

STATEMENT OF  
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ADMINISTRATOR, RESEARCH AND INNOVATIVE TECHNOLOGY ADMINISTRATION  
U.S. DEPARTMENT OF TRANSPORTATION  
BEFORE THE  
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY  
U.S. HOUSE OF REPRESENTATIVES  
HEARING ON

*Impacts of the LightSquared Network on Federal Science Activities*

September 8, 2011

Chairman Hall, Ranking Member Johnson, and Members of the Committee:

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

The Global Positioning System (GPS) is one of the greatest success stories of government and private sector innovation. Today, the use of GPS is ubiquitous. No one knows exactly how many commercial uses are built around GPS. Worldwide sales of GPS navigation devices exceed \$20 billion, annually, and an estimated \$3 trillion worth of commerce relies on GPS for tracking, timing and navigation.

The United States clearly is the leader in space-based positioning, navigation, and timing (PNT) and we must continue to maintain and improve GPS, its augmentations, and backup capabilities.

GPS is vital to multi-modal applications of transportation safety and efficiency. The Next Generation Air Transportation System (NextGen) will transform America's air traffic control system from an aging ground-based system of today to a satellite-based system of the future. NextGen GPS technology will be used to shorten routes, save time and fuel, reduce traffic delays, increase capacity, and permit controllers to monitor and manage aircraft with greater safety margins. Positive Train Control (PTC) will increasingly depend on GPS to prevent train-to-train collisions, train derailments, and accidents caused by railroad switches left in an incorrect position.

The Intelligent Transportation System (ITS) program will rely on GPS as a key technology for vehicle collision-warning and crash-avoidance systems. GPS-based location is also a crucial element of the Next Generation-911 public safety response

systems currently in development.

Per U.S. National Space-based PNT policy, the Department of Transportation also is responsible for representing the space-based PNT interests of partner civilian federal agencies, as well as our own. These applications include millions of GPS receivers used for precision agriculture and scientific and surveying systems such as those that NASA, NOAA, Department of the Interior, and others rely on.

To provide the accuracy necessary for precision navigation, GPS receivers have been designed with a “wide front end” that pick up signals greater than the band authorized for GPS. In order to pick up this wide range of signals, precision receivers also pick up signals from the adjacent band, reserved for Mobile Satellite Service (MSS).

Until recently, this did not create a conflict. The GPS and MSS bands were both designed to be ‘quiet’, limited to weak satellite signals, a tiny fraction of a watt when they reached the earth. GPS receivers easily filtered out the MSS signals.

In January 2011, the Federal Communications Commission (FCC) approved the application of LightSquared to broadcast broadband signals in the MSS band, contingent on LightSquared resolving potential interference to GPS. The LightSquared-led Technical Working Group (TWG) performed measurements and submitted its results and findings to the FCC on June 30<sup>th</sup>.

Technical staff from the Federal Aviation Administration (FAA) participated in the TWG testing. In addition, the FAA commissioned RTCA, Inc. to study the impact of LightSquared’s proposed operations on aviation. The Department of Transportation also participated in a joint federal study – the National Space-Based PNT Engineering Forum (NPEF) – to assess the impact on a broad range of common government and commercial GPS receivers.

The tests, based on the original operating plan that LightSquared had submitted to the FCC, focused on “overload interference” – interference with the GPS receivers that ‘listened in’ to the adjacent MSS band. The powerful broadband signal overwhelmed filters and effectively blocked GPS signals in almost all of the devices tested.

The Department of Transportation assessed the impact of these test results from LightSquared’s original operating plan and concluded that the planned use of GPS for

NextGen, Positive Train Control, and Intelligent Transportation System research and applications would not be feasible under this scenario.

Based on the test results of using both the upper and lower portion of the LightSquared band – the original LightSquared operating plan -- aviation use of GPS would be significantly compromised due to the aggregate effect of 40,000 high-power LightSquared transmitters. This would impact GPS receivers onboard over 60,000 aircraft, resulting in substantial retrofit costs. Benefits of providing more direct routes and improving capacity, as well as safety benefits of using GPS for approach and landing in all weather conditions, and addressing controlled flight into terrain and runway incursions, would not be fully realized.

As a mitigation technique, there would be heavy reliance on aging legacy ground-based systems which do not meet the performance requirements for NextGen. The aviation industry also could have a demand for a non-U.S. satellite navigation system, such as Russia's GLONASS system, which operates farther away in frequency from LightSquared than does GPS.

The FAA has initiated an Alternative Positioning, Navigation, and Timing (APNT) research program to identify technologies that meet the requirements of NextGen in the event that GPS is disrupted.

Other transportation applications that rely on GPS also would be affected. For Positive Train Control, use of GPS is the least costly method for transmitting location information. If GPS were deemed to be unreliable, most railroads would have to switch to the transponder-based technology such as that used for the Advanced Civil Speed Enforcement System (ACSES) currently in place on the Northeast Corridor.

A need to identify alternate and complementary sources for positioning, navigation, and timing would result in significant increases in PTC implementation time and costs.

The Intelligent Transportation Systems Joint Program Office and their industry partners have invested many years and millions of dollars in safety-based research that leverages GPS to make significant improvements in surface transportation crash avoidance. A degradation or loss of GPS will affect the operation of Vehicle-to-Vehicle and Vehicle-to-Infrastructure applications that provide the location and speed of other vehicles assisting drivers in preventing crashes, thereby reducing the substantial number of fatalities and injuries that occur each year.

On June 30<sup>th</sup>, LightSquared submitted a Recommendation Paper to the FCC proposing to initially broadcast only on the lower 10 MHz portion of the band in an attempt to avoid many of the interference issues. LightSquared plans to “standstill” on use of the upper portion of the band. It is important to realize that any future use of the upper portion of the band would introduce all of the impacts uncovered by the test results previously discussed. As a result, any future examinations of LightSquared should be made under the paradigm that only the lower 10 MHz portion of the band would ever be utilized for the proposed high power terrestrial transmitters.

While this scenario may lessen the impacts on aviation and other modes of transportation, it is important that the new scenario – at which LightSquared only operates at the lower 10 MHz portion of its spectrum – be thoroughly analyzed and tested to determine any impact to GPS performance.

The FAA is concerned that high-precision GPS receivers used for airfield and flight procedure surveys, flight test tracking, space weather monitoring, and timing applications might be impacted. Also, applications which require access to both GPS and MSS signals such as precision agriculture may be the most difficult to resolve.

The Department of Transportation would like to work towards a “win-win” – if one exists -- that allows for increased broadband access, without disrupting existing and planned GPS-based services, such as NextGen.

However, we are concerned that if terrestrial broadband transmissions are allowed anywhere in the MSS-band, they will disrupt existing GPS uses including precision agriculture and many scientific and surveying systems such as those that NASA, NOAA, Department of the Interior, and others rely on.

The Department of Transportation has communicated its concerns to the National Telecommunications and Information Administration (NTIA), the agency that is responsible for managing Federal agencies’ use of spectrum, and with which the FCC has stated it will consult in determining whether the interference concerns raised by this matter have been resolved. NTIA has advised the FCC that the LightSquared proposal “raises significant interference concerns” and has urged the FCC to ensure

these concerns are resolved before permitting LightSquared to become operational.<sup>1</sup>

The Department of Transportation will look for solutions to the challenges of our partner agencies, as well as our own, in interagency discussions. Going forward, Deputy Secretary John Porcari has committed the Department to work with NTIA and the other federal agencies to ensure that we have a plan in place such that the GPS systems in development now will not be compromised by interference in the years to come.

The Administration believes that we must protect existing GPS users from disruption of the services they depend on today and ensure that innovative new GPS applications can be developed in the future. At the same time, recognizing the President's instruction to identify 500 MHz of new spectrum for innovative new mobile broadband services, we will continue our efforts at more efficient use of spectrum.

Therefore, in the short run, we will participate in any further testing or analysis required to establish whether there are any mitigation strategies that can enable LightSquared operation in the lower 10MHz of the band. We also encourage commercial entities with interests to work with Lightsquared toward a possible resolution, though any proposed mitigation must be subjected to full testing. The challenge of meeting the President's goal also depends on long-term actions by Federal agencies in the area of research and development, procurement practices that encourage spectrally efficient applications, and new policy development.

Thank you and I look forward to answering your questions.

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<sup>1</sup> Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce, to Julius Genachowski, Chairman, Federal Communications Commission, (January 12, 2011). *See also*, Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce, to Julius Genachowski, Chairman, Federal Communications Commission, (July 6, 2011).

**Peter H. Appel**

**Administrator**

**April 29, 2009 – present**

Peter H. Appel was confirmed by the U.S. Senate as Administrator of the Research and Innovative Technology Administration (RITA) on April 29, 2009. Since joining RITA, Appel has worked with Secretary Ray LaHood to advance key U.S. Department of Transportation (USDOT) initiatives by leveraging effective research and cross-modal coordination. These initiatives have included two Distracted Driving Summits, which have brought key transportation researchers, advocates, decision makers and other leaders together to address this growing safety issue; the bolstering of USDOT's Intelligent Transportation Systems (ITS) Program to best improve safety, efficiency, and environmental sustainability across all modes of surface transportation; the enhancement of the Bureau of Transportation Statistics' data collection, coordination and analysis capabilities; and the establishment of the Department's Safety Council, which brings together all ten modal administrators to advance transportation safety across the Department.



Before joining RITA, Mr. Appel was with the global management consulting firm of A.T. Kearney, Inc. He has led business improvement initiatives for clients in the private and public sectors, with a focus on Transportation and Infrastructure.

Mr. Appel has over 20 years of experience in Transportation, and has supported organizations in the railroad, trucking, airline, and ocean shipping industries with growth strategy, supply chain improvement, post-merger integration, public-private partnerships, and other key business and policy issues. Previously, he served as the Special Assistant to the Administrator of the Federal Aviation Administration, and as Assistant Director for Pricing and Yield Management at Amtrak. Mr. Appel earned his bachelor's degree from Brandeis University in Economics and Computer Science with Highest Honors, and received his Master of Science in Transportation from the Massachusetts Institute of Technology.