

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

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| In the Matter Of: |) | |
| |) | |
| Expanding Flexible Use of the 3.7 to 4.2 |) | GN Docket No. 18-122 |
| GHz Band |) | |

COMMENTS OF AT&T SERVICES, INC.

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Dated: October 29, 2018

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I. INTRODUCTION AND SUMMARY

AT&T Services, Inc., on behalf of the subsidiaries and affiliates of AT&T Inc. (collectively, “AT&T”), hereby submits the following comments in response to the Federal Communications Commission’s (“Commission” or “FCC”) *C-Band Notice* in the above-captioned proceeding.¹ AT&T commends the Commission for initiating this proceeding, which wisely focuses on the potential for reallocating for terrestrial flexible use a portion of the 3.7-4.2 GHz band (“C-band”). On the one hand, the C-band presently is allocated principally for Fixed Satellite Service (“FSS”) use and, as such, it is vitally important to a number of essential industries that rely on satellite-based services to support their data transmission needs; on the other hand, the C-band has virtually unmatched potential in the mid-band range to facilitate the deployment of terrestrial fifth generation (“5G”) services. As the Commission has recognized in this and other proceedings, mid-band spectrum will be a critical component of terrestrial 5G networks and essential to maintain US international competitiveness.² Yet there is currently

¹ *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122 *et al.*, Order and Notice of Proposed Rulemaking, FCC 18-91 (rel. July 13, 2018) (“*C-Band Notice*”).

² *Id.* at ¶5 (recognizing “[m]id-band spectrum is well-suited for next generation wireless broadband services due to the combination of favorable propagation characteristics (compared to high bands) and the opportunity for additional channel re-use (as compared to low bands)”; *see also* “The FCC’s 5G FAST Plan” (Sept. 28, 2018) (noting “[m]id-band spectrum has become a target for 5G buildout given its balanced coverage and capacity characteristics”).

inadequate mid-band spectrum to support robust 5G services in the United States. Hence, reallocating a significant portion of the C-band for terrestrial flexible use is perhaps the most promising opportunity to address this deficit.

The C-Band Alliance (“CBA”), which collectively represents space station licensees serving virtually all of the C-band customers in the continental United States, recently has gone on record suggesting that 200 MHz of C-band spectrum could be reallocated to accommodate terrestrial flexible use while continuing to meet satellite needs.³ Thus, careful consideration of how that reallocation could be accomplished and perhaps enlarged is clearly warranted. In other words, given the vast potential for mid-band spectrum to enable 5G services, the FCC should continue to develop the record on the potential for shifting use of the C-band, while ensuring that current users of satellite services continue to have access to highly reliable, competitive data transport services.

AT&T is, in many ways, a meaningful microcosm of the C-band. AT&T is both a pre-eminent wireless carrier at the forefront of 5G development *and* a heavy user of C-band to support its telecom and video businesses. Through its DIRECTV subsidiary and its U-verse

³See Letter from Jennifer D. Hindin, counsel to C-band Alliance, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket Nos. 17-183, 18-122 (Oct. 23, 2018) (“*CBA October 23 Letter*”) (attaching press release titled “C-Band Alliance Increases to 200 MHz Its FCC Proposal for Spectrum Repurposing in the U.S. to Support Nationwide 5G Deployment”); *see also* Letter from Jennifer D. Hindin, counsel to C-band Alliance, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket Nos. 17-183, 18-122 (Oct. 17, 2018) (“*CBA October 17 Letter*”) (committing to reallocation process that “is founded on a commitment to protect C-band services in the United States and the rest of the world, thereby continuing to provide the quality, reliability and certainty that our customers need to successfully operate and grow their businesses”); Joint Comments of Intelsat Licensee LLC and Intel Corporation, GN Docket No. 17-183 at 2 (Oct. 2, 2017) (noting optimal process for repurposing C-band spectrum is “to create market-based incentives for FSS space station incumbents to undertake voluntarily the complicated and costly process of clearing portions of the C-band downlink spectrum in specific areas across the country, thus opening the way for coordinated terrestrial use as rapidly as possible”).

operations, AT&T owns numerous earth stations operating in the C-band to receive video content—facilities that serve as crucial links in a network distributing that content to tens of millions of end users over AT&T’s multichannel video outlets. Indeed, thanks to DIRECTV’s market-disrupting innovations over the past two decades, today AT&T is the largest satellite company in the United States. AT&T’s WarnerMedia subsidiary also operates a range of C-band earth stations and contracts with C-band satellite systems to distribute video programming to cable television and satellite multichannel video systems across the United States, serving must-have content to a substantial percentage of the population. In addition, AT&T uses C-band satellite services for telecom services, including for interconnection of remote villages in Alaska and for restoration of wireless and wireline services in the event of weather-related or other disasters. In sum, AT&T requires both: (i) the ability to access, on an economic basis, facilities with the unique data transmission characteristics of the C-band, and (ii) new mid-band spectrum to meet the burgeoning demands of 5G connectivity.

II. THE COMMISSION’S REALLOCATION OF C-BAND SPECTRUM FOR 5G TERRESTRIAL MOBILE SERVICES SHOULD BE GUIDED BY THE REALITIES OF CONSUMER DEMAND FOR DIGITAL CONNECTIVITY

A. The FCC Should Adopt Policies that Maximize the Market Potential for Reallocating Spectrum for 5G Mobile Broadband Services

The Commission has recognized that unlocking the massive societal benefits of 5G—both for consumers and the economy overall—will require significant infusions of spectrum. Although the Commission has recently made great strides in allocating and licensing spectrum in the millimeter wave (“mmWave”) bands in the *Spectrum Frontiers* proceeding,⁴ allocating and

⁴ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Fourth Further Notice of Proposed Rulemaking, FCC 18-110 (Aug. 8, 2018) (“*Spectrum Frontiers Fourth FNPRM*”); Third Report and Order and Further Notice of Proposed Rulemaking, FCC 18-73 (June 18, 2018) (“*Spectrum Frontiers Third R&O*”); Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC

licensing additional mid-band spectrum has lagged behind, even though such spectrum is known to be critical for the development of robust, wide area 5G systems.⁵ Undoubtedly, the quest for viable mid-band spectrum has been hampered by the intensity with which spectrum in that range is already used. Thus, when the CBA acknowledges the potential for re-purposing significant amounts of 3.7-4.2 GHz spectrum for flexible terrestrial use within the continental United States,⁶ the Commission and all interested parties should pay significant attention.

Part of such attention should focus on the fact that, given the interrelationship between clearing an impactful portion of the C-band and generating sufficient funding to offset the effects of that clearing, the ability to capitalize on a potential reallocation may depend on maximizing

Rcd 10988, 10994-11006, ¶¶15-59 (2017) (“*Spectrum Frontiers Second R&O*”); Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8023-62, ¶¶19-124 (2016) (“*Spectrum Frontiers R&O*”).

⁵ See, e.g., David Abecassis, Chris Nickerson, and Janette Stewart, *Global Race to 5G – Spectrum and Infrastructure Plans and Priorities*, Analysis Mason (April 2018) (“*CTIA Analysis Mason Report*”), https://api.ctia.org/wp-content/uploads/2018/04/Analysis-Mason-Global-Race-To-5G_2018.pdf (last visited Oct. 18, 2018).

⁶ See, e.g., *CBA October 23 Letter*. Cf., Letter from Michele C. Farquhar, on behalf of Intelsat-SES, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 17-183 at Attach. at 1 (Feb. 21, 2018) (“*Intelsat-SES Feb. 21 Letter*”) (noting proposal would “[f]ree up a target of approximately 100 MHz of C-band downlink spectrum, starting at 3700 MHz (with impairment of additional frequencies beyond the cleared spectrum)”); Letter from Henry Gola, counsel Intelsat on behalf of Intelsat and SES Americom, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket Nos. 17-183, 18-122 at Attach. 1, p. 8 (Apr. 23, 2018) (“*Intelsat-SES Apr. 24 Letter*”) (stating “early analyses indicate that 40-60 MHz will be needed for the filter to achieve desired attenuation at 3.8 GHz”). While AT&T supports the effort to clear a block of C-band spectrum within the continental United States (“CONUS”), AT&T believes that reallocation outside the CONUS may have different policy considerations. Not only are the needs different in Alaska, Hawaii, Puerto Rico, and the U.S. protectorates, but the considerations governing the satellites with coverage that includes those areas may also be considerably different. Thus, AT&T agrees with CBA that both the basis for, and the factual background of, the non-CONUS regions may militate in favor of separate consideration. See *CBA October 17 Letter*, Attach. at 2 (noting proposal excludes “Alaska and Hawaii—no transfer of spectrum in these regions”).

the market potential of the spectrum for 5G services. Accordingly, AT&T discusses below the key policies that would optimize the value of the band to terrestrial carriers.

As AT&T and many others have repeatedly explained, the allocation of additional mid-band spectrum for terrestrial 5G is essential to the “imperative that America be first in fifth-generation (5G) wireless technologies.”⁷ As the Administration recently observed, “[w]ireless communications and associated data applications establish a foundation for high-wage jobs and national prosperity” and “wireless technologies capable of meeting the high-capacity, low-latency, and high-speed requirements . . . can unleash innovation broadly across diverse sectors of the economy and the public sector.”⁸

This is also borne out by industry research—a study commissioned by CTIA concluded that “there are real and significant consequences to maintaining global wireless leadership and that while the U.S. has an opportunity to win the 5G race, other countries are pulling ahead right now with key policy reforms and industry investment.”⁹ The stakes in this race are high—\$275B in new investment, \$500B in economic growth, and 3 million new jobs.¹⁰ In terms of 5G-readiness, the report cited to a recent mid-band allocation in China (3.4-3.6 GHz), expected allocations in South Korea (3.5 GHz), auctions in the UK (3.4 GHz), and planned auctions in France and Germany.¹¹ As the FCC noted, the Radio Spectrum Policy Group of the European

⁷ Presidential Memorandum on Developing a Sustainable Spectrum Strategy for America’s Future (Oct. 25, 2018); available at: <https://www.whitehouse.gov/presidential-actions/presidential-memorandum-developing-sustainable-spectrum-strategy-americas-future/> (last visited Oct. 29, 2018).

⁸ *Id.*

⁹ *CTIA Analytix Mason Report* at 2.

¹⁰ *Id.*

¹¹ *Id.* at 7-9.

Commission also issued a “Strategic Spectrum Roadmap Towards 5G for Europe” and observed that the “3.6 GHz (3400-3800 MHz) will be the first primary band for 5G and bring the necessary capacity for new 5G services.”¹² Thus, the record reflects that any spectrum that can be repurposed from the 3.7-4.2 GHz band – without unduly harming incumbent licensees and their customers -- clearly should be repurposed for exclusive, licensed terrestrial flexible use.¹³

The record also demonstrates that to achieve optimal 5G performance in the 3.7 GHz band, 80-100 MHz of contiguous spectrum would be needed.¹⁴ As an initial matter, that channelization would comport with 3GPP standards.¹⁵ Ericsson states that “something on the order of 100 MHz will be needed on a per-operator basis to fulfill mobile 5G broadband use cases.”¹⁶ Nokia observes that “the governments in [China, South Korea, and Japan] have prioritized providing 100 MHz (or more) of spectrum *per operator* in this mid-band spectrum range to deploy robust 5G.”¹⁷ Indeed, the European Conference of Postal and Telecommunications Administrations harmonization paper cited by the Commission notes that “5G use cases suggest the adoption of minimum contiguous frequency allocations of around

¹² *C-Band Notice* at ¶6 (citing “Strategic Spectrum Roadmap Towards 5G for Europe,” Radio Spectrum Policy Group, Directorate-General for Communications Networks, Content and Technology, RSPG18-006 FINAL at 2 (Jan. 30, 2018), https://circabc.europa.eu/sd/a/b7f85cbb-5155-4268-abbb-fa83113b3ed4/RSPG17-034final_2nd_draft_opinion_on_5G.pdf).

¹³ See, e.g., Reply Comments of T-Mobile USA, Inc., GN Docket No. 18-122 at 4 (June 15, 2018).

¹⁴ See, e.g., Comments of Ericsson, GN Docket No. 18-122 at 9 (May 31, 2018) (“Ericsson Comments”); Comments of Nokia, GN Docket No. 18-122 at 4-5 (May 31, 2018) (“Nokia Comments”).

¹⁵ See, e.g., *Spectrum Frontiers Fourth FNPRM* at ¶10 (citing 3GPP Release 15: 3GPP TS 38.101-2 V15.1.0 (2018-03), Section 5.3.5, available at http://www.3gpp.org/ftp//Specs/archive/38_series/38.101-2/38101-2-f10.zip (last checked July 18, 2018)).

¹⁶ Ericsson Comments at 9.

¹⁷ Nokia Comments at 4-5 (emphasis in original).

50/80 MHz per operator.”¹⁸ Thus, configuring a reallocation of the C-band with optimal utility for terrestrial 5G—and thereby maximizing the market value of the C-band—will depend upon a reallocation substantial enough to provide multiple licensees with the opportunity to obtain significant spectrum depth in the band.

The FCC—or a private entity managing a reallocation—should also provide for multiple licenses to ensure competitive entry. Indeed, maximizing bandwidth is an important goal to achieve the full benefits of 5G; but those benefits would be impaired without competition among prospective C-band spectrum licensees. Moreover, the overall amount of spectrum reallocated for terrestrial flexible use should also be consistent across the CONUS so that equipment can be standardized and manufactured with economies of scope and scale.

B. Any Reallocation of C-Band Spectrum Must Minimize the Impact on C-Band Incumbents and Their Customers

CBA has stated that “C-band satellite operators are committed to ensuring that their customers, and thus U.S. consumers, continue to receive quality service with no disruptions,” and promised that “the C-Band carriers will make their customers whole for the cost of the transition.”¹⁹ CBA’s latest press release also states that its proposal “balances the need to protect the C-band user community, which includes television and radio programming distribution to over 100 million U.S. homes.”²⁰

¹⁸ *C-Band Notice* at ¶6 (citing European Conference of Postal and Telecommunications Administrations, CEPT Draft Report 67 at 3, 4 (2018), https://www.cept.org/files/9522/Draft%20CEPT%20Report%2067%20PF_1.docx).

¹⁹ See Letter from Jennifer D. Hindin, Counsel to the C-Band Alliance, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket Nos. 17-183, 18-122, Attach. C “C-Band Alliance” at 3 (Oct. 9, 2018).

²⁰ See *CBA October 23 Letter*.

Those guarantees by CBA are appropriate. Nevertheless, the record requires much further development to determine what is truly necessary to support those guarantees. At this point, for example, the record suggests that (i) there may be excess C-band capacity; (ii) C-band spectrum might potentially be used more efficiently; and (iii) there likely is some ability to shift certain kinds of C-band uses to alternative frequencies or other transmission technologies. However, C-band satellite services provide an essential component of the infrastructure relied upon by several vital industries. Not only must those key uses be permitted to continue completely unimpaired, the Commission should also ensure that any C-band reallocation does not limit the ability of C-band satellite customers to rely on competition among capacity providers that will deliver quality services and reasonable pricing. While technology and added investment may create an opportunity for satellite providers to spin-off spectrum and realize some gain through the increased value of the 3.7-4.2 GHz band for terrestrial services, that gain should not be derived at the expense of customers relying on unique C-band characteristics for crucial services.

Although the details of CBA's reallocation plan are still to be unveiled, CBA has stated that C-band spacecraft and earth stations can be adapted to operate within a 300 megahertz subset of the existing allocation and still sustain current C-band user demand.²¹ Before that, the ultimate founders of CBA stated that reallocation of 200 megahertz of C-band would be feasible within 18 to 36 months following an FCC Order without significant impact to C-band-supported services.²² CBA's proposed reallocation has potential technical merit and possible room for

²¹ *Id.*

²² See *Intelsat-SES Feb. 21 Letter* (noting clearing of 100 MHz); *Intelsat-SES Apr. 24 Letter* (noting guardband of 40-60 MHz); Letter from Henry Gola, counsel on behalf of Intelsat, SES Americom, Inc., Intel Corporation, and Auctionomics, to Marlene H. Dortch, Secretary, Federal

enlargement—to the extent, for example, that (i) there is excess C-band satellite capacity in the United States in the form of both “installed” satellite capacity and “uninstalled” C-band satellite capacity (*i.e.*, geostationary orbital slots viewable from the US that are unused),²³ and/or (ii) there are available satellite technology upgrades that would enable more efficient spectrum use of the remaining C-band spectrum still allocated for fixed satellite use.

Moreover, for some use cases, there may be potential for shifts to Ka- or Ku-band spectrum or to fiber optic transmission.²⁴ It is thus possible that a reduction in C-band capacity would prompt additional fiber deployment, or that Ku’s suitability as a substitute could be improved by increasing the use of geographic diversity to absorb excess demand for C-band services. While, as discussed below, there are systems that rely on very specific characteristics of the C-band and thus cannot be relocated, the potential does exist to create financial incentives to address some components of C-band demand, as well as technical solutions to increase C-band capacity. AT&T looks forward to a detailed proposal by CBA showing how these capabilities and levers might be employed to concentrate satellite use in the 3.7-4.2 GHz band and free capacity for flexible terrestrial 5G use, while still meeting user demand for competitive C-band satellite offerings.

That said, however, any reallocation of C-band FSS spectrum must still provide for capacity that not only meets existing FSS needs, but also expected future demand. The

Communications Commission, GN Docket Nos. 17-183, 18-122 at 1 (Apr. 20, 2018) (“*Intelsat-SES-Intel Apr. 20 Letter*”) (noting 18-36 month timeframe).

²³ There may be C-band orbital slots in the geostationary equatorial plain viewable from the US that are not currently in use. Additional investment to fill these C-band orbital slots would ameliorate any potential demand disruptions in C-band-supported services.

²⁴ See, *e.g.*, Letter from Danielle J. Pineres, counsel for NCTA – The Internet & Television Association, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 18-122 at 1 (June 13, 2018); Ericsson Comments at 8.

remaining capacity available must also offer existing earth stations licensees the opportunity to seek competitive provisioning of C-band satellite services. AT&T suggests that the FCC develop further information that helps characterize the actual usage in the band, including the capacity used today, the potential drivers of FSS usage in the C-band, the capacity that would exist in a smaller but more efficient post-transition FSS C-band ecosystem, the efficiency enhancements that could be deployed to increase capacity in the remaining FSS C-band, and how the investments in added capacity and enhanced or modified terrestrial equipment would be made to ensure C-band users remain whole.

The need to retain C-band satellite capacity on a competitive basis going forward stems from the highly valued C-band uses that have been documented in the record.²⁵ AT&T, for example, relies on satellite C-band services to support video and data backhaul distribution across multiple businesses, including WarnerMedia, DIRECTV, U-verse, and traditional wired and wireless telecommunications—in the latter case for backhaul in remote areas, emergency services and disaster recovery, among other things. Although AT&T has previously documented how C-band is used in its wireless, wireline and MVPD operations,²⁶ WarnerMedia uses C-band satellite services extensively both to transmit video content to approximately 4,000+ cable/satellite/telco and over-the-top (“OTT”) video distributor head-ends (“WM Distributors”) and to cover high-value sporting, entertainment and news events using mobile earth stations (*i.e.*, truck transportable earth stations). Notably, with respect to transmitting video content, every

²⁵ See, e.g., AT&T Comments at 5-9; Comments of the American Cable Association, GN Docket No. 17-183 at 2 (Oct. 2, 2017); Comments of the Content Companies, GN Docket No. 17-183 at 2-3 (Oct. 2, 2017); Comments of General Communication, Inc., GN Docket No. 17-183 at 6 (Oct. 2, 2017); Comments of the Satellite Industry Association, GN Docket No. 17-183 at 10 (Oct. 2, 2017); Comments of SES Americom, Inc., GN Docket No. 17-183 at 3-4 (Oct. 2, 2017) .

²⁶ See AT&T Comments at 5-9.

WM Distributor receives programming via satellite C-band services, even if the WM Distributor is also receiving programming via fiber—no WM Distributor relies solely on fiber. On the production side, WarnerMedia’s Turner subsidiary rents about 190 C-band trucks a year, primarily to cover via satellite services sports such as NBA on TNT, NBATV, and MLB.

Although some C-band uses might migrate from satellite services to alternative distribution modes, there are a number of use cases and locations where there presently seem to be no comparable alternatives to such C-band services. For example, C-band satellite service is an essential component to a video programming delivery system that works today with near 100 percent reliability. Compared to fiber networks, C-band satellite services present fewer points of failure (*e.g.*, fiber cuts).²⁷ C-band satellite services are similarly critical to distributing programming and covering high-value sporting and other events in locations not served by fiber. These include, but are not limited to, rural and other sparsely populated areas. Indeed, while MVPDs operating over large areas might feasibly deploy geographically-diverse Ku-band earth stations to overcome atmospheric, weather-related rain fade issues, that option does not exist for certain smaller rural operators who lack the footprint to allow such diversity. AT&T fully supports incentives and other mechanisms to induce C-band users to migrate to other facilities, but with the recognition that there are a host of uses that cannot achieve comparable quality of service through any other means.

²⁷ See, *e.g.*, “Friday’s Massive Comcast Outage Shows How Fragile The Internet Is,” *Wired* (June 29, 2018); available at: <https://www.wired.com/story/friday-comcast-outage-cut-fiber/> (last visited Oct. 22, 2018) (discussing massive outages related to “two, separate and unrelated fiber cuts to our network backbone providers”).

III. THE PROPOSED MODIFICATIONS TO THE FCC’S RULES FOR C-BAND SERVICES SHOULD PROMOTE SPECTRUM REALLOCATION EFFORTS WHILE MINIMALLY IMPACTING REGISTERED C-BAND SATELLITE SERVICE USERS

A key aspect of ensuring C-band users can continue to obtain viable C-band services following any spectrum reallocation is crafting regulations for any “reduced” C-band (*i.e.*, the reduced portion of the C-band that remains allocated for satellite use) that reflect and protect user needs. *Importantly, ensuring the most efficient and flexible use of the reduced C-band FSS allocation would permit the greatest compression of FSS use in that band, which would, in turn, increase the amount of spectrum that could be made available for terrestrial broadband use.* First, the technical requirements for C-band earth stations should permit flexible use and the expansion of operations in a rational manner. Second, rules for satellite system operators should provide the necessary technical flexibility to implement efficiency-enhancing upgrades and should not stand as a bar to bringing additional C-band capacity on-line. Finally, the regulations should not impose artificial limits on C-band use by introducing terrestrial fixed operations into the portion of the C-band preserved for satellite operations. In this manner, the FCC can at once maximize the reallocation to terrestrial broadband services and, at the same time, optimize the utility of the reduced C-band for FSS users.

The regulations governing FSS use of a continued subset of the C-band should provide flexibility for C-band users, including the ability to expand the scope of their existing operations. First, earth stations authorized to operate in the remaining satellite portion of the C-band should be permitted to obtain “full band, full arc” coordination.²⁸ While such practices may be inefficient in situations where the spectrum is shared between FSS and other uses, securing the

²⁸ In this context, “full band” would refer to the full band reserved for satellite operations, as opposed to the use of “full band” today, which denotes the entirety of the 3.7-4.2 GHz band.

largest possible C-band reallocation for terrestrial 5G services inherently requires that the spectrum retained for satellite operations be fully optimized for satellite use—including barring the introduction of systems that may be incompatible with full (reduced) band, full arc coordination. Full band, full arc coordination allows an earth station licensee to negotiate for satellite service from the largest possible universe of space station licensees, which enhances an earth station licensee’s ability to obtain competitive satellite service in a world with potentially smaller capacity. Indeed, such flexibility will be all the more important with reduced C-band capacity. In addition, upon completion of the spectrum reallocation, the Commission should remove the current freeze on C-band earth stations and spacecraft to enable a vibrant and sustainable C-band satellite ecosystem in the remaining FSS spectrum.

Enabling satellite service providers to upgrade existing C-band satellite facilities and “densify” their network by adding new spacecraft to their fleet will be essential to ensure minimal impact on users of C-band services. Accordingly, upon completion of the spectrum reallocation, the FCC should remove any bars or impediments it can to allow licensees to invest in and upgrade their systems or launch new space stations that have the potential to increase effective capacity in the FSS portion of the C-band.

As a final matter, the FCC should not authorize Fixed Point-to-Multipoint (“PtMP”) services within the portion of the C-band to be retained for satellite use on a co-primary basis. Although AT&T recognizes that fixed wireless services and FSS can co-exist in some circumstances, terrestrial services in the C-band should be limited to the spectrum reallocated for terrestrial flexible use. As AT&T has previously noted, the goal of concentrating FSS usage to the smallest possible subset of the C-band, while preserving optionality and utility for C-band users, compels the conclusion that any post-transition spectrum in the C-band should be

optimized specifically for FSS use. In any event, the terrestrial spectrum cleared for 5G would be licensed for flexible use, so the cleared spectrum would by definition accommodate fixed use, and those who plan fixed rather than mobile deployments would still be eligible to bid for the spectrum at auction (whether run by the FCC or a private entity). If advocates for PtMP use in the C-band are unwilling to take advantage of auction or secondary market mechanisms to gain access to C-band spectrum on an economically rational basis, they should not be permitted to affect the market re-balancing of FSS and terrestrial use—as they would if they were permitted to impose themselves as an obstacle to full FSS use of the remaining portion of the C-band.

The notion of “coordinated” deployment of PtMP on a co-primary basis could impact both the deployment of earth stations and the ability to access FSS capacity going forward—neither of which is sound public policy in view of the proposed contraction of FSS spectrum in the C-band. The deployment of a PtMP system would affect the ability to coordinate future earth stations in and around the PtMP deployment and, as AT&T has noted, there are specific C-band uses that presently seem irreplaceable and thus will continue to require new facilities. At a minimum, as AT&T and others have observed, some current FSS C-band uses are mobile or temporary in nature, such as disaster recovery and news media use, and, if nothing else, allowing fixed wireless in the same frequencies retained for satellite use would impinge on these use cases.

The deployment of PtMP systems could also affect the capacity available to individual earth station operators. If “full-band, full arc” rights were not strictly maintained, the earth station operator – and therefore the C-band ecosystem as a whole – would not be able to rely on a key necessary condition to enable customers to switch satellites vendors, spacecraft and/or transponders. While this might not seem like a significant issue to some, it should not be

underestimated. Indeed, the loss of C-band earth station operator's "full band, full arc" rights in the remaining FSS C-band would stifle the C-band services market and render it unsustainable.

To illustrate this point, in the absence of full band, full arc rights, imagine a content provider interested in evaluating a C-band backhaul video distribution proposal from a new satellite system. Before such a proposal could be contemplated, the new satellite service provider and the content provider would need to ensure that coordination at each and every one of the C-band receive earth stations owned by each and every one of the content provider's clients takes place (that is, every single cable headend, broadcast headend, direct-to-home satellite service feeder link, radio headend, or other customer of that content provider). This could include thousands of locations across the country where coordination would need to take place prior to consideration of the new C-band services proposal. And if any significant coordination issues were to arise due to existing PtMP deployment, the content provider attempting to switch satellite systems might lose their ability to competitively bid for system capacity or be faced with loss of distributor options. It is not hard to imagine how this regulatory environment could rapidly lead to a freeze-in-place of the C-band market and, hence, assure its unsustainability.

IV. THE FCC SHOULD REQUIRE THAT ANY PLAN TO RE-PURPOSE C-BAND SPECTRUM BE CONDUCTED THROUGH AN OPEN, FAIR AND EQUITABLE PROCESS AND WITHIN A PREDICTABLE TIMEFRAME THAT PROMOTES RATIONAL INVESTMENT IN THE BAND

AT&T has long been an advocate of private market solutions, and believes that CBA's proposal to engage in a market-based, *de facto* "re-allocation" warrants serious consideration. At present, however, it remains unclear (i) whether CBA's spectrum reallocation proffer is the efficient amount of spectrum to be reallocated; (ii) how much it would cost to accommodate and hold harmless current users in the C-band; and (iii) how the reallocated spectrum would be

apportioned among competing potential flexible use, terrestrial licensees. Many additional details regarding the principles and mechanisms of this market-based proposal are obviously necessary, and AT&T looks forward to reviewing a comprehensive plan from CBA for the secondary market reallocation of this spectrum.

In any event, there are certain key elements of the spectrum reallocation plan and market-based “licensing” system that should be inherent in any proposal for a private market-based solution. *First*, although incumbent earth station use of the reallocated spectrum might be cleared in stages, there should be only one, all-encompassing market transaction (whether led by the FCC or a private Transition Administrator) for all spectrum to be repurposed. In other words, the spectrum transition should not be piecemeal, with some spectrum rights transferred in the relatively near future and then more spectrum reallocated later. For equipment manufacturers to develop an ecosystem of devices and network equipment with economies of scope and scale, the full dimensions of the reallocation must be identified quickly, and with finality. And the spectrum sale should be scheduled to occur as soon as possible, as this spectrum will be critical to domestic 5G deployments. Finally, and perhaps most importantly, the spectrum sale should encompass as much spectrum as is feasible given other constraints.

Second, although the timetables for prioritizing clearing and band transition may be subject to policies that create rational interim distinctions, the entire band should be subject to a date certain for final clearing. Put another way, clearing might benefit from staging to prioritize, for example, urban versus rural earth station users; but those intermediary clearing stages must have an end point that is immutable—as of a date certain, all remaining FSS use within the subset of the C-band reallocated for terrestrial flexible use should revert to secondary status. To

maximize utility of the band, and therefore its value for terrestrial licensees, a final timeline for transition must be publicly known prior to the spectrum reallocation market transaction.

Third, the spectrum clearing should be uniform nationwide, as that is how the 5G ecosystem will develop and maximize use of the band. There may be some opportunity to tailor the licensing regime (*i.e.*, the number of licenses and amount of spectrum per license) in different regions, but the total amount of re-purposed bandwidth should be identical nationwide.

Fourth, the spectrum should be made available in a flexible, market-responsive manner. In particular, any auction or secondary market transaction should be open and unrestricted, without eligibility requirements other than the legal requirements for being granted an FCC license. Similarly, there should be no *ex ante* spectrum aggregation limits on acquiring reallocated C-band spectrum by terrestrial licensees.

Fifth, a C-band auction, or secondary market transaction conducted by CBA or a proxy, should be fair and equitable. The mechanism must allow all bidders the opportunity to participate and engage in reasonable price discovery. The FCC has years of experience developing auction processes and procedures that efficiently price spectrum, mechanisms that are generally well-known and understood by spectrum licensees and would-be licensees. Even if the spectrum is distributed by a private entity rather than the FCC, the FCC's cumulative auction learning should be leveraged to the degree feasible.

Sixth, the procedures established for an agency-mandated, or privately structured, reallocation of C-band spectrum should consider and address the minimal financial commitments that are a necessary pre-requisite for the reallocation. As the FCC has done in the past with

minimum bids to guarantee incumbent relocation costs,²⁹ or to fund Federal relocation,³⁰ the C-band mechanism must address—and guarantee—that C-band users will be made whole. At a minimum, an auction of C-band spectrum must: (i) ensure reasonable protection of incumbent C-band users and any required retrofitting of earth stations, and (ii) guarantee the payment of those relocation/retrofitting obligations.

None of these principles is inherently at odds with the broad outline for a market-based solution, including the one generally proposed by CBA. But each is critical to ensuring that any privately-managed spectrum sale maintains the standards of transparency, fairness and openness that would otherwise be required for spectrum licensing by the Commission itself. Should the Commission proceed with CBA's or any other proposed private solution, it should insist on ground rules that maintain the integrity of the licensing process.

V. THE FCC SHOULD ADOPT SERVICE AND LICENSING RULES FOR C-BAND BROADBAND MOBILE SERVICES THAT PARALLEL COMPARABLE ALLOCATIONS AND SERVICES

AT&T also generally concurs with the FCC's draft regulations for flexible terrestrial services, which propose operational and technical rules that have proven effective for prior allocations. The proposed regulations do not depart significantly from the regulations used for other flexible use allocations and have effectively regulated licensee conduct, while providing the basis for investment and development by licensees. In particular, AT&T supports the proposal that "licensees in the 3.7-4.2 GHz band comply with licensing and operating rules that

²⁹ See Broadcast Incentive Auction Scheduled To Begin On March 29, 2016, Public Notice, 30 FCC Rcd 8975, 9078-86 ¶¶215-35 (2015) (discussing Final Stage Rule and Extended Round procedures designed to ensure auction recovered sufficient funds to pay obligations to relocating broadcasters and broadcasters canceling authorizations).

³⁰ See Auction of Advanced Wireless Services Licenses Scheduled for June 29, 2006, 21 FCC Rcd 4562, 4613-15 ¶¶190-200 (2006) (discussing minimum auction reserve by band to ensure funding sufficient to relocate Federal users in AWS band).

are applicable to all Part 27 services, including assignment of licenses by competitive bidding, flexible use, regulatory status, foreign ownership reporting, compliance with construction requirements, renewal criteria, permanent discontinuance of operations, partitioning and disaggregation, and spectrum leasing.”³¹ AT&T further supports:

- An “open eligibility standard for licenses in the 3.7-4.2 GHz band,” while maintaining “citizenship, character, or other generally applicable qualifications that may apply under [the FCC’s] rules”;³²
- Not “adopt[ing] a pre-auction bright-line limit on the ability of any entity to acquire spectrum in the 3.7-4.2 GHz band through competitive bidding at auction”;³³
- A “15-year term for licenses in the 3.7-4.2 GHz band”;³⁴
- Relying on established benchmarks, compliance procedures and penalties for “mobile or point-to-multipoint service in accordance with [the FCC’s] Part 27 rules” for construction benchmarks, while leaving open the possibility of new “Internet-of-things”-specific benchmarks to be developed in the future;³⁵
- Power limits for fixed, base and mobile stations based on comparable AWS-1 and AWS-3 regulations;³⁶
- Field strength limits at market boundaries based on “the same -76 dBm/m²/MHz power flux density limit at the service area boundaries as is used for the UMFUS rules”;³⁷ and,
- Use of “flexible antenna height rules that apply to AWS-1 and AWS-3.”³⁸

³¹ *C-band Notice* at ¶143.

³² *Id.* at ¶145.

³³ *Id.* at ¶147.

³⁴ *Id.* at ¶149.

³⁵ *Id.* at ¶¶151-161.

³⁶ *Id.* at ¶¶164-167.

³⁷ *Id.* at ¶182.

³⁸ *Id.* at ¶186.

At bottom, other than the actual mechanism of licensing, which is a departure from prior practices, and the out-of-band emissions (“OOBE”) issue discussed below, the characteristics of the band are not so different from other bands that changes in the regulations are warranted. AT&T urges the FCC to adopt the same technical and operational rules for the terrestrial portion of the 3.7-4.2 GHz band as it uses for other, similarly-situated bands.

Unlike other allocations to date, the proposed C-band terrestrial allocation would abut a quasi-licensed spectrum band—the Citizen’s Broadband Radio Service (“CBRS”) allocation at 3.55-3.7 GHz. As the Commission is aware, CBRS spectrum is subject to a complex sharing regime where the “priority access licensees” (“PALs”) and “general authorized access” (“GAA”) licensees must obey intricate dynamic protocols to avoid mutual interference, including reductions in power and emissions in adjacent markets and in adjacent bands. AT&T strongly believes that those protocols should not infect the C-band, and that the OOBE limits should effectively prioritize C-band terrestrial licensees over 3.5 GHz shared licensees. In effect, any guard band or dynamic consequences of the adjacency of the band should not require the C-band licensee at 3.7 GHz to modify their operations in any way to address potential interference to CBRS—the repurposed C-band blocks should be completely fungible from a technical operations perspective. Similarly, any necessary guard bands to protect continued FSS operations should be established in a manner that will ensure all C-band terrestrial broadband licenses have fungible technical characteristics, with guard bands established, if necessary, in non-terrestrial spectrum to ensure that outcome.

VI. CONCLUSION

AT&T appreciates the FCC’s willingness to take a deep dive to address a thorny regulatory problem—ensuring adequate mid-band spectrum for the deployment of 5G services while continuing to maintain sufficient C-band capacity for FSS users. Although AT&T is

enthusiastic about any potential for releasing mid-band capacity for mobile services in quantities sufficient to enable competitive broadband 5G offerings, AT&T is also mindful that thoughtless reductions in C-band FSS capacity could have devastating consequences to a number of vital industries that rely on the very specific capabilities of the C-band to interconnect telecommunications services or distribute content across the United States. AT&T urges the FCC to carefully examine all options, including CBA's proposal (which hopefully will be fleshed out in much greater detail during the comment process), and do so in a deliberate manner focused on not only freeing terrestrial mobile capacity, but also on ensuring C-band FSS demands will continue to be served in a competitive, efficient, and reliable manner.

Respectfully submitted,

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Dated: October 29, 2018