment of outer space, operating safely adjacent to other satellites and among orbital debris. The satellite industry has been successful because of its ability to navigate these challenges, largely because of its exacting focus on quality control and reliability. As prudent risk management demands, the industry has close ties with the financial and insurance industries, allowing the industry to mitigate risk and meet the high up-front investment costs of satellite projects. Having guarantors of risk is vital to the maintenance of the satellite business model. While most financing is provided by the private sector, and rightfully so, governments around the world have also stepped in to provide export credit financing for international sales of satellites. SIA urges the Congress to continue to support a strong U.S. Export-Import Bank that will allow U.S. manufacturers to compete internationally. Governments have also offered launch indemnification against the possibility of certain damages stemming from launch failures involving both government and commercial satellites. The U.S. commercial launch indemnification regime expires at the end of this year, and SIA strongly supports making this regime permanent or extending it for a minimum of 10 years. This regime has allowed U.S. commercial launch service providers to more effectively compete with foreign providers, and has never been drawn upon.

The satellite industry has more than fifty years of experience in commercializing the world's most advanced technologies. We have harnessed the power of space to serve national security, to connect every corner of the world, and deliver entertainment to people on every continent. We have grown at an average annual rate of ten percent over the past decade, sustaining a robust worldwide space economy. The satellite industry is proud to lead the way for the safe, successful, and sustained commercialization of space.

Mister Chairman, Ranking Member Edwards, distinguished members of the Subcommittee, this concludes my testimony. On behalf of the members of the Satellite Industry Association, thank you again for the opportunity to testify, and I look forward to your questions.