September 23, 2015

VIA ECFS

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

Re: Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, GN Docket No. 14-177; Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band, RM-11664

Dear Ms. Dortch:

The Satellite Industry Association ("SIA")[1] submits this ex parte to urge the Commission to supplement the existing record in the above-referenced proceedings. While there have been numerous filings about how proposed 5G systems might operate in the various spectrum bands under consideration, many complex policy and technical questions related to sharing between existing services and proposed new ones have yet to be given full consideration. SIA takes this opportunity to propose to the Commission a number of questions that, if included in a future *Notice of Proposed Rulemaking*, would prompt a more robust record on complex licensing and operational issues:

[1] SIA is a U.S.-based trade association providing representation of the leading satellite operators, service providers, manufacturers, launch services providers, and ground equipment suppliers. Since its creation twenty years ago, SIA has advocated on behalf of the U.S. satellite industry on policy, regulatory, and legislative issues affecting the satellite business. For more information, visit www.sia.org. SIA Executive Members include: The Boeing Company; The DIRECTV Group; EchoStar Corporation; Intelsat S.A.; Iridium Communications Inc.; Kratos Defense & Security Solutions; LightSquared; Lockheed Martin Corporation; Northrop Grumman Corporation; SES Americom, Inc.; SSL; and ViaSat, Inc. SIA Associate Members include: ABS US Corp.; Airbus DS SatCom Government, Inc.; Artel, LLC; Cisco; Comtech EF Data Corp.; DRS Technologies, Inc.; Eutelsat America Corp.; Global Eagle Entertainment; Glowlink Communications Technology, Inc.; Hughes; iDirect Government Technologies; Inmarsat, Inc.; Kymeta Corporation; Marshall Communications Corporation.; MTN Government; O3b Limited; Orbital ATK; OneWeb; Panasonic Avionics Corporation; TeleCommunication Systems, Inc.; Telesat Canada; TrustComm, Inc.; Ultisat, Inc.; Vencore Inc.; and XTAR, LLC.

Questions Related to 5G Networks

- For each frequency band under consideration, what are the 5G networks' system characteristics that can be utilized for examining the sharing environment, including deployment characteristics, cell sizes, and base station/user terminal EIRPs, antenna patterns and out of band emission characteristics?
- In certain bands, could 5G networks be limited to indoor-only use restrictions in order to minimize the potential for harmful interference into other co-primary services? If so, how would an indoor-only use restriction be effectively enforced?
- In the Spectrum Frontiers NOI, there was a discussion of introducing 5G services into several segments of the Ka-band currently used by satellite and LMDS operators. Should the Commission consider adjacent, more lightly-used band segments, such as 31.8-33 GHz?
- As noted in a filing by EchoStar[2], recent 5G research indicates that antenna arrays in the 120-240 GHz range would be cost-effective and deliver better performance than arrays in the 30-60 GHz range. Should the scope of the above-referenced proceedings therefore be expanded to include frequencies above 95 GHz?
- What are the prospects for and challenges associated with developing user devices capable of interoperability across the various bands between 24 GHz and 95 GHz (or above) that may eventually be used for 5G services?

Questions Related to Propagation

There are no developed propagation models for 5G systems above 24 GHz, and current empirical propagation models used for 3G and 4G are valid only for frequencies up to approximately 3 GHz. In the absence of such a model, SIA submits that the Commission would have to use a conservative Free Space Loss model to assess propagation for interference purposes.

- Should the Commission use the Free Space Loss model for purposes of interference calculation from 5G systems into incumbent systems? If not, what other propagation models could the Commission use? Should any other propagation models used for interference calculations be tested and supported by measurements? In what time frame should such propagation models be made available for review? How should such models address building penetration loss? For a propagation model to calculate the interference into other systems, how should the reflection and absorption of buildings and terrain be taken into account in addition to free-space loss?

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[2] *See* Letter to Marlene Dortch, Secretary, Federal Communications Commission, from Jennifer A. Manner, Vice President, Regulatory Affairs, EchoStar Satellite Operating Corporation, GN Docket No. 14-177 and RM-11664 (Sept. 15, 2015).

Questions Related to Satellite Networks

- What are the technical parameters of the earth station types currently deployed or planned to be deployed in the specific frequency bands under consideration in this proceeding?
- Have any sharing techniques or technologies been developed since the current band plan designations were adopted twenty years ago that now would facilitate the ability of FSS earth station uplinks to operate without interfering with terrestrial networks?[3]
- In the lower LMDS band, are there public interest benefits to elevating certain FSS operations to co-primary status?

Questions on Inter-Service Sharing

- What would a possible sharing environment between satellite earth stations and 5G systems look like? What enforcement provisions, if any, would preserve this sharing environment and minimize interference? In such a sharing environment, how would the growth of both services be accommodated? Is additional information required in order to identify technical and regulatory structures that would enable a functional sharing environment?

Questions on Cumulative Interference

SIA submits that the Commission will need to obtain data to better understand potential cumulative interference from 5G systems to other operations, including answers to the following questions:

- What compatibility models or studies are available or have been conducted to analyze the potential cumulative interference of 5G systems (e.g., from all base stations or all mobile stations in a particular frequency band) to systems operating in other services in the same or adjacent frequency bands? What technical assumptions were made about the technical and operational parameters of the victim service in these studies?
- Have such models or studies been created or conducted in those cases where spectrum being considered for 5G could also be assigned for additional systems[4]? In general, how would the cumulative interference from multiple

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[3] *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignated the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order, 11 FCC Rcd 19005 ¶ 10 (1996) (noting absence, at the time, of such technical capabilities).

[4] For example, the United States has proposed an agenda item for WRC-19 to study the potential identification of spectrum for HAPS that would provide service to fixed stations in certain bands, including 27.5-28.35 GHz.

systems be analyzed?

Questions on Licensing Models

In the Spectrum Frontiers NOI, the FCC discussed several licensing models, including exclusive licenses, shared licenses, and unlicensed use.

- For each type of potential licensing regime, how would current and future operations of incumbent operators be protected?

SIA respectfully requests that the Commission take steps to include the questions above in any forthcoming action in these dockets. Please don't hesitate to contact me with any questions.

Respectfully submitted,

SATELLITE INDUSTRY ASSOCIATION

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