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April 20, 2015

Via Overnight Express and Electronic Mail

Ms. Karen Van Dyke  
Director, Office of Positioning, Navigation  
and Timing and Spectrum Management  
Office of the Assistant Secretary  
for Research and Technology  
Department of Transportation  
3rd Floor, E31-302  
1200 New Jersey Avenue, SE  
Washington, 20590-9898

**Re: LightSquared Comments for Adjacent Band Compatibility Study**

Dear Ms. Van Dyke:

On behalf of LightSquared, we appreciated the opportunity to participate in the March 12, 2015, workshop (the “Workshop”) regarding the Department’s Adjacent Band Compatibility Study (the “Study”) being overseen by the Office of Positioning, Navigation and Timing and Spectrum Management (the “Office”). The Workshop produced information that can be useful to the Office and the Volpe Center (“Volpe”) as they move forward with the Study.

As LightSquared stated at the beginning of its presentation at the Workshop, we continue to believe that the Department lacks jurisdiction to establish spectrum emissions standards and that the FCC is better suited to perform this type of study. In particular, the Department does not have any Congressional authority or concurrent jurisdiction that permits it to set standards, directly or indirectly, regarding use of the spectrum from 1525 MHz to 1675 MHz, much less the spectrum between 1675 MHz and 1680 MHz, which some parties have suggested should be included in the Study. However, it is clear from the Workshop that despite our objections, which were outlined in detail in my December 31, 2014, letter to Deputy General Counsel Kristin Amerling, the Department plans to move forward with its Study. We are submitting this letter in an effort to ensure that the Study will ultimately be useful to the FCC as it makes decisions regarding the adjacent band in which LightSquared operates.

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This letter has four purposes:

1. To summarize important topics on which there appears to be a broad base of consensus among stakeholders based on statements at the Workshop. With respect to these topics, we request that you explicitly acknowledge this consensus in the draft protocols to be published in the *Federal Register*.
2. To summarize the topics discussed by LightSquared at the Workshop on which there was no substantive input by other stakeholders. With respect to these topics, we request that the protocols published in the *Federal Register* reflect the input provided by LightSquared.
3. To identify several material issues where there appears to be a difference of opinion between LightSquared and others that is sufficiently clear for the Department to adopt the most reasonable opinion.
4. To briefly comment on the recent letter from the GPS Innovation Alliance (“GPSIA”) that was circulated by the Department and that we just received on Thursday, April 16. We will reserve the right to respond more fully to GPSIA’s letter at an expeditious but later date.

The substance of this letter has been informed by the materials from the Workshop that have now been made available, a transcript from the Workshop, and more recently by the analysis overseen by another agency within the Department, the Federal Aviation Administration. The FAA’s analysis has focused on assessing the potential impact of adjacent band services on aircraft using certified GPS receivers which are assumed to be compliant with relevant FAA GPS receiver standards.

### **A. The Department should concur with facts and opinions widely shared at the Workshop.**

Unfortunately, very few issues at the Workshop were discussed to the point of achieving consensus. However, at least four points appeared to us to be the subject of broad agreement, and the Department’s testing plan should reflect consensus on these points:

1. *Input from Participants.* The draft protocols and test plan of the Study should be published in the *Federal Register*, and comment should be permitted for 15 days thereafter. This approach is consistent with your statement at the Workshop that “everyone is going to have an opportunity to review and comment and provide input on” the development of the test requirements and test plan.<sup>1</sup>

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<sup>1</sup> GPS Adjacent Band Compatibility Assessment Workshop III, Transcript at 44 (hereinafter “Tr.”).

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2. *Timing.* As you explained at the Workshop, the Department would prefer that “testing . . . occur over the summer” and that its analysis with respect to GPS receivers be “done by the end of the calendar year.”<sup>2</sup> Based on our observations at the Workshop, that timeline appears to be the subject of consensus among stakeholders. As discussed in LightSquared’s presentation, we think the Study can be completed in August 2015 and that the results should be submitted to the FCC and NTIA, along with any Department comments, no later than October 2015.<sup>3</sup> This timing is quite achievable, especially given the presentation at the Workshop indicating that testing can be performed in a much more efficient manner than the previous GPS testing programs. Specifically, Greg Gerten of PreTalen indicated that PreTalen’s Panacea testing system can simultaneously test up to 32 receivers in one lab. The Panacea system is entirely automated and can collect and analyze data without human intervention.<sup>4</sup> Using these sorts of systems can help ensure these deadlines are met, while improving process integrity by eliminating manufacturer participation in the testing of actual devices.
3. *Transparency.* All stakeholders seemed to welcome the steps toward transparency taken by the Department when it announced that the testing plan for the Study would be published in the *Federal Register*. We further request that all information concerning the Study and all correspondence about the Study’s methods, processes, and conclusions be open and transparent. Information concerning the Study, including this letter, should be made publicly available, for example by posting such information and correspondence on a Department website. Furthermore, the Office should create and publish a regularly-updated “Issues Log” tracking all items raised in past and future workshops as well as private meetings with Study participants. As discussed further below, any confidential information can be protected with an appropriate confidentiality agreement that permits reasonable access to data for the purpose of performing tests.<sup>5</sup>
4. *Receive Antenna Patterns.* At the Workshop, the Department stated that GPS manufacturers would submit the GPS receive antenna patterns for each device tested to the Department. LightSquared agrees that this is an important element of the

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<sup>2</sup> Tr. at 80–81.

<sup>3</sup> See *Real World Balance Between GPS-Satellite Use Cases and Licensed Broadband Service*, LightSquared Presentation to DOT Workshop, at 7 (Mar. 12, 2015), available at [http://www.rita.dot.gov/pnt/sites/rita.dot.gov.pnt/files/LightSquared%20Presentation%20to%20DOT%20Workshop%20031215\\_0.pdf](http://www.rita.dot.gov/pnt/sites/rita.dot.gov.pnt/files/LightSquared%20Presentation%20to%20DOT%20Workshop%20031215_0.pdf). LightSquared’s presentation is attached to this letter for reference.

<sup>4</sup> See Tr. at 47.

<sup>5</sup> See *id.* at 59.

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information needed to understand and analyze any resulting dataset appropriately.<sup>6</sup> LightSquared urges the Department to include this information in the publicly-available dataset so that use case analyses can be properly validated.

We respectfully request that the Department acknowledge the consensus on these issues and incorporate that consensus in the draft protocols to be published in the *Federal Register*.

### **B. The Study should reflect LightSquared's input to ensure that the Study is useful and credible with the FCC.**

In its written materials and oral presentation at the Workshop, LightSquared asserted the following nine points, and no other stakeholders offered a comprehensive set of alternative views but raised only generalized objections.<sup>7</sup> Accordingly, the Department's testing plan should reflect these points:

1. The Study should follow an articulated and highly detailed testing plan. Consistent with the proposed Statement of Work attached to my letter of March 9, 2015, and discussed at the Workshop, the Office and Volpe should produce a detailed plan for how GPS devices will be tested, including schematics for the RF-setup and transmit components to emulate GPS signals and LightSquared transmissions. Specific elements of this testing plan, such as the use of device specific GPS antenna patterns (rather than a standardized pattern as recommended in a recent GPSIA filing) and the use of a finite library of representative LightSquared transmissions (e.g. LTE based transmissions as opposed to a technology-agnostic test signal, also recommended in the GPSIA filing) should be used.
2. When the Department communicates the Study to the FCC and NTIA, it should provide a full dataset to demonstrate that data has not been selectively edited.<sup>8</sup>
3. The GPS manufacturers should make identical devices, "test mode" software codes, and any necessary data collection cables available to third parties to allow parallel testing that would ensure that the Study's dataset is reproducible.

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<sup>6</sup> The GPSIA letter proposes using a "standardized antenna model," with the manufacturers noting any "major deviations" from such model, but provides no further detail or explanation. *See* Letter from M. Anne Swanson *et al.* to Stephen M. Mackey (Apr. 14, 2015). In order to avoid loss of valuable data due to interpretation of vague language, LightSquared believes the Department's plan to include antenna patterns specific to each device tested should be maintained.

<sup>7</sup> One GPS industry representative participating in the Workshop noted that there were points in LightSquared's presentation with which he disagreed, stating that he would "kind of reserve objection, just to keep the discussion flowing." Tr. at 55. However, neither that participant nor others presented the kind of comprehensive testing plan set forth by LightSquared.

<sup>8</sup> *See id.* at 52.

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4. The GPS manufacturers should provide the frequency selectivity curve and linearity of the receiver front-end for all devices to third parties, and to the Department for communication with the Study to the FCC and NTIA. While LightSquared agrees this data should be provided in accordance with a confidentiality agreement, this will allow authorized third parties and regulators to understand which receivers have the best performing filters installed and confirm whether their performance in tests correlates with such filtering.
5. The GPS manufacturers should provide descriptions of typical use cases for each device tested. These descriptions should be provided to the Department for communication with the Study to the FCC and NTIA. This information should be provided so that the FCC can better understand the relationship between a device's test results and how the device is typically utilized.
6. The evidence used by the Department during the Study should be available for LightSquared and others parties to analyze, and any conclusions drawn from the Study should be capable of being proved true or false by a competing study.<sup>9</sup> This is the hallmark of an open and transparent process and is a fundamental feature of the Administrative Procedure Act ("APA").<sup>10</sup>
7. LightSquared's proposed Confidentiality and Non-Disclosure Agreement, which was attached to my letter of March 9, 2015, distributed to all attendees prior to the Workshop, and discussed during the Workshop, should be used as a model to protect confidential information submitted in connection with the Study while enabling relevant information to be both accessed and protected by interested parties.<sup>11</sup> As Geoff Stearn of LightSquared explained, "anything that is part of that process that is truly confidential information would be protected under the proposed [Confidentiality and Non-Disclosure Agreement]," including specific sales volumes and frequency selectivity curves.<sup>12</sup> The FCC has extensive experience with confidentiality agreements, including agreements protecting information that is certainly as

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<sup>9</sup> *See id.*

<sup>10</sup> *See* 5 U.S.C. § 553; *see also Nat'l Ass'n of Regulatory Util. Comm'rs v. FCC*, 737 F.2d 1095, 1124 (D.C. Cir. 1984) (noting that when an agency undertakes a thorough, primary, evaluation of all relevant facts, it is highly desirable that the agency independently amass the raw data, verify the accuracy of that data, apply that data to consider several alternative courses of action, and reach a result confirmed by the comments and submissions of interested parties).

<sup>11</sup> Tr. at 56, 59.

<sup>12</sup> *Id.*

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commercially sensitive as any information being provided as part of the Study, and the Office can also look to those FCC orders for models.<sup>13</sup>

8. Adjacent band power should be measured at the GPS antenna connector.<sup>14</sup> It has subsequently been suggested that it may be difficult to use the antenna connector for some GPS units.<sup>15</sup> However, this approach would not require any device modifications as the measurement would be taken in free space as close to the antenna as possible.
9. The Study shall generate multiple receiver masks reflecting different levels of noise floor increase and different percentages of devices experiencing such increase, thus showing how the mask may vary from the worst-case scenario to “gold standard” devices.

### **C. The Department should resolve now, prior to the Study, the issues left unresolved at the Workshop.**

The Workshop addressed several issues, but a number of important issues remain open. The Department should take care to resolve these issues now, before the Study begins. The Department should begin by publishing its own views on these topics in the *Federal Register* and allowing interested stakeholders to provide comment. In particular, the Department should resolve the issues set forth below:

#### 1. Scope of Spectrum To Be Studied

The Department has now been presented with a sharp disagreement regarding the scope of the spectrum to be studied, although all stakeholders agree that this is an issue of great importance. One Workshop participant urged that the Study examine spectrum from 1500 MHz

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<sup>13</sup> See, e.g., *Applications of Cricket License Company, LLC, et al., Leap Wireless International, Inc., and AT&T Inc. for Consent to Transfer Control of Authorizations*, Second Protective Order, 28 FCC Rcd 11803 (2013); *Applications of AT&T Inc. and Deutsche Telekom AG for Consent to Assign or Transfer Control of Licenses and Authorizations*, Second Protective Order (Revised), 26 FCC Rcd 8801 (2011); *Applications for Consent to the Assignment and/or Transfer of Control of Licenses Adelfia Communications Corporation (and Subsidiaries, Debtors-In-Possession), Assignors, to Time Warner Cable Inc. (Subsidiaries), Assignees, Adelfia Communications Corporation, (and Subsidiaries, Debtors-In-Possession), Assignors and Transferors, to Comcast Corporation (Subsidiaries), Assignees and Transferees*, Second Protective Order, 20 FCC Rcd 20073 (2005); *Applications of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications Corporation to WorldCom, Inc.*, Order Adopting Protective Order, 13 FCC Rcd 11166 (1998).

<sup>14</sup> See Tr. at 58 (“Adjacent band power will be measured at the GPS antenna connector, or at the point in space that’s immediately adjacent to the antenna, for over-the-air testing.”).

<sup>15</sup> See Letter from M. Anne Swanson *et al.* to Stephen M. Mackey (Apr. 14, 2015).

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to 1700 MHz.<sup>16</sup> Indeed, that participant advocated examination of the AWS-3 spectrum above 1700 MHz.<sup>17</sup> Similarly, GPSIA has proposed, without further explanation, that the Study assess the spectrum bands from 1525 MHz to 1680 MHz.<sup>18</sup> LightSquared, by contrast, has maintained that studying a huge swath of spectrum from 1500 MHz to 1700 MHz (or higher) is not necessary. Instead, LightSquared has recommended that testing be limited to spectrum reasonably likely to have a measurable impact on the performance of the best-performing GPS devices. Specifically, LightSquared has recommended that testing be limited to spectrum within 50 MHz on each side of the GPS L1 center frequency of 1575.42 MHz, so from 1525-1625 MHz. This approach is supported by the following considerations:

- There is no basis to include LightSquared’s uplink bands in the Study, since it has been conclusively shown that operations in the upper bands pose no risk of actual harm to GPS devices.<sup>19</sup>
- If the Office decides to conduct a study of an *imbalanced* block, such as 50 MHz below the GPS L1 center frequency but 100 MHz above it, then that would appear to be arbitrary and capricious, contrary to the requirements of the APA. That decision would be especially problematic when past studies have shown there is no need to study the bands at 1625-1675 MHz.
- *Cellular.* LightSquared’s uplinks are no more in need of testing than services in similarly situated bands that have been in operation for many years and have had no harmful effects on GPS. Nearby cellular services, for example, do not need to be tested. However, the Department should explain why it would not be arbitrary and capricious for the Study to include LightSquared’s uplinks but exclude nearby cellular services. Including LightSquared’s uplink spectrum in the Study runs the risk of raising the same issues regarding out-of-band emissions by wireless carriers that have long been resolved by the FCC.<sup>20</sup>

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<sup>16</sup> *Id.* at 39–40.

<sup>17</sup> Specifically, the participant stated: “There’s a lot more, as a result of the latest AWS-3 auction, occupancy and demand to 1700, even above that. Should we reflect that in these test plans?” *Id.* at 40.

<sup>18</sup> This proposal was made in a recent letter from GPSIA, which is discussed in more detail below. Notably, the letter provides no justification for testing *any* of the spectrum above the GNSS band, let alone all the way up to 1680 MHz.

<sup>19</sup> See Letter from John P. Janka to Marlene H. Dortch, Secretary, Federal Communications Commission (July 15, 2013), *available at* <http://apps.fcc.gov/ecfs/document/view?id=7520930804>.

<sup>20</sup> See, e.g., Trimble Navigation Limited and Deere & Company, Petition for Reconsideration, GN Docket No. 13-185 (filed July 7, 2014) (arguing that the FCC “did not adopt appropriate technical safeguards to protect [GPS] from harmful interference” when it established the AWS-3

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- *MSS*. Another topic that was discussed during the Workshop was testing of other MSS providers in addition to LightSquared. Specifically, one presenter stated: “Looking more now at the consumer terrestrialization of MSS, there’s more devices being launched, more systems that are broadband being launched by MSS. This is one example, Iridium NEXT, which launches its first satellite in a few months in June. This is going to replenish all 66 Iridium satellites at a cost of about \$3 billion CAPEX. These are the kind of devices that are going to be at trucks, at homes that are remote. These have a 7 watt EIRP. These can definitely interfere with GPS/GNSS receivers.”<sup>21</sup> The same presenter added: “So the interfering signal sources we’re considering are Big LEO, which is a Globalstar. The next one over, in frequency, is Iridium. I assume that’s just an LTE installation, about 1626.6. And there’s some high-power Inmarsat transmitters with directive antennas that give some pretty huge power letters.”<sup>22</sup> LightSquared disagrees that other MSS providers need to be tested. However, the Department should explain why it would not be arbitrary and capricious for the Study to include LightSquared’s uplinks but exclude MSS devices operating in nearby bands.

### 2. Data To Be Collected

Workshop participants have presented the Department with very different views regarding what data should be collected to demonstrate the impact of adjacent band operations on GPS devices. GPSIA has stated “that 1 dB reduction in  $C/N_0$  is the most appropriate interference metric.”<sup>23</sup> By contrast, LightSquared has recommended in both the written materials it has submitted and its oral presentation at the Workshop that the Study should produce data showing how various adjacent band power levels cause a 1, 3, 6 and 10 dB rise in the noise floor, *as well as the resulting change in position/timing error* for the various identified classes and models of GPS devices. This full dataset, as well as a meaningful number of receiver masks demonstrating various strata of adjacent band rejection capabilities of the tested receivers, will give the FCC the data necessary to determine the power levels that result in harmful interference. LightSquared’s recommendation is supported by the following considerations:

- The ultimate goal of the Study should be to provide detailed test results so that its findings will be useful to the FCC, the agency that will ultimately need to make a decision regarding the potential for harmful interference to GPS devices. As Hadi

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rules”); Comments of the GPS Innovation Alliance, GN Docket No. 13-185 (filed Sept. 18, 2013) (urging the FCC to consider the potential for interference to GPS in developing technical rules for AWS-3).

<sup>21</sup> Tr. at 69.

<sup>22</sup> *Id.* at 71.

<sup>23</sup> Letter from M. Anne Swanson *et al.* to Stephen M. Mackey (Apr. 14, 2015).

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Wassaf of Volpe acknowledged at the Workshop, the Department and Volpe “are not regulators . . . . The ultimate rulemaking and all that, it’s not us, for sure.”<sup>24</sup>

- The purpose of the Study should not be simply to duplicate the work performed in 2011 by the LightSquared-GPS Technical Working Group (“TWG”). As Geoff Stearn of LightSquared explained at the Workshop, the company’s proposals are “a way to make [the test] results meaningful and to make DOT’s study of this actually have some informative element to it,” a result which could not be achieved by mere duplication of the TWG’s efforts.<sup>25</sup> This would include testing for changes in position and timing accuracy as well as a broader analysis of the change in the noise floor.
- While 1 dB C/N<sub>0</sub> does measure interference, it has never been correlated to result in harmful interference. The Department should provide the FCC and NTIA with relevant data points without attempting to supplant the role of the spectrum regulator by determining its own measure of harmful interference.
- The FCC defines “harmful interference” as “[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 operating in accordance with [the International Telecommunication Union] Radio Regulations.”<sup>26</sup> This definition of harmful interference, which comes from the International Telecommunication Union’s Radio Regulations, has been used by the FCC for decades.<sup>27</sup>
- To be credible, the Office’s testing protocol should recognize that the FCC distinguishes the concept of harmful interference from the concept of interference more generally. First, the FCC has a separate definition for “interference.”<sup>28</sup>

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<sup>24</sup> Tr. at 36.

<sup>25</sup> *Id.* at 60.

<sup>26</sup> 47 C.F.R. § 2.1(c).

<sup>27</sup> See ITU Radio Regulations § 1.169; FED. COMM’NS COMM’N, REPORT OF THE INTERFERENCE PROTECTION WORKING GROUP SPECTRUM POLICY TASK FORCE 8 (2002), *available at* <http://transition.fcc.gov/sptf/files/IPWGFfinalReport.pdf>.

<sup>28</sup> The Commission has also defined three other levels of interference. See 47 C.F.R. § 2.1(c) (defining “interference,” as “[t]he effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy”). The FCC has also separately defined “permissible interference” and “accepted interference.” See *id.* The definitions of “interference,” “permissible interference,” and “accepted interference” also come from the ITU Radio Regulations. See ITU Radio Regulations §§ 1.166–1.168.

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Moreover, the Commission has made clear that in writing its rules, the primary concern is preventing harmful interference, not interference in general. For instance, in a recent matter, the FCC established technical rules for the H Block that the Commission specified “are not, nor could they reasonably be, designed to prevent all possible instances of interference generally.”<sup>29</sup> Rather, the rules “will permit use of this block without causing *harmful* interference (although not necessarily eliminating all interference).”<sup>30</sup> In addition, the FCC has indicated that receivers must be able to tolerate certain levels of interference.<sup>31</sup>

- The Office should learn from the recent actions of the FAA with respect to the FAA’s analysis of the potential impact of adjacent band services on aircraft using certified GPS receivers—a process that was acknowledged during the Workshop.<sup>32</sup> Critically, the FAA uses *the change in position error* as its key measurement to certify compliance with its GPS standards. This decision by a sister agency of the Office underscores the fundamental role of this measure in determining whether harmful interference is present. LightSquared made exactly this point in its presentation at the Workshop, stating: “[W]e are confident that position and timing error are the primary elements that must be studied . . . [A]s we said before, the carrier-to-noise ratio just is not a good proxy for harmful interference.”<sup>33</sup> In addition, the FAA detailed at the outset specific use cases reflecting intended operation of GPS devices as part of a

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<sup>29</sup> *In the Matter of Serv. Rules for Advanced Wireless Servs. H Block Implementing Section 6401 of the Middle Class Tax Relief & Job Creation Act of 2012 Related to the 1915-1920 Mhz & 1995-2000 Mhz Bands*, 28 FCC Rcd 9483, 9494–95 (2013).

<sup>30</sup> *Id.* at 9492–93 (emphasis added).

<sup>31</sup> The 2004 Report and Order in the 800 MHz proceeding, for instance, set minimum receiver performance criteria that were required for non-cellular licensees to be entitled to full protection against what the FCC described as an unacceptable level of interference. *See In the Matter of Improving Spectrum Efficiency Through Flexible Channel Spacing & Bandwidth Utilization for Econ. Area-Based 800 MHz Specialized Mobile Radio Licensees*, 27 FCC Rcd 6489 (2012). The Receivers and Spectrum Working Group of the FCC Technological Advisory Council (TAC) has also advocated for increased use of harm claim thresholds—ceilings on the interfering signals that must be exceeded before a receiving system can claim harm, which the TAC has stated would improve coexistence without necessarily requiring a regulator to specify receiver standards that constrain technical and commercial innovation. *See* FED. COMMC’NS COMM’N TECHNOLOGICAL ADVISORY COUNCIL RECEIVERS AND SPECTRUM WORKING GROUP, INTERFERENCE LIMITS POLICY: THE USE OF HARM CLAIM THRESHOLDS TO IMPROVE THE INTERFERENCE TOLERANCE OF WIRELESS SYSTEMS 7 (2013), *available at* <http://transition.fcc.gov/bureaus/oet/tac/tacdocs/WhitePaperTACInterferenceLimitsv1.0.pdf> (noting that regulation to minimize interference has addressed receivers).

<sup>32</sup> *See* Tr. at 20.

<sup>33</sup> *See id.* at 53.

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comprehensive end-to-end plan on which public comment was solicited. At minimum, an orderly administrative process requires the Office to explain why the metric it selects to measure impact is fundamentally different than the metric used by a sister agency in the same Department.

### 3. Devices To Be Tested

As discussed at the Workshop, any testing should cover each of the following categories of devices: (a) the top-selling devices in 2014, by SKU and device manufacturer; (b) the top-selling devices from 2004 to 2013 that manufacturers believe are in widespread use; (c) any devices newly released or ready for release in 2015 for which test devices are available; and (d) band-pass filters identified for all devices. Other devices for which the manufacturers can show are widely used for safety of life applications should be tested, but on the same transparent basis.<sup>34</sup>

### 4. No Device Anonymity

Devices tested as part of the Study should *not* be anonymized. Rather, interested third parties should be well informed about the devices being tested and should be provided with relevant data.

### 5. Parties Conducting Testing

At the Workshop, Volpe stated that all testing will take place at government-owned or contracted labs.<sup>35</sup> While LightSquared agrees that testing at an independent facility is crucial to ensuring that data is reliable, it appears that GPS manufacturers may still be responsible for testing their own devices and collecting their own data at these facilities. In order for there to be adequate assurance that testing is objective and resulting data is reliable, testing should not only be conducted at a government-owned or contracted lab, it should be conducted by an objective third party.

## **D. Comments on GPSIA's recent letter**

This section includes brief comments on the recent letter written by GPSIA and circulated by the Department commenting on the Workshop and the Study. Because we did not receive the letter until Thursday, April 16, we have not had time to perform a complete evaluation of the contentions therein. However, there are important deficiencies that are immediately evident from our preliminary review:

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<sup>34</sup> *Id.* at 55–56.

<sup>35</sup> See *Recap and Program Plan Update*, Stephen Mackey Presentation to DOT Workshop, at 5 (Mar. 12, 2015), available at [http://www.rita.dot.gov/pnt/sites/rita.dot.gov.pnt/files/Recap\\_Program\\_Plan\\_Update\\_v3.pdf](http://www.rita.dot.gov/pnt/sites/rita.dot.gov.pnt/files/Recap_Program_Plan_Update_v3.pdf).

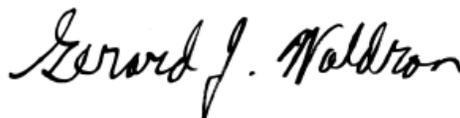
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- The recommendations of the GPSIA will not provide regulators with results that are significantly different from those already produced three years ago by the TWG and NPEF testing.
- GPSIA contends that testing should only measure a 1 dB change in the noise floor. However, GPISA has never demonstrated why that measurement is useful, nor has it demonstrated why measuring a change in position/timing accuracy is not superior. Moreover, it does not even address the decision by the FAA to test actual positional error and not changes in the noise floor.
- GPSIA has asked that the Study cover spectrum ranging all the way up to 1680 MHz. The letter provides no justification for this request, and GPSIA has never provided justification for testing any spectrum above 1610 MHz. It also has not addressed why an imbalanced analysis of spectrum on either side of the GPS L1 center frequency is not arbitrary and capricious.
- GPSIA has requested to increase the number of GPS satellites in view from 8 to 12, but have provided no justification for doing so.
- GPSIA has requested to test GLONASS signals as well, but have not explained why this approach would be justified given that GLONASS-capable receivers have not yet been licensed in the United States, as required by the FCC.

\* \* \*

We look forward to continuing to work with the Department as the Study progresses. We propose that we meet with you in order to try to reach agreement on the proposals and suggestions in this letter.

Sincerely,



Gerard J. Waldron  
*Counsel to LightSquared Subsidiary LLC,  
Debtor-in-Possession*

cc: Mr. Gregory D. Winfree, Assistant Secretary for Research and Technology  
Ms. Ellen Partridge, Deputy Assistant Secretary for Research and Technology  
Ms. Kristin Amerling, Deputy General Counsel  
Mr. Chris Perry, Office of General Counsel

Attachment

# Presentation to DOT Workshop

March 12, 2015

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# LightSquared Comments on Testing Program

- The FCC has Exclusive Jurisdiction to Regulate Spectrum Emissions
- The Established Process is for Agencies to Ask the FCC to Conduct Such Studies
- The Only Purpose of Any Such Study is to Inform FCC Regulatory Action
  - If DOT does enter into an agreement with Volpe to perform a study, it should make sure the work is useful to the FCC
- In Order for a Study to be Useful
  - It must be based on a published, detailed test plan
  - Testing should inform the FCC's consideration of economic and social issues
  - The study's conclusions must be capable of being proved true or false by a competing study
  - The evidence used must be available for LightSquared or others to study
  - The study must begin and end in 2015
  - The study should adduce evidence relevant to "actual harm"
  - The study should identify the gold standard of GPS resiliency

# Appropriate Elements of Study

- Overall Roles and Responsibilities
  - DOT to gather all relevant datasets, position and timing error for widely used GPS devices
  - Full dataset, along with DOT perspective, shall be submitted to NTIA and FCC for review, public comment and action
  - Subject to confidentiality protection for proprietary elements, dataset should be capable of testing by LightSquared
- Scope
  - Downlink spectrum band only
- Focus of Assessment
  - Position / timing error
  - Change in  $C/N_0$
  - Providing detailed test results for both elements is essential
    - Positional and timing variance is what matters to determine “actual harm”
    - Signal/noise is a very poor proxy.
- All Testing to be Performed by Volpe or Qualified Independent Laboratories

# Devices for Testing

- The Devices Tested Should Cover:
  - Top selling devices for 2014 by SKU and seller
  - Top selling devices 2004-2013 that manufacturers believe are still in widespread use
    - Supporting information to DOT
    - Ability to provide test samples to DOT
  - Devices that are newly released in 2015 or ready for release with test devices available
- For Each Model Provided To DOT for Testing; Volpe Will Test two Identical Units
  - If units fail to achieve consistent results in confirmational testing; an additional two units will be provided
- Manufacturers to Make Identical Devices, “Test Mode” Software Codes, and Any Necessary Data Collection Cables Available to 3<sup>rd</sup> Parties For Parallel Testing
  - DOT can use confidentiality agreements to protect proprietary elements
- GPS Receive Antenna Patterns to be Made Available in Order to Perform Subsequent Use-Case Analyses
- The Frequency Selectivity Curve and Linearity of the Receiver Front-End for all Devices to be Provided to DOT (and FCC)
- Manufacturers to Provide Description of Typical Use Cases for Devices Submitted
- LightSquared to Have Same Information and Access in Order to Perform its Own Tests

# Testing Process and Output

- Conducted Testing Will be Performed When Feasible; Otherwise Over-the-Air Testing Will be Performed
- Adjacent Band Power Will be Measured at the GPS Antenna Connector (or Immediately Adjacent to the Antenna for Over-the-Air Testing)
  - Eliminates need for propagation model assumptions in the analysis process
- All Test Results, Including Full Device Identities, to be Publicly Released on a Rolling Basis as Testing is Completed
- In Order to Provide a Complete Data Set to NTIA and the FCC, DOT to Create a Series of Receiver Masks to Illustrate the Impact of the Adjacent Band on Different Classes of Devices
  - Mask representing all devices within a category
  - Mask which eliminates the 15% of devices with the poorest rejection of adjacent band signals
  - Mask which shows the top 50% of devices with respect to rejection of adjacent band signals
- Multi-GNSS Receivers Will not be Tested Since There is Currently no Authorization for Non-GPS Satellite Receivers to Be Used in the United States
- “Gold Standard” to be Assessed

# Openness and Transparency

- Creation of an “Issues Log” to Track All Items Raised at Workshops and Private Meetings; Updated and Released Weekly
  - Date
  - Description
  - Status
  - Resolution
  - Responsible Party
- Public Availability of Information
- Confidentiality Would be Afforded to Proprietary Information Only
  - Specific sales volumes for devices
  - Device front-end information (such as frequency selectivity and linearity of devices submitted for testing)
- All Communications and Materials Presented at Meetings Between DOT and Study Participants Outside of Workshops to be Posted to the DOT ABC Website
- Audio Recording of Future Workshops to be Available at the DOT ABC Website in Addition to the Meeting Materials

# Key Milestones

Redraft of Current Test Plan, Public Comment and Final Draft Released	5/4/2015
Devices to be Tested Provided to Volpe by Manufacturers	5/18/2015
Lab Setup Complete / Final Test Plan Issued	5/25/2015
Device Testing Begins	5/25/2015
Test Results Released	Rolling
Device Testing Complete	8/26/15
Final Results Submitted to NTIA/FCC (No Interference Standards to be Recommended)	9/30/2015