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

In the Matter of	)	
	)	
FCC Seeks Comment on	)	IB Docket No. 04-286
Recommendations Approved by the	)	
Advisory Committee for the 2015	)	
World Radiocommunication Conference	)	

COMMENTS OF SES AMERICOM, INC.

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SES Americom, Inc. ("SES") hereby submits its comments on the International Bureau's December 18, 2014 Public Notice seeking input on the recommendations of the Commission's Advisory Committee ("WAC") for the 2015 World Radiocommuncation Conference ("WRC-15").[1] SES strongly supports no change to the allocations for the 3400-4200 MHz and 4500-4800 MHz bands, as set forth in View A of Document WAC/099.[2]

I. INTRODUCTION AND SUMMARY

With respect to WRC-15 Agenda Item 1.1 on identifying additional spectrum for mobile broadband or broadband wireless access systems, the Public Notice invited comment on the differing views expressed in document WAC/099. As a worldwide satellite fleet operator,[3] SES is vitally interested in the WRC-15 proceedings of the International Telecommunication

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1 FCC Seeks Comment on Recommendations Approved by the Advisory Committee for the 2015 World Radiocommunication Conference, Public Notice, IB Docket No. 04-286, DA 14-1845 (Dec. 18, 2014) ("Public Notice").

2 *See* Document WAC/099, Attachment A to the Public Notice at 13-19.

3 SES and its affiliates operate a combined fleet of 54 geostationary fixed-satellite service ("GSO FSS") spacecraft – more than 20 of which are authorized to serve the United States – that deliver diverse services including radio and television broadcast and distribution, internet access, data transmission, and business and government communications to customers worldwide.

Union ("ITU") and welcomes the opportunity to provide input on the development of U.S. positions and proposals at that conference.

Preserving access to C-band spectrum for satellite operations is critical to the public interest. The C-band is used today for a broad variety of services, including distributing video content to cable systems and Direct Broadcast Satellite ("DBS") networks viewed by tens of millions of households in the United States alone, providing the sole source of connectivity to remote villages in the Alaskan bush, restoring communications following natural disasters, and providing mission critical telemetry, tracking and control ("TT&C") necessary to the safe operation of satellite systems.

Given the importance of these services, preserving interference free access for the FSS to C-band spectrum is essential. However, both ITU studies and real-world experience have shown that terrestrial mobile broadband services cannot practically coexist with FSS operations in the same band. As a result, the proposal in View B to make the 3400-3800 MHz spectrum available for mobile broadband[4] would threaten the continuity of existing FSS offerings and curtail future growth and development of the satellite infrastructure.

Nor would the identified spectrum meet the legitimate needs of the mobile broadband industry. As SES has previously emphasized, spectrum will be suitable for introducing terrestrial mobile broadband networks if the spectrum is underutilized or if such terrestrial systems can feasibly share with existing operations, but neither is the case for the C-band and extended C-band frequencies above 3400 MHz.[5] Instead, the measures required to protect existing sensitive FSS receivers would preclude meaningful use of this spectrum for new

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4 *See id.* at 20-32.

5 *See* Comments of SES Americom, Inc., IB Docket No. 04-286 (filed March 25, 2011) at 2.

terrestrial operations given the demonstrated incompatibility of such networks with the extensive C-band FSS operations.

Furthermore, although View B supporters claim that identifying the 3400-3800 MHz band for mobile broadband would provide advantages by promoting spectrum harmonization, the opposite is true. The 3400-4200 MHz and 4500-4800 MHz band are already globally allocated and harmonized for FSS downlinks, and the wide geographic coverage of satellites makes such spectrum harmonization essential for satellite services. Introducing an inconsistent allocation for mobile broadband would sacrifice the significant efficiencies created by satellite spectrum harmonization.

Accordingly, SES strongly urges the International Bureau and the Commission to adopt View A specifying no change to the allocations in the 3400-3800 MHz and 4500-4800 MHz bands.

II. C-BAND SPECTRUM IS UNIQUELY SUITED FOR PROVISION OF CRITICAL FSS SERVICES THAT REQUIRE A HIGH LEVEL OF RELIABILITY

C-band spectrum is intensively used for a wide array of satellite services that are vital elements in the overall telecommunications infrastructure, serving important commercial, public safety, and national security objectives. Because of its propagation characteristics, C-band spectrum is ideal for coverage of wide areas. Furthermore, the spectrum is resistant to rain and snow fade effects and therefore provides superior service availability as compared to other, higher-frequency satellite bands.

These fundamental facts have been explicitly recognized by the ITU:

> There is extensive utilization by the FSS of the frequency band 3625-4200 MHz in all ITU Regions of the world (except certain countries in Europe and in Asia) and of the frequency band 3400-3625 MHz in ITU Region 1 (except parts of Europe) and Region 3 (except some countries of Asia). The low atmospheric absorption in these bands

> enables highly reliable space-to-earth communication links with wide service coverage, particularly in, but not limited to, geographical areas with severe rain fade conditions. The wide coverage enables services to be provided to developing countries, to sparsely populated areas and over large distances.[6]

SES and other commercial satellite operators have launched hundreds of C-band satellites into geostationary orbit to provide service using these frequencies. These satellites represent tens of billions of dollars of investment and are used to provide numerous crucial services in the United States and around the globe. Moreover, this substantial investment in C-band satellite assets is continuing, with additional satellites being constructed for launch in the coming few years. The proven effectiveness of C-band satellite capacity and long-term development efforts of the satellite industry have also created a favorable environment for users of the technology. Economies of scale have lowered equipment costs, making connectivity affordable for customers of all sizes in both developing and developed nations.

Conventional C-band frequencies are used by the FSS to distribute video and audio programming using a network of ubiquitously-deployed earth stations in the U.S. and around the world. The satellite infrastructure in this spectrum serves as the backbone for distribution of media content nationwide and globally. Programming is distributed over C-band facilities to thousands of cable headends that serve 54 million viewing households in the U.S. alone.[7] C-band satellites carry content to DIRECTV and Dish, the two U.S. DBS networks,

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[6] Report ITU-R M.2109, "Sharing studies between IMT Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3400-4200 and 4500-4800 MHz frequency bands," (2007) ("Report ITU-R M.2109") at 4.

[7] *See* https://www.ncta.com/industry-data (last visited January 8, 2015).

which serve more than 34 million additional households.[8] C-band satellites are also used to deliver network and syndicated programming to thousands of television and radio stations nationwide. Moreover, U.S. cable programmers often rely on C-band satellite networks to relay their video programming to affiliates and distributors in other parts of the world in order to reach wider audiences.

C-band satellite networks play an important role in media contribution as well. Many domestic and international news organizations use C-band satellites for satellite news gathering, enabling live coverage of breaking news and sporting events from all across the United States and around the world.

C-band spacecraft are also used to provide essential communications links in areas where terrestrial infrastructure is limited, including remote parts of the United States. SES, for instance, operates satellites used by the two largest Alaskan telecommunications service providers, AT&T Alaska and GCI, to serve the needs of customers in remote parts of the state for basic voice telecommunications as well as more advanced services, such as Internet connectivity. There are more than 4,400 C-band earth stations on vessels ("ESVs"), 298 of them in North America, that provide video distribution, Internet, and mobile backhaul services.[9]

The U.S. government also uses C-band satellites extensively for communications with its embassies and military bases around the world. For example, the conventional and extended C-band is used to help distribute the Armed Forces Radio and Television Service to members of the U.S. Armed Forces situated around the world.

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[8] *See* SNL Kagan Press Release dated Mar. 19, 2014, "Multichannel Video Subscription Count Drops by a Quarter Million in 2013 According to Research by SNL Kagan," available at: http://www.snl.com/InTheMedia.aspx (last visited January 8, 2015).

[9] Northern Sky Research, Commercial Mobility via Satellite, 10th Edition (June 2014)

While use of the extended C-band frequencies in the United States is limited due to explicit restrictions in the Commission's rules, that spectrum supports important services both domestically and around the world. Services being provided include end-to-end communications solutions to military, commercial and government customers. Typical FSS applications in this spectrum include IP trunking to expand retail Internet services in developing nations and other underserved regions, international video distribution for U.S. programmers, government communications, and international private lines. Inmarsat, for instance, uses extended C-band frequencies (3600-3700 MHz) for feeder links and TT&C for its global fleet of L-band mobile satellite service ("MSS") satellites. Those spacecraft perform many critical safety-of-life functions by enabling rapid restoration of communications after natural disasters. Inmarsat's fleet of MSS satellites, supported by feeder links in the extended C-band, has been in the vanguard of disaster relief efforts both in the U.S. and globally, including those after Hurricane Katrina, the Haiti earthquake, and the massive earthquake in Japan.

Extended C-band spectrum is broadly used in countries that do not have regulatory limits similar to those in the U.S. Brazil alone has more than 20 million DTH dishes that receive signals in the extended C-band.[10] A number of U.S. content providers use capacity in the extended C-band for distribution of media programming around the globe. Extended C-band frequencies are also relied on to provide backhaul for cellular networks and Internet access in Asia, Africa, and Latin America.

In addition, conventional and extended C-band spectrum is used for critical TT&C transmissions essential for safe spacecraft operations. Reliable reception of these signals

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[10] *See* The Usage of the 3.4 to 4.2 GHz Spectrum in Region 2, Comisión Interamericana de Telecomunicaciones ("CITEL"), OEA/Ser.L/XVII.4.2, CCP.II-RADIO/doc. 3115/12, 18 October 2012 at 1-2 (the Brazilian Radio and TV Broadcasters Association estimates that 22 million homes receive radio and TV network programming using C-band receive dishes).

must be protected in order to allow operators to track and monitor the status of in-orbit satellites' position, health and operational characteristics. Disruption of these signals could mean loss of control over a satellite and increased risk of collision with other space objects.

Given the extensive satellite use of the C-band frequencies, adding a new allocation for terrestrial mobile services must not be considered unless it is clear they would be compatible with existing services. As discussed below, however, the record conclusively shows that it is infeasible for terrestrial mobile services to share C-band spectrum with existing and future satellite networks.

III. BOTH ITU STUDIES AND PRACTICAL EXPERIENCE CONFIRM THAT TERRESTRIAL MOBILE SERVICES CANNOT SHARE THE C-BAND WITH THE FIXED SATELLITE SERVICE

In-depth examination over the past decade has shown that International Mobile Telecommunications ("IMT") services cannot be feasibly introduced in C-band spectrum used by FSS networks. Empirical data reinforce the results of these analyses.

In the period leading up to WRC-07, extensive studies were performed regarding the ability of "IMT-Advanced" stations to share with C-band downlinks in 3400-4200 MHz and 4500-4800 MHz, and these studies are summarized in Report ITU-R M.2109. The Report demonstrates that it is impractical for FSS networks to share the C-band with IMT. In particular, the studies showed that separation distances ranging from tens of kilometers to greater than 100 kilometers would be needed between transmitting IMT stations and receiving earth stations in order to avoid interference into the earth station from in-band, co-channel IMT signals.[11] An IMT transmitter operating in an adjacent band would need to be separated from an earth station by up to tens of kilometers to avoid causing interference. As a follow-up after WRC-07,

[11] *See* Report ITU-R M.2109 at 41-42.

additional studies were conducted regarding broadband wireless access ("BWA") systems. These studies led to similar conclusions, and are contained in Report ITU-R M.2199 released in 2010.[12]

Most recently, sharing studies have been performed in JTG 4-5-6-7 to assess the technical feasibility of deploying IMT-Advanced systems (including small cells) in the 3400-4200 MHz and 4500-4800 MHz bands using the latest IMT-Advanced characteristics provided by Working Party 5D. The results from these recent sharing studies have shown no improvements in the ability of IMT-Advanced to share with FSS, and thus are in line with those already found in Reports ITU-R M.2109 and ITU-R M.2199. The latest ITU-R studies related to the bands 3400-4200 MHz and 4500-4800 MHz are set forth in a draft report that was recently approved by Study Group 5, the ITU expert group on terrestrial services.[13]

In the ongoing "Small Cells" proceeding before the Commission,[14] even proponents of permitting introduction of terrestrial wireless networks in a portion of the extended C-band have acknowledged the need for separation distances between terrestrial transmitters and sensitive earth station receivers.[15] Based on the specific usage characteristics of that band segment, the Commission is exploring the possibility of relying on a complex database system to maintain protection of FSS operations, but has not yet concluded whether such an approach is feasible. If the Commission goes forward with this approach, significant development and

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[12] *See* Report ITU-R M.2199, "Studies on compatibility of broadband wireless access systems and fixed-satellite service networks in the 3400-4200 MHz band" (2010).

[13] *See* Draft new Report ITU-R [FSS-IMT C-BAND DOWNLINK] – Sharing studies between IMT-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3400-4200 MHz and 4500-4800 MHz frequency bands in the WRC study cycle leading to WRC-15, Rev.1 to document 5/126 (http://www.itu.int/md/R12-SG05-C-0126/en).

[14] *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354.

[15] *See* Google Written *Ex Parte* Presentation filed Sept. 3, 2013 in GN Docket No. 12-354.

testing will be needed before small cell deployment can even begin, and still more time will elapse before the success or failure of the proposed sharing framework can be assessed. Thus, the mere fact that the Commission is conducting an examination of the potential for introduction of terrestrial services domestically into a limited part of the extended C-band has no bearing on the policy issues here. It is simply premature to make any conclusions about the ultimate feasibility of the approach being considered in the Small Cells proceeding, and in any event, that approach is based on the specific facts relating to domestic usage of this particular band segment and therefore is not suitable for application outside the United States or in other frequency bands, domestically or abroad.[16]

To the contrary, real-world experience has borne out the ITU study groups' predictions concerning the incompatibility of IMT and FSS networks, with significant disruption to satellite services occurring when terrestrial wireless broadband systems have been introduced in C-band spectrum.[17] As just one example, field trials of terrestrial service in Hong Kong resulted in television signals serving 300 million households being knocked off the air.[18]

The proponents of View B simply ignore both the ITU studies and the corroborating evidence relating to the inability of terrestrial wireless services to co-exist with C-band FSS networks, but the International Bureau cannot do so. Nor can the Bureau just hope for the best, proposing an IMT allocation now and assuming that a regulatory framework to make

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[16] *See, e.g.*, Comments of the Satellite Industry Association filed Feb. 20, 2013 in GN Docket No. 12-354 ("SIA Small Cells Comments") at 4-7.

[17] *See, e.g.*, International Associations of the Satellite Communications Industry, *Position Paper on Interference in C-band by Terrestrial Wireless Applications to Satellite Applications* at 1-3, ITU Workshop on Market Mechanisms for Spectrum Management (2007), *available at* http://www.itu.int/osg/spu/stn/spectrum/workshop_proceedings/Background_Papers_Final/C-band%20Interference%20-%20Global%20Position%20Paper%20for%20ITU%20%20%20%20%20%20spectrum%20workshop.pdf (visited Jan. 12, 2015).

[18] *See id.* at 2.

sharing feasible can be developed and enforced at some future time.[19] Instead, consistent with the instruction in Resolution 233, the Bureau must take "into account the current and planned use of [potential IMT candidate] bands by the existing services" in assessing the suitability of those bands for IMT.[20] Because the undisputed evidence demonstrates that IMT and BWA cannot feasibly share with FSS, the C-band spectrum cannot be designated for new terrestrial wireless services.

IV. IDENTIFYING THE 3400-3800 MHz BAND FOR IMT WOULD BE CONTRARY TO THE PUBLIC INTEREST

In light of the satellite industry's robust use of the C-band for essential services and the incompatibility of IMT operations with those existing uses, the proposal advocated in View B to identify the 3400-3800 MHz band for IMT would not serve the public interest.

A. C-Band Spectrum Will Not Satisfy Legitimate Wireless Industry Needs

Wireless interests themselves have emphasized that the C-band spectrum is not ideal for IMT operations due both to its inherent propagation characteristics and the constraints imposed by the need to share with existing FSS and other services. AT&T, one of the proponents of the View B approach here, was explicit in the Small Cells proceeding that "the fastest way to expedite mobile broadband deployment and to increase mobile speed and capacity is to identify, clear, and auction additional spectrum below 3 GHz for exclusive, licensed use."[21]

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[19] As SIA has observed in the Small Cells proceeding, both the Commission and the satellite industry have experience with interference resulting from the proliferation of poorly made unlicensed devices and the difficulty, once the interfering devices are deployed, of recalling them or halting their use. *See* SIA Small Cells Comments at 17 and n.54.

[20] Resolution 233 (WRC-12), "Studies on frequency-related matters on International Mobile Telecommunications and other terrestrial mobile broadband applications," at 3.

[21] Comments of AT&T filed Feb. 20, 2013 in GN Docket No. 12-354 ("AT&T Small Cells Comments") at 2. *See also* Comments of CTIA – The Wireless Association® filed Feb. 20, 2013 in GN Docket No. 12-354 at 1 (because the spectrum being considered is not below 3 GHz, it is not suitable for mobile broadband).

In other words, the wireless equipment manufacturers and network operators want low-frequency spectrum that they don't have to share with other services. Of course, the C-band frequencies at issue here are not below 3 GHz, nor are they available for exclusive licensing given the significant existing usage by and investment in FSS networks.

These practical realities would seriously limit the usefulness of C-band spectrum for IMT services. In particular, the need for adequate separation distances from C-band earth stations that are ubiquitously deployed in many parts of the world will effectively preclude introduction of terrestrial mobile services in those areas. SES and other satellite operators have questioned whether the shortfall of available spectrum for terrestrial wireless networks is as significant as has been alleged given that many of the demand projections are unsupported by concrete evidence and do not appear to take into account the ability of wireless networks to more intensively and efficiently use the spectrum they already have.[22] But whatever the validity of the wireless industry's assertions about a spectrum shortage, it is clear that C-band frequencies will not materially diminish the unmet demand.

Instead, their propagation characteristics and the need for significant constraints on any wireless operations to protect incumbent FSS services meant that C-band frequencies are definitely not "Cinderella spectrum" for the wireless industry whose identification will lead to a fairy-tale happy ending. Even if an IMT allocation is made in this spectrum, it will not fit the stated needs of wireless interests perfectly (or even particularly well), and wireless companies will continue to press for additional spectrum in other ranges for IMT. In contrast, as discussed

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[22] *See* SIA Small Cells Comments at 7-10 and n.22. *See also* A. Mehta and J.A. Musey, Overestimating Wireless Demand: Policy and Investment Implications of Upward Bias in Mobile Data Forecasts, Aug. 15, 2014 (analyzing evidence that "reveals a persistent tendency to overestimate" projected wireless demand and noting that persistent upward biases in mobile demand projections "have significant, long-term policy implications"), available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2418364 (last visited Jan. 12, 2015).

above, the C-band is uniquely suited for FSS operations, allowing wide coverage areas, high reliability, and affordable equipment. Good policy sense forbids imperiling the continued usability of C-band spectrum that is critical for satellite users in order to grant IMT systems theoretical access to a band that will be of very limited practical utility for wireless operators.

B. Identifying C-band Frequencies for IMT Will Prevent, Not Promote, Achieving the Goals of Spectrum Harmonization

The suggestion by View B proponents that adding a terrestrial mobile allocation in the 3400-3800 MHz band will produce advantages due to spectrum harmonization[23] must also be rejected. As View A adherents have observed, the "3400-4200 MHz and 4500-4800 MHz bands" are already "globally allocated and harmonized to provide C-band FSS downlinks."[24] As a result, the benefits of spectrum harmonization identified in the View B discussion – including economies of scale and equipment commonality[25] – are present today and enhance the value of FSS services for customers worldwide.

Furthermore, given the large coverage areas of C-band satellites, the benefits of and need for spectrum harmonization are more significant for satellite services than they are in the wireless context. The ability to serve customers throughout a satellite's footprint is essential in order to maximize the value from a spacecraft operator's capital investment, which is hundreds of millions of dollars per satellite. As a result, any threat to the operator's access to harmonized spectrum will fundamentally affect the underlying service economics.

The proposal to identify C-band spectrum for IMT would constitute such a threat because it would create uncertainty regarding satellite networks' ability to continue to operate and expand free from harmful interference. Accordingly, the purported benefits of achieving

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23 *See* Document WAC/099, Attachment A to the Public Notice at 21-22.

24 *See id.* at 14.

25 *See id.* at 21.

harmonization for IMT would come only by undermining the even more significant benefits of the existing spectrum harmonization for FSS. The end result would be a net loss in consumer welfare.

V. CONCLUSION

For the reasons discussed herein, SES urges the International Bureau and the Commission to adopt View A on Document WAC/099, which advocates for no change to the allocations in the 3400-4200 MHz and 4500-4800 MHz bands. Given the importance of C-band FSS services and the undisputed evidence that terrestrial wireless services cannot share with existing and future FSS networks, the Commission must conclude that a no change approach is necessary to serve the public interest. The alternate approach set forth in View B would result in significant harms to satellite service customers and the hundreds of millions of end users around the globe who indirectly rely on C-band satellite services.

Respectfully submitted,

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