In the Matter of Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band

REPLY COMMENTS OF THE SATELLITE INDUSTRY ASSOCIATION ON LICENSING MODELS AND TECHNICAL REQUIREMENTS

The Satellite Industry Association (“SIA”) hereby submits this reply to the comments of other parties regarding licensing models and technical requirements in the 3550-3650 MHz band (“3.5 GHz band”).1 The record in this proceeding continues to raise significant questions regarding whether the Commission’s proposals to introduce new terrestrial service in occupied 3.5 GHz spectrum will be compatible with existing uses and responsive to the stated needs of the wireless industry.2 The comments here demonstrate that substantial disagreement remains on all material aspects of the proposed framework,3 and workable sharing solutions remain an


2 For example, AT&T, Nokia, and PCIA all emphasize that the wireless industry’s priority is obtaining access to cleared spectrum below 3 GHz. See Comments of AT&T (“AT&T Comments”) at 2; Comments of Nokia Solutions and Networks US LLC (“Nokia Comments”) at 3; Comments of PCIA – The Wireless Infrastructure Association and The HetNet Forum, a membership section of PCIA (“PCIA Comments”) at 2. The Wireless Internet Service Providers Association argues that in rural areas, spectrum designated for small cells would likely remain fallow, as the need is for fixed broadband access, not for the small cell configurations contemplated in the Notice. Comments of the Wireless Internet Service Providers Association (“WISPA Comments”) at 6.

3 In particular, there is still a sharp divide on the issue of how many “tiers” of spectrum access should be available. Some parties support the three-tiered spectrum plan put forth by the Commission, which allows for opportunistic General Authorized Access (“GAA”). See, e.g., Comments of Google Inc. (“Google Comments”) at 15; Comments of Microsoft Corporation at 1; Comments of Motorola Solutions, Inc. (“Motorola Solutions Comments”) at 1; and Comments of the Open Technology Institute at the New America Foundation and Public Knowledge
aspiration, not a reality. As it continues to consider 3.5 GHz issues, the Commission must ensure both continuity and the capacity for growth for primary Fixed-Satellite Service (“FSS”) operations in C-band and extended C-band spectrum.

I. ANY SHARING FRAMEWORK MUST PROTECT SATELLITE NETWORKS AND ALLOW THEIR CONTINUED GROWTH AND DEVELOPMENT

The SIA comments argue that the Commission’s licensing framework for new 3.5 GHz operations must ensure that primary FSS networks are not disrupted and that their continued ability to grow is not blocked. This is consistent with the Commission’s stated desire to protect incumbent services. Thus, SIA opposes any action that would purport to grant priority access – either in the form of a Priority Access License (“PAL”) or a localized critical access authorization – in the 150-km radius around FSS earth stations. The SIA filing notes that within the separation zones needed to prevent interference to earth stations, a secondary operator cannot be granted an authorization that suggests exclusive spectrum access.

Other parties reflect similar concerns. For example, filers emphasize the need for PAL licensees to have certainty regarding their access to spectrum. Such certainty is clearly impossible in the required 150-km protection area surrounding a primary earth station.

(“OTI/PK Comments”) at 5-6. Other parties argue that the Commission should instead use a Licensed Shared Access approach that downplays or excludes GAA use. See, e.g., Comments of Ericsson (“Ericsson Comments”) at 6; Comments of QUALCOMM Incorporated at 1; Comments of T-Mobile USA, Inc. (“T-Mobile Comments”) at 2. Verizon suggests yet another configuration, using a transitional framework based on traditional licensing models in the short term pending development of a multi-tier framework. See Comments of Verizon and Verizon Wireless (“Verizon Comments”) at 4-5.

4 Comments of the Satellite Industry Association (“SIA Comments”) at 2-6.


6 SIA Comments at 3-5.

7 See, e.g., AT&T Comments at 5.
SIA’s objection to localized critical access authorization grants within the protected zone around earth stations notes the difficulty of enforcing an indoor-only restriction.\(^8\) Other parties similarly express doubts about the efficacy of interference protection that relies on indoor-only use, observing that a device operated indoors but in proximity to a window could interfere with networks outside.\(^9\) For these reasons, SIA continues to oppose issuance of any type of “priority” license within a 150-km radius of an FSS earth station.

SIA’s comments also express concern that the Commission appears to be suggesting that primary status will not be permitted for future FSS earth stations. By definition, however, the proposed secondary status of the CBS means that it must accommodate both existing and future deployments in the primary FSS.\(^10\) In addition, as SIA has explained, precluding future earth station deployments in the 3.5 GHz band could strand a significant portion of the multi-billion dollar existing investment in satellite capacity in that band.\(^11\) Other commenters express concern here about the possibility of stranded investment, but in the context of new 3.5 GHz users.\(^12\) Yet such users will have notice of their limited spectrum rights, and their deployment expenditures will be a tiny fraction of the costs of even a single FSS spacecraft. These interests clearly cannot outweigh the legitimate expectations of FSS operators using the 3.5 GHz band.

Furthermore, blocking future earth station deployment is not justified by the facts. As a number of parties observe, the Commission contemplates that the Spectrum Access System

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\(^8\) SIA Comments at 5-6.
\(^9\) See Motorola Solutions Comments at 5 n.7; Nokia Comments at 10.
\(^10\) See 47 C.F.R. § 2.104(d)(3) (“Stations of a secondary service … [s]hall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date”).
\(^11\) Comments of the Satellite Industry Association filed Feb. 20, 2013 in GN Docket No. 12-354 at 12 & Appendix 1 (list of satellites currently operating in all of parts of the 3.5 GHz band).
\(^12\) See AT&T Comments at 2; Google Comments at 19.
(“SAS”) will be able to dynamically assign spectrum. This capability will allow the SAS to revise spectrum access protocols based on the changing interference environment, thereby permitting primary FSS and government radar systems to continue to evolve. After all, GAA users access spectrum on an opportunistic, unprotected basis and receive no guarantee of continued access. Thus, they must anticipate that changes in primary networks may require modification or termination of their operations.

Alcatel-Lucent suggests that PAL bidders should have assurance that incumbent operations will not change during the course of their license terms. As noted above, it would be inconsistent with the status of the CBS as a secondary service (whether a PAL or a GAA user) to preclude future deployment of earth stations in the primary FSS. It would be better to avoid the possibility of such conflicts altogether by, for example, confining PALs to the 3550-3600 MHz band where there is no FSS allocation today.

But if the Commission were to issue PALs in the satellite portion of the 3.5 GHz band, it may be possible to balance the right of the primary FSS to deploy new earth stations in the future and the potential hardship that may be caused to a PAL licensee in the secondary CBS. The Commission proposes to issue PALs for one-year, non-renewable terms. If a new earth station is proposed and built such that its 150-km protection zone would overlap with the PAL, the Commission could specify that the earth station would not be entitled to interference protection from PAL operations for the first 90 days after the earth station operator certifies that construction of the earth station is complete, or for the remainder of the one-year PAL license

13 See OTI/PK Comments at 22; Comments of Spectrum Bridge, Inc. at 1.
14 See Comments of Alcatel-Lucent (“Alcatel-Lucent Comments”) at 10. The Alcatel-Lucent discussion focuses only on changes in 3.5 GHz spectrum use by primary government operations, but the same analysis is applicable to establishment of new FSS earth stations.
15 Notice at ¶ 24.
term, whichever is shorter. After that time, the PAL operations must protect the new FSS earth station in accordance with the criteria programmed into the SAS. Such a process would give the PAL licensee a reasonable period of time to make alternative arrangements if necessary, without unduly restricting the right of the primary FSS to deploy future earth stations.

When an application for a new earth station has been filed, the Commission should not issue any new PALs for the surrounding area. The Commission may want to set a deadline to ensure that new earth station applications are filed sufficiently in advance of the PAL bidding window – for example, a month or more before – to ensure that bidders are on notice of planned new primary FSS operations in the band before the auction begins. As discussed above, PALs should not be granted in the vicinity of existing FSS earth stations, and the Commission should not issue further PALs once a new earth station license has been requested.

In light of these considerations, the Commission should immediately lift the freeze on new earth stations in the 3.5 GHz band and make clear that future earth station deployments will be permitted subject to the policies discussed herein.

II. COMMENTERS AGREE THAT THE SAS DATABASE WILL NECESSARILY BE COMPLEX AND REQUIRE SIGNIFICANT SECURITY MEASURES

SIA’s comments explain that if the SAS is to be used to allow opportunistic use of the 3.5 GHz band, the database must incorporate significant advanced operational and security features that must be thoroughly tested prior to implementation.16 At the very least, the SAS database must be able to calculate the interference level from any one small cell using an agreed upon propagation model in conjunction with a terrain database. Additionally, the SAS must have the capability of calculating the aggregate level of interference into an earth station prior to

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16 SIA Comments at 6-8.
determining if a new small cell station can be permitted to operate at any given frequency and at the specific separation distance that it has relative to one or more earth stations.

Other parties agree about the complexity. AT&T and Motorola Mobility emphasize that the spectrum management task of the SAS will be “complicated”\textsuperscript{17} and will present “novel technical challenges.”\textsuperscript{18} Other filers present detailed lists of the specific capabilities that will need to be included in the SAS.\textsuperscript{19} Verizon observes that development of database with the needed functionalities will take significant time.\textsuperscript{20} IEEE DYSPAN-SC reports on related standardization work in the area of spectrum consumption modeling, but notes that it is not scheduled to be completed for more than a year.\textsuperscript{21}

The comments also reinforce SIA’s observations regarding the need for robust security measures for the database, 3.5 GHz base stations and user terminals, and the communications among the network elements.\textsuperscript{22} In particular, Verizon outlines the myriad types of security features that will be essential to prevent unauthorized alteration of devices or spoofing of communications between the database and network devices, and to ensure device location information is valid.\textsuperscript{23} Federated Wireless emphasizes the need for the SAS to be able to

\textsuperscript{17} AT&T Comments at 7.
\textsuperscript{18} Comments of Motorola Mobility LLC at 3.
\textsuperscript{19} Comments of BLiNQ Networks Inc. (“BLiNQ Comments”) at 15-16; Motorola Solutions Comments at 5-6; WISPA Comments at 18-19.
\textsuperscript{20} Verizon Comments at 5.
\textsuperscript{21} Comments of IEEE DySPAN Standards Committee at 3.
\textsuperscript{22} SIA Comments at 8.
\textsuperscript{23} Verizon Comments at 6-7.
confirm credentials when spectrum access is requested in order to prevent unauthorized operations.24

Only Google suggests that the necessary functionalities of the SAS database are straightforward and achievable in the near term. Google claims that it has developed a prototype database with a broad range of capabilities, including the ability to manage various tiers of use and ensure primary users are protected.25 SIA agrees that the functionalities Google identifies are necessary to a robust SAS. However, Google does not say what work, if any, has been done to allow independent evaluation of its prototype, nor does it address whether robust security mechanisms have been incorporated. Unless and until the Google prototype has been fully validated and its security measures have been proven, the Commission clearly cannot assume that the prototype represents an appropriate model for the SAS database.

Thus, the vast majority of commenters recognize that critical development and testing work remains to be done before the Commission can introduce new services in the 3.5 GHz band relying on the SAS database to prevent interference to primary users and other secondary operations in this spectrum.

III. ADDITIONAL ANALYSIS IS NEEDED TO ENSURE THAT TECHNICAL STANDARDS SUFFICIENTLY PROTECT PRIMARY EARTH STATIONS

As the SIA comments discuss, a clear understanding of the operational parameters of any permitted new small cells operations, most importantly the maximum EIRP density, is necessary to determine what constraints will be required to prevent unacceptable interference to FSS

24 Comments of Federated Wireless, LLC at 39.
25 Google Comments at 11-12.
networks. The record here, however, demonstrates the continuing lack of any meaningful agreement on these issues.

As a threshold matter, the Commission’s decision to further explore technical standards in this Notice but not consider sharing issues is problematic. SIA’s filing makes clear that these matters are inextricably linked. Both Ericsson and NPR agree. Ericsson observes that the sharing approaches and technical values proposed in the Notice cannot be resolved without a better understanding of the sharing environment. Ericsson goes on to emphasize that the proposed sharing solutions seem to support only a single use case, without considering aggregate interference from ubiquitously deployed systems. NPR notes that the Commission and some commenters appear to focus on maximizing the capabilities of small cell devices, ignoring the concomitant heightened risk of potential interference.

NPR’s concerns are borne out by the comments of a number of parties. Several filings advocate for higher power limits for 3.5 GHz small cell devices – or for no power limits at all – with a view toward granting maximum operational flexibility to these proposed secondary users. However, these commenters either do not address the increased interference threat to primary operations associated with such higher power limits or summarily dismiss any interference concerns.

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26 SIA Comments at 8-10.
27 See id. at 1.
28 Ericsson Comments at 2.
29 Id.
30 Comments of National Public Radio, Inc. at 3.
31 See, e.g., Alcatel-Lucent Comments at 7-8; BLINQ Comments at 6-7, 9; Comments of CommScope (“CommScope Comments”) at 3-4; Nokia Comments at 18; OTI/PK Comments at 15-16; PCIA Comments at 4-5; T-Mobile Comments at 13-14; Verizon Comments at 11-12; WISPA Comments at 8-12.
For example, Alcatel and BLiNQ suggest that the Commission apply the power limits for 3.65 GHz WiMAX operations to the 3.5 GHz band. In that spectrum, however, the Commission has established 150-km coordination zones surrounding primary earth stations within which WiMAX facilities cannot operate without the express agreement of the earth station licensee. Allowing similar power limits in the 3.5 GHz band would require at least the same separation distances. BLiNQ and CommScope assert that various mitigation techniques can be used to prevent interference, but neither provides any analysis to quantify the effectiveness of those measures.

The SIA comments endorse the suggestion that the Commission should convene one or more multi-stakeholder groups to further analyze the technical issues and interference prevention measures that will be needed for successful spectrum sharing. The Consumer Electronics Association and the Wireless Innovation Forum both concur with this idea as well. SIA urges the Commission to move forward with this approach to facilitate more concrete discussion of sharing issues and potential solutions among the affected and interested parties.

32 Alcatel-Lucent Comments at 7-8; BLiNQ Comments at 7.
33 See 47 C.F.R. § 90.1331(a).
34 BLiNQ Comments at 9 (claiming that techniques such as antenna downtilt and directional antennas “can replicate the protection provided by the Commission’s current restrictive proposed power limits”); CommScope Comments at 4 (alleging that narrower vertical beamwidth of higher gain antennas and use of antenna downtilt can mitigate potential for greater interference to government radars and FSS earth stations).
35 SIA Comments at 10.
36 Comments of the Wireless Innovation Forum at 4-5; Comments of the Consumer Electronics Association at 2.
IV. CONCLUSION

As discussed herein and in previous SIA filings, the Commission must act to ensure that rules that would permit new terrestrial services in the 3.5 GHz band do not result in harm to existing primary satellite services or limit their future growth.

Respectfully submitted,

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