

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of:)	
)	
LightSquared Subsidiary LLC)	SAT-MOD-20101118-00239
)	Call Sign: S2358
Request for Modification of its Authority for an Ancillary Terrestrial Component)	IB Docket No. 11-109

COMMENTS OF AT&T

AT&T Inc. (“AT&T”) hereby submits comments in response to the Federal Communications Commission’s Public Notice¹ inviting comments on the GPS Technical Working Group Report and the Recommendations submitted by LightSquared on June 30, 2011.²

I. INTRODUCTION

AT&T supports the Commission’s identification of the MSS bands as an important potential source of additional spectrum for satisfying the growing demand for mobile broadband services. As the Commission recognized in the National Broadband Plan, additional wireless broadband spectrum is needed to ensure continued innovation and economic growth, and to provide the opportunity for all Americans to enjoy the benefits of broadband technology. Making additional spectrum available allows existing providers to extend mobile broadband coverage, deploy more advanced mobile broadband technologies, and increase capacity. It can

¹ Comment Deadlines Established Regarding The LightSquared Technical Working Group Report, IB Docket No. 11-109, *Public Notice*, DA 11-1133 (rel. June 30, 2011).

² See Letter from Henry Goldberg, Counsel for LightSquared Subsidiary LLC to Marlene H. Dortch, Secretary, Federal Communications Commission, SAT-MOD-20101118-00239 (filed June 30, 2011), submitting into the record Recommendation of LightSquared Subsidiary LLC (June 30, 2011) (“Recommendations”) and Final Report of the GPS Technical Working Group (June 30, 2011) (“Working Group Report”).

also facilitate new entry into the mobile broadband marketplace. The MSS spectrum bands are among the best available opportunities to achieve these benefits.

LightSquared's entry into mobile broadband will further intensify competition in an already vibrantly competitive U.S. wireless broadband services marketplace, and it would be accomplished over MSS spectrum made available for terrestrial mobile use. However, it is essential that in approving the repurposing of this satellite spectrum for terrestrial use, the Commission takes into account interactions between new and established services.³

Understanding the impact on existing primary services is particularly important here in light of the ATC operators' obligation to cure any harmful interference caused to other services.⁴ The Commission correctly implemented this principle when it required the creation of the GPS Technical Working Group in the LightSquared Waiver Order.⁵

The Working Group engaged in an impressive collaborative effort that demonstrated the commitment of all members in the wireless and GPS industries to identify solutions to the challenges presented by the interaction between terrestrial mobile broadband services in the L-Band and GPS operations. The Working Group analyzed test results for over 130 GPS devices tested by six independent testing laboratories, FAA, and NASA. "Live Sky" field tests were also conducted on several devices to better simulate actual deployment conditions.

³ Especially in a proceeding such as the present one, where public notices have consistently been released immediately upon the submission of the underlying filings, where comment dates have been truncated, and where waivers have been granted even in the absence of an actual request, it is important that the Commission take the appropriate time and care to ensure that the final result is truly in the public interest.

⁴ See 47 C.F.R. § 25.255.

⁵ See LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component, SAT-MOD-20101118-00239, *Order and Authorization*, 26 FCC Rcd. 566, ¶¶ 41-43 (2011).

The Working Group Report indicated that LightSquared's planned deployment posed a potential for harmful interference to a wide range of existing GPS receivers. Both the Working Group Report and a report submitted by the National Telecommunications and Information Administration ("NTIA") recommended additional testing and study to investigate the viability of terrestrial operations in the L-band, the feasibility of enhanced filtering, and the need for any additional mitigation mechanisms. In light of these findings, LightSquared now proposes a different deployment plan over only the lower 10 MHz of its authorized L-band spectrum, which it asserts will address interference concerns. The Commission should continue to support this process, and before it authorizes LightSquared's commercial operations, the Commission should ensure that GPS will be protected from harmful interference, as required under its rules. Additionally, the Commission should codify the commitments made by LightSquared in its Recommendations.

II. THE WORKING GROUP REPORT RAISES TECHNICAL QUESTIONS THAT MUST BE ADDRESSED.

The Working Group Report raised a number of interference concerns. The Working Group conducted its analysis through seven sub-teams, each representing a different aspect of the GPS industry. Each sub-team reported that full power base station operations over the entire 20 MHz of LightSquared's ATC downlink spectrum would cause harmful interference to a wide range of deployed and planned GPS receivers. In particular, the results of the Cellular and Timing sub-teams, which are of most immediate relevance to the commercial wireless industry, indicated that LightSquared's original planned deployment scenarios would interfere with wireless operations, including E911 location accuracy and essential network timing functionality. The Working Group Report concluded that additional work will be needed to determine the viability of the mitigation techniques and to implement them into devices and networks.

The Cellular sub-team conducted laboratory tests on 41 commercial devices from a variety of carrier networks using both GSM/UMTS and CDMA technologies.⁶ Additionally, 29 devices from 8 different models were evaluated in the field during the live sky testing conducted by the Working Group in Las Vegas. Although every test case was not completed for every device, the preliminary test results indicated that LightSquared operations in the higher 5 MHz (1550.2-1555.2 MHz) and 10MHz (1545.2-1555.2 MHz) portion of its intended downlink spectrum consistently caused GPS failure in a significant number of devices, but that operations in the lower 10 MHz portion (1526-1536 MHz) are somewhat more compatible with existing cellular GPS devices, although some performance degradation would still be expected. Regarding interference mitigation, the Cellular sub-team concluded that “it does not appear that compatible operations will be feasible with LightSquared’s upper ATC channels until the installed base is replaced by much higher immunity devices.”⁷ Such devices are not currently commercially available.

Similarly, laboratory testing conducted by the High-Precision, Network, and Timing Sub-teams demonstrated that interference would be caused to a significant number of GPS timing receivers by the later phases of LightSquared’s contemplated deployment.⁸ The Sub-team also identified a significant risk of interference caused by third order intermodulation products when

⁶ Of these 41 devices, only 9 were designed for use over GSM/UMTS networks, while in the overall market, nearly one-half of all handset models offered in the U.S. in 2010 operated over the GSM line of protocols. *See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, WT Docket No. 10-133, *Fifteenth Report*, FCC 11-103, 189 Tbl. 33 (rel. June 27, 2011). Additionally, the GPS Working Group Report assumed a -5 dBi GPS antenna gain to estimate the impacts to GPS receivers. However, some devices actually have a GPS antenna gain that is significantly higher than -5 dBi, which would make them more susceptible to harmful interference.

⁷ Working Group Report 118.

⁸ *See id.* at 244, Tbl. 11. GPS timing receivers are commonly installed in commercial wireless network infrastructure and are essential to the operation of wireless communications networks.

LightSquared operations are conducted over both the upper and lower portions of its band.⁹ Although LightSquared and the GPS industry members of the High Precision, Network, and Timing sub-teams could not agree on the significance of the results, laboratory tests indicated that the lower 10 MHz-only transmission scenario caused less interference than the combined, or upper 10 MHz-only deployments.¹⁰

The Las Vegas field tests confirmed the laboratory findings with respect to the risk of harmful interference posed to cellular network GPS timing receivers. The two commercial carriers that conducted live sky testing saw numerous apparent failures by network timing receivers during operations over the upper or combined upper and lower portions of LightSquared's band.¹¹ While Verizon Wireless's testing appears to have demonstrated some interference caused to its timing receivers even under a lower 10 MHz-only transmission scenario,¹² Sprint Nextel reported that "[t]here was little to no noticeable GPS interference seen at cell sites when LightSquared transmitted only the lower frequency."¹³ In both laboratory and field tests, preliminary results indicated better interference resistance by timing receivers using narrowband PCTEL antennas, although LightSquared and the GPS industry members of the High Precision, Network, and Timing sub-teams could not agree on the appropriate interpretation and significance of these results.¹⁴ Data submitted by the NTIA confirms the findings of the

⁹ *Id.* at 247.

¹⁰ *See id.* at 243-45.

¹¹ *See* Working Group Report at 252-54.

¹² *See id.*, App. H.1.4.

¹³ *Id.* at 253.

¹⁴ *See id.* at 245-47.

GPS Technical Working Group with respect to the susceptibility of GPS precision and timing receivers to harmful interference from LightSquared's initially planned deployments.¹⁵

In response to the findings of the GPS Technical Working Group, LightSquared has offered a potential path forward in the form of a terrestrial deployment only over the lower 10 MHz of its base station spectrum. Preliminary test results on these lower-band transmissions demonstrate a decreased potential for harmful interference with cellular and timing GPS devices. The Cellular sub-team of the GPS Technical Working Group indicated that lower band operations could be feasible with existing handset filter technologies,¹⁶ although some negative impact on key performance indicators would still be expected.¹⁷ Similarly, both the Timing sub-team and NPEF reports acknowledge that operations over the lower 10 MHz of LightSquared's band also appeared to reduce the risk of harmful interference to Timing receivers in many, but not all cases.¹⁸

The Cellular Sub-team report stated that some filter manufacturers report the capability of developing filters to mitigate potential interference from LightSquared's upper-band emissions to future cellular GPS receivers.¹⁹ The sub-team pointed out that "[t]he fact that some of the tested

¹⁵ Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, United States Department of Commerce, to the Hon. Julius Genachowski, Chairman, Federal Communications Commission, IBFS File No. SAT-MOD-20101118-00239 (filed July 6, 2011) ("Strickling Letter") (submitting into the record National Space-Based Positioning, Navigation, and Timing Systems Engineering Forum, *Assessment of LightSquared Terrestrial Broadband System Effects on GPS Receivers and GPS-dependent Applications* ("NPEF Report")).

¹⁶ Working Group Report at 117.

¹⁷ *See, e.g., id.* at 92 (reporting a negative impact on 2D position error measurements for WCDMA phones under the lower 10 MHz deployment scenario).

¹⁸ *Id.* at 244-45; NPEF Report at 12. Based upon the test results regarding LightSquared's initial planned deployments and the preliminary testing of lower 10 MHz operations, both the GPS Technical Working Group and the NTIA concluded that additional study is needed to determine the complete interference risks and the viability of any interference mitigation mechanisms. Working Group Report at 22; Strickling Letter at 1.

¹⁹ Working Group Report at 119.

devices showed considerable resilience to the upper channel combinations suggests that it may be feasible to design cellular GPS receivers with existing components so as to achieve resilience comparable to the best performing devices.”²⁰ However the sub-team also recommended further study of these issues to test the viability of these filtering options, and the feasibility of producing them in large enough volume to support widespread deployment.²¹

While the GPS Technical Working Group Report and LightSquared’s recommendations only begin the process of identifying an appropriate solution to the interference concerns raised by the interaction between LightSquared’s planned terrestrial deployment and existing GPS operations, the preliminary results are sufficient to demonstrate that some degradation of GPS performance may occur under any currently contemplated or proposed deployment scenario. For example, the Cellular sub-team indicated that even in the presence of the lower 10 MHz LightSquared terrestrial deployment, the average GPS 2-D positioning error was detrimentally affected by nearly 8 meters for GSM/UMTS devices. This level of additional error could have an impact on a carrier’s ability to meet its E911 location accuracy obligations, which require automatic location identification to be provided with an accuracy of 50 meters or less in many situations. Particularly in light of the Commission’s recent decision to implement an eight-year transition to enhanced location accuracy requirements²² and its determination to hold all future wireless networks to the more demanding handset-based location accuracy obligation,²³ the Commission should recognize that its decision in this proceeding could put carriers in a difficult

²⁰ *Id.*

²¹ *Id.*, 119-20.

²² *Wireless E911 Location Accuracy Requirements*, Second Report and Order, 25 FCC Rcd. 18909 (2010).

²³ *Wireless E911 Location Accuracy Requirements*, Third Report and Order and Second Further Notice of Proposed Rulemaking, FCC 11-107 (rel. July 13, 2011).

situation. Accordingly, if the Commission decides to grant the requested authority, it should be prepared to grant additional flexibility on location accuracy requirements as needed.

III. THE COMMISSION SHOULD APPROPRIATELY CONDITION LIGHTSQUARED'S AUTHORIZATION TO PROTECT GPS OPERATIONS.

In light of the findings of the GPS Technical Working Group and the NPEF report, the Commission should authorize LightSquared to begin commercial operations under its alternative proposal only after all relevant technical data has been analyzed, any necessary additional testing of lower band performance and filter effectiveness is completed, and an appropriate solution has been identified to protect current and planned GPS operations. LightSquared's recommendations are an important first step in this process, and, in addition to any other mechanisms revealed to be necessary after further study, the Commission should codify in any future order the mitigation proposals offered by LightSquared, which are essential to ensuring continued and reliable operation of cellular GPS devices.²⁴ As an initial matter, LightSquared has committed to a maximum base station EIRP per sector of 32 dBW for the single carrier it is proposing to operate in its lower 10 MHz.²⁵ This commitment should be codified by the Commission. Additionally, a standstill on deployment in the upper portion of LightSquared's downlink frequency should be put into place. LightSquared should also be required to cooperate with the government and industry in the development of filters and any other necessary mitigation techniques. Moreover,

²⁴ See Recommendation at 24-36. Codification of these commitments is also consistent with the requirements of the Commission's rules, which place an obligation on MSS ATC operators to cure any harmful interference caused to other services. See 47 C.F.R. § 25.255. As CTIA explains in its Petition for Clarification of the recent *MSS Order*, when the Commission adopted this rule it intended the obligation on ATC operators to apply even where the ATC operations were in full compliance with the Commission's technical parameters. See Petition for Clarification and/or Reconsideration of CTIA—The Wireless Association at 2, ET Docket No. 10-142 (filed June 30, 2011) (citing *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands*, Report and Order, 18 FCC Rcd 1962, ¶ 104 (2003)).

²⁵ Recommendation at 25.

to the extent that LightSquared's deployment necessitates a forced technology transition, it should be required to underwrite any additional costs created.

LightSquared's voluntary "standstill period" in terrestrial use of the upper portion of its downlink spectrum should be codified for at least ten years after successful development of cellular devices that mitigate the new interference without loss of GPS sensitivity. This ten year period is necessary to allow for the natural and orderly transition of legacy consumer handsets to mobile devices with enhanced filters. The standstill period must allow for the creation of an ample supply of viable products to which to transition. Not only does this require the development of a new filter, but the filter technology must be incorporated into a wide variety of devices and must be commercially manufactured. The transition period will have to include the amount of time it takes to produce sufficient filters to accommodate a potentially unprecedented simultaneous transition by the entire wireless industry to an identical technology. Any shorter standstill period could result in the need for a forced migration of hundreds of millions of mobile devices. Such a migration would be complex, costly, environmentally wasteful, and significantly disruptive to consumers. Moreover, it is unclear whether conventional manufacturing processes and infrastructure are even sufficient for such a task.

In its recommendations, LightSquared commits to underwriting the development of additional filters for legacy precision receivers that experience interference under its lower 10 MHz deployment proposal, and to working with the manufacturing industry to develop mitigation techniques for future receivers.²⁶ However, it is not entirely clear from LightSquared's recommendations whether these commitments are intended to pertain only to precision receivers. Under an appropriately crafted standstill, it may be the case that filters

²⁶ Recommendation at 33-35.

sufficient to fortify devices against harmful interference caused by LightSquared's deployment can penetrate the consumer market in the course of normal handset technology transitions. But to the extent that LightSquared's entry to the market forces a technology migration on a schedule different from what would normally occur in the marketplace, LightSquared should be expected to underwrite the additional transition costs, regardless of the type of GPS receiver. To remove any ambiguity, the Commission should clearly state that, consistent with its rules requiring MSS ATC operators to cure harmful interference to other services, LightSquared's commitments will apply to all affected GPS applications.

IV. CONCLUSION

The GPS Technical Working Group accomplished an impressive feat in a short amount of time. AT&T is encouraged that, although the Technical Working Group confirmed that LightSquared's deployment plans would cause harmful interference to a large number of GPS receivers, the Working Group Report and LightSquared's recommendations begin to identify a potential path that will allow new competitive entry into the wireless broadband marketplace while also ensuring the protection of essential GPS services.

Respectfully submitted,

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