



Written Testimony of Tom Stroup

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Before the

United States House Energy and Commerce Subcommittee on Communications & Technology

Hearing on

Realizing the Benefits of Rural Broadband: Challenges and Solutions

The Satellite Industry Association (SIA) 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. SIA represents the satellite broadband industry, whose capabilities can be summarized as follows:

Satellite broadband is available today

- Services are available to households and businesses in all 50 states, and offerings include up to 100 megabits per second (Mbps).
- Approximately 2 million customers subscribe at reasonable rates to speeds that meet the FCC's definition of broadband service.

Satellite broadband is expanding and improving

- Geostationary satellites have rapidly increased throughput, from 10 gigabits per second (Gbps) in 2008, to 260 Gbps today, to 1000 Gbps expected by the end of the decade.

- Thousands of new non-geostationary satellites from multiple providers will soon be launched into Low-Earth and Medium-Earth orbits to provide low-latency broadband.

Satellite services use spectrum efficiently

- Satellite service providers have shared the use of spectrum bands amongst themselves and other communications services for decades.
- Frequency re-use and spot beam technology are examples of efficiency innovations that increased output using the same amount of spectrum.

Broadband is an evolving service, and not technology-specific

- Broadband is a combination of evolving performance characteristics, based on technologies and applications consumers want and use, not a fixed definition.
- A technology-neutrality policy approach will allow solutions most responsive to consumer needs and preferences to succeed.

Satellite services are a domestic economic driver

- American companies design and manufacture antennas that serve both fixed and mobile satellite broadband applications.
- In 2017, the US satellite industry had an estimated revenue of \$113 billion, supporting over 213,000 American jobs.



Chairman Blackburn, Ranking Member Doyle, and distinguished Members of the Subcommittee, thank you for having me testify before you today. I am Tom Stroup, President of the Satellite Industry Association (SIA). SIA is a U.S.-based trade association providing representation of the leading satellite operators, service providers, manufacturers, launch services providers, and ground equipment suppliers. 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.

Satellite communications services are positioned to be the keystone for bringing 21st century broadband capabilities to the entirety of the United States. These services are capable of providing broadband to rural and remote areas of the country where it remains uneconomical for terrestrial services to deploy, and provide both speeds and prices comparable to terrestrial alternatives. These services are available directly to the consumer today, covering all 50 states and delivering broadband offerings up to 100 megabits per second (Mbps). Satellite broadband is also used by business and government enterprises, for both fixed and mobile purposes, using a range of spectral bands to deliver assured access to broadband communications. Further, satellites are providing critical backhaul Internet connectivity to local Internet Service Providers and community institutions in remote locations.

Satellite service providers are always striving to improve and expand service so that all Americans can take advantage of its capabilities. Approximately 2 million customers nationwide are enjoying high-quality satellite broadband services at reasonable rates, and at speeds that meet and exceed the FCC's definition of broadband service. This includes many of the 8% of consumers that currently are not served by terrestrial broadband. Commercial satellite operators, that have already invested billions of



dollars in the construction and deployment of high throughput satellites, offer service to those consumers today, no matter where they are located.

Satellite services enable communications connectivity even when miles away from available terrestrial infrastructure. American citizens continue to see the benefits of satellites in providing communications-on-the-move, making broadband service available wherever we take our mobile devices. Aeronautical and maritime high throughput communications are largely facilitated by satellite broadband connectivity to aircraft and ships. The sector is growing to keep pace with demand for broadband connectivity for avionics, ships' operations, and Internet access for passengers who are onboard airlines and cruise vessels.

The satellite industry is today investing tens of billions of dollars to innovate and increase broadband connectivity in the United States and across the globe. 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. 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); today's satellites have capacities of up to 260 Gbps, a number expected to increase to 1000 Gbps by the end of the decade. These terabit capacity geostationary satellites will provide orders of magnitude capacity increases and resulting consumer broadband benefits, remaining competitive with terrestrial offerings.

In another highly-anticipated advancement in the industry, thousands of new high throughput (non-geostationary) satellites will soon join existing operators in Low-Earth and Medium-Earth orbits to provide additional high-speed broadband at low latency levels; prototypes of these satellites have already begun to launch. Existing high throughput satellites currently support the delivery of 3G and 4G services, as well as enable global machine-to-machine communications. Future satellite fleets will be a



part of a system architecture that delivers new 5G, IoT, and intelligent, connected transportation services to consumers.

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 its 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 to relief efforts and enhance recovery efforts. For example, satellite broadband provided connectivity in both Puerto Rico and the Virgin Islands, where 95% and 77% of all cell sites were wiped out by Hurricanes Irma and Maria this fall. 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. 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. And the First Responder Network Authority (FirstNet) is expected to rely in part upon satellite communications in order to meet the geographic coverage needs of its nationwide public safety broadband network.

With all the benefits one can gain from using satellite services, satellite service operators will continue to grow and become more available to the average consumer, including those once considered unreachable. Therefore, in order to serve the last unserved households, it is important to understand where broadband is currently available. For this reason, it is as important to have a clear and accurate

map of broadband coverage in America. Ensuring that all broadband platforms are included in broadband mapping will improve the accuracy of the data and help consumers, regardless of location, understand all the competitive options that are available in selecting a broadband provider. Even more, accurate data regarding broadband availability across the nation is important to inform future public policy aimed to address broadband gaps in unserved areas across the nation. For these reasons, SIA supports funding to improve broadband mapping and to continuously update the National Broadband Map. However, such activities should not delay the prompt implementation of Universal Service Fund or other federal funding programs aimed to get broadband service to unserved citizens across the nation.

As Congress develops its broadband policies, it should consider the many positive attributes of satellite broadband. These include, but are not limited to:

1. Competition: Just as it has with radio and television services in the past, satellite services provide market-based competition to terrestrial broadband services. Satellite broadband brings additional package options, pricing, and innovative services to consumers in the United States, often in areas with only a single or low number of providers.
2. Wide Geographic Coverage: To address the digital divide, broadband services need to be available for the most rural and remote areas of the country. The nature of satellite's wide coverage ensures that all communities within the satellite's footprint receive the same quality of service, whether they are remote communities or big cities. Public policymakers should leverage terrestrial-style incentives with satellite's geographically-independent cost structure to achieve universal communications services.
3. Availability: Unlike terrestrial broadband, satellite broadband is available today across a significant portion of the United States without the build out of additional infrastructure. When incentives are provided on a technology neutral basis, a customer can obtain satellite

broadband services by simply ordering and awaiting at-home installation. Accordingly, unlike with respect to terrestrial broadband, no long-term build out of terrestrial network infrastructure is required of satellite broadband.

4. Cost-efficiency: Because satellite systems have inherently wide-area coverage, when technology neutral incentives are made to encourage capacity redirection, there is no additional cost to build out to rural and remote areas, only lost opportunity costs in more lucrative service areas. This is unlike terrestrial services, where the low density of rural and remote areas makes it costlier and, in most cases, not economically viable, to build out and cover these areas.
5. Reliability: Natural and manmade disasters can interrupt terrestrial broadband services. Satellites, however, are less affected by these events, and satellite ground systems or satellite-enabled airborne equipment can be quickly deployed to restore connectivity. Additionally, some satellites serve as a router in the sky, independently switching to provide connectivity to the end user without additional deployed equipment. This level of reliability is often sought by government and businesses alike to ensure continuity and rapid response.

There are no real limitations on what broadband can become and, therefore, it is better to avoid rigid definitions. Rather, it is more appropriate to define broadband in terms of evolving performance characteristics, based on the technologies and applications that consumers want and use, not fixed “top-down” performance definitions. In the past, there has been a singular focus on “speed” as the sole factor that should define broadband (e.g., Gigabit service). While this may be important for some applications, it may not be necessary at arbitrary levels for all essential applications: different speeds may be more suitable for different types of applications.

Other factors such as differentiated service or pricing models, data caps, service availability, jitter, bursting, symmetry, latency, mobility, and portability may emerge to play a role in consumer broadband

choice and requirements. Given a competitive market, those solutions that are most responsive to consumer needs and preferences should succeed, while those that do not are likely to fail. Technology neutrality is especially important in addressing today's expectation of being continuously connected regardless of location. Satellite mobility applications now reach Americans not just in underserved areas, but allow them to stay connected while on airplanes, on vessels, and in transit to remote locations.

One last general note on innovation: the satellite industry is continuously gaining momentum and it plays a crucial role in the growth of the economy. In 2017, the U.S. satellite industry had an estimated revenue of \$113 billion, supporting over 213,000 American jobs. This number includes tens of thousands of well-paying manufacturing jobs as well as construction, design and operational jobs, among others.¹ However, this figure does not reflect revenues generated from businesses made possible by our services, services which, like satellites themselves, are not always apparent. But satellites remain a pillar of the U.S. telecommunications infrastructure, enabling the American economy in ways consumers might not be aware, such as supporting smartphone app transactions, to use just one example.

Finally, the satellite industry is and will continue to grow to heights once considered unreachable. Its uses and unreplaceable abilities will continue to not only assist in the U.S. economy's growth but to also save countless American lives.

Of course, all 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

¹ In 2017, there were 72,367 jobs associated with consumer, fixed, mobile, and Earth observation satellite services; 17,510 jobs associated with satellite manufacturing; 51,852 jobs associated with the launch industry, and 71,980 jobs associated with ground equipment manufacturing, installment, and services. The total number of satellite-focused jobs in the U.S. was 213,709. Data retrieved from the Bureau of Labor Statistics, 4th Quarter 2017.



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, to support the National Broadband Mapping system as to provide a clear and complete map of broadband services, and to help the industry sustain the momentum it is currently witnessing. Together we have an opportunity to address the digital divide, meet the growing needs of U.S. consumers, and ensure our country's safety. Failure to do so will deny American citizens access to the high-quality, advanced, cost- efficient broadband services that are available via satellite today without waiting years to build out and underrepresent the advances already underway in ongoing satellite broadband technology innovation.

The Satellite Industry Association stands ready to answer questions and to provide any additional information as necessary and would like to thank you for interest in learning more about the current and future capabilities of the industry.

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