TESTIMONY

OF

JEFFREY J. CARLISLE

EXECUTIVE VICE PRESIDENT, REGULATORY AFFAIRS & PUBLIC POLICY
LIGHTSQUARED

SUBCOMMITTEE ON AVIATION AND SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION, HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

2167 RAYBURN HOUSE OFFICE BUILDING

JUNE 23, 2011

Chairmen Petri and LoBiondo, Ranking Members Costello and Larsen, and Members of the Subcommittees, I am pleased to appear before you today to discuss our plans to bring exciting new telecommunications services to the United States and its adjacent waters, in a manner that is fully compatible with users of our critical GPS system. Much has been written and stated about LightSquared's plans and interference with the GPS network. Please allow me to be direct, clear, and unequivocal: LightSquared has no intention of conducting its operations in a way that interferes with government or commercial aviation or maritime operations in the United States, nor do we believe the FCC would allow us to do so.

LightSquared hears the sincere concerns expressed about interference, shares them, and will continue to devote considerable time and resources to solving them. This past Monday, we announced our plans to begin operations only in the lower 10MHz of spectrum, which is farthest away from the L1 Band used by GPS operators. In the meantime, we will work cooperatively with the government and affected stakeholders to either find alternative spectrum to allow our complete build out, or permit a long-term, phased approach to using the upper frequency band only in a manner that is widely acceptable, technologically compatible, and financially cost-effective.

We believe that ubiquitous, reliable, 4G LTE wireless broadband service can live harmoniously with current and expanding uses of GPS for the mutual benefit of our citizens and each affected industry. Enlightened and responsible spectrum management will give the American public the best of both worlds – a world class wireless broadband network and a GPS service that continues to enrich and protect our lives.

I. LIGHTSQUARED IS BUILDING CRITICAL INFRASTRUCTURE FOR THE 21ST CENTURY

LightSquared is investing $14 billion over the next eight years to build a nationwide next generation 4G wireless broadband network. This investment will support over 15,000 jobs a year for each of the five years that it will take to construct this network. When completed, our ground network will provide over 260 million people with wireless broadband service at expected speeds of 5 to 10 megabits per second. We believe this new electronic highway system, built with private sector money, will add significantly to our country's economic growth, consistent with important public policy goals of expanding deployment of broadband service.

This state-of-the-art 4G network is the culmination of years of hard work and billions of dollars of private investment. LightSquared has been authorized to use spectrum for mobile satellite services (MSS) since 1989, and launched its first satellite in 1996. For the last 15 years, we have provided voice and data services over our satellites to federal, state and local governments, transportation and maritime industries, and others who need reliable communications when a ground network is unavailable.

In 2003, the FCC first authorized the use of LightSquared's spectrum for ground networks, and since then LightSquared has worked hard to bring its network to market. We coordinated spectrum and developed technology to support an integrated satellite and ground network. We have also spent several years working with the FAA and the U.S. Coast Guard to protect the use of aviation and safety services within the band where LightSquared operates. For example, we agreed to limit our own emissions into adjacent bands well beyond those standards required by law.

Now we are ready to move forward, and this investment is coming at a particularly crucial time. The U.S. is seeing, today, the beginning of an almost vertical growth in data usage.

The industry predicts that data usage will jump from under 2 million terabytes per year to almost 14 million terabytes in 2015. Spectrum is needed to carry that data, and spectrum is severely limited. The FCC has already identified a need for at least 500 MHz of additional spectrum to be freed for broadband use over the next ten years, and some have said the FCC's projections significantly understate the need.

We are bringing 40 MHz of spectrum to be used for broadband services – a substantial down payment on the FCC's ten-year goal. We will do this in a way that is completely different from other wireless companies in two ways.

First, LightSquared will be the only wireless broadband network with an integrated satellite/land-based system. The first of our two next generation satellites was launched in November 2010, with the largest dish ever placed on a commercial spacecraft – seven stories tall. This allows a smartphone, tablet, data stick, or other device to link to the satellite when the ground network is not available, either because the device is out of range, or when ground networks have been destroyed by natural disasters. Our satellite operates up to 200 nautical miles offshore. The size and cost of satellite-enabled devices will be the same as that of regular cellular devices and will replace today's satellite phones, which currently resemble more of a brick than a cell phone. The seamless terrestrial/satellite functionality will provide substantial benefit to government, public safety, the maritime community and individual consumers.

Second, LightSquared will be the first wholesale-only network. We will sell capacity to wireless companies, retailers and other companies that want to provide broadband services, and they can then provide the integrated network to their consumers. When we build our network, we're not just enabling LightSquared as a competitor; we're enabling dozens of competitors in the marketplace.

What LightSquared is doing is making a massive private investment in critical U.S. infrastructure, making better and more efficient use of spectrum, and enabling wireless competition, all to the benefit of American consumers, public safety, and the nation as a whole.

II. GPS INTERFERENCE HAS BEEN STUDIED COMPREHENSIVELY

Part of LightSquared's spectrum is directly adjacent to the spectrum used by GPS. This is not a new development. When LightSquared first proposed using satellite spectrum for a ground network ten years ago, the FCC sought public comment, including review by federal government spectrum users. The GPS community, represented by the US GPS Industry Council (USGIC), asked us to voluntarily limit our energy that might bleed over into the GPS band. If we did nothing, comparatively powerful base stations used in cell sites could drown out faint GPS signals. So, in 2002, we voluntarily accepted USGIC's proposal to limits on emissions out of our band into the GPS band that are 1000 times stricter than what the FCC required, and designed our network around this agreement. The GPS industry applauded our agreement and urged the FCC to grant our license. I have provided a chronology with citations to source materials as Attachment 1 to my testimony for additional background.

The current concerns about interference do not stem from our out-of-band emissions from us into the GPS band. Rather, in September 2010, the USGIC raised a different issue that it had never raised before, regarding certain GPS receivers that are designed to not only capture GPS signals in the GPS band, but also capture signals in our band. As a result of their design, these receivers can be desensitized, or overloaded by our signals in our licensed spectrum. I have provided illustrations showing this effect as Attachment 2 to my testimony.

The FCC's normal policy is to expect receiver manufacturers – GPS or otherwise – to protect themselves from signals outside their band through careful design of their receivers. We

did, however, recognize the potential seriousness of the issue and committed to work collaboratively to solve it.

In January of this year, the FCC accepted our commitment to work with the GPS community and federal agencies to determine the scope of the problem and possible mitigation, and ordered us to establish a cooperative testing group.

What followed was an extensive study of interference conducted by perhaps the most comprehensive group ever assembled for such a study. The Technical Working Group (TWG), co-chaired by LightSquared and the USGIC, comprised 37 individuals with strong technical expertise representing a full range of GPS receiver categories, installed user groups, and other interested parties. It included representatives of all the major GPS manufacturers, the four major wireless companies, two public safety organizations, the Department of Defense, FAA, NASA, Boeing, Rockwell, and Lockheed Martin. The TWG also relied on advisors representing a full range of GPS stakeholders including manufacturers, user groups and individual experts. Over a three-and-a-half month period, the TWG tested over 130 devices across seven GPS receiver categories — aviation, cellular, general location and navigation, high precision, networks, space-based receivers, and GPS timing receivers. Following a two-week extension, the Final TWG Report is due to be filed by July 1.

Separately, the Department of Defense, RTCA (the not-for-profit aviation safety standards organization) and the Jet Propulsion Laboratory conducted their own analysis and tests of dozens of GPS receivers. LightSquared provided equipment and engineering expertise for each of these tests. Several reports or summaries have already been made public including reports from RTCA, the NPEF (National PNT Engineering Forum) Report of government

receivers derived from the DoD tests, and a report by the National Public Safety Telecommunications Council (NPSTC).

III. LIGHTSQUARED CAN DEPLOY ITS SERVICE AND CAUSE NO INTERFERENCE TO AVIATION AND MARITIME USE OF GPS

Although the TWG tests have not yet been released, existing public information points the way towards mitigation that will fully address the concerns of the aviation and maritime communities, while allowing LightSquared to bring this important broadband network to hundreds of millions of Americans

Mitigation options are built upon the understanding the vast majority of GPS receivers look only at that part of LightSquared's spectrum that is immediately adjacent to GPS – the spectrum comprising the upper portion of the FCC-allocated spectrum. LightSquared's original plan, before USGIC raised the overload issue in September 2010, was to use this spectrum first, and then bring additional spectrum located in the lower range of the band online two to three years later, when it needed further spectrum to serve capacity needs. This additional spectrum in the lower range of our licensed band is as far away as we can possibly operate from the GPS band. Indeed, the upper edge of these frequencies is a full 23 MHz removed from the bottom of the GPS frequency,

Unsurprisingly, then, publicly available reports have concluded that LightSquared's *planned* deployment would cause interference with a broad range of different types of GPS receivers, because the planned deployment would have started close to the GPS band. They also show, however, that our operation in the lower part of the band does not cause interference for the vast majority of GPS receivers. We believe that of the 400-500 million GPS receivers in use today in the United States, less than one percent are susceptible to harmful interference from our lower channel operations. The NPEF recommends further testing of the 10 MHz furthest away

from GPS, as the testing conducted by the federal government agencies on receivers so far has shown minimal or no interference. Similarly, the RTCA report stated that the 5 MHz furthest away from GPS does not cause a problem for aviation receivers even under worst-case analyses, and that further analysis is needed to confirm that the next 5 MHz is similarly clear. The RTCA also concluded that aviation receivers tested performed significantly better than the minimum performance standards. LightSquared is optimistic that this further analysis can be concluded in the next few weeks and will confirm the ability to use the lower 10 MHz channel without potential impact to aviation receivers.

Separately, NPSTC, having looked at results from testing of public safety receivers, filed a letter with the FCC on June 15 stating that initial tests have suggested that operations at the 5 or 10 MHz farthest away from GPS do not negatively impact public safety devices.

The potential for interference from our operation on the lower channel is almost exclusively limited to receivers in the categories referred to as "high-precision," "network," and "timing." We do not minimize the importance of these devices, but we estimate that they represent no more than roughly one million devices. Filtered antennas are available for timing devices that will permit them to continue to be used without interruption. Precision and network GPS receivers represent a more difficult problem because they have been designed to listen to both the GPS signal and to signals from another satellite operator in our band, to augment the precision of their GPS device.

LightSquared believes the TWG results will largely confirm the direction pointed by these tests and reports. Accordingly, we are proposing a three-part solution.

- First, LightSquared will operate at lower power than permitted by its existing FCC authorization, voluntarily relinquishing the right to operate at power levels approved in early 2010.
- Second, LightSquared will agree to a standstill in the terrestrial use of its upper 10 MHz immediately adjacent to the GPS band and will not incorporate those frequencies into its terrestrial network until the FCC and NTIA are satisfied that this can be done without risk to GPS. This additional time can be used to determine a glide path for use of this spectrum.
- Third, LightSquared will commence terrestrial commercial operations only on those portions of its spectrum that pose no risk to the vast majority of GPS users and will coordinate and share the cost of underwriting a workable solution for the relatively small number of legacy precision measurement devices that may be at risk.

In addition and contrary to the claims of some of the GPS manufacturers, there are technical and operational solutions that are available to allow us to deploy our network while retaining the benefits provided by these high-precision GPS devices. For example, LightSquared can coordinate its rollout so high-precision agricultural receivers will not be near LightSquared base stations for several years. Additionally and as part of our overall mitigation proposal I've already discussed, for those uses in urban areas that may be affected sooner, LightSquared can work out coordination of operations and spot replacement of high-precision and network receivers. LightSquared is prepared to underwrite the development of filtering technology for new receivers that can then be used consistently with the placement of our network. LightSquared will also work with Inmarsat to find a place in our band where the augmentation signal for high-precision and network receivers can be placed over the long term,

isolated from terrestrial operations and where they can have a much higher certainty for their ongoing operations than they do today. We are already working with Inmarsat and the U.S. Coast Guard to ensure maritime safety communications are not adversely affected.

IV. CONCLUSION

LightSquared takes seriously the sincere concerns expressed by the GPS community over the interference issues raised by the design of GPS receivers and readily accepts its obligation to be a good neighbor, no matter however or whenever this issue arose. By taking the steps I've outlined in my testimony, LightSquared will address this issue for over 99% of the receivers currently used, including receivers used today in aviation and maritime applications. These steps are not inexpensive to us, and they are not easy, but they can and must be done. We are stepping up to this commitment so that Americans can get the benefit of our significant investment in critical infrastructure, and continue to have all the benefits of a robust GPS system, and we hope the GPS industry will do the same.

* * * *

Jeff Carlisle is Executive Vice President for Regulatory Affairs and Public Policy for LightSquared, where he is responsible for all domestic and international regulatory and policy matters including those at the FCC, Congress, the Executive Branch, the ITU, and in foreign markets.

Before joining LightSquared, Jeff served as Vice President of Regulatory Affairs for SkyTerra Communications. Before joining SkyTerra, he served as Vice President, International Public Policy and Government Relations of Lenovo, the global computer manufacturer. Jeff headed Lenovo's Washington office from 2005 until 2008.

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Jeff has spoken at numerous events on telecommunications, trade and security policy issues. He received a B.A. in History, magna cum laude and with honors, from UCLA; a J.D. from Boalt Hall at the University of California, Berkeley; and an M.A. in Law and Diplomacy from The Fletcher School.

ATTACHMENT 1

CHRONOLOGY

Attachment 1

LIGHTSQUARED AND GPS – THE FACTS

For the last decade, LightSquared has planned to deploy a terrestrial network, and worked with the GPS community to make sure its network would not interfere with GPS.

LIGHTSQUARED'S SERVICE HAS BEEN EXPECTED FOR ALMOST TEN YEARS

- In 2001, LightSquared proposed using satellite spectrum for a fully-capable ground network. In 2002, after discussions with the GPS industry representatives, LightSquared agreed (http://fjallfoss.fcc.gov/ecfs/document/view?id=6513283601) to curtail any portion of its signal that crossed into GPS frequencies. This agreement imposed restrictions that were 1000 times stricter than what the FCC rules eventually required. http://edocket.access.gpo.gov/cfr_2010/octqtr/pdf/47cfr25.253.pdf.

- In 2003, the FCC adopted initial rules allowing LightSquared's ground network to operate near GPS. http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-15A1.pdf. These rules were adopted after a full review by DoD, FAA and all other interested government agencies. As the FCC said recently, "extensive terrestrial operations have been anticipated in [LightSquared's spectrum band] for at least 8 years." *FCC MSS Flexibility Order*, ¶ 27 (Apr. 6, 2011). http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-11-57A1.pdf.

THE GPS INDUSTRY UNDERSTOOD THE SCOPE OF LIGHTSQUARED'S NETWORK

- The 2003 rules allowed LightSquared to deploy over 10,000 base stations. ATC Report and Order, FCC 03-15, at ¶¶ 144-47 (February 10, 2003). http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-15A1.pdf.

- In 2003, the U.S. GPS Industry Council ("USGIC") stated that the restrictions of the 2002 agreement were necessary to protect GPS against "[t]he increased user density from potentially millions of MSS mobile terminals operating in ATC mode . . . [and] *potentially tens of thousands of ATC wireless base stations*." Reply Comments of USGIC, IB Docket No. 01-185, at 2 (Sept. 4, 2003) (emphasis added). http://fjallfoss.fcc.gov/ecfs/document/view?id=6515082621.

- In 2004, the USGIC supported the LightSquared application for authority to operate a ground network under the 2003 rules, stating that the 2002 agreement was "intended to protect GPS receivers and at the same time allow [LightSquared] to maximize the utility of its ATC [ground network] service to its users." Letter from USGIC to FCC (Mar. 24, 2004). http://licensing.fcc.gov/myibfs/download.do?attachment_key=366878.

- In 2005, the FCC removed all limits on the number of base stations LightSquared could build and increased their permissible power to 1.6 kw, the level at which LightSquared now plans to operate. *ATC Order on Reconsideration*, FCC 05-30, at ¶¶ 48-50, 53 (February 25, 2005). http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-30A1.pdf. Again, this

decision was reviewed by all interested government agencies and was not challenged by USGIC.

- Beginning in 2006 and continuing to 2010, LightSquared disclosed its intent to build a wireless network using tens of thousands of base stations in its annual filings with the SEC http://www.sec.gov/Archives/edgar/data/756502/000119312506067030/d10k.htm and http://www.sec.gov/Archives/edgar/data/756502/000119312510041110/d10k.htm.

THE GPS INDUSTRY KNEW ABOUT LIGHTSQUARED'S PLANNED POWER LEVELS AND DID NOT OBJECT

- In 2009, LightSquared asked the FCC to increase the power levels of its base stations by approximately 10 times to 15 kw, to match the power levels at which other wireless networks are permitted to operate. http://licensing.fcc.gov/myibfs/download.do?attachment_key=-164606.

- USGIC did not object to even those higher power levels. It objected only to the possibility of interference into the GPS band from low-power indoor femtocells, an objection it withdrew (http://licensing.fcc.gov/myibfs/download.do?attachment_key=738501) in August 2009 after reaching agreement with LightSquared. http://licensing.fcc.gov/myibfs/download.do?attachment_key=731265.

- In March 2010, the FCC approved LightSquared's increased power levels. http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-10-534A1.pdf. As with all previous FCC proceedings, the order was issued after a public proceeding and was fully coordinated with all interested federal government agencies. Neither USGIC, nor any other party, filed for reconsideration or review of this order.

- Also in March 2010, the FCC required LightSquared to build a ground network reaching 260 million people by the end of 2015. http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-10-535A1.pdf. Neither USGIC, nor any other party, filed for reconsideration or review of this requirement.

LIGHTSQUARED IS DOING EVERYTHING IT CAN TO WORK WITH GPS TO ADDRESS ISSUES RAISED ONLY A FEW MONTHS AGO

- In September 2010, USGIC raised for the first time (http://fjallfoss.fcc.gov/ecfs/document/view?id=7020912452) — in a general mobile satellite proceeding -- the possibility that some GPS receivers may be subject to interference because they can be overpowered by signals transmitted by LightSquared inside the spectrum the FCC licensed to Lightsquared.

- In November 2010, LightSquared applied (http://licensing.fcc.gov/myibfs/download.do?attachment_key=852869) to allow devices onto its ground network that do not also communicate with its satellite. This application did not change the power, number, deployment or any other technical characteristic of LightSquared's base stations. USGIC raised the same objection it raised in September. http://licensing.fcc.gov/myibfs/download.do?attachment_key=854795.

Attachment 1

- Although the interference issue was irrelevant to this application, LightSquared, in January 2011, proposed a rigorous program of testing to determine the extent of the susceptibility of GPS receivers to LightSquared's transmissions, which the FCC made a condition of granting LightSquared's application on Jan. 26, 2011. http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-11-133A1.pdf.

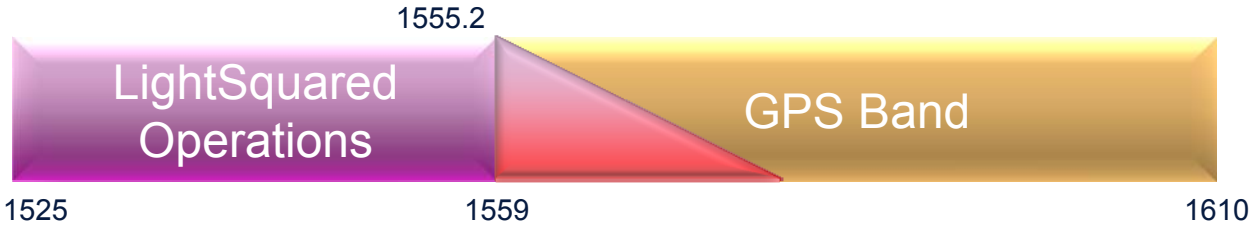
- The FCC validated the GPS testing process a few weeks ago by unanimous Commission vote, noting USGIC's September 2010 comments and the cooperative testing program, and stating that "responsibility for protecting services rests not only on new entrants but also on incumbent users themselves, who must use receivers that reasonably discriminate against reception of signals outside their allocated spectrum." *FCC MSS Flexibility Order*, ¶ 27 (Apr. 6, 2011). http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-11-57A1.pdf.

ATTACHMENT 2

ILLUSTRATION

The Two Sides of the Equation: Transmitters and Receivers

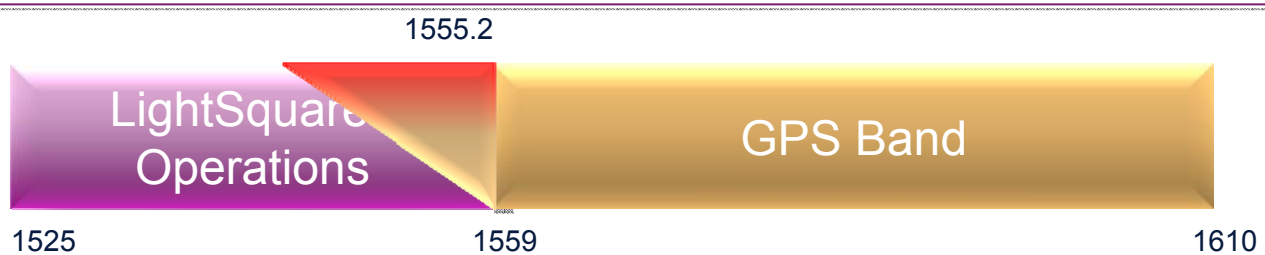
Transmit



The power emitted by an FCC licensee is generally allowed to fall off at a gradual rate into an adjacent band – this is known as Out of Band Emissions.

In 2003, LightSquared reached agreement with the US GPS Industry Council to severely limit LightSquared's Out of Band Emissions into the GPS band (to -100 dBW/MHz).

Receive



The characteristics of the receivers operating in the adjacent band are critical as well. If receivers are not designed with proper filtration that prevents them from looking into an adjacent band, receivers can become overloaded by the higher power adjacent band signal.

Images are for illustration and are not drawn to scale

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COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

Truth in Testimony Disclosure

Pursuant to clause 2(g)(5) of House Rule XI, in the case of a witness appearing in a nongovernmental capacity, a written statement of proposed testimony shall include: (1) a curriculum vitae; and (2) a disclosure of the amount and source (by agency and program) of each Federal grant (or subgrant thereof) or contract (or subcontract thereof) received during the current fiscal year or either of the two previous fiscal years by the witness or by an entity represented by the witness. Such statements, with appropriate redaction to protect the privacy of the witness, shall be made publicly available in electronic form not later than one day after the witness appears.

(1) Name: Jeffrey Carlisle

(2) Other than yourself, name of entity you are representing:

Light Squared

(3) Are you testifying on behalf of an entity other than a Government (federal, state, local) entity?

YES **If yes, please provide the information requested below and attach your curriculum vitae.**

NO

(4) Please list the amount and source (by agency and program) of each Federal grant (or subgrant thereof) or contract (or subcontract thereof) received during the current fiscal year or either of the two previous fiscal years by you or by the entity you are representing:

Please see attachment A

Signature

6/21/11
Date

ATTACHMENT A TO
TRUTH IN TESTIMONY DISCLOSURE

LightSquared received the following Federal contract in the current fiscal year, which included two separate amounts for equipment and service:

$1,756,501.23	Federal Bureau of Investigation, Department of Justice MSS receivers
$367,092.00	Federal Bureau of Investigation, Department of Justice Annual amounts for voice and data service for above receivers