



**Written Testimony of Tom Stroup
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**Before the
United States Senate Committee on Commerce, Science, and Transportation
Subcommittee on Communications, Technology, Innovation, and the Internet**

**Hearing on
Exploring the Value of Spectrum to the U.S. Economy**

Chairman Wicker, Ranking Member Schatz and members of the Subcommittee, I would like to thank you for holding this important hearing and for the opportunity to appear before you today. I am Tom Stroup, President of the Satellite Industry Association (SIA)¹. Before joining SIA in late 2014, I served as CEO of Shared Spectrum Company (SSC), a leading developer of spectrum intelligence technologies. For a little more than ten years, I also served as the President of the Personal Communications Industry Association (PCIA). I have also founded and run several companies in the technology industry, including Columbia Spectrum Management, P-Com Network Services, CSM Wireless, and SquareLoop.

The Satellite Industry Association is a U.S.-based trade association representing the leading satellite operators, manufacturers, launch providers, and ground equipment suppliers who serve commercial, civil, and military markets. Since its creation almost twenty years ago, SIA has been the unified voice of the U.S. satellite industry on policy, regulatory, and legislative issues affecting the satellite business.

Before I go any further into my remarks, let me first commend the Federal Communications Commission (FCC), who I know will be testifying here next week, and the National Telecommunications and Information Administration (NTIA) for decades of experience and for their foresight in allocating spectrum to useful technologies and applications, including satellite services. Their efforts have resulted

¹ SIA Executive Members include: The Boeing Company; AT&T Services, Inc.; EchoStar Corporation; Intelsat S.A.; Iridium Communications Inc.; Kratos Defense & Security Solutions; Ligado Networks; Lockheed Martin Corporation; Northrop Grumman Corporation; OneWeb; SES Americom, Inc.; Space Exploration Technologies Corp.; SSL; and ViaSat, Inc. SIA Associate Members include: ABS US Corp.; Artel, LLC; Blue Origin; DigitalGlobe Inc.; DRS Technologies, Inc.; Eutelsat America Corp.; Global Eagle Entertainment; Glowlink Communications Technology, Inc.; Hughes; Inmarsat, Inc.; Kymeta Corporation; L-3 Electron Technologies, Inc.; O3b Limited; Panasonic Avionics Corporation; Planet; Semper Fortis Solutions; Spire Global Inc.; TeleCommunication Systems, Inc.; Telesat Canada; TrustComm, Inc.; Ultisat, Inc.; and XTAR, LLC.



in innovative government and commercial capabilities, which have benefited U.S. consumers and the nation.

Today, the satellite industry supports over 213,000 American jobs, many of which reside in the home states of several of this Subcommittee's members. This number includes tens of thousands of well-paying manufacturing jobs. Just to mention one area of growth, more of these jobs will be added in states like Florida, where tomorrow, March 3rd one of our members will be breaking ground on a new plant.

The satellite industry's 2015 estimated revenue was \$89 billion. These figures of course do not reflect revenues from businesses made possible by our services, services which, like satellites themselves, are not always apparent. But satellites are constantly operating in the background of space, enabling the American economy in ways consumers might not be aware, such as supporting smartphone app transactions, to use just one close at hand example. Beyond strictly financial metrics, I would encourage the committee to consider that our very way of life depends on the benefits we receive from satellite-based services and applications. Satellites – communications, earth observation, and position, navigation, and timing – have transformed how we communicate, how we map, navigate, and see our world, how we produce food and energy, conduct banking, predict weather, perform disaster relief, ensure national security, and so much more. Of course, delivering these diverse services to a broad range of customers is only possible because of our ability to access spectrum in a number of frequency bands.

I want to go into a little more detail on just a few of the qualitative benefits we receive from satellites because of their ubiquitous coverage, which enables cost-effective service even in rural and remote areas.

Satellites have long played a central role in distributing virtually all television content to American viewing audiences. In particular, live events like breaking news and sports events such as the Super Bowl and the upcoming NCAA Tournament depend on the point-to-multipoint coverage and high service quality that satellites provide. Communications satellites also provide connectivity – including broadband connectivity - to business networks, to mobile platforms like commercial aircraft and maritime vessels, as well as direct to household consumers.

As you all know all too well, advances in information technology and communications continue to spur economic growth in the United States, but they also highlight a growing disparity between the haves and have-nots. Satellite broadband, a high-quality and cost-effective solution for broadband services, is playing an increasingly important part in addressing the digital divide across the United States, including in the most rural and remote areas of the country where it remains uneconomical for terrestrial services to build. Today the commercial satellite industry has approximately 2 million customers nationwide enjoying high-quality broadband services at reasonable rates, no matter where they are located. This includes the 14% of consumers that currently are not served by terrestrial broadband. Commercial satellite operators, which have already invested billions of dollars in the construction and deployment of high-throughput satellites, offer service to those consumers today.

With the addition of multiple high throughput, high speed broadband satellites this year, we expect the prevalence of broadband services by satellite to increase rapidly and the number of satellite broadband customers across the United States to continue to grow substantially. Further, given that most of these satellites and their ground equipment will be built in the United States, we should see the creation of additional domestic design and manufacturing jobs.

It is also extremely important to mention the critical nature that satellites, and the use of spectrum, provide to our safety and national security. Satellite capabilities enable our military's ability to project power in the air, on land, at sea and in cooperation with allies. To list all of the ways satellites and spectrum are utilized by the U.S. military and Intelligence Community would take too long and quickly lead to classified discussions. So, I will mention just a few examples.

- Satellite communications (SATCOM), both commercial and military, provide agile connectivity and efficient mission control capability to our forces and operations in the continental U.S. (CONUS) and forward deployed locations, including for remotely piloted aircraft or (RPA), other advanced weapons systems like the F-35, and U.S. Navy warships. Capacity demand for the bands supporting these needs routinely outpaces supply and continues to grow rapidly.
- Intelligence, surveillance and reconnaissance (ISR) satellites and aerial platforms are essential to capabilities that allow us to see global threats to our nation, including from missiles, terrorism, as well as more traditional activities of enemy combatants and potential adversaries, and they demand dedicated high-capacity satellite links.
- The Global Positioning System (GPS) provides position, navigation, and timing services which are critical to every phase of military operations, commercial networks, critical infrastructure, and more.

All of these satellite capabilities depend upon spectrum availability and heavily factor in the Department of Defense's decisions concerning future force structure and concepts of operation. From individual special operations teams to large scale theater-level air, land and sea operations, none of these would exist as we know them today without the command and control and delivery of data that satellites provide. In short, it is hard to overstate how integral satellites are to our nation's ability to defend our interests in a conflict-filled world.

In addition, satellites play a critical role when our national terrestrial communications infrastructure is unavailable because of a national disaster, electrical outage or, worse yet, terrorist attack. Unlike their terrestrial counterparts, satellite networks are not susceptible to damage from such disasters, because the primary repeaters are onboard the spacecraft and not part of the ground infrastructure. Hand-held terminals, portable Very Small Aperture Terminal (VSAT) antennas, and temporary fixed installations can all be introduced into a post-disaster environment to provide support relief and enhance recovery efforts. This is why the Department of Homeland Security has designated commercial satellite systems as critical infrastructure.

Indeed, emergency preparedness networks are increasingly including satellite networks as part of their system design in order to ensure sufficient resiliency and cost-effectiveness. Government and



intergovernmental agencies use satellite networks to provide seismic, flood-sensing, and other early warning data. Public Safety Answering Points (PSAPs) have begun incorporating satellite back-up into their next generation 911 systems to cost-effectively mitigate potential network outage risks caused by any ground-based or environmental disruptions.

I alluded earlier to the fact that satellites have been relying on the use of spectrum for many years, but this should not lead anyone to conclude that the industry has been doing anything but driving technology forward in exciting ways. So, let me say a word on innovation and growth. The satellite industry is today investing tens of billions of dollars to innovate and increase connectivity in the U.S. and across the globe. Specifically, even as demand for spectrum has increased, the satellite industry has developed ways to use this limited natural resource more efficiently. High throughput satellites, for example, rely on frequency re-use and spot beam technology to produce increased output factors upward of 20 times that of traditional satellites, meeting FCC benchmark broadband speeds. The industry has seen similar increases in the capacity of its systems. The first broadband satellite began service in 2008 with a capacity of 10 gigabits per second (Gbps) and today they have capacity of 180 Gbps or more.

In another highly-anticipated advancement in the industry, hundreds of new high-throughput (non-geostationary) satellites will soon join existing operators in Low-Earth and Medium-Earth orbits to provide additional high speed capacity at low latency levels. Existing high throughput satellites already support the delivery of 3G and 4G services, and in the future satellite fleets will be a part of a system architecture that delivers new 5G, IoT, and intelligent, connected transportation services to consumers.

To expand further on another area of growth, mentioned at the outset, advances in commercial remote sensing satellites are also occurring at a rapid pace. SIA Member companies are launching satellites that can view and sense the Earth across multiple spectral bands, at unparalleled spatial resolution and unprecedented global coverage and revisit rates. The U.S. industry's capacity to monitor, evaluate, and understand change is allowing for more frequent insights into the impacts and opportunities of human activity in all aspects of life and business, and enabling a data revolution from space. Data from U.S. remote sensing operators are building new markets in agriculture, mapping, business intelligence, and weather prediction; they are supporting global efforts for humanitarian assistance and disaster response; and they are providing unique information to the U.S. national security community that, by virtue of it being commercial and unclassified, can be shared at critical times with our allies and partners.

One final, general note on innovation: the satellite industry also helps drive our exploration of frontiers in science and space, ensuring American technological leadership continues in these increasingly competitive areas.

Of course, all of the breakthroughs we've seen because of satellite technologies should not be taken for granted. They depend upon our industry's ability to access spectrum. And here I would like to note that satellites can and often do operate in bands with other users. In most cases satellite networks have different – often higher – requirements for sharing. In order for our industry to sustain and meet the



growing demand for satellite services, we encourage regulators to continue to allocate sufficient spectrum for satellite use. In a similar vein, we also ask the Senate and this Sub-committee to consider how to pursue a balanced approach to making additional spectrum available for future growth, that you ensure that satellite is a part of that equation. Together we have an opportunity to address the digital divide, meet the growing needs of U.S. consumers, ensure our country's safety and national security, and do so in a manner that utilizes spectrum most efficiently.

I appreciate the opportunity to appear before you and I am happy to answer any questions.