



PUBLIC NOTICE

Federal Communications Commission
445 12th St., S.W.
Washington, D.C. 20554

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WIRELESS TELECOMMUNICATIONS BUREAU, INTERNATIONAL BUREAU, OFFICE OF ENGINEERING AND TECHNOLOGY, AND OFFICE OF ECONOMICS AND ANALYTICS SEEK FOCUSED ADDITIONAL COMMENT IN 3.7-4.2 GHZ BAND PROCEEDING

GN Docket No. 18-122, RM-11791, RM-11778

Comments Due: August 7, 2019
Reply Comments Due: August 14, 2019

By this Public Notice, the Wireless Telecommunications Bureau, International Bureau, Office of Engineering and Technology, and Office of Economics and Analytics invite interested parties to supplement the record to address issues raised by commenters in response to the Commission's July 2018 *Notice of Proposed Rulemaking* in GN Docket No. 18-122 (*Notice*).¹ In the *Notice*, the Commission sought comment on several approaches, including auction-based approaches, for making some or all of the 3.7-4.2 GHz band (C-Band) available for terrestrial, flexible use.² The Commission also sought comment on other issues essential to the introduction of new terrestrial wireless services in the band, including incumbent protection criteria, technical and licensing rules, and appropriate methodologies for transitioning or protecting existing Fixed Satellite Service and Fixed Service operators in the band.³

In response to the *Notice*, commenters proposed auction-based approaches and other transition mechanisms to introduce new flexible-use licensing in the band. Commenters also espoused different views on appropriate repurposing methodologies, Fixed Satellite Service earth station protection criteria, technical rules, and other issues raised in the *Notice*.⁴ Today, we seek additional comment on the recent filings by: (1) ACA Connects – America's Communications Association (ACA Connects), the Competitive Carriers Association (CCA), Charter Communications, Inc. (Charter) (collectively, ACA

¹ *Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122, Order and Notice of Proposed Rulemaking, 33 FCC Rcd 6915 (2018) (*Notice*).

² *See, e.g., id.* at 6935-51, paras. 58-115 (seeking comment on market-based and auction-based approaches, as well as a hybrid approach that could combine elements of various transition mechanisms).

³ *See generally id.*

⁴ The record was further supplemented by comments filed in response to a May 2019 Public Notice. *See International Bureau and Wireless Telecommunications Bureau Seek Additional Comment in 3.7-4.2 GHz Band Proceeding*, GN Docket No. 18-122, Public Notice (rel. May 3, 2019); 84 Fed. Reg. 25512 (June 3, 2019) (*May 3 Public Notice*).

Connects Coalition); (2) AT&T; and (3) the Wireless Internet Service Providers Association (WISPA), Google, and Microsoft.⁵

The ACA Connects Coalition, which collectively represents both incumbent C-band earth station users and wireless providers that seek to use this spectrum to provide 5G services, recently submitted a joint proposal for repurposing a large portion of the C-band for 5G use. Their proposal consists of three key elements that would make 370 megahertz of C-band spectrum available for flexible wireless use on a nationwide basis: (1) a Commission-driven auction that would award new terrestrial licenses and assign obligations for transition costs;⁶ (2) a plan to transition certain Fixed Satellite Service earth station operators to fiber;⁷ and (3) a plan for satellite operators to repack remaining earth station users to the upper portion of the band.⁸

Implementing such a proposal would entail a multi-step, Commission-driven transition process. First, the Commission would conduct an auction to award new flexible-use licenses—this could be a traditional auction, such as an auction of overlay license rights, or potentially an incentive auction.⁹ Under such an approach, bidders acquiring new terrestrial licenses through the auction would be required by rule to contribute to a fund that would cover the costs of the fiber transition, reimburse satellite operators and their customers, and further compensate operators and users.¹⁰ Incumbent earth stations would be mandatorily relocated and repacked.

The remaining elements of the ACA Connects Coalition proposal involve using the common pool of funds for a combination of transitioning certain earth stations to fiber, repacking remaining earth station users to the upper portion of the band, and providing compensation to satellite providers. Video programmers and multichannel video programming distributors (MVPDs) would transition the delivery of video programming to MVPDs from C-band Fixed Satellite Service use to terrestrial fiber delivery. Simultaneous with the MVPD transition, satellite operators would repack services used by non-MVPD

⁵ See Letter from ACA Connects, CCA, and Charter, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 2, 2019) (ACA Connects Coalition Proposal); Letter from Pantelis Michalopoulos, Counsel for ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 9, 2019), Attachment (Cartesian Study); Letter from Henry Hultquist, Vice President, Federal Regulatory, AT&T Services, Inc., to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122 (filed May 23, 2019) (AT&T May 23 *Ex Parte*). See also Letter from Raquel Noriega, Director, Federal Regulatory, AT&T Services, Inc., to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122 (filed June 6, 2019) (AT&T June 6 *Ex Parte*); Letter from Wireless Internet Service Providers Association, Google LLC, and Microsoft Corp. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 15, 2019), Attachment (Reed Study).

⁶ ACA Connects Coalition Proposal at 4-6; Cartesian Study at 2, 12.

⁷ See Cartesian Study at 3 (estimating that the transition to fiber could be accomplished within 18 months in urban areas, within three years in the majority of remaining areas, and within five years for a few hard-to-reach areas). See also Letter from Pantelis Michalopoulos, Counsel for ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 15, 2019) (ACA Connects July 15 *Ex Parte*) (discussing temporary technical conditions that will need to be placed on licenses to avoid interference from 5G base stations and mobile handsets operating in areas cleared within 18 months to C-band earth stations in adjacent areas cleared in later stages).

⁸ ACA Connects Coalition Proposal at 4; Cartesian Study at 6, 10. See generally AT&T May 23 *Ex Parte* at 13 (unlike a cable head-end or satellite collection facility receiving linear content for hundreds of channels, earth stations supporting radio stations, one or two religious channels, and occasional use, transportable operations typically only need to use a limited number of transponders); AT&T June 6 *Ex Parte*, Attach. at 7 (proposing exploration of efficiencies gained from repacking low transponder-need applications to upper edge of the Fixed Satellite Service band).

⁹ See, e.g., *Amendment of Parts 1 and 22 of the Commission's Rules with Regard to the Cellular Service, including Changes in Licensing of Unserved Areas*, Notice of Proposed Rulemaking and Order, 27 FCC Rcd 1745, 1757, para. 23 (2012) (“overlay license is issued for the entire geographic area . . . but requires the overlay licensee to provide interference protection to incumbent operations. . . .”); *id.* at 1759, para. 30 (explaining that an overlay licensee is

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earth station users, such as radio and television broadcasters, to the upper portion of the C-band, and resources would be made available to protect these remaining C-band customers from harmful interference by out-of-band 5G emissions, using interference prevention measures such as installing antenna filters, repointing antennas, and changing antennas' frequencies or polarization.¹¹ The common pool of funds would be used to further compensate satellite operators for lost revenue resulting from the transition to fiber.¹² In the *Notice*, the Commission sought comment on a similar hybrid approach to transition the band, whereby satellite operators would relinquish their rights to a certain amount of spectrum that would then be made available for terrestrial use nationwide, and additional spectrum could be made available on a geographic basis in areas where it is cost-efficient to transition earth stations to other forms of transmission, such as fiber.¹³ The Commission noted that fiber is most prevalent in urban areas, and sought comment on whether it would be feasible to transition certain regions based on the existence of fiber, and if so, how such a transition could be accomplished.¹⁴ We seek comment on each of the elements of the ACA Connects Coalition proposal, both individually and as a package, and how each element could further the Commission's goal of maximizing the terrestrial use of this spectrum while protecting incumbent earth station users.

We also seek comment on the viability of variants on the ACA Connects Coalition approach. For example, we seek comment on mandatory relocation and repacking requirements that would use fiber delivery (potentially redundant fiber delivery) but maintain the C-band delivery of MVPD video programming via non-urban "super" head-ends.¹⁵ How much spectrum could be cleared—nationwide or regionally—using this approach? What transport facilities would be required to transmit video content from consolidated earth station receive sites (i.e., satellite dish farms) to endpoints closer to existing receive-only earth stations or would the data centers just bypass satellite dish farms?¹⁶ How would the number and location of those consolidated receive sites be determined and who would own and operate those sites? How would sufficient network reliability be achieved? Is complete network redundancy

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not required to protect an incumbent in any area where the incumbent relinquished spectrum); 47 U.S.C. § 309(j)(8)(G) (authorizing the Commission to conduct incentive auctions); *see also Notice*, 33 FCC Rcd at 6946-47, paras. 99-102. The *May 3 Public Notice* noted that Section 309(j)(8)(G) permits the Commission to use an incentive auction as a means to encourage "a licensee to relinquish voluntarily some or all of its licensed spectrum usage rights," 47 U.S.C. § 309(j)(8)(G) (emphasis added), and it sought comment on whether the Commission's incentive auction authority would allow it to structure a reverse auction in which satellite operators and licensed or registered receive-only earth station operators compete to relinquish their spectrum usage rights. *May 3 Public Notice* at 4-6.

¹⁰ ACA Connects Coalition Proposal at 5-6 (citing *Service Rules for Advanced Wireless Services H Block – Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, WT Docket No. 12-357, Report and Order, 28 FCC Rcd 9483, 9546-9550, paras. 160-71 (2013)). The further compensation would include incentive payments "to the extent permitted by law." ACA Connects Coalition Proposal at 6 (citing Letter from Elizabeth Andrion, Senior Vice President, Regulatory Affairs, Charter Communications, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 3-6 (filed Feb. 22, 2019); *see also* Cartesian Study at 12.

¹¹ ACA Connects Coalition Proposal at 4-5; Cartesian Study at 10, 18.

¹² *See* ACA Connects Coalition Proposal at 5.

¹³ *See Notice*, 33 FCC Rcd at 6937-38, paras. 63-64 (seeking comment on the viability of alternate content delivery mechanisms and noting the availability of Fixed Satellite Service substitutes, including fiber, particularly in urban areas).

¹⁴ *Id.*

¹⁵ *See, e.g.*, Verizon Comments at 14-15; Letter from Steve B. Sharkey, Vice President, Government Affairs, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 (filed June 15, 2018), attaching Phoenix Earth Station Relocation Study (May 30, 2018) and Mid-band Assessment: Cost Factors Affecting Fiber as an Alternative to Satellite (June 14, 2018).

necessary or can required reliability levels be achieved through other means? Should winning bidders have the option to build the redundant fiber themselves (or agree amongst themselves on who should build the redundant fiber) rather than contribute to a pool? We seek comment on the likely costs of constructing and maintaining fiber networks and interconnecting the head-ends to ensure fiber delivery to the locations of existing earth stations.¹⁷ To what extent is fiber readily available to all affected end users? How and to what extent should the costs of the fiber transition be addressed? How could the Commission best align the incentives of those building any fiber delivery routes with those required to pay for such routes? More broadly, what if any rights to mandatorily relocate and repack existing earth stations should accrue to any new terrestrial licensees? What obligations should redound with such rights—for example, what costs must be covered by any such licensees (and particularly are a lost opportunity to receive revenues a valid cost for these purposes)? We also seek comment on how long it would take to implement this transition.

In addition, we seek comment on appropriate characteristics of the licenses that could be offered at auction to promote a transition and accomplish the type of geographic clearing and fiber transition described in the ACA Connects Coalition Proposal or through centralized earth station receive sites.¹⁸ Would these approaches work better with particular license parameters (i.e., larger geographic license areas) and service rules that differ from those proposed in the *Notice*?¹⁹ We also seek comment on how the Commission's approaches during the AWS-3 and 800 MHz transitions might inform this proceeding.²⁰ For example, should the Commission designate a Transition Administrator or require the creation of a clearinghouse to facilitate the sharing of the costs for mandatory relocation and repacking? We seek comment on these and any other relevant issues in the record.

On May 23, 2019, AT&T submitted comments responding to the C-Band Alliance's proposed technical criteria for operations in the band, particularly with respect to co-existence with incumbent Fixed Satellite Service earth stations.²¹ AT&T asserts that the C-Band Alliance's proposed technical criteria would constrain 5G deployment,²² and it proposes an alternate band plan to address its concerns.²³ AT&T recommends dividing the 3.7-4.2 GHz band into three segments: (1) a largely unrestricted mobile terrestrial 5G segment in the bottom of the band ("Unrestricted Licenses"); (2) "Adjacent Licenses" in the middle of the band that would have to coordinate with or mitigate impact on Fixed Satellite Service; and

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¹⁶ Cartesian Study at 8-9.

¹⁷ *Id.* at 12; *see also* Letter from Steve B. Sharkey, Vice President, Government Affairs, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed June 21, 2019).

¹⁸ *See Notice*, 33 FCC Rcd at 6937, 6946-50, paras. 98-115 (seeking comment on the application of various auction mechanisms, including an auction of overlay licenses, and hybrid approaches to transition incumbent users).

¹⁹ *See id.* at 6959-70, paras. 133-63 (seeking comment on service and licensing rules for new terrestrial wireless services in the C-band, including any alternatives that commenters propose).

²⁰ *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, Report and Order, 29 FCC Rcd 4610 (2014); *Improving Public Safety Communications in the 800 MHz Band et al.*, WT Docket No. 02-55, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969 (2004).

²¹ AT&T May 23 *Ex Parte* (citing Letter from Jennifer D. Hindin, Counsel for the C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Oct. 9, 2018); C-Band Alliance Comments at 9; C-Band Alliance Reply Comments (including Technical Annex Attachment); and Letter from Jennifer D. Hindin, Counsel for the C-Band Alliance, to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Apr. 9, 2019) (Transition Implementation Process Attachment)).

²² *Id.* at 11.

²³ *Id.* at 5.

(3) remaining Fixed Satellite Service spectrum in the top of the band. Unrestricted Licenses could operate using full power and would not be obligated to coordinate with Fixed Satellite Service earth stations; Adjacent Licenses would operate using lower power or subject to other limitations, or would be obligated to coordinate with nearby Fixed Satellite Service earth stations.²⁴ AT&T also describes a number of technical issues that would benefit from further analysis in the record, including technical criteria necessary to determine appropriate protection thresholds for in-band and adjacent band Fixed Satellite Service earth stations, receiver filter performance, the ongoing operational needs of Fixed Satellite Service earth stations in the band, and out-of-band emission limits for terrestrial wireless devices.²⁵

On July 15, 2019, WISPA, Google, and Microsoft filed a study conducted by Reed Engineering, which analyzed Fixed Satellite Service and fixed wireless point-to-multipoint co-channel coexistence in the 3.7-4.2 GHz band.²⁶ Among other conclusions, the Reed Study suggests that exclusion zones of about 10 kilometers are sufficient to protect most Fixed Satellite Service earth stations from harmful interference caused by properly-engineered co-channel point-to-multipoint broadband systems.²⁷ The propagation model used in the study relied on Fixed Satellite Service earth station characteristics that require them to point upwards towards the geostationary satellite arc. Thus, the earth stations are specifically designed to mitigate their response to signals arriving from the horizon, such as terrestrial point-to-multipoint links.²⁸ Additionally, the study relied on the directional nature of fixed service antennas and clutter to assume reduced emissions at earth stations.²⁹

We seek comment on the technical issues raised by the ACA Connects Coalition proposal, AT&T's proposal, and the Reed Study, and on the questions raised therein. Specifically, what are the appropriate interference thresholds and protection criteria, how should they be modeled, and under what deployment assumptions? That is, how should protection criteria be calculated and implemented to achieve both in-band and adjacent band Fixed Satellite Service protections through coordination or other protection mechanisms?³⁰ Should these criteria differ for telemetry, tracking, and command earth stations?³¹ Given the needs of next-generation wireless networks and the need to ensure continuity of service for current users of Fixed Satellite Service earth stations, what are the appropriate technical parameters for terrestrial base stations and end user devices in the band, including transmit power limits and out-of-band emission limits?³² We also seek comment on suggestions by the ACA Connects Coalition, AT&T, and the Reed Study on ways to increase efficient shared use of the C-band through validation of earth station filters, protection zones around stations, analysis of the relevant parameters of earth stations for protection (e.g., elevation angles, range of pointing angles, and frequencies that are used), and other technical matters. For example, which filters are actually realizable and available to achieve the sharing goals of the various proposals? Is it possible to achieve the short-term sharing goals of the proposals given the need to retrofit multiple types of Fixed Satellite Service earth station front-end

²⁴ *Id.*

²⁵ *Id.* at 2.

²⁶ *See generally* Reed Study.

²⁷ *Id.* at 2.

²⁸ *Id.* at 21.

²⁹ *Id.*

³⁰ *See Notice*, 33 FCC Rcd at 6972-74, paras. 172-79 (seeking comment on appropriate in-band and adjacent-band protections for FSS earth stations).

³¹ *See id.* at 6974, para. 180.

³² *See id.* at 6970-72, paras. 164-71.

elements (e.g., Low Noise Block downconverter/filter) and the susceptibility of Fixed Satellite Service receivers to Passive Intermodulation?

We also seek comment on appropriate parameters to manage co-existence of terrestrial stations with earth stations during any band transition where differing amounts of spectrum might be cleared during different time periods for nearby geographic areas. For example, ACA Connects suggests creating a zone where mobile handsets may have operating restrictions and another zone where base station power flux density would be limited.³³ AT&T suggests that either lower power terrestrial stations or coordination procedures could be used to manage terrestrial operations on spectrum adjacent to fixed satellite service operations.³⁴ Under either of these proposals, what technical parameters regarding power levels, power flux density levels, and coordination procedures are appropriate to achieve co and adjacent band operation during and after any transition period? We also seek additional quantitative analysis and over-the-air field test results to strengthen the record on the service impact of specific interference levels, with results that can be independently reproduced by third parties.

Over the past year, a robust and diverse record has been developed in this proceeding, providing new insights into the issues raised in the *Notice*. To ensure that the Commission has the information it needs to complete its deliberations, we seek comment on the specific questions raised above. To that end, all commenters are encouraged to provide detailed proposals, including technical assessments, cost benefit analyses, and projected timelines to support their positions.

Filing Requirements. Interested parties may file comments and replies on or before the dates indicated on the first page of this document.³⁵ All filings must reference GN Docket No. 18-122, RM-11791 and RM-11778. Comments and replies may be filed using the Commission's Electronic Comment Filing System (ECFS).³⁶

- Electronic Filers: Comments may be filed electronically using the Internet by accessing ECFS: <https://www.fcc.gov/ecfs/>.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing.
- Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.
 - All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th Street, SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
 - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
 - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

³³ ACA Connects July 15 *Ex Parte* at 2-3.

³⁴ See AT&T May 23 *Ex Parte* and June 6 *Ex Parte*.

³⁵ 47 CFR § 1.2.

³⁶ See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

Ex Parte Rules. This proceeding has been designated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.³⁷ Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

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Additional Information. For further information regarding this Public Notice, please contact Matthew Pearl, Wireless Telecommunications Bureau, at Matthew.Pearl@fcc.gov or 202-418-2607.

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³⁷ 47 CFR §§ 1.1200 *et seq.*