STATEMENT OF

THE HONORABLE JOHN D. PORCARI
DEPUTY SECRETARY
U.S. DEPARTMENT OF TRANSPORTATION

BEFORE THE

SUBCOMMITTEE ON AVIATION
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
U.S. HOUSE OF REPRESENTATIVES

HEARING ON

A Review of Issues Associated with Protecting and Improving Our Nation's Aviation Satellite-Based Global Positioning System Infrastructure

February 8, 2012

Chairman Petri, Ranking Member Costello and Members of the Subcommittee:

Thank you for the opportunity to appear before you today to discuss this important topic.

Global Positioning System (GPS) applications are vital to transportation safety and efficiency. Tens of millions of drivers across America use GPS to navigate. The Department's Federal Aviation Administration (FAA) estimates that by 2013, 60,000 aircraft will be equipped with GPS to navigate the skies over America. Positive Train Control, which is an improved safety application for rail transportation, will increasingly rely on GPS. The Intelligent Transportation System (ITS) program will depend on GPS as a key technology for vehicle collision-warning and crash-avoidance systems.

The Department of Transportation has committed to deploying the Next Generation Air Transportation System (NextGen) to modernize America's air traffic control system. NextGen will transform America's air traffic control system from the aging ground-based system of today to a satellite-based system of the future. NextGen employs GPS technology to shorten routes, save time and fuel, reduce traffic delays, increase capacity, and permit controllers to monitor and manage aircraft with greater safety margins.

The FAA and industry have invested as much as $8 billion into NextGen. The FAA conservatively estimates that the benefits of NextGen will total $23 billion by 2018, and over $120 billion by 2030.

In addition to the transportation applications I mentioned, GPS is essential for the operations of first responders, search and rescue, resource management, weather tracking and prediction, earthquake monitoring, national security, and critical infrastructure such as dams and power plants, financial transactions, surveying and mapping, and industries such as precision agriculture, where the ability to fertilize plants with centimeter-level accuracy increases conservation, reduces waste run-off, and saves American farmers up to $14-30 billion, annually.

As a testament to its success, the GPS program was the 2011 winner of the 60th Anniversary Award from the International Astronautical Federation for having "provided the greatest human benefit over the history of the space age".

In June, 2010 President Obama announced an administration goal to free up 500 MHz of federally-owned spectrum and make it available for mobile broadband, in support of a goal to provide at least 98% of Americans with access to 4G high-speed wireless service, and to especially provide access to underserved rural communities. The President asked this be done in such a way as to "…ensure no loss of critical existing and planned Federal, State, Local and Tribal Government capabilities".

LightSquared proposed that the Federal Communications Commission (FCC) allow the company to broadcast broadband signals in the Mobile Satellite Service (MSS) band. LightSquared's concept is to develop the first wholesale-only wireless 4G-LTE broadband network, reaching over 260 million people by the end of 2015. In January, 2011, the FCC approved this concept, contingent on LightSquared conducting tests with the GPS industry and affected federal agencies to identify and resolve any interference to GPS.

Since 2004, the Department of Transportation has served as the lead federal agency for all federal civilian uses of GPS. I, along with the Deputy Secretary of Defense, co-chair the National Executive Committee for Space-Based Positioning, Navigation, and Timing (PNT), which includes representatives from seven cabinet agencies, the National Aeronautics and Space Administration (NASA), and the Joint Chiefs of Staff.

Over the past year, at the request of the FCC and the National Telecommunications and Information Administration (NTIA), the agencies comprising the National Space-Based PNT Executive Committee (EXCOM) have worked closely with LightSquared to evaluate its original deployment plan, and subsequent modifications, to address GPS interference concerns. LightSquared's cooperation in the testing and analysis has been exemplary. The company shared proprietary business plans, as well as technical data

and equipment.

The test results showed that LightSquared's design and filters effectively prevented "out-of-band" emissions; in other words, their powerful broadband signal was not 'leaking' into the adjacent GPS band.

However, the powerful broadband signal operating in the upper and lower 10 MHz of the MSS band (5 billion times the signal of GPS even ½ a mile from a LightSquared transmitter) overwhelmed filters and effectively blocked GPS signals in most of the devices tested in what is referred to as "overload interference". Also, interference caused by LightSquared's design of a dual carrier signal (upper and lower 10 MHz channels combined) resulted in an inter-modulation product in the adjacent GPS frequency band.

The most modern and accurate GPS devices, picking up the widest range of signals, tended to be affected the most. Less accurate "narrow band" GPS receivers, such as those commonly built into cell phones, were less affected.

Test results on LightSquared's original operating plan to operate in the upper and lower 10 MHz of the MSS band conducted by the National Space-Based PNT Systems Engineering Forum (NPEF) and the LightSquared-led Technical Working Group (TWG) were submitted to the NTIA and the FCC respectively in June 2011.

In addition, the FAA commissioned RTCA, Inc. to study the impact of LightSquared's proposed operations in the upper and lower 10 MHz of the MSS band on certified aviation receivers. This report also was completed in June 2011. All three test and analysis efforts concluded that LightSquared's planned operation would cause significant interference to GPS.

On June 30, 2011, LightSquared submitted a Recommendation Paper to the FCC proposing to initially broadcast only on the lower 10 MHz portion of the MSS band and "standstill" on the upper 10 MHz for an unspecified period of time in an attempt to avoid many of the interference issues with GPS receivers. In this paper, LightSquared recognized that even if transmissions were limited to only the "lower 10", they would still interfere with many GPS high precision receivers largely used for science and surveying, and in agriculture, mining and construction.

LightSquared committed to develop filters and mitigations for affected high precision receivers, while the FCC and NTIA asked the EXCOM agencies to analyze and test

LightSquared's revised plan for interference with general navigation devices. The FAA separately analyzed the plan's impact on certified aviation GPS devices.

If and when any interference concerns with certified aviation and general navigation devices are resolved, the involved federal agencies would then work with LightSquared to test its proposed solutions to interference with high precision receivers.

On September 9, 2011, the NTIA Administrator requested that NPEF and LightSquared jointly test this modified LightSquared proposal with general/personal navigation and cell-phone GPS, in strict adherence to NTIA standards and methods. NTIA requested that tests enable conclusive and final recommendations about general/personal navigation and cellular GPS devices.

Participants in the second round of testing included representatives from the Departments of Defense, Transportation, Homeland Security, Commerce, Interior, Agriculture, and State, as well as LightSquared, Broadcom, Garmin, Hemisphere GPS, John Deere, OnStar, and Trimble. This testing was completed in November 2011.

Analysis of the data was based on criteria provided by the NTIA for determining harmful interference. Based on this criteria, the NPEF testing showed that 75% of the tested general navigation devices experienced harmful interference from the LightSquared lower 10 MHz signal, experiencing a degradation in receiver carrier to noise density ratio of 1 dB or greater at an equivalent distance of greater than 100 meters from the LightSquared simulated tower. This impact is based on LightSquared's proposed transmit power level and a standard propagation model chosen by NTIA.

The NPEF test results were independently reviewed by Idaho National Laboratory and MIT Lincoln Laboratory, neither of which are affiliated with GPS industry. Both independent labs not only confirmed the NPEF findings, but felt that the NPEF may even have underestimated the magnitude of the harmful effects on the set of receivers tested.

In addition, FAA has been working with LightSquared since August 2011 on an analysis of the impact to certified aviation receivers of LightSquared's planned operation at the lower 10 MHz channel only. Since certified aviation receivers are necessarily designed and built to strict, internationally harmonized standards, analysis instead of testing is quite effective and LightSquared concurred with this approach.

Based on this analysis, the FAA concluded that LightSquared's proposed terrestrial

network is not compatible with FAA requirements for low-altitude operations in the vicinity of LightSquared transmitters. This incompatibility is primarily focused on lower-altitude aviation operations, including use of GPS for terrain awareness and warning systems (TAWS), navigation operations to include GPS-based approaches, departures and some low-altitude enroute flight, and automatic dependent surveillance-broadcast (ADS-B).

TAWS is used by the fixed-wing and helicopter communities to reduce the risk of controlled flight into terrain. This technology uses GPS position in conjunction with a database of terrain to alert the flight crew of potentially unsafe trajectories and was mandated for commercially-operated turbine aircraft with 6 seats or more after a 1995 accident in Cali, Colombia which took 160 lives.

The mandatory installation of TAWS into U.S. commercial aircraft is considered by many to have made the single greatest impact to improving U.S. commercial aviation safety in the last 20 years. This technology also has been voluntarily adopted in general aviation as part of GPS-based navigation systems. With improvements in obstacle databases, the technology has proved particularly useful for helicopter operations at low altitudes and outside of FAA-established routes.

LightSquared has proposed to address this interference issue through a combination of site-by-site tailoring of their network density and operating parameters plus neutral third-party verification. Prior to initiating any attempt to implement such a solution, site-by-site analyses to account for differences in signal blockage and reflections would be required and the remaining technical issues on the specific propagation models would need to be resolved.

Even if these conditions could be accomplished, maintaining the in-air power level limit presents a severe challenge, as the surrounding environment, LightSquared's network, and aviation operations are all dynamic and continue to change. For example, helicopter MediVac or search-and-rescue need to be able to operate anywhere and if an adjacent building is constructed, it could create a new signal reflection.

In sum, LightSquared's proposal would require constant, individual monitoring and adjustments to over 40,000 broadcasting sites nationwide, to ensure that they could be, and would remain, consistent with air safety requirements. This is simply not practical. Therefore, based upon all of the testing and analysis that has been performed, there appears to be no practical solutions or mitigations that would permit the LightSquared broadband service, as proposed, to operate in the next few months or years without

significantly interfering with GPS.

It is the unanimous conclusion of the test findings by the EXCOM agencies that both LightSquared's original and modified plans for its proposed mobile network would cause harmful interference to many GPS receivers. As a result, we believe no additional testing or analysis is warranted at this time.

Substantial federal resources, including over $2 million from the FAA, have been expended and diverted from other programs in testing and analyzing LightSquared's proposals.

This level of investment in assisting a commercial applicant to achieve the successful approval of its government application is quite unusual. However, due to the Administration's commitment to increased access to broadband, the investment was merited, but given the results we reviewed, further investment cannot be justified at this time.

The EXCOM agencies continue to strongly support the President's June 28, 2010 Memorandum to make available a total of 500 MHz of spectrum over the next 10 years, suitable for broadband use.
We propose to work with NTIA to draft new GPS spectrum interference standards that will help inform future proposals for non-space, commercial uses in the bands adjacent to the GPS signals, to strengthen existing national policy protection of adjacent band spectrum.

We will ensure that any such proposals are clearly communicated with stakeholders and are implemented without affecting existing and evolving uses of space-based PNT services vital to economic, public safety, scientific, and national security needs.

Thank you and I look forward to answering your questions.

# # #