



DOD Concerns About the FCC-Approved Ligado Network

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On April 20, 2020, the Federal Communications Commission (FCC) [unanimously approved](#) an application by Ligado Networks LLC (Ligado) to “deploy a low-power [9.8 decibel watts (dBW)] terrestrial nationwide network in the 1526-1536 MHz, 1627.5-1637.5 MHz, and 1646.5-1656.5 MHz bands [of the electromagnetic spectrum] that will primarily support Internet of Things (IoT) services.” These frequency bands are [traditionally used for satellite operations](#). The Department of Defense (DOD) [opposed](#) this decision—along with the Department of Homeland Security, Department of Transportation (DOT), Department of Interior, Department of Justice, the Federal Aviation Administration (FAA), and others. That opposition related to concerns that Ligado’s proposed network could interfere with signals from satellites to Global Positioning System (GPS) receivers. Congress may consider federal agency concerns, including DOD concerns related to mission-critical systems and the FCC’s response, as it conducts oversight of the FCC’s ruling. Congress may also consider broader issues related to fifth generation (5G) mobile technologies, such as the allocation of spectrum among competing users and the impact of spectrum decisions on national security.

DOD Concerns and Related Studies on GPS Interference

In both its formal response to the FCC’s ruling and its [May 6, 2020, testimony](#) before the Senate Armed Services Committee (SASC), DOD cited two primary studies that shaped its belief that the Ligado network “would cause unacceptable operational impacts and adversely affect the military potential of GPS”: a [2018 DOT study](#) and a [2016 classified study conducted by the U.S. Air Force \(USAF\)](#). The 2018 DOT study assessed the extent to which cellular base stations with power levels ranging from -6 dBW to 31 dBW and cellular handsets of -7 dBW would interfere with GPS. (At the time of the study, Ligado proposed a base station power level of 32 dBW and a handset power level of -7 dBW.) The study concluded that base stations at the proposed Ligado frequency would have to be limited to 9.8 dBW to ensure the protection of certified avionics in most scenarios. In conversation with CRS, DOT officials asserted that the protection of other categories of GPS equipment—including noncertified aviation, general location/navigation, high precision, timing, and space-based—could not be assured at this power level. DOD additionally [recommended](#) “that proposals for use of bands adjacent to GPS should not be approved unless they meet the transmission power levels described in the [DOT test].” Based on the DOT study findings for certified aviation, Ligado submitted an [amended](#) application to the FCC, reducing its

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proposed power levels to 9.8 dBW. Per the [FCC ruling](#), Ligado also agreed to maintain a 23-MHz guard-band of unused spectrum designed to separate its transmissions from GPS, thus attempting to mitigate potential interference.

There are limited details available in the public domain that describe the technical parameters of the 2016 classified USAF study; however, the USAF's [formal response](#) to the FCC ruling notes that its study, which specifically tested potential interference with military GPS receivers, "supported the conclusions drawn from the DOT testing ... conducted during the same month." This suggests that the study may not provide evidence that a Ligado network—using the FCC-approved specifications from the company's 2018 amended application—would necessarily interfere with GPS. Furthermore, [according to FCC Chairman Ajit Pai](#), DOD neither submitted nor attempted to submit the classified USAF study to the FCC for consideration. Nonetheless, DOD has continued to cite these studies in its public objections to the ruling.

Dr. Michael Griffin, Under Secretary of Defense for Research and Engineering (USD R&E), [has additionally asserted](#) that any ground transmissions—regardless of power level—"would drown out the very weak signals that come from [GPS] satellites," likening the effect of the proposed Ligado network on GPS to attempting to listen to the rustling of leaves while 100 jet aircraft simultaneously took off.

Statutory Obligations with Regard to Potential GPS Interference

DOD has [noted](#) its statutory obligation, pursuant to 10 U.S.C. §2281, to object "to any restriction on 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" [emphasis added]. Although the DOT and the USAF study do not appear to provide assured evidence that a Ligado network *would* adversely affect military GPS, neither definitively ruled out the *potential* for adverse effects. As a result, Secretary of Defense Mark Esper [concluded](#), "Consistent with my statutory responsibilities, I believe there are too many unknowns and the risks are far too great to federal operations to allow Ligado's proposed system to proceed."

DOD has additionally noted that Section 1698 of the National Defense Authorization Act for Fiscal Year 2017 (P.L. 114-328)—codified at Section 343 of the Communications Act—prevents the FCC from approving commercial terrestrial operations in the bands proposed by Ligado "until 90 days after the Commission resolves concerns of widespread harmful interference by such operations to covered GPS devices." DOD asserts that the FCC did not resolve such concerns prior to approving Ligado's application; [paragraph 130](#) of the FCC ruling provides the FCC's justification for its belief that the concerns were "effectively resolved."

FCC Response to Concerns About Potential GPS Interference

Although the FCC has not issued a formal response to DOD, Commissioner Brendan Carr noted in a [statement](#) accompanying the FCC's decision that "after a thorough and multi-year review, the FCC's professional staff of engineers and other experts determined that we can advance America's 5G leadership while protecting GPS and other adjacent band services." Commissioners Jessica Rosenworcel and Geoffrey Starks termed the decision "an extremely close call," but similarly noted in their [joint statement of concurrence](#) that, despite the concerns of DOD and others about potential GPS interference, "in the end, we are compelled to support the expert technical analysis done by the [FCC's] engineering staff."

Legislative Activity

The [FY2021 National Defense Authorization Act](#) (P.L. 116-283) contains five Ligado- or GPS interference-related provisions:

1. Section 1611 requires DOD to develop a plan for a resilient and survivable positioning, navigation, and timing capability within two years. This provision would allow DOD to reprogram resources as needed to develop the plan.
2. Section 1661 prohibits funds for retrofitting GPS devices or networks that use GPS for the purposes of “[mitigating] harmful interference from commercial terrestrial operations using the 1526–1536 megahertz band, the 1627.5–1637.5 megahertz band, or the 1646.5–1656.5 megahertz band” (i.e., the bands approved for the Ligado network).
3. Section 1662 prohibits funding for contracts with entities “that [engage] in commercial terrestrial operations using the 1525–1559 megahertz band or the 1626.5–1660.5 megahertz band unless the Secretary has certified to the congressional defense committees that such operations do not cause harmful interference to a Global Positioning System device of the Department of Defense.”
4. Section 1663 directs the Secretary of Defense to seek an independent technical assessment of the FCC’s Ligado authorization order (FCC 20-48) from the National Academy of Sciences. This assessment is to “evaluate the potential harmful interference concerns relating to Global Positioning System devices,” review potential mitigation measures, and provide associated recommendations to the department.
5. Section 1664 prohibits the Secretary of Defense from obligating or expending funds to comply with the FCC’s Ligado authorization order until the Secretary submits to the congressional defense committees an estimate of the cost associated with any potential interference-mitigation measures.

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