

DOD Concerns About the FCC-Approved Ligado Network

Updated June 15, 2020

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 “a typical cellular base station power level of 29 dBW” would interfere with GPS. (At the time of the study, Ligado proposed a base station power level of 32 dBW.) The study concluded that a 29 dBW base station would exceed allowable levels of interference, instead recommending that ground station transmissions not exceed 9.8 dBW to ensure the protection of certified avionics in “the most restrictive of the certified aviation scenarios examined.” 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 these recommendations, Ligado submitted an [amended](#) application to the FCC, reducing its 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.

Congressional Research Service

<https://crsreports.congress.gov>

IN11400

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."

Potential Independent Review of Test Results

Due to the ongoing disagreement about the impact of Ligado's proposed network on GPS, [some analysts have suggested](#) that relevant tests should be independently reviewed by a "neutral arbiter," such as the National Academy of Sciences. According to a Pentagon spokesman, DOD would "support an impartial third party, one with demonstrated expertise in GPS testing, conducting a thorough examination of all data collected during the preceding decade of testing." Such a review, which would delay execution of the FCC decision, would likely require the approval of the congressional commerce committees.

Legislative Activity

The [FY2021 National Defense Authorization Act SASC mark-up](#)

prohibits the use of DOD funds to comply with the FCC Order on Ligado until the Secretary of Defense submits an estimate of the costs associated with the resulting GPS interference, and directs the Secretary of Defense to contract with the National Academies of Science and Engineering for an independent technical review of the order to provide additional technical evaluation to review Ligado's and DOD's approaches to testing.

Author Information

Kelley M. Sayler
Analyst in Advanced Technology and Global Security

John R. Hoehn
Analyst in Military Capabilities and Programs

Disclaimer

This document was prepared by the Congressional Research Service (CRS). CRS serves as nonpartisan shared staff to congressional committees and Members of Congress. It operates solely at the behest of and under the direction of Congress. Information in a CRS Report should not be relied upon for purposes other than public understanding of information that has been provided by CRS to Members of Congress in connection with CRS's institutional role. CRS Reports, as a work of the United States Government, are not subject to copyright protection in the United States. Any CRS Report may be reproduced and distributed in its entirety without permission from CRS. However, as a CRS Report may include copyrighted images or material from a third party, you may need to obtain the permission of the copyright holder if you wish to copy or otherwise use copyrighted material.