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INSIGHT

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 "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.

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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

Both the House and the Senate have proposed Ligado- or GPS interference-related legislation in their respective versions of the FY2021 National Defense Authorization Act. First, Section 1601 of the Senate version would require DOD to develop a plan for a resilient and survivable positioning, navigation, and timing capability. This provision would allow DOD to reprogram resources as needed to develop this plan. Section 234 of the Senate bill would require an independent assessment from the National Academy of Sciences to evaluate the potential impacts of the proposed Ligado network on GPS. In addition, Section 1083 would prevent the DOD from entering into a contract with a corporation that would potentially interfere with GPS signals, and would require a cost estimate to "the extent of covered costs and the range of eligible reimbursable costs associated with interference resulting from such order and authorization to the Global Positioning System."

Section 1609 of the House version of the bill has similar language to the Senate's, prohibiting funds to comply with the FCC order on Ligado; however, the House would not direct an independent assessment of the Ligado proposal. Section 1608 of the House bill additionally 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."

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