COALITION TO SAVE OUR GPS

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Submitted Electronically

Ms. Marlene Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: LightSquared Subsidiary, LLC, Application for Modification of Authority for Ancillary Terrestrial Component; IB Docket No. 11-109; IBFS File No. SATMOD2010111800239; Written Ex Parte Communication

Dear Ms. Dortch:

Members of the Coalition to Save Our GPS (the "Coalition") have actively participated in the FCC's proceeding designed to evaluate whether LightSquared Subsidiary, LLC ("LightSquared") should be permitted to proceed with its planned ubiquitous terrestrial network using L-Band spectrum designated for Mobile Satellite Service ("MSS").[1/] While LightSquared originally planned to use all of the spectrum for which it is authorized for terrestrial wireless use, as the work of the FCC-directed Technical Working Group ("TWG") proceeded, LightSquared announced that it had revised its plans and asked that the interference issue be considered based on the use of the "lower 10 MHz" of its spectrum only.[2/] After several months of consideration, serious concerns remain about LightSquared's potential use of its lower 10 MHz of spectrum. As a result, the FCC and the National Telecommunications and Information Administration ("NTIA") concluded that additional testing was necessary to assess the harmful interference that LightSquared could cause to GPS receivers using only the lower 10 MHz of its spectrum.[3/]

1/ *See LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component*, Order and Authorization, 26 FCC Rcd 566 (2011).

2/ *See* Press Release, *LightSquared Solution to GPS Issue Will Clear Way for Nationwide 4G Network* (June 20, 2011).

3/ *See Status of Testing in Connection with LightSquared's Request for ATC Commercial Operating Authority*, Public Notice, FCC IB Docket No. 11-109, DA 11-1537 (rel. Sept. 13, 2011); Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce, to Julius Genachowski, Chairman, Federal Communications Commission, FCC IB Docket No. 11-109 (filed Sept. 13, 2011) ("NTIA Letter"). The testing that NTIA is currently undertaking relates only to general navigation and location devices. As NTIA recognized, additional testing of high precision and other devices will be required before NTIA can provide a complete assessment of the impact of LightSquared's proposed operations on government use of GPS technology.

Coalition members are actively participating in that testing process, just as they did in the TWG effort.

Due to LightSquared's suggestion that all parties focus on the interference effects of lower band only operations as a "solution" to the interference problems created by its original upper and lower band operations, there has been little further consideration of the overwhelming evidence of problems with upper band operations. None of the current NTIA tests are intended to assess the impact of LightSquared's use of the upper 10 MHz of its spectrum. Yet LightSquared has recently stated publicly that it may need to use its upper band spectrum, possibly as soon as 2015.[4/]

In the interest of bringing administrative finality to the FCC's consideration of LightSquared's proposed terrestrial use of the MSS band, and for the reasons set forth herein, the Coalition respectfully requests that the Commission promptly rule that LightSquared will not be permitted to pursue high powered terrestrial ATC operations in the upper MSS band in the future. There is overwhelming technical evidence that LightSquared's originally proposed operation on the upper and lower band will produce harmful "overload" of GPS receivers by the high powered signals being transmitted in immediately adjacent upper band spectrum. Beyond this, due to the close proximity of the entire MSS band to the GPS band, operation on both the upper and lower band simultaneously creates interfering "intermodulation" signals in the heart of the GPS band, well outside of LightSquared's authorized frequencies. This impermissible interference, standing alone, should prohibit LightSquared from operating in its upper band spectrum. While LightSquared has claimed there are "solutions" for mitigating interference from the use of its lower 10 MHz of spectrum – which have yet to be tested or actually demonstrated to be effective in eliminating harmful interference – there has been no suggestion that there will ever be an effective way to mitigate interference from its use of the upper 10 MHz without seriously degrading GPS performance.[5/]

In the absence of a decision from the Commission relative to the upper MSS band, the GPS industry, as well as critical government and private users of GPS products and applications, are in an untenable position. LightSquared has repeatedly acknowledged that any solution which will accommodate its lower band operations will require that a substantial, as yet undetermined, number of GPS devices be either retrofitted or replaced. At a minimum, this includes a large number of expensive high precision devices in use in critical economic sectors such as agriculture, aviation, and construction, as well as government uses including national defense, disaster response, and public safety. Many of the affected receivers, such as those used in

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[4/] *See* JC Johns, Director, FAA Navigation Services, *LightSquared Impact to Aviation: FAA Perspective*, at 3 (July 26, 2011) ("FAA Impact Assessment"), *available at* http://science.house.gov/sites/republicans.science.house.gov/files/documents/Letters/2011%2007%2026%20FAA%20LSQ%20Impact%20Assessment.pdf (noting that in Congressional testimony, LightSquared stated its need to be "on a vector to use upper 10 MHz channel within 2-3 years.").

[5/] *See* Howard Buskirk, *LightSquared Officials Still Hope for Quick FCC Approval*, COMM. DAILY, at 4-7 (Oct. 14, 2011) (reporting that LightSquared claims interference in the lower 10 MHz of the L-Band can be addressed by changing an external antenna and by using other "low-cost fixes," but that "a solution for the upper 10 [MHz] is much harder.").

aviation and defense, are subject to lengthy and expensive certification and testing processes that can take up to a decade to complete, and devices that pass that lengthy process then remain in service for many years. Similarly, there is undisputed evidence in the record that many commercial high precision devices have typical useful lives in excess of 10 years.[6/]

Without FCC action stating that LightSquared may not use its upper 10 MHz of MSS spectrum in its densely deployed terrestrial network, affected users may be required to go through a time consuming and highly disruptive transition process to accommodate LightSquared's lower band operations – only to face demands from LightSquared that they expend significant resources on another round of upper band testing a few years from now, notwithstanding the proven technical futility of such an effort, and pressure to undertake further efforts and disruption to accommodate LightSquared's business plans for the upper 10 MHz. This suggestion is contrary to any notion of the public interest. The FCC owes it to all concerned to immediately act to ensure that this cloud is removed and that LightSquared is put on clear notice that it will not be allowed to pursue future terrestrial use of the upper MSS band spectrum.

A prompt ruling responsive to the Coalition's request will also create a much more constructive and solutions-oriented process for completion of consideration of LightSquared's proposed lower band operations. Government agencies such as the Department of Defense ("DoD") and the Federal Aviation Administration ("FAA"), whose time horizons for analysis and decision-making stretch well beyond the period during which LightSquared will need to access its upper band spectrum, can then assess the implications of accommodating lower band operations without also having to consider complex contingencies arising from possible future upper band operations. Without such uncertainty, GPS manufacturers will be unable to optimize performance of their products with a known and predictable long-term interference environment, which will likely have the additional benefit of reducing potential disruptions from lower band operations, if and when solutions accommodating lower band operations have been developed and validated.

The Coalition and its members remain committed to full and constructive participation in the Commission's current attempts to find reasonable means to accommodate operations in the lower MSS band. The GPS industry and affected users have already devoted countless hours to consideration of LightSquared's proposals and will continue to devote substantial resources to the consideration and validation of its current technical proposals. The Commission should do its part to provide a rational decision-making framework for this process, and removing the upper band from consideration is critical to doing so.

[6/] *See* Comments of Trimble Navigation Limited, FCC IB Docket No. 11-109, at 60 (filed Aug. 1, 2011) ("Trimble Comments") ("[H]igh precision systems are routinely deployed for a useful life of ten to fifteen years.").

I. THE INTERFERENCE POTENTIAL FROM THE USE OF THE UPPER 10 MHz IS CLEAR AND UNDISPUTED

A. TWG Results

As the Coalition and other commenters noted in this proceeding, the TWG Report demonstrates without a doubt that LightSquared's proposed deployment in the upper 10 MHz of the MSS band would cause massive interference to GPS devices.[7/] The Aviation sub-group, for instance, determined that LightSquared's network would result in the loss of airborne GPS service in large portions of the United States.[8/] The Cellular sub-group similarly reported that LightSquared's signal in the upper 10 MHz band would cause failure for a significant number of GPS receivers embedded inside cellular devices, with the potential to cause GPS failure for hundreds of millions of cell phones.[9/] Data submitted by the High-Precision, Networks, and Timing sub-group demonstrated a severe impact on high precision receivers, noting that 100 percent of the high precision receivers that were tested at the Las Vegas "live sky" environment suffered detrimental interference and that harmful interference affected high precision, wideband GPS receivers even at great distances.[10/] Numerous parties commenting in this proceeding have confirmed Trimble's analysis of these results.[11/]

7/ *See id.* at 29-37; Reply Comments of Trimble Navigation Limited, FCC IB Docket No. 11-109, at 3-9 (filed Aug. 15, 2011); Reply Comments of the Coalition to Save Our GPS, FCC IB Docket No. 11-109, at 5 (filed Aug. 15, 2011) ("No party, not even LightSquared, has expressed any doubt that the TWG Report conclusively shows that LightSquared's proposed operations in the upper 10 MHz band would cause massive interference to every category of the millions of GPS receivers used in the United States."); *see also* Comments of Lockheed Martin Corporation, FCC IB Docket No. 11-109, at 3 (filed July 29, 2011) ("Lockheed Comments") (asserting that the TWG Report's conclusion that LightSquared's proposed operations will cause harmful interference to GPS receivers and applications "is unanimous for all GPS receiver types tested for terrestrial operations in the 'upper 10 MHz' of the 1525-1559 MHz band.").

8/ *See* Technical Working Group Report, Final Report, IBFS File No. SAT-MOD-20101118-00239 at 15, 28 (filed June 30, 2011) ("TWG Report") (observing that with operations on both upper and lower MSS bands, "GPS-based operations are expected to be unavailable over entire regions of the country at any normal operational aircraft altitude.").

9/ *See id.* at 16-17.

10/ *See id.* at 22, 180, 277.

11/ *See* Lockheed Comments at iii (explaining that the TWG Report confirms that LightSquared cannot operate its network without causing harmful interference to receivers and devices operating with GPS and other radionavigation-satellite service systems); Comments of Deere & Company, FCC IB Docket No. 11-109, at 11, 13-14 (filed Aug. 1, 2011) ("Deere Comments") (finding that the TWG test results demonstrate that LightSquared's service would cause widespread harmful interference to all classes of GPS receivers, particularly high precision receivers); Comments of Verizon Wireless, FCC IB Docket No. 11-109, at 4 (filed Aug. 1, 2011) (arguing that the TWG test results conclusively demonstrate that LightSquared's proposed operations in the upper 10 MHz of its authorized spectrum would interfere with cellular GPS receivers).

B. Other Independent Test Results

Test results submitted by other organizations and commenting parties align with the findings of the TWG. For example, the report prepared and submitted by the National Space-Based Positioning, Navigation, and Timing Systems Engineering Forum ("NPEF") concluded that LightSquared's operations in the upper 10 MHz band caused performance degradation for all GPS applications assessed, including U.S. government and commercial GPS applications.[12/] It noted that LightSquared's signal in the upper 10 MHz band caused interference to adjacent GPS applications even at distances of approximately one kilometer to several hundred kilometers.[13/]

The National Public Safety Telecommunications Council ("NPSTC") also submitted a report suggesting that LightSquared's proposed configuration would result in significant harmful interference to several GPS applications in the U.S., and that "terrestrial use of L-Band allocations near accepted and utilized Satellite Navigation allocations (1559 – 1610 MHz), including GPS, does diminish location accuracy and/or preclude, under certain circumstances, GPS service entirely."[14/] NPSTC predicted vast service outages for mobile PC-based and stand-alone devices utilized in public safety operations.[15/] NPSTC also reported denial of service at a distance of 140 to 400 meters from LightSquared's signal to portable devices used for public safety services, which represents the biggest concern to the public safety industry since, in certain circumstances, first responders may be unable to communicate their location in an emergency and GPS tracking may be their only back-up for assistance.[16/] Finally, NPSTC expressed its concern that LightSquared's signal could adversely impact cellular-based devices used for E911 calls, which assist rescue and law enforcement personnel with responding to an incident.[17/]

Commenting parties such as Clearwire Corporation ("Clearwire"), Stansell Consulting ("Stansell"), and Charles W. Rhodes ("Rhodes") conducted additional technical analyses that support the TWG's conclusions. Clearwire's report indicates that LightSquared's proposal to operate in the upper 10 MHz band "will cause catastrophic interference and loss of lock to

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12/ *See Assessment of LightSquared Terrestrial Broadband System Effects on GPS Receivers and GPS-dependent Applications*, IBFS File No. SAT-MOD-20101118-00239, at 4, 12 (filed June 13, 2011) ("*NPEF Report*"); *see also* Letter from Barry Schaffter, Senior Vice President, Intelligent Solutions Group and Chief Information Officer, Deere & Company, to Marlene H. Dortch, Secretary, Federal Communications Commission, IBFS File No. SAT-MOD-20101118-00239 (filed July 5, 2011) (supporting the *NPEF Report*).

13/ *See NPEF Report* at 4.

14/ Letter from Ralph A. Haller, Chair, National Public Safety Telecommunications Council, to Julius Genachowski, Chairman, Federal Communications Commission, IBFS File No. SAT-MOD-20101118-00239, at 3, 9 (filed June 15, 2011).

15/ *See id.* at 5.

16/ *See id.* at 5-6.

17/ *See id.* at 6.

Clearwire base station GPS units."[18/] Stansell's comments suggest that the reductions in GPS receiver bandwidth and degradation in Carrier-to-Noise ratio resulting from LightSquared's operations in the upper 10 MHz band would be devastating to GPS operations, particularly for high precision applications.[19/] Finally, using his own analysis, Rhodes determined that the combination of the noise floor increase and power levels from LightSquared's proposed terrestrial transmissions would likely result in the de-sensitization of GPS transistors and significant jamming of GPS reception.[20/]

C. Combined Operation on the Upper and Lower MSS bands Creates Impermissible Interfering Signals in the Heart of the GPS Band

Throughout the debate over the interference issues arising from its proposals to utilize MSS spectrum to provide ubiquitous, terrestrial only wireless services, LightSquared has made much of the fact that its operations would not create interference due to interfering signals transmitted signals outside of *its* authorized frequencies. This claim misses the point. Transmission of signals in the MSS band which are *billions* of times stronger than the authorized satellite signals in the adjacent GPS band creates impermissible overload of protected GPS receivers, even if the offending transmissions are confined entirely to the MSS band. Beyond this, the TWG tests showed that simultaneous transmissions on both the upper and lower MSS bands caused devastating interfering signals in the heart of the GPS band, which constitutes impermissible interference with authorized GPS services.

This interference results from a radiofrequency phenomenon known as "intermodulation." Where multiple high powered signals are transmitted in close proximity to each other, the interaction between the signals produces unwanted harmonic signals outside of the band in which the high powered signals are being transmitted. These effects are aggravated by LightSquared's proposed modulation scheme.[21/] Given the close proximity of the MSS band to the GPS band, these interfering signals occur outside the MSS band, and in the center of the GPS band, among other places. Thus, the TWG Report found that the combined interference effects of upper and lower band operations were substantially higher than the sum of the interference from operations on each band separately.[22/]

18/ *GPS Interference Report of Clearwire Corporation*, IBFS File No. SAT-MOD-20101118-00239, at 10 (filed July 14, 2011).

19/ *See* Comments of Stansell Consulting, FCC IB Docket No. 11-109, at 2-3 (filed Aug. 1, 2011); Erratum, FCC IB Docket No. 11-109, at 2-3 (filed Aug. 8, 2011).

20/ *See* Comments of Charles W. Rhodes, FCC IB Docket No. 11-109, at 1, 3 (filed Aug. 3, 2011). As explained in Trimble's Reply Comments, Mr. Rhodes was responsible for the technical aspects of the testing of Advanced Television Systems and digital television signals.

21/ *See* Deere Comments at 26, n.76 ("LightSquared's proposed Orthogonal Frequency Division Multiplexing ('OFDM') architecture is known to create a large number of intermodulation products, and the frequency bands chosen by LightSquared have the potential to generate a significant number of intermodulation products in the GPS/GNSS frequencies. No foreseeable filter will mitigate this problem."); *Id.* at n.76 ("LightSquared's OFDM architecture will potentially generate upwards of 100 million third order intermodulation products inside the GPS band.").

22/ *See* TWG Report at 269.

This interference will not occur if LightSquared's operations are limited to the lower MSS band only. For this reason alone, LightSquared should be prohibited from conducting high powered terrestrial operations in the upper MSS band.

D. Use of the Upper 10 MHz will Have a Particularly Severe Impact on Military Uses of GPS

In 2000, the GPS Military Design Team, led by the GPS Joint Program Office, completed a multi-year process to define a recommended design for a new military signal, designated as the "M code," which is to be implemented in the next generation of GPS satellites and military GPS receivers over the next several decades.[23/] The purpose of the new signal is to add new military capabilities, to protect military use of GPS by the United States and its allies, and to prevent hostile use of GPS, while at the same time preserving the peaceful use of the civil radionavigation system.[24/] In the interests of spectral efficiency, the Design Team focused on reuse of the spectrum already allocated for GPS use, including the spectrum adjacent to the MSS band at the L1-Band (1560 – 1610 MHz).[25/] In order to add signals to this band, while ensuring mutual coexistence with the civilian signal centered at 1575.42 MHz, the GPS Military Design Team determined that the new military sign should use a "split spectrum" modulation that places most of its power near the edges of the allocated L1 and L2 bands, away from the center of the bands.[26/] Therefore, the M code design puts one lobe of the new military signal almost directly adjacent to any high powered terrestrial transmissions in the upper MSS band, which will present even more severe challenges to effective use of the new signal in the U.S. beyond those already demonstrated for commercial use.

This concern, standing alone, should be dispositive. As General Shelton, head of Air Force Space Command has testified,

> For our military, GPS has become an integrated part of US and coalition training and operations. GPS is used by all our Services, from boots-on-the-ground patrols, to precision-guided munitions, to synchronization and security of communications networks, to search and rescue operations, to humanitarian relief operations. As I stated to this Subcommittee in my March 2011 testimony, I believe AFSPC has an obligation to provide the best support possible to our brothers and sisters in harm's way. GPS helps fulfill that obligation by providing an essential capability that is a tremendous enabler and enhancer of joint, combined, and allied operations.[27/]

23/ *See* Capt. Brian C. Barker, et al., *Overview of the GPS M Code Signal*, at 2 (2000), *available at* http://www.mitre.org/work/tech_papers/tech_papers_00/betz_overview/betz_overview.pdf.

24/ *See id.*

25/ *See id.*

26/ *See id.*

27/ *Sustaining GPS for National Security: Hearing Before the Subcomm. on Strategic Forces of the H. Comm. on Armed Services*, 112th Cong., at 1-2 (Sept. 15, 2011) (written testimony of General William

The fact that this new military code was a matter of public record in 2000, well before LightSquared's predecessors first proposed limited terrestrial use, makes clear that the FCC could not have contemplated use of the upper MSS band for high powered terrestrial use at any time thereafter, LightSquared's many attempts at revisionist history notwithstanding. Conversely, LightSquared's failure to take the M code into consideration when it proposed the use of its upper 10 MHz of spectrum for ubiquitous terrestrial operations is yet additional evidence of its failure to adequately consider the impact of its proposed operations on critical government functions.

E. Future Use of the Upper MSS Band is Inconsistent with LightSquared's Proposal for Mitigation of Lower Band Interference to High Precision GPS Receivers

Even in its many statements claiming to have "solved" the GPS interference issue, LightSquared concedes that lower band only operations will interfere with hundreds of thousands of high precision GPS receivers currently in use in critical economic sectors such as agriculture, aviation, and construction, as well as critical government uses including national defense, disaster monitoring and response, and public safety. This is attributable in part to the fact that many high precision GPS receivers were designed to receive signals in the MSS band to take advantage of satellite "augmentation" services that LightSquared itself provides, as does the other licensee in the MSS band – Inmarsat.[28/]

These services provide additional satellite signals that can be used in conjunction with GPS signals to significantly improve the accuracy of the location information generated by a GPS device. LightSquared's own contracts with satellite customers reserve the right to transmit signals anywhere in the entire MSS band upon notice, so GPS receivers which use LightSquared MSS services are required to be designed to receive signals in the entire MSS band. Thus, as a result of LightSquared's own services and contractual requirements, high precision receivers will receive "in band" interference[29/] no matter where LightSquared transmits in its MSS spectrum,

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L. Shelton, Commander, Air Force Space Command), *available at* http://armedservices.house.gov/index.cfm/files/serve?File_id=9043b110-61fa-45b9-a8ec-6c9f338981cc.

[28/] *See* Trimble Comments at 32, 56; Comments of the U.S. GPS Industry Council, FCC IB Docket No. 11-109, at 43 (filed Aug. 1, 2011); Deere Comments at 8.

[29/] Much of the discussion of interference to date has focused on interference from LightSquared's high powered transmissions due to overload of sensitive receivers that are built to receive signals in the GPS spectrum adjacent to LightSquared's MSS spectrum, which takes place even if LightSquared is transmitting only within its own spectrum band. In other words, this interference is caused "out of band" relative to LightSquared's authorized frequencies. In the case of high precision receivers, which have been designed to receive additional services transmitted by LightSquared and Inmarsat in the MSS band, these receivers will suffer interference from terrestrial transmissions in the same band they are designed to receive, an even more intractable interference problem. In addition, LightSquared's inaccurate claim that GPS receivers "squat" on LightSquared's spectrum or "inappropriately violate" LightSquared's spectrum rights have no applicability to these receivers since they "look into" LightSquared's frequencies to receive services LightSquared itself provides.

making such receivers far more vulnerable to overload by LightSquared's proposed operations. The same is true of augmentation services provided through Inmarsat, including Deere's Starfire service.

In order to address interference to high precision receivers resulting from its lower band operations, LightSquared has proposed a series of mitigation steps. The most important proposal is to move the augmentation signals to a "secure spot" in the *upper MSS band* and to modify its own contracts accordingly.[30/] In other words, in order to accommodate its lower band operations, LightSquared is asking high precision manufacturers to redesign their receivers to be open to transmissions in the same upper band that LightSquared wants to use for future high powered terrestrial services, recreating the same interference issue it is supposedly solving for the lower band. This is planned obsolescence on the backs of GPS users, and must be categorically rejected. It also highlights the need for stable, sustainable, long-term policies for the terrestrial exploitation of the MSS band, rather than the short-term "proposals of the week" that LightSquared has offered. The correct answer is to make clear now that high powered terrestrial operations will be limited to the lower band, so that LightSquared's proposed mitigations actually mean something.

II. THERE IS NO SOLUTION TO UPPER 10 MHz INTERFERENCE

LightSquared has offered what it believes to be several solutions to resolving the interference that was observed from its use of its lower 10 MHz. In particular, LightSquared has asserted that it can resolve the interference it causes to GPS from its use of the lower 10 MHz band by limiting its power on the ground and using filters for, among others, precision navigation devices.[31/]

However, it has offered no solutions – because none exist – for resolving interference from its proposed operations in the upper 10 MHz. In light of the preliminary nature of the solutions that have been offered for the use of the lower 10 MHz – the use of filters, for example that have been neither produced nor tested – it is plain that there simply is no means to address the interference that would be caused by LightSquared's use of the upper 10 MHz. Indeed, Mr. Javad Ashjaee, CEO of Javad GNSS, Inc., has claimed to have developed a filter that will purportedly cure interference from LightSquared's use of its lower 10 MHz, but even these claims have yet to be rigorously tested and verified.[32/] No such claims have been made regarding

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[30/] *See* Letter from Jeffrey Carlisle, Executive Vice President, Regulatory Affairs & Public Policy, LightSquared Subsidiary, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, FCC IB Docket No. 11-109, at Attachment, at 3 (filed Sept. 7, 2011).

[31/] *See* Press Release, *LightSquared Solution to GPS Issue Will Clear Way for Nationwide 4G Network* (June 20, 2011) ("LightSquared will modify its FCC license to reduce the maximum authorized power of its base-station transmitters by over 50%."); Letter from Jeffrey Carlisle, Executive Vice President, Regulatory Affairs & Public Policy, LightSquared Subsidiary, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, FCC IB Docket No. 11-109 (filed Sept. 21, 2011) (asserting that interference to high precision devices will be solved by the use of filters manufactured by Javad GNSS, Inc.).

[32/] *See* Javad Ashjaee, *LightSquared and GPS Can Coexist*, THE HILL'S CONGRESS BLOG (Oct. 18, 2011), *available at* http://thehill.com/blogs/congress-blog/technology/188259-lightsquared-and-gps-can-

the interference that LightSquared will cause by its use of the upper 10 MHz of spectrum, nor would such claims be credible given the much more formidable challenges presented by such use.

This is not a question of straightforward engineering. Rather, the combination of the very close proximity of the upper MSS band to the GPS band, along with an extreme disproportion of signal strength (a terrestrial signal billions of times stronger than the satellite signals) presents extraordinary and unprecedented challenges. Moreover, any additional filtering to protect against LightSquared's operation in the upper 10 MHz will unacceptably degrade the performance of GPS receivers.[33/] The passage of time will not affect this result. The proximity of the upper 10 MHz of spectrum to the GPS bands means that any filters used will unacceptably prevent GPS devices from receiving a sufficient amount of the GPS signal. It is not in the public interest to degrade GPS for hundreds of millions of users for the foreseeable future to free up incremental spectrum in addition to the lower MSS band spectrum where mitigation solutions are not yet proven to be effective.

III. THE UPPER 10 MHz SHOULD BE TAKEN OFF THE TABLE NOW

In light of the foregoing, the FCC should make clear now that the condition imposed in the January 2011 Waiver Order has not been satisfied and that the waiver is revoked with respect to the upper MSS band. The continued uncertainty regarding whether LightSquared may use that spectrum for stand-alone terrestrial operations is contrary to the public interest. While all of the evidence points to the fact that LightSquared will never be able to use the upper 10 MHz band for terrestrial operations, LightSquared has refused to surrender its use of that spectrum for terrestrial use, making further progress on the potential use of the lower 10 MHz band much more difficult than it needs to be.

LightSquared has tied its ability to initiate deployment to its use of only the lower 10 MHz of its spectrum. In fact, it scolded four-star General Shelton, who expressed concern over LightSquared's potential interference to GPS, for not understanding that it planned to use only its

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coexist; *LightSquared Says Compatible GPS Devices Ready for Testing*, TELECOMMUNICATIONS REPORTS (Nov. 2011) (quoting Mr. Ashjaee as saying it "took us about two weeks to build a prototype" of the antenna.).

33/ *See* Trimble Comments at 37-38 ("The TWG noted that . . . [t]he only filter that could be tested was for narrowband GPS receivers only, and would cause a loss of over 96 percent of the GPS signal, leaving large portions of the GPS community without adequate GPS service."); Deere Comments at iv-v (asserting that there are no filters available that can immunize high precision receivers without severely degrading the performance of the receivers); *see also Sustaining GPS for National Security: Hearing Before the Subcomm. on Strategic Forces of the H. Comm. on Armed Services*, 112th Cong., at *10 (Sept. 15, 2011) (oral testimony of General William L. Shelton, Commander, Air Force Space Command) ("Shelton Oral Testimony"), *available at* http://findarticles.com/p/news-articles/political-transcript-wire/mi_8167/is_20110916/rep-michael-turner-holds-hearing/ai_n58165676/ (observing that even with the "enormous cost, time, integration and testing to thoroughly wring out these filters, if they're technically feasible. . . . [w]e believe that the precision of those receivers would be impacted even in the presence of that filter.").

lower 10 MHz.[34/] While this criticism was not in fact accurate, even as LightSquared was criticizing General Shelton, it was telling representatives of Wall Street firms that it was only a matter of time before it convinced the FCC to allow it to use its upper 10 MHz of spectrum.[35/] In fact, LightSquared has made it clear it will need the spectrum to meet its service goals and that it has no intention of giving up the upper 10 MHz of spectrum for terrestrial use.[36/]

LightSquared's unwillingness to permanently relinquish the use of the upper 10 MHz of spectrum for terrestrial use severely inhibits constructive consideration of its proposed use of the lower 10 MHz of spectrum. As noted above, one of the keys to LightSquared's use of the lower 10 MHz of spectrum is the use of filters – as yet unavailable and untested – in connection with, among others, precision GPS devices. Even if it is confirmed that those filters are effective in preventing interference from LightSquared's operations in the lower 10 MHz, they certainly will not be effective in preventing interference from those operations in the upper 10 MHz. Therefore, any redesign or retrofitting needed to accommodate LightSquared's operations in the lower 10 MHz of spectrum would necessarily need to be repeated in the highly unlikely event that a solution could be proven for the upper 10 MHz. Given the rapid growth of demand for GPS devices, the installed base in the future will be much larger than it is now. And any such transition would affect many current GPS users twice, since GPS equipment is often in service for between 10 and 15 years.[37/] While waiting for this second shoe to drop, those responsible for overseeing critical GPS uses (such as the DoD and FAA), as well as GPS users and manufacturers, would be left to deal with a cloud of uncertainty. The only certainty is that LightSquared will seek to force such a transition when it needs the capacity available from its upper band spectrum to expand its business. The Commission can avoid this uncertainty, and it should do so promptly.

A further transition for LightSquared's use of the upper 10 MHz is even more untenable for many government and other users where lengthy equipment certification and testing processes are involved. Military equipment, for example, requires in-depth testing before it can be put in

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34/ *See* Howard Buskirk, *LightSquared Officials Still Hope for Quick FCC Approval*, COMM. DAILY, at 7 (Oct. 14, 2011) ("Gen. Shelton mixed up our old bandplan with the new one.").

35/ *See* Press Release, *LightSquared Chief Financial Officer and Chief Marketing Officer Presented at the Goldman Sachs 20th Annual Communacopia Conference on September 22* (Sept. 22, 2011), *available at* http://www.lightsquared.com/press-room/press-releases/lightsquared-chief-financial-officer-and-chief-marketing-officer-presented-at-the-goldman-sachs-20th-annual-communacopia-conference-on-september-22/ (describing LightSquared's overview and update on its business plans and solution to GPS interference issues); Webcast Presentation: Goldman Sachs 20th Annual Communacopia Conference (Sept. 22, 2011), *available at* http://cc.talkpoint.com/gold006/092011a_lr/?entity=42_DEGHLNS.

36/ *See* Paul Kirby, *LightSquared Says It May Need More Capacity In Five, Six Years*, TR DAILY (Oct. 19, 2011) ("Eventually, LightSquared will need to add additional capacity to its network . . . We do not expect to need such capacity for 5 to 6 years at least. When needed, this additional capacity could be added by bringing the upper portion of our spectrum online."); *see also* FAA Impact Assessment at 3.

37/ *See, e.g.*, Trimble Comments at 60; Comments of the Coalition to Save Our GPS, FCC IB Docket No. 11-109, at 42 (filed Aug. 1, 2011) ("[F]actory-installed GPS systems in automobiles are typically not replaced during the 10-15 years life of the vehicle and the same can be said for aircraft, trucks, ambulances, and agricultural and construction machinery to name but a few.").

service where lives depend on its use.[38/] Similarly, aviation navigation equipment which incorporates GPS technology must be extensively tested before entrusting the safety of aircraft to its use.[39/] Ten years is required to design, develop, certify and modify the civil aviation fleet.[40/] It remains to be seen whether these requirements can be satisfied relative to the proposed lower 10 MHz operations, or how long any required redesign or retrofit of GPS receivers to accommodate lower 10 MHz operations will take. But it is clear beyond dispute that future use of the upper 10 MHz will require a repeat of all of these processes given the far more substantial interference from upper band operations to all types of GPS receivers. If it were up to LightSquared, by the time those users fully test and install LightSquared's purported solution for the lower 10 MHz, it will be time for those users to begin the process all over again.

Finally, while the FCC has no obligation to LightSquared's investors, it should not ignore the fact that LightSquared continues to tell those investors about actions that the FCC will purportedly take, and has specifically provided assurances that it will try to claim the upper 10 MHz for use in the near future.[41/] To protect LightSquared's investors and allow rational business planning by LightSquared itself, it is incumbent upon the FCC to clearly state the ground rules going forward, and clearly prohibit high powered terrestrial operation in the upper MSS band. It is overwhelmingly in the public interest for the Commission to bring certainty to an area where LightSquared has shown that it is unwilling to do so.

[38/] Comprehensive testing, evaluations, and certifications would need to be conducted for *every* class of ground vehicle, helicopter, tactical aircraft, strategic bomber, and ship in the Department of Defense's inventory. *See* Shelton Oral Testimony at *11-12 (noting that even if a filter solution is technically feasible, "we would have to thoroughly test it. We might even have to do software modifications to accommodate it. I mean, there's just a whole bevy of questions that are unanswered at this point.").

[39/] *See* Letter from M. Anne Swanson, Dow Lohnes, Counsel to Garmin International, Inc., to Marlene H. Dortch, Esquire, Secretary, Federal Communications Commission, FCC IB Docket No. 11-109, at Attachment, at 22 (filed Sept. 15, 2011) (describing the equipment and installation certification process of the Federal Aviation Administration).

[40/] *See id.* at Attachment, at 32; FAA Impact Assessment at 10 (indicating that a "10 year retrofit timeline is assessed as medium to high risk.").

[41/] *See* Roger Cheng, *LightSquared CEO Upbeat At One-Year-Milestone*, CNET (July 19, 2011) (reporting that LightSquared was expecting the FCC to affirm its waiver decision in September); Sara Yin, *LightSquared Decision Expected in September*, PCMAG.COM (Sept. 13, 2011) (quoting Martin Harriman, Executive Vice President of LightSquared, as saying "I expect there to be a resolution in the next month.").

The Coalition looks forward to continuing to work with the FCC on this important matter. If there are any questions, please contact the undersigned directly.

Very truly yours,

/s/ Paul G. Scolese

Paul Scolese
Coalition to Save our GPS