

May 6, 2020

The Honorable James Inhofe
Chairman
Committee on Armed Services
United States Senate
Washington, D.C. 20510

The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United State Senate
Washington, D.C. 20510

Dear Chairman Inhofe and Ranking Member Reed:

We understand that you are holding a hearing on the unanimous, bipartisan decision of the Federal Communication Commission (“FCC”) to grant our spectrum license applications, after a lengthy public proceeding involving years of public comment and expert review. It is unfortunate that members of the Committee will not have the opportunity to hear from any witnesses from Ligado, whose spectrum is at issue, nor from the FCC, whose decision is the subject of your hearing and will only hear from witnesses representing one perspective: the Department of Defense (“DoD”). In light of this, we take this opportunity to explain how the FCC’s Order protects GPS, describe the process the FCC has established to ensure that DoD’s concerns are addressed going forward, and clarify the inaccurate characterizations of the FCC’s adjudicative decision. We understand that there is a lot of technical information being discussed today, but our sincere hope is that after reading our comments, all Members on this Committee will know a little more about our company, the exhaustive process we’ve participated in over the past four years, and appreciate our commitment to working together with stakeholders to implement the conditions as defined in the final Order. We respectfully request that this submission (and its Attachments) be included in the hearing record.

At the outset, we want to share with you that we are experienced engineers and wireless network executives who have built leading U.S. wireless networks over many decades. Our priority at Ligado has always been to develop and deploy our spectrum to advance national security, create jobs, and generate economic growth. Our business has pursued these goals for decades, offering critical satellite services on so-called “L-Band” spectrum to both government and private sector entities. For example, using this spectrum, Ligado has provided critical and reliable satellite communication services to federal, state, and local first responders as well as public health agencies serving areas including our tribal lands and areas hard-hit by disasters such as 9/11, Hurricanes Katrina and Maria, and tornadoes that ripped through the South in 2012 and 2013. We now look forward to the opportunity to build a network that will advance our Nation’s progress on the race to 5G. The four-year process of review by the FCC has resulted in unprecedented conditions on our company to protect GPS, and we willingly accept those.

By way of background, the spectrum at issue in the FCC’s Order has been licensed exclusively to Ligado for over three decades. This spectrum has been designated by the FCC for commercial mobile use for 17 years. Ligado’s recently-approved license does not in any way expand Ligado’s spectrum or reallocate spectrum previously allocated to GPS to Ligado. It

merely modifies how Ligado can use its spectrum by establishing specific and stringent technical limitations on use of the spectrum—and imposes those limitations solely and specifically for the purpose of protecting GPS. GPS has long been allocated to spectrum far away from Ligado’s spectrum, specifically, a full 23 megahertz away. And that allocation is also not changed by the recent FCC action. The distance between Ligado and GPS is substantial: guardbands are typically 2-5 megahertz and 23 megahertz is roughly the amount of spectrum needed for four TV stations. The FCC Order ensured that this distance between GPS and Ligado combined with the lower power levels imposed and approved by the FCC affords GPS devices operating in the GPS spectrum a complete defense against interference from Ligado. Every test performed in this proceeding, including those done by the Department of Transportation (“DOT”), the Department of Defense and Department of Commerce lab (“NASCTN”), and an independent lab supports this conclusion. In its allocated spectrum, GPS is fully protected, even by the tiniest change of one decibel (1 dB) which is the metric of interference that the DoD urged the FCC adopt. So the FCC Order does not give Ligado additional spectrum or take any away from GPS; it also does not impact any GPS device operating in the spectrum allocated to GPS.

A decade ago in an effort to reach a compromise and in acknowledgement that Ligado should be able to use the spectrum allocated to it, several federal agencies undertook to try to resolve the technical debate that is at the heart of the Ligado proceeding. As part of that process, the U.S. Air Force assessed its GPS-related spectrum needs and agreed in a formal Memorandum of Understanding with the Department of Commerce’s NTIA (the government agency charged with overseeing Government spectrum users) that the Air Force does not need access to any spectrum outside the GPS allocated spectrum and therefore that it did not need any additional restrictions on Ligado’s spectrum. Against these facts, then, it becomes clear that today DoD’s position is different than its prior positions. It seems that DoD may now be asking Congress and the FCC to allow them to use spectrum that belongs to someone else even though they long ago stated they do not need Ligado’s spectrum to protect GPS, and the testing supports that same view. Throughout this proceeding, the important distinction between the Ligado spectrum and the GPS spectrum has been either overlooked or not acknowledged. Ligado’s band is 23 megahertz away from GPS. These airwaves are separate and distinct. Imagine if someone who lives 23 blocks from you decided to move into your basement, said that the quiet music in your upstairs bedroom was too loud and then demanded you never play music in your house. That simply does not seem fair, and more importantly, consistent with our system of laws.

Putting aside the underlying legal framework, Ligado understands the critical significance of GPS and takes very seriously the concerns about any interference to it. That is why Ligado consulted over the course of many years with the DoD, DOT, Federal Aviation Administration (“FAA”), GPS device manufacturers, and other stakeholders in developing our spectrum proposal. We sought to ensure that our network does not cause harmful interference (meaning, does not impair a GPS device’s ability to work and perform as intended) to any nearby spectrum users and even offered substantial safeguards to those continuing to operate outside their assigned spectrum. Our license proposal, first filed in December 2015, included significant technical concessions developed in conjunction with GPS manufacturers (and pursuant to agreements with many of them) and designed specifically to protect GPS from interference. Ligado’s operating parameters include dramatically reduced power levels and tighter emissions levels. They also include the specific and very low power level recommended by the FAA and

the DOT to protect certified aviation GPS receivers. The FAA-recommended power level that was adopted by the FCC is more than 99% lower than the power level agreed to by GPS manufacturers Deere, Garmin, NovAtel and TopCon (who are among the very companies from whom the DoD and other GPS users obtain their GPS equipment). The power level the GPS companies agreed to was 1600 Watts; the FCC approved 10 Watts. These concessions, and the involvement of the GPS industry in developing them, were critical to the FCC's decision to approve Ligado's application.

Another critical fact for the FCC was the data it reviewed during the more than four years that it took to consider Ligado's proposal. One of those tests was performed at the National Advanced Spectrum and Communications Test Network ("NASCTN"). NASCTN is sponsored by DoD and the Department of Commerce and provides "accurate, reliable, rigorously scientific, and unbiased measurements and analyses" in technical spectrum matters. NASCTN has tested, and is continuing to test, other spectrum bands important to meeting our U.S. spectrum needs, including AWS-3 and CBRS. Several of the projects undertaken by NASCTN are proposed by organizations such as the DoD Defense Spectrum Organization ("DSO") and Edwards Air Force Base. Ligado submitted its proposal to testing at NASCTN at the specific request of Fred Moorefield in the DoD's Chief Information Office. After thousands of hours of comprehensive testing, NASCTN released testing data in February of 2017 which show that Ligado's proposed network would not cause harmful interference to GPS devices. Independent testing from 2016 produced the same results.

The FCC, the independent agency charged by Congress with regulating spectrum, took all this evidence into account when it decided to approve Ligado's application. The FCC's Order concludes a process that has been pending for well over four years. Ligado submitted its proposal to the FCC in December 2015. In April 2016, the FCC issued a public notice asking all parties including agencies with concerns about the proposal to submit specific technical information to support any concerns. The FCC issued another public notice in 2018 asking for additional comments. However, DoD never filed any technical information or analysis, and at no point did DoD provide information expressing specific technical concerns to the FCC. That remains true to this day. In addition, over the past several years we have asked the three DoD witnesses to meet with us in an effort to understand their concerns. They have declined those invitations. Moreover, a draft of the Order was given to NTIA and all federal agencies in mid-October 2019. The FCC even extended its customary two-week feedback deadline for several months to provide DoD with ample time to submit into the FCC record any substantive technical data that would justify a different result. The unanimous bipartisan FCC Order stated clearly that DoD has not provided any information to support its assertions about implications for GPS devices.

The FCC's specific findings are important. In its Order, the FCC concluded that GPS devices are absolutely entitled to the very highest level of protection in the spectrum that belongs to GPS and that the Ligado proposal gives them that protection. From the study conducted by the DOT, the study conducted by NASCTN, and every other study, the record is, and has for years been, unambiguous and crystal clear: no GPS device will experience any issue whatsoever—even the smallest change in the background noise level (1 dB)—when operating in the band allocated to GPS. We think even the DoD would agree with the FCC on this point. The

FCC also determined that while only a very small number of high-precision GPS devices operating “far outside” the GPS spectrum allocation may have the potential to be affected by Ligado’s operation, the FCC found that the technical data indicated practically all of these devices would not be impacted.

Still, in recognition of the importance of GPS and the concerns of the DoD, the FCC established a comprehensive coordination regime that requires Ligado to provide six-months advance notice before deploying; to have a 24/7 monitoring capability, a hotline, a stop buzzer or kill switch; to work directly with any federal agency with concerns about the potential for interference; and to repair or replace at Ligado’s cost any government device shown to be susceptible to harmful interference. The FCC went even further with regard to DoD, requiring Ligado address DoD concerns about harmful interference by lowering its power levels even further or establishing an exclusion zone near DoD installations as needed.

The FCC’s decision was delivered after four years of consideration, carefully and meticulously analyzes the extensive record, all of the testing in the record, the DoD’s position, national and international standards on protecting GPS, and all available evidence, and it concluded on a bipartisan and unanimous basis that the Ligado spectrum proposal will not affect GPS devices. In addition to being supported by the data, the FCC’s decision makes intuitive sense: to conclude that GPS devices need the protection DoD seeks would mean that the vast number of the world’s most expensive military defense systems that rely on GPS are vulnerable to the power equivalent of a 10-Watt lightbulb. As Dan Goldin recently explained: “If taken at face value, this means the DoD has spent over \$50 billion over 45 years on a military GPS system that is so fragile it can be rendered useless by a 10-watt transmitter (a refrigerator light bulb) operating 23 megahertz away. If true, this would represent one of the most egregious mismanagements of taxpayer dollars in federal procurement history.”¹

The FCC’s Order also found, consistent with the documented views of Nokia and Ericsson (*i.e.*, the only 5G equipment manufacturers in the world not associated with the Chinese), that this spectrum will absolutely advance our Nation’s goal to win the race to 5G. The benefit this spectrum offers to the advancement of 5G is dramatic: it “would reduce the number of towers required from around 400,000 to 80,000, most of which already exist -- and would therefore enable a full, stand-alone U.S. 5G network by 2024.”² We have decades of experience building wireless network; Nokia and Ericsson have, over the decades, been the major suppliers to those networks. We are confident in the views of the world’s leading 5G equipment manufacturers and our own experience that this 40 megahertz of greenfield spectrum will advance our Nation’s race to 5G.

Claims to the contrary are unrelated to the GPS-specific concerns before this Committee, and are inconsistent with the broad, bipartisan agreement among policy makers and across industry that U.S. global technological leadership demands that we pursue an ‘all of the above’ spectrum strategy. We have heard that there are those who urge that Ligado’s spectrum can be

¹ <https://www.c4isrnet.com/opinion/2020/04/24/recalculating-gps-l-band-and-the-pentagons-untenable-position-on-5g/>.

² Dan Goldin’s op-ed in the *Wall Street Journal* is attached.



replaced by other spectrum. However, for next-generation networks to be as secure, as resilient and as robust as possible, spectrum like Ligado's must be part of the equation.

In sum, we would like to underscore some key, fundamental facts.

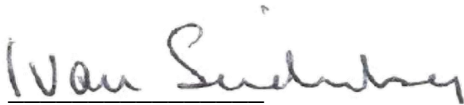
- The FCC's Order does not change or otherwise affect the allocation of spectrum to GPS devices.
- The FCC's Order does not affect the rules governing the protection of GPS devices from interference from Ligado or any other licensee operating in the L-band.
- In the Order, the FCC applied its same rule to protect radionavigation devices such as GPS that it has used since 1984; this is the same rule that the Department of Commerce relies on to regulate federal users.

Nevertheless, the FCC imposed additional conditions to ensure that GPS devices will continue to be protected from any activity that could affect GPS operations. Specifically, the FCC directed Ligado to provide protections to GPS devices using its spectrum by imposing stringent coordination, cooperation, and replacement obligations on Ligado, so that Ligado bears the burden of ensuring that no device using Ligado's spectrum will be negatively impacted. Make no mistake: the obligation is ours, and the burden falls solely on our company.

We stand ready to begin working right away with the FCC, the DoD, the Commerce Committee and other stakeholders to ensure GPS is protected and to advance our progress toward 5G. We respectfully request that this Committee consider both the extensive administrative law process this proceeding has gone through and the prospect of judicial review.

We thank you for your consideration.

Sincerely,



Ivan Seidenberg
Chairman



Doug Smith
President & CEO

cc: Members of the Senate Committee on Armed Services

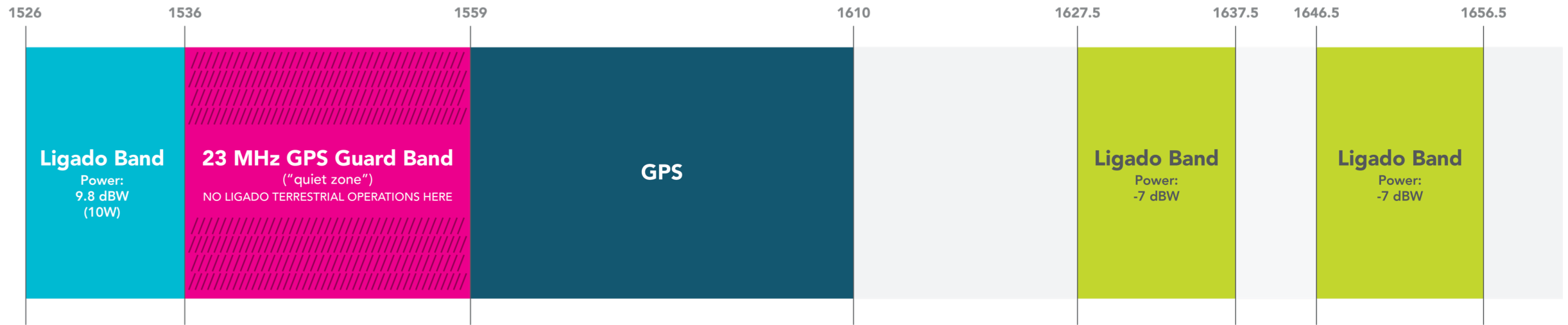
Attachments

THE FACTS: LIGADO AND GPS

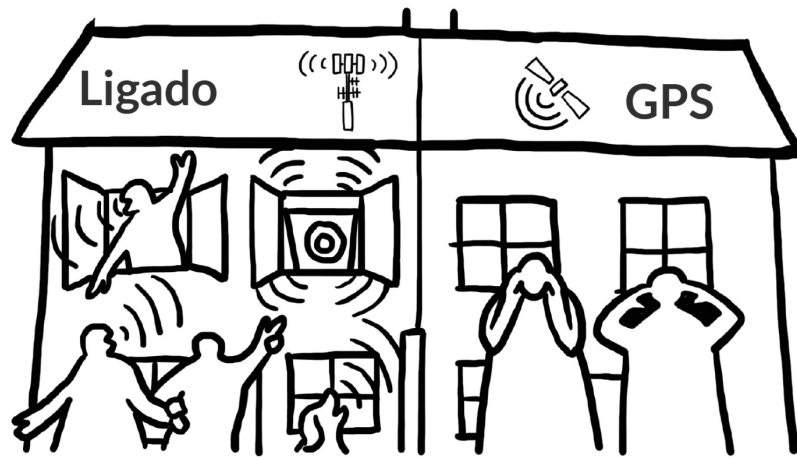
May 2020

Everyone involved in this proceeding—the FCC, Ligado, and the participating executive branch agencies, including the DoD—can agree on the importance and need to protect GPS performance and ensure GPS devices are not impacted in any meaningful way. This means that there is no harmful interference and GPS devices can function without any service degradation.

L-BAND SPECTRUM MAP

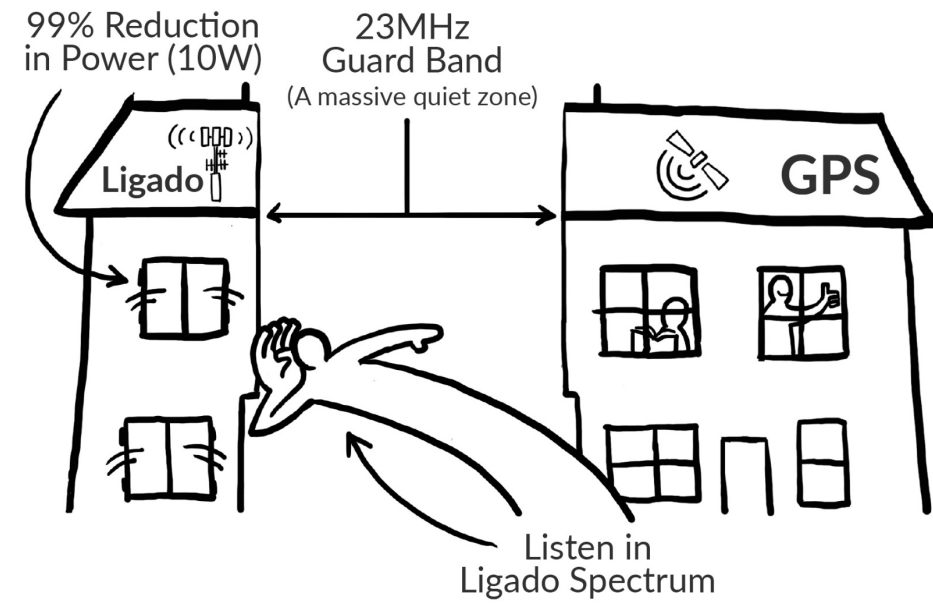


DOD FICTION



as presented in the DOD slide deck to the SASC

FACTS



Whose Spectrum is It?

The spectrum at issue has been licensed to Ligado since 1989 and authorized for terrestrial use since 2004; This spectrum is not licensed to DOD or any other federal agency or any private GPS stakeholder.

Where Does the License Allow Operations?

Ligado's license, and thus all of its operations, are limited to the U.S.; Ligado will not operate at sea or overseas.

Is This 5G Spectrum?

Yes, just ask Nokia and Ericsson. Not all mid-band spectrum is created equal, and Ligado's lower-mid-band spectrum has key advantages over the 3 GHz spectrum, including superior propagation characteristics that allow for in-building penetration and greater coverage at lower costs, which must not be brushed aside if we are to lead in 5G. This is not an either/or scenario for the U.S.

How Did the FCC Ensure Protection of GPS?

- **Are GPS Receivers Protected in GPS Spectrum?** Yes. For all GPS devices operating in the GPS spectrum (1559 MHz-1610 MHz aka the L1 GPS signal), the FCC Order provides total protection to all GPS devices and users at the 1dB level requested by DoD. DoD also uses spectrum at 1.2 GHz, aka the L2 GPS signal, for mission critical operations.
- **Are GPS Receivers Protected in Ligado's Spectrum?** Yes. For the few GPS devices still operating in spectrum allocated to Ligado (1526-1536 MHz), the FCC Order requires Ligado to lower its power to 10 Watts, the level that the FAA concluded was necessary to protect aviation. Furthermore, the FCC provides significant protections including:

1. providing base station location information and technical operating parameters to federal agencies months in advance of commencing operations in the 1526-1536 MHz band;
2. working with any affected agency to identify devices that could be affected;
3. working with any affected agency to evaluate whether there would be harmful interference from Ligado operations;
4. developing a program to repair or replace any such devices that is consistent with that agency's programmatic needs, as well as applicable statutes and regulations relating to the ability of those agencies to accept this type of support; and
5. in the event that it is determined that Ligado operations will cause harmful interference to a specific, identified GPS receiver operating on a military installation, the FCC expects Ligado and the affected government agency to negotiate an acceptable received power level over the military installation or to establish limited exclusion zones.

Did the FCC Process Provide Opportunity for Input?

The proposal to modify Ligado's license to protect GPS was with the public for over four years, includes hundreds of public comments, and received significant inputs from federal agencies. The FCC circulated the Order to federal agencies over six months ago, and at every request, provided the agencies with additional time for review.

Did DoD Provide any Evidence to Support its Claims about National Security?

No. All information submitted into the process by the DoD, PNT ExCom, and the IRAC agencies was premised on the DOT Study.

What is Needed for GPS to Be Protected?

The establishment of operating parameters for all services that ensure GPS receivers continue to work properly, perform the intended services, and provide accurate information.

Why Did the FCC Reject the DOT Study?

The DOT Study did not study degradation to GPS receivers. It measured fluctuations in the noise level by the tiny margin of 1 dB, and as NASCTN concluded, there is no correlation between when a GPS receiver recognizes a 1 dB change and the performance of that receiver.

What is the NASCTN Study?

[NASCTN](#) is an independent lab set up by DoD and NIST in Boulder, Colorado. The DoD CIO's office in 2016 directed Ligado to use this lab for the study. NASCTN is currently studying other spectrum bands under CRADAs, including AWS and 3 GHz bands. Furthermore, thousands of CRADAs are entered into across government and industry every year. [See Raytheon CRADA with DoD.](#)

What did NASCTN Study?

NASCTN's extensive testing—which consisted of approximately 1,476 hours in the testbed and the collection of over 19,000 data files, subsequently processed to yield a set of 3,859 anonymized data files (780 MB)—studied the location and timing accuracy of GPS devices when exposed to the potential wireless broadband operations proposed by Ligado. Review of NASCTN's results and statistical analyses thus vindicate the judgment of the GPS firms: devices in every category of the GPS ecosystem would not experience actual harm if Ligado were permitted to deploy a terrestrial network in accordance with the proposed parameters. Indeed, the data reveal that GPS devices are highly resilient equipment and already co-exist or can easily be made to co-coexist with the network proposed by Ligado.

FUNDAMENTAL ISSUE 1: WHAT IS HARMFUL INTERFERENCE?

Since the introduction of the Communication Act in 1934, the FCC has always evaluated out-of-band harmful interference based on service degradation, not noise, period. That's exactly what they did in this case. This metric has been used successfully for 85 years and has guided and resolved harmful interference disputes resulting in the success of the U.S. wireless ecosystem. To suggest the FCC – with its 5-0 bipartisan vote – somehow got it wrong or should change this now with zero evidence makes no sense from any standpoint.

FCC

Harmful
interference

=

GPS device
degradation

The FCC Order takes the position that harm means device performance is degraded.

Under the FCC's rules, "harmful interference" is "[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service."

DOD

1dB fluctuations in
background noise

≠

GPS device
degradation

The DOD, PNT EXCOM, and the DOT Study define harm not as when a GPS device has performance degradation, but rather, when a miniscule increase in noise — *i.e.*, a 1 dB C/N₀ change – is picked up by the receiver.

FUNDAMENTAL ISSUE 2: IS GPS PROTECTED?

All stakeholders that continue to claim the FCC Order puts GPS receivers at risk and every use case that they cite, are using the DOT Study which is premised on 1 dB C/No.

The disagreement is about whether GPS is entitled to protection outside its allocated spectrum.

FCC

The FCC takes the position that GPS is not entitled to any more protection more than necessary to prevent a degradation in performance. To prevent that degradation, the FCC imposed numerous conditions on Ligado, including:

1. very low power levels;
2. very spaced out towers;
3. very stringent advance deployment notification and coordination requirements;
4. a requirement to repair and replace U.S. Government devices;
5. the potential to establish exclusion zones for military installations as needed.

DOD

DOD / PNT EXCOM takes the position that GPS is entitled to protection far outside of its allocation. But 1 dB does not ensure protection of GPS since it correlates only to fluctuations in background noise rather than actual GPS device degradation. Complying with the President's EO will protect GPS.

EXAMPLES OF HOW DOD PRESENTATION MISCHARACTERIZES ELEMENTAL FACTS

FICTION

Page 5 of the Staff Memorandum to SASC Members and MLAs:

Proposed mitigations put the burden on the DoD and do not provide adequate relief to non-government users; and

FACT

The FCC's order is clear that the burden for replacing any impacted government devices is primarily on Ligado:

Federal Communications Commission

FCC 20-48

105. Finally, we address several of the remaining assertions in the Air Force memorandum. First, we disagree that granting Ligado's 2018 license modification applications would shift the burden onto U.S. governmental agencies to monitor and report interference issues.³⁵⁶ We are conditioning our approval of Ligado's ATC authority on Ligado's commitment to maintain network operations center procedures for 24/7 continuous monitoring of the transmit power for each of its base station sites. This, combined with the information-sharing and negotiation requirements we adopt here, places the burden primarily on Ligado, and not the affected government agencies. Second, to the extent the Air Force is concerned with potential effects to GPS receivers used in support of aviation services,³⁵⁷ the conditions we adopt in this order related to requirements for certified aviation GPS receivers and availability of

Slide 10 of the DOD Presentation to the Committee states:

Ligado's proposal does not include limits on base station spacing; earlier they had suggested a minimum spacing of 400 m

The FCC order is explicit in intersite distance requirement:

Federal Communications Commission

FCC 20-48

2. Power Levels and Operating Restrictions

134. *Downlink Power Level.* Consistent with the DOT ABC Report and Ligado's May 31, 2018 amendment (in fulfillment of its December 2015 commitment to abide by the recommendation of the FAA), Ligado's ATC base stations operating in the 1526-1536 MHz band shall not exceed an EIRP of 9.8 dBW (10 W) with a +/- 45 degree cross-polarized base station antenna. Based on FAA analysis, the minimum inter-station separation distance shall be 433 meters in a hexagonal grid.

NON-FEDERAL SPECTRUM

FCC—INDEPENDENT AGENCY

AS AUTHORIZED BY CONGRESS 47 USC [301](#), [303](#)

STATE + LOCAL GOVERNMENT
COMMERCIAL INDUSTRY
CIVIL USE

FEDERAL SPECTRUM

U.S. PRESIDENT

AS AUTHORIZED BY CONGRESS 47 USC [305](#)

COMMERCE
NTIA
IRAC

AS AUTHORIZED BY CONGRESS 47 USC [902](#), [903](#), [904](#)

ALL OTHER
EXECUTIVE BRANCH AGENCIES

THE WALL STREET JOURNAL.

Keep 5G Safe From Chinese Domination

The FCC has a draft plan that would cut through bureaucratic obstacles to allocating new spectrum.

BY DANIEL GOLDIN
January 29, 2020

The U.S. has long led the world in telecommunications, but it has fallen behind, and badly, in developing fifth-generation, or 5G technology. China is racing to deploy 5G around the world with huge discounts and coercive methods. Telecommunications placement and access, coupled with Chinese security and payment systems in many countries, translate into economic and political influence, even control.

The nation that dominates 5G will reap economic, military and political advantages for decades. If America fails to close the gap, the consequences will be dire. Some of the most important obstacles are bureaucratic—but they'll be lifted if the Federal Communications Commission approves a draft proposal that now awaits action.

I've dedicated my professional life to science and technology in support of U.S. national security. Recently, in an unpaid private capacity, I've worked closely on solutions with telecom executives, technical

experts and senior government leaders.

The greatest technical obstacle is the lack of available frequency spectrum for U.S. wireless carriers to deploy. If the U.S. remains on its current spectrum-allocation timeline, it won't have 5G soon enough to protect American interests. Even when suitable spectrum is identified, it must be cleared and auctioned for use, and towers and other hardware must be put in place over many years. Time is critical.

Last year I began to research allocation and deployment options, in particular midband spectrum, which will be the core backbone of 5G networks. The U.S. has deployed no midband for 5G, whereas China has deployed 200 megahertz and is in the process of deploying another 500 megahertz. A subset of midband called C-band is a critical part of the 5G solution, but the C-band auction may slip into 2021 and full deployment may take until 2030—far too late to establish American 5G leadership.

But there's a viable solution: an innovation that combines lower midband spectrum, or L-band, with C-band to accelerate 5G deployment by many years. This "C+L" approach would reduce the number of towers required from around 400,000 to 80,000, most of which already exist—and would therefore enable a full, stand-alone U.S. 5G network by 2024.

When combined with other foundational elements of a 5G strategy, this option could help provide other nations with a viable alternative to Huawei, as U.S. leaders encourage allies and partners not to jeopardize their security and political independence from Chinese Communist influence by adopting Chinese 5G.

The strongest objections to C+L have come from those, including at the Defense and Commerce departments, who worry that this application of L-band frequency may create harmful interference to Global Positioning System receivers. "GPS is fundamental to the nation's economy, national security, and continued technological leadership," the National Telecommunications and Information Administration argued in a December letter to FCC Chairman Ajit Pai. That's true, but

C+L doesn't put GPS at risk. I have studied the L-Band record, and more than 5,000 hours of testing has shown there is no harmful interference to GPS.

This isn't a technology problem; it's a bureaucracy problem. Bureaucracy provides predictability and stability, but it can also inhibit strategic leadership and risk-taking. If innovators are overly focused on their own programs, they can gradually become averse to innovation. Ironically, if we do not accelerate the deployment of U.S. 5G now, we risk the very economic, national security and technological leadership we endeavor to protect.

U.S. leadership in this next-generation wireless technology will have a monumental impact on U.S. national security and its economy. America can both ensure the protection of GPS and more rapidly deploy 5G through C+L—a decisive step toward true competition in 5G. The FCC has a draft order. All it needs to do is launch it.

Mr. Goldin served as administrator of the National Aeronautics and Space Administration, 1992-2001.