DEPARTMENT OF THE AIR FORCE

UNITED STATES SPACE FORCE

PRESENTATION TO THE

COMMITTEE ON ARMED SERVICES

UNITED STATES SENATE

SUBJECT: Department of Defense Spectrum Policy and Equities: Risk of Ligado's Proposal to GPS

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UNITED STATES SENATE

Mr. Chairman, Ranking Member Reed, and members of the committee, thank you for the opportunity to appear before you today with my esteemed colleagues and to reiterate the importance of the Global Positioning System (GPS) to national security, public safety, and our economic well-being.

As the Chief of Space Operations for the United States Space Force, I am responsible to the Secretary of the Air Force for organizing, training, and equipping the forces that provide GPS services to our military forces, allies, and others who use it around the world. The Space Force is designing, building, and deploying the satellites and ground systems; operating the constellation; establishing and maintaining standards for all civil and military GPS signals; and developing the critical components for military GPS receivers. As the Commander of United States Space Command, I am responsible for directing daily GPS operations and ensuring the positioning, navigation, and timing (PNT) services provided by the system are there and available for use to our warfighters under all conditions.

From the launch of the first GPS Block I satellite in 1978, through the accelerated fielding of GPS IIA satellites to support Desert Storm in 1990, to today, the performance of the system and the services it provides have continuously improved. On April 27, 2020, when we celebrated the 25th anniversary of GPS at full operational capability, today's GPS constellation delivers PNT accuracy three times as precise as was required by the original military specification.

The next-generation of satellites we are deploying, GPS III, and the new, more resilient and cyber-secure ground control system to operate these new satellites, will improve that performance even further. The first GPS III was successfully launched in December 2018 and the second in August of last year. In addition, this block of satellites includes a new civil signal that increases the system's international interoperability while protecting national security use—evidence that our nation sees GPS as global good and instrument of national power that far exceeds its military utility.

GPS has long been the gold standard for the world for PNT and provides military, civil, and commercial benefits previously unimagined. The GPS enterprise helps fuel a $20 trillion economy that depends on it not just for positioning but to synchronize financial and cellular networks; enable robotic and autonomous systems; and create unbounded economic opportunity.

In my role as the Commander of U.S. Space Command, I am also responsible for protecting the GPS system, and the services it provides to our military forces, from the threats any adversary might pose to its use. For many other military space systems the nation relies on for its security and defense, this increasingly involves the need to protect our systems from physical attack. Our adversaries are now building counterspace weapons to kinetically attack our satellites from the ground and in orbit.

This, however, is not the primary threat to GPS. The primary threat to GPS, both in the past and for the foreseeable future, is electronic attack or jamming of GPS receivers. Since the GPS

signal originates from 12,000 miles in space, it is incredibly weak by the time it reaches the receivers that decode and process the complex signal on the Earth's surface. Adversaries understand this and build jammers in an attempt to deny our use of this signal in military operations. In response, we train to recognize this threat, employ special tactics to defeat the jammers, and operate sophisticated systems to maintain our use of GPS services in conflict. This requires great skill and comes at some risk to our forces, as they are required to defeat these electronic weapons to execute their missions.

Here at home, anything that degrades the effectiveness and reliability of GPS has the ability to prevent military forces from training effectively to maintain readiness; and worse yet, keep us from protecting and serving the public by responding to natural disasters and providing humanitarian assistance, tracking national security threats, and defending the homeland.

Transmitters adjacent to the GPS spectrum have significant potential to disrupt and degrade the operation of the approximately 1 million GPS receivers in the Department of Defense (DoD) inventory, and therefore bring harm to military training, readiness, and DoD's ability to conduct operations. Without solid data about the location of ground-based transmitters and antennas, DoD cannot begin to fully understand and work to mitigate the impact to existing systems, if any mitigation is possible. Changes necessary to combat potential interference from systems operating near the GPS signals could delay the development and deployment of new GPS capabilities for years—and cost billions in U.S. taxpayer investment.

GPS has also long been a critical technology that has supported the Nation's public safety, law enforcement medical and medical responders. It literally saves lives. While Americans at home are typically not under threat of purposeful electronic attack, the GPS services they depend on every day for life and livelihood are also threatened if the GPS signal and its environment are not protected from disruption. As with military forces conducting our critical Homeland Defense mission, or training for combat in the United States, degradation of GPS signals can affect safety of flight for aircraft and other segments of the national transportation system; prevent first responders from finding their way to emergencies or communicate when they arrive, and affect the economic activity of every American.

By law the Secretary of Defense must raise concerns regarding anything that would adversely affect the military potential of GPS. He has done so. As the Commander of U.S. Space Command, I have been assigned a Unified Command Plan mission of protecting and defending our space capabilities. I cannot take direct action to protect America's use of GPS in the homeland, but I can provide awareness of the threats, the impacts of those threats on our joint military forces, and strongly advise against emitters that can negatively impact our ability to operate our critical space capabilities that fuel our American way of life and our American way of war.