

**Written Testimony of Tom Stroup
President, Satellite Industry Association
Before the
United States House Committee on Energy and Commerce
Subcommittee on Communications, Technology, Innovation, and the Internet

Hearing on
Launching Into The State of the Satellite Marketplace**

Chair Latta and Ranking Member Matsui and distinguished Members of the Subcommittee, thank you for inviting me to testify before you today. I am Tom Stroup, President of the Satellite Industry Association (SIA).¹ SIA is a U.S.-based trade association that represents the leading satellite operators, service providers, manufacturers, launch services providers, space situational awareness companies, and ground equipment suppliers.

Satellites are the backbone of modern society. We rely on them for communications, position, navigation and timing, and remote sensing across the globe. In addition to the vast range of services offered by the industry today, the companies represented by SIA are poised to lead the U.S. into an interconnected and data-driven future.

We are at a time of explosive innovation in the space industry, with over 7,000 active satellites on orbit today² and plans for tens of thousands more through the end of the decade.

¹SIA Executive Members include: Amazon; The Boeing Company; DIRECTV; EchoStar Corporation; HawkEye 360; Intelsat S.A.; Iridium Communications Inc.; Kratos Defense & Security Solutions; Ligado Networks; Lockheed Martin Corporation; Northrop Grumman; OneWeb; Planet Labs PBC; SES Americom, Inc.; Spire Global Inc.; and Viasat Inc. SIA Associate Members include: ABS US Corp.; The Aerospace Corporation; Artel, LLC; AST & Science; Astranis Space Technologies Corp.; Aurora Insight; Blue Origin; Comtech; Eutelsat America Corp.; ExoAnalytic Solutions; Hughes; Inmarsat, Inc.; Kymeta Corporation; Leonardo DRS; Lynk; Omnispace; OneWeb Technologies; Ovzon; Panasonic Avionics Corporation; Peraton; SpaceLink; Skyloom; Telesat; ULA and XTAR, LLC. SIA Affiliate Members include: ARA; ATG; Davis Wright Tremaine; EVONA; Genus Group; Hogan Lovells; Integrasys LLC; Kencast; Keysight Technologies, Inc.; Media Broadcast Satellite; Orange Business Services; Orbital Research; Plexus Corp; SD Government; Sheppard Mullin; Skylo Technologies and Wiley

² “NORAD GP Element Sets Current Data”, CelesTrak, 30 January 2023 <https://celestrak.org/NORAD/elements/>

Before more fully exploring the innovation in the industry, it is important to understand the breadth of service provided by satellite companies.

Americans have long relied upon satellites to provide direct to home TV, satellite radio, and distribution of programming to cable companies as well as to TV and radio broadcasters. The satellite industry provides FCC-defined broadband service today across the globe and is prepared to bring the furthest corners of America into the 21st Century by serving as the most viable technology capable of bridging the digital divide in rural areas as well as working to bring the nation into an interconnected future as a backbone for 5G, IoT, and Artificial Intelligence (AI) technologies. Satellite technology will not only enable U.S. leadership domestically, but will be an essential foundation as we set up a permanent lunar space station.

Satellites today provide anytime, anywhere global connectivity to consumers, utilities, supply chain logistics providers, the IoT community, cruise and other ships, airlines, and unmanned aerial vehicles. Soon, we will be living in a world where an autonomous car can update its operating system while driving anywhere in the world via a satellite link, spectators at a football game will be able to connect to satellite and use augmented reality to revisit plays on smart glasses in real-time, and connected sensors on infrastructure will be able to determine potential failures as well as directly deploy satellite-connected UAVs to inspect even the most remote sites. Geospatial satellite data has not only transformed environmental monitoring, but also provides essential business analytics from monitoring remote infrastructure to analyzing supply chain performance. When integrated with geolocation data provided by Global Positioning System (GPS), AI can be used in real time to redirect resources and optimize output.

In addition, satellites play a critical role in preparation, response, and recovery from national disasters, electrical outages and terrorist attacks. Unlike terrestrial communications

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 and recovery efforts. In addition, the deployment of direct to mobile satellite connectivity will greatly expand the range of communications available in emergencies. Remote sensing satellites are used to provide better weather forecasting through both optical sensors and by measuring the refraction of GPS signals in the Earth's atmosphere to achieve better weather profiles. Remote sensing data and analytics can also help pinpoint where damage has occurred and what routes to the location are still accessible. Furthermore, synthetic aperture radar satellites can see through clouds and allow the mapping of damaged regions when storms are still overhead.

Satellite technology is transforming agriculture across America. Satellite broadband, for instance, enables remote farms with livestock sensors, soil monitors, and autonomous farming equipment in rural America, far beyond where terrestrial wireless and wireline can reach or make economic sense to deploy. Precision GPS technologies allow farmers to increase crop yield by optimizing use of fertilizer, pesticides, herbicides, and applying site-specific treatments to fields. Earth imaging satellites provide regular high-resolution imagery that allows farmers to determine when to plant, water, or fertilize crops and can be used to provide crop yield estimates and monitor global food security. Satellite advances in weather forecasting help farmers prepare for drought, floods, and other adverse weather conditions.

Satellites are not only a core technology for our domestic future but also play a crucial role today for advancing our national security priorities and partnerships abroad. Satellite

communications have been a lifeline in Ukraine, where terrestrial infrastructure has been destroyed. Earth imaging satellites allow for unprecedented monitoring and analysis of areas of concern. This commercial imagery is often shareable with partner nations and the general public and has been a game changer in providing near-real time transparency into the Russian invasion of Ukraine. These images have enabled the world to more effectively respond to the humanitarian crisis in Ukraine and better understand the ever-changing situation on the ground. Synthetic aperture radar satellites can see through clouds, and thus, for instance, can provide insight into North Korea's military operations during the 50% of the time the country is cloud-covered. Remote sensing satellites are also capable of mapping radiofrequency transmissions, at the level of a handheld radio in space, and have been critical in monitoring the movement of Russian troops in Ukraine and detecting sources of GPS interference. From troops on the ground to the largest remotely piloted aircraft, our military relies on space and will need to utilize the most advanced technologies to lead it in the IoT and AI battlefield applications of the future.

The satellite industry today is investing constantly to ensure it can address the challenges of the future and to make its technologies available to every American. Satellite companies are working to optimize the use of spectrum, by investing in high-throughput satellites and flexible, software defined payloads that allow for instantaneous reallocation of spectrum resources and the mitigation of harmful interference. Costs are dropping for both space and ground systems through the use of modular satellites, digital engineering, intersatellite links and cloud-integrated ground stations, which minimize the need for expensive ground architecture. Flat panel and phased-array antennas lower consumer costs and enable better connectivity that has been essential to the deployment of non-geostationary satellite constellations. Launch costs have also declined dramatically, a result of reusable rockets, enhanced in-space transportation and

improved separation technologies that provide opportunities for ridesharing through the launch of over 100 satellites on a single launch.

The U.S. satellite industry is continuously gaining momentum, with estimated revenue of \$179 billion in 2021.³ However, this figure does not reflect revenues generated from businesses which rely on satellite services behind the scenes. Satellites remain a pillar of U.S. infrastructure, enabling the American economy in ways consumers might not be aware, such as supporting smartphone app transactions, to use just one example. We are submitting for the record SIA's State of the Satellite Industry Report, which includes detailed economic analysis, and SIA's Satellite 101 briefing, which provides further information on satellite technologies.

While the U.S. has long led the space sector, China trails close behind, with similar investments in space technologies that not only will be transformative in times of conflict, but also undermine international democracy. China is investing in navigation, communications, and remote sensing systems to rival the U.S.; it has already launched its BeiDou Global Navigation Satellite System to rival GPS and provides free military-grade service to some of its allies. It has planned a constellation of 13,000 communications satellites, as well as remote sensing constellations from optical to radar. As these services are offered below market rate or free of charge globally, with them will come backdoor security risks for the China to exploit as exist with Huawei. It is critical for Congress to support continued domestic innovation and avoid regulations that put U.S. providers on an unequal playing field internationally.

The U.S. satellite industry is set to revolutionize daily life as we move into a more interconnected world where change on Earth is more visible than ever. In order to ensure the success of the U.S. satellite industry both domestically and globally, the industry needs:

³ Satellite Industry Association, State of the Satellite Industry Report 2022

1. Assured access to the spectrum that enables these technologies, from communications frequencies to remote sensing data downlinks. As we approach the World Radiocommunications conference, strong interagency coordination is needed to preserve the spectrum needed for satellite operations and enable the use of future satellite technologies.
2. Technology inclusive policies, allowing for innovative solutions across domains to address America's most challenging needs including the provision of broadband services at the most affordable rates.
3. Adequate funding for government agencies responsible for oversight and licensing of the industry to enable them to keep up with the rapid pace of growth in the sector.
4. A level playing field with international competitors, including the removal of satellite technologies from restrictive export-control regulation when international commercial alternatives exist.

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