

GPS Threatened With Widespread Interference

Recently, a company called LightSquared applied to the Federal Communications Commission (FCC) for a waiver allowing it to repurpose the satellite spectrum *immediately neighboring that of the Global Positioning System (GPS)* for use in extremely high-powered ground-based transmissions. This has caused serious concern within the GPS industry and user community since this planned use is fundamentally incompatible with existing GPS uses. Initial technical analyses have shown that the distant, low-powered GPS signals would receive substantial interference from high-powered, close-proximity transmissions from a network of ground stations.

The consequences of disruption to the GPS signals are far reaching, likely to affect large portions of the population. Therefore, it is imperative that the LightSquared system not be deployed unless it can be conclusively guaranteed that the GPS system is fully protected from radio interference. The problem LightSquared's plans pose and additional steps the FCC needs to take are explained below.

LightSquared plans to transmit radio signals that would be one billion or more times more powerful than GPS signals as received on earth, potentially causing severe interference and rendering useless millions of GPS receivers – including those used by U.S. Federal and Local Government agencies, first responders, airlines, agriculture, and everyday consumers in their cars and on hand-held devices.

- Initial technical analyses show that GPS signals, which are low-powered and emanate from distant satellites, would receive substantial interference from LightSquared's network of high-powered, close-proximity ground station transmissions.
- LightSquared's planned use of these high-powered terrestrial networks in the frequency immediately adjacent to the GPS frequency is unproven and unprecedented and may be found to be fundamentally incompatible with existing GPS uses.
- Any technical arguments regarding the ability of the two systems to co-exist are unproven and require independent, authoritative, verified and thorough analysis and testing prior to any transmissions being made.

The usual FCC process is to conduct extensive testing followed by approvals. For LightSquared, the process was approve first, *then* test. The unusual waiver recently granted to LightSquared allows it to use its satellite spectrum for high-powered ground-based broadband transmissions *if* the company can demonstrate that harmful interference could be avoided.

- Issues of interference should have been addressed *before* the waiver was granted.
- The waiver was granted just two months after it was requested. Even with such a short window, the U.S. GPS Industry Council (USGIC), the National Telecommunications and Information Administration (NTIA) – along with some federal departments, concerned state and local governments, public safety authorities, and GPS commercial users – all voiced strong objection to LightSquared's plan to reposition the spectrum.
- The FCC's conditional waiver puts LightSquared in the conflicting position of assessing whether or not its own system will interfere with GPS transmissions.

The Global Positioning System, or GPS, was first launched more than 30 years ago and is now a critical and extremely reliable part of our national infrastructure. Millions use it routinely every day.

Initial tests indicate that each LightSquared ground station will cause varying levels of interference with GPS within miles of the ground stations, and LightSquared plans to build as many as 40,000 such ground stations. If GPS is interfered with, critical private and public sector activity will be adversely affected, including:

- **Public Safety:** Public safety depends on GPS technology daily because first responders such as law enforcement, fire fighters, and emergency medical personnel rely on it day-in and day-out to provide critical instant location and route information. Disruptions to the GPS transmission pose a serious threat to public safety.
- **Homeland Security:** GPS equipment is widely used by the Departments of Defense, Interior, Transportation, Commerce and Homeland Security. Federal, state, and local government employees rely on GPS equipment in disaster response, public safety, and security and in the management of our national assets and infrastructure, as do emergency services for rapid response, dispatch, and accident investigation.
- **Consumers:** Millions of Americans use GPS-enabled consumer devices in their cars and on their cell phones and other hand-held devices as vital, reliable every day navigational tools.
- **Aviation:** GPS receivers used in thousands of aircraft could be jammed within miles of LightSquared's transmissions. GPS, together with the Wide Area Augmentation System or WAAS (which will also be affected) has long been approved by the Federal Aviation Administration (FAA) for aircraft navigation and FAA-approved GPS instrument approaches now provide a landing system option at the many U.S. airports not equipped with land-based instrument landing systems. GPS also plays a critical role in the FAA Next Generation Air Transportation System, which will modernize air traffic control and address the nation's need for expanded air traffic capacity without compromising air safety.
- **Transportation:** GPS equipment is used in critical asset management activities for our national road and rail infrastructure, improving efficiency, lowering costs and enabling better decision making. The Federal Rail Administration's Positive Train Control mandate further drives the use of GPS to prevent train-to-train collisions, derailments, and casualties or injuries to railway workers. In addition, GPS is used to help fleets lower fuel consumption and improve their carbon footprint.
- **Agriculture:** Farmers use GPS to improve efficiency and crop yields, reduce environmental impact and comply with U.S. Agriculture reporting regulations.
- **Forestry:** The U.S. Forestry industry and Forest Service use GPS in forest land management and for Forest Automation Systems which improve logging efficiency and reduce environmental harm.
- **Engineering and Construction:** The U.S. building, construction, and civil engineering industry – one of the economic sectors most severely impacted by the recent recession – has made large

investments in the use of GPS technology to modernize and automate construction sites, machines and processes. GPS is also used to monitor the movement of physical infrastructure such as bridges, dams, mines, and other natural and manmade structures. Disruption to this service could negatively impact positive economic and societal improvements.

- **Surveying, Mapping, and Land Management:** Interruption of the national geodetic infrastructure would disrupt surveying and mapping activities necessary for land title transactions, land development, building and civil engineering activity, and accident investigations. It would also disrupt the field creation, maintenance, and use of geographic information systems (GIS) databases that underpin our national digital mapping infrastructure.
- **Utilities:** Utility services nationwide including electricity, water, gas and telecommunications depend on GPS signals in a number of ways. This includes synchronizing networks, maintaining and managing infrastructure and coordinating rapid responses to network outages and incidents – activities that are all essential to restoring disrupted services as quickly as possible.
- **Natural Resources:** Natural resources industries engaged in the exploration, production and distribution of energy and minerals rely on the GPS service throughout their operations.
- **Disaster Management and Scientific Research:** High-accuracy GPS networks are deployed along crustal faults and around volcanoes. In the U.S, the data is used to study and better understand the crustal movements that cause seismic hazards such as earthquakes and volcanic eruptions. In addition to disaster prevention and relief, GPS is also used for weather services and scientific research.

In recognition of the potential interference to GPS receivers, the FCC, as part of its January 26, 2011 modification order, required the establishment of a working group to bring together LightSquared and the GPS community. This working group will study the interference concerns, identify measures to prevent interference and produce a report for FCC review no later than June 15, 2011. The working group process will be complete once the FCC, in consultation with NTIA, concludes that “the harmful interference concerns have been resolved and sends a letter to LightSquared stating that the process is complete.”

The GPS industry is committed to work with LightSquared, FCC, NTIA and other interested parties in this working group process. However, we believe that additional safeguards are needed. We recommend:

1. The FCC must make clear that LightSquared’s license modification is contingent on the outcome of the mandated study. That study must be overseen by a strong neutral observer, not by an interested party.
2. The FCC should make clear that LightSquared and their investors should not proceed to make any investment in operating facilities prior to a final FCC decision.
3. Further, the FCC’s finding that “harmful interference concerns have been resolved” must mean “resolved to the satisfaction of preexisting GPS providers and users.”

4. Resolution of interference has to be the obligation of LightSquared, not the extensive GPS user community of millions of citizens. LightSquared must bear the costs of preventing interference emanating from their devices — GPS users or providers should not have to bear any of the consequences of LightSquared's actions.
5. This is a matter of critical national interest. There must be a reasonable opportunity for public comment of at least 45 days on the report produced by the working group and further FCC actions on the LightSquared modification order should take place with the approval of a majority of the commissioners, not at the bureau level.

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