

**STATEMENT OF
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before the

SENATE ARMED SERVICES COMMITTEE

SPECTRUM HEARING

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Mr. Chairman, Ranking Member Reed, and Members of the Committee, thank you for the opportunity to appear before you today and offer testimony on the necessity of protecting the radio spectrum used by the Global Positioning System (GPS). GPS is not just a critical pillar of our national security, it is the foundation on which much of the United States', indeed the world's, current and future economy is built. To that point, if the recent decision of the Federal Communications Commission (FCC) to approve Ligado Network, LLC's license modification petition is allowed to stand, it will undermine both our national defense and economic security.

GPS was designed, built, operated, and is sustained by the Department of Defense for the core purpose of providing precise positioning, navigation, and timing information to our forces on land and sea, in air and space.

But beyond its original purpose, GPS has proven to be so valuable for civil and commercial applications that the military is now actually a minority user. According to a recent study by Grand View Research, GPS will be a \$146.4 billion commercial industry by 2025, growing at 18% annually. In 2019, the Department of Commerce released a study estimating that GPS has generated \$1.4 trillion in economic benefits since the 1980s¹.

When you use the mapping app on your smartphone, swipe a credit card to execute a secure point-of-sale transaction, or board an airplane, you are relying on GPS. Just as with other parts of our critical infrastructure, such as electric power, indoor plumbing, railways, highways, gas stations, and the air traffic control system, it has become a public utility – an almost unnoticed feature of the civilized world that we take for granted, and can no longer do without.

GPS depends for its ubiquity and accuracy on more than two dozen satellites in precisely known positions 12,500 miles above the Earth. These satellites broadcast signals to earthbound and airborne receivers which, knowing where the satellites are, can determine their own positions, just as navigators in an earlier era used the known positions of stars to determine their positions at sea. The GPS satellites are essentially "stars" that shine with radio rather than with visible light.

But signals from GPS satellites, as from all satellites, are extremely weak, and earthbound GPS receivers must be highly sensitive in order to use them. For this reason, they are assigned to portions of the radio spectrum—frequency bands—reserved exclusively for their use. Any nearby transmitter operating in or close to the frequency bands that have been set aside for GPS would overwhelm their signals. Such interference has been prevented by rules that have protected GPS and the entire space communications band surrounding it for decades, allowing it to become an integral part of the global economic infrastructure, used literally by the entire world.

But the radio spectrum is valuable property, worth many billions of dollars when portions of it are placed for auction by FCC. Thus, unfortunately, some have proposed dismantling the rules that protect GPS in order to allow earthbound operators to use frequency bands previously reserved for space communications in general, and those adjacent to GPS in particular.

The U.S. Department of Transportation (DOT) conducted a testing program developed over multiple years with stakeholder involvement, evaluating 80 consumer-grade navigation, survey, precision agriculture, timing, space-based, and aviation GPS receivers. This test program was conducted in

¹ <https://www.space.commerce.gov/doc-study-on-economic-benefits-of-gps/>

coordination with DoD testing of military receivers. The results, as documented in the DoT “Adjacent Band Compatibility” study released in March, 2018, demonstrated that even very low power levels from a terrestrial system in the adjacent band will overload the very sensitive equipment required to collect and process GPS signals. Also, many high precision receivers are designed to receive Global Navigation Satellite System (GNSS) signals not only in the 1559 MHz to 1610 MHz band, but also receive Mobile Satellite Service (MSS) signals in the 1525 MHz to 1559 MHz band to provide corrections to GPS/GNSS to improve accuracy. With the present and future planned ubiquity of base stations for mobile broadband use, the use of GPS in entire metropolitan areas would be effectively blocked. That is why every government agency having any stake in GPS, as well as dozens of commercial entities that will be harmed if GPS becomes unreliable, opposed the FCC’s decision.

There are two principal reasons for the Department’s opposition to Ligado’s proposal. The first and most obvious is that we designed and built GPS for reasons of national security, reasons which are at least as valid today as when the system was conceived. The second, less well-known, is that the DoD has a statutory responsibility to sustain and protect the system. Quoting from 10 USC 2281, the Secretary of Defense “...shall provide for the sustainment and operation of the GPS Standard Positioning Service for peaceful civil, commercial, and scientific uses...” and “...may not agree to any restriction of the GPS System proposed by the head of a department or agency of the United States outside DoD that would adversely affect the military potential of GPS.”

Leaving entirely aside the national security implications of jamming our own military navigation system, if Ligado moves forward with establishing its network, we in the United States will have imposed a self-inflicted wound on GPS. Though other nations are building or upgrading their own satellite navigation systems, ours is the present world standard and the basis of hundreds of billions of dollars in economic advantage for our nation. While we set out to redesign and refresh hundreds of millions of GPS receivers in our installed national security and industrial base, others, especially Russia and China, will be quick to take advantage of our mistake by offering replacement systems that are not vulnerable to Ligado’s interference. A weakened GPS system offers our adversaries the opportunity to replace the United States as the world standard for satellite navigation. Both Russia and China will jump on that opportunity.

The Department is not opposed to sharing the airwaves. Indeed, as part of the DoD’s 5G-to-Next G initiative, we will be working alongside industry to test spectrum sharing technologies at military bases around the country, while promoting collaboration across the interagency, academia, and allies to develop, test, and deploy innovative solutions for spectrum sharing. But, as the Chairman and Ranking Member rightly noted in recent statements, Ligado has little to do with 5G. Although Ligado portrays their solution as 5G, there is no evidence that they have a technically viable 5G solution, and they are therefore misrepresenting their offering. Denying Ligado’s petition will not affect the pace at which the nation rolls out 5G technologies and service.

We have built strong relationships across the government and industry to ensure that the U.S. remains at the cutting edge of communications technology. We must not allow this issue to cloud our progress. We must not put the security and economic advantage of the United States and its partners and allies at risk by allowing Ligado to put forward a false choice between the protection of GPS and the promotion of U.S. 5G competitiveness. One has nothing to do with the other, and we can have both if we are smart enough to recognize that. In light of the facts the choice is clear. The FCC must reverse its decision on Ligado, and deny any similar future petitions which would repurpose the radio spectrum adjacent to that assigned to GPS.