

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of

Expanding Flexible Use of the 3.7 to 4.2
GHz Band

GN Docket No. 18-122

Petition for Rulemaking to Amend and
Modernize Parts 25 and 101 of the
Commission's Rules to Authorize and
Facilitate the Deployment of Licensed Point-
to-Multipoint Fixed Wireless Broadband
Service in the 3.7-4.2 GHz Band

RM-11791

Fixed Wireless Communications Coalition,
Inc., Request for Modified Coordination
Procedures in Band Shared Between the
Fixed Service and the Fixed Satellite Service

RM-11778

REPLY COMMENTS OF GOOGLE LLC

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Table of Contents

I. INTRODUCTION AND SUMMARY.....	2
II. SHARING BETWEEN FSS AND FIXED BROADBAND SERVICES IS VIABLE AND VALUABLE.....	3
A. Database Technologies Can Accommodate FSS Operations as New P2MP Uses Are Introduced.....	4
B. An Accurate and Current IBFS Database Is Essential to Maximizing the Utility of the C-Band.....	7
C. Immediately Authorizing Fixed P2MP Services Will Benefit the Public Interest.....	9
D. Extending the Freeze on New Earth Station Registrations Would Increase Certainty for New Entrants.....	11
E. Protective “Full-Band, Full-Arc” Registrations Should Be Eliminated.....	11
III. REPURPOSING UNNEEDED FSS SPECTRUM TO ADVANCE MOBILE 5G IS FEASIBLE WITHOUT USING A RISKY PRIVATE-ADMINISTRATOR APPROACH.....	14
A. C-Band Spectrum Can Be Repurposed Without Endangering Content Delivery.....	14
B. Numerous Issues Would Need to be Resolved Before the Commission Could Forego an Auction and Rely on a Private Administrator to Repackage C-Band Spectrum.....	21
i. The Private-Administrator Approach Is Not Guaranteed to Optimize Spectrum Availability and May Undermine Competition.....	22
ii. C-Band Licensees and Potential Buyers May Not Receive Equitable Treatment in a Private Sale.....	24
iii. A Private Sale May Take Longer Than an Open Auction.....	25
IV. CONCLUSION.....	28

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Spectrum sharing in the 3.7 to 4.2 GHz band (C-Band) offers unique opportunities to foster expanded wireless service by point-to-multipoint (P2MP) service providers and flexible-use licensees, without constraining fixed-satellite service (FSS) operations. Expeditious action to unleash the potential of this spectrum is fundamental to ensuring the development of a robust 5G ecosystem and should be a high priority for the Commission.

I. INTRODUCTION AND SUMMARY

Comments filed in response to the Notice of Proposed Rulemaking (NPRM)¹ strongly support the Commission's proposals to open the C-Band for both fixed P2MP² and mobile broadband.³ Doing so will foster the 5G transition by providing new mid-band spectrum resources for fixed P2MP services to serve rural areas and industrial wireless operations, as well as mobile flexible-use wireless operations to primarily serve population centers. Additionally, opening the C-Band will help implement the Congressional directive under Section 603(a)(1) of the MOBILE NOW Act that the Commission work to identify an additional 255 megahertz of spectrum for mobile and fixed wireless broadband use.⁴

To ensure that its rules allow intensive use and do not unnecessarily allow spectrum to lay fallow, the Commission should immediately permit fixed P2MP services to operate throughout the band on an opportunistic basis. As commenters explain, allowing fixed P2MP services to operate in locations and on channels where FSS or flexible-use licensees are not present will protect these licensees while bringing unused frequencies into operation. To institute this system commenters rightly support:

- Using a robust but straightforward automated database to manage spectrum sharing;
- Ensuring that FSS licensees meet their obligations to keep accurate and current registration information in the International Bureau Filing System (IBFS) database; and

¹ *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Order and Notice of Proposed Rulemaking, FCC No. 18-91, GN Docket No. 18-122 (adopted July 12, 2018) (NPRM).

² See *id.* ¶¶ 116-119.

³ See *id.* ¶¶ 49-57.

⁴ See *id.* ¶ 7; Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, Div. P, Title VI (MOBILE NOW Act) § 603(a).

- Eliminating overbroad “full-band, full-arc” registrations that artificially block the use of spectrum that is in fact vacant.

The record also supports repurposing surplus FSS spectrum for flexible-use operations including mobile. The C-Band Alliance confirms that FSS licensees can relinquish hundreds of megahertz of C-Band spectrum for mobile and other terrestrial uses without harming satellite delivery of content. A variety of commenters confirm that the band is significantly underutilized and recommend the creation of a lower sub-band for mobile terrestrial services.

The record brings to light significant risks if the Commission forgoes an auction in favor of reliance on a private administrator to accomplish mobile entry in the C-Band. Specifically, commenters suggest that a private-administrator framework would not optimize spectrum availability for 5G, nor safeguard (much less promote) competition, and may not treat existing FSS licensees and prospective terrestrial licensees equitably. Finally, creating, implementing, and potentially litigating a private-administrator approach might well take longer than a Commission-supervised auction, removing the central argument in favor of this proposal.

II. SHARING BETWEEN FSS AND FIXED BROADBAND SERVICES IS VIABLE AND VALUABLE.

The Commission’s proposal to allow fixed P2MP services in the upper portion of the C-Band, where FSS licensees will continue to operate even after mobile services enter the lower portion of the band, is commendable. This spectrum sharing will enable 5G deployments in furtherance of the Commission’s goal of intensifying use of C-Band frequencies.

A. Database Technologies Can Accommodate FSS Operations as New P2MP Uses Are Introduced.

The Commission can rely on existing tools to accommodate FSS operations while fostering innovative new P2MP uses. The current frequency coordination process should be automated to “enforce real-time, real-world interference protection criteria for incumbent FSS earth stations, enforce denials of permission to operate in areas where flexible-use licensees eventually deploy and commence service, and enable faster and more cost-effective coordination” for any authorized P2MP deployments.⁵ These database systems could incorporate both real-world data submitted to the IBFS by earth station operators and detailed information on terrain, clutter (such as foliage and buildings), and other geographic information system (GIS) datasets to allow more intensive spectrum use.⁶

Database-managed coordination between FSS and fixed broadband operators would present minimal burdens for existing licensees or P2MP licensees. Enabling spectrum sharing in the C-Band is not as complex as the Spectrum Access System (SAS) approach developed for the 3.5 GHz Citizens Broadband Radio Service (CBRS) band, or even using TV white spaces. Here, unlike those other services, the locations of both protected users and new entrants are fixed, static, and known. Incumbents do not include classified military mobile operations, which drive most of the complexity in the Part 96 rules for CBRS.⁷ P2MP links and the overwhelming majority of satellite earth

⁵ Comments of the Broadband Connects America Coalition (BCAC) at 23, GN Docket No. 18-122 (filed Oct. 29, 2018) (BCAC Comments).

⁶ *Id.* at 23.

⁷ See Comments of the Broadband Access Coalition at 31, GN Docket No. 18-122 (filed Oct. 29, 2018) (BAC Comments). See *also* 47 C.F.R. §§ 96.15(a)(2)-(a)(3) (explaining that use of Citizens Broadband Radio Service Devices (CBSDs) only should be authorized “consistent with information on federal frequency use obtained from an

stations do not move in their ordinary operations.⁸ On account of this key fact, the Commission can adopt a very lightweight automated database authorization system to modernize the time-consuming coordination process codified in Part 101 of the Commission's rules.⁹ This frequency management database system could be combined with a requirement that P2MP equipment be operable across the C-Band so that fixed operators can accommodate changes to the locations or frequencies in earth station registrations.¹⁰

The same database technologies can allow immediate P2MP fixed wireless deployments in the lower half of the band without foreclosing future use of the same spectrum for mobile.¹¹ If all P2MP radios were frequency agile and operable in any 20-megahertz channel across the entire C-Band, P2MP operators could change

approved [Environmental Sensing Capability (ESC)]" and "Category A CBSDs may only be authorized consistent with information on federal frequency use provided to the SAS by an approved ESC").

⁸ A small number of earth stations are associated with maritime or offshore operations. See, e.g., Comments of Global Eagle Entertainment at 1, GN Docket No. 18-122 (filed Oct. 29, 2018) (Global Eagle Comments); Comments of ITC Global, Inc. at 2-4, GN Docket No. 18-122 (filed Oct. 29, 2018); Comments of Speedcast Communications, Inc. at 3, in GN Docket No. 18-122 (filed Oct. 29, 2018). The Commission could address these instances by allowing port authorities to register appropriate frequencies at active commercial docks and anchorages where earth stations may be found on an ongoing basis. Because the possibility of harmful interference between a fixed service terrestrial link and a ship in transit is vanishingly small, protection of these moving earth stations should not be a roadblock to freeing up significant amounts of spectrum for 5G.

⁹ See, e.g., Comments of Google LLC at 9, GN Docket No. 18-122 (filed May 31, 2018) (May 2018 Google Comments); Letter from Austin C. Schlick, Director, Communications Law, Google LLC, to Marlene H. Dortch, Secretary, FCC at Attachment 10-11, GN Docket No. 17-183 (filed Feb. 13, 2018); Comments of Google LLC and Alphabet Access at 9-11, GN Docket No. 17-183 (filed Oct. 2, 2017); Reply Comments of Google Fiber Inc. at 4-5, RM-11778 (filed Jan. 24, 2017).

¹⁰ See Comments of Dynamic Spectrum Alliance at 7, GN Docket No. 18-122 (filed Oct. 29, 2018) (DSA Comments).

¹¹ BCAC Comments at 21-22.

frequencies as needed to clear spectrum for flexible-use licensees.¹² As in the adjacent CBRS band, frequency agile, fixed P2MP operations governed by an automated Part 101 geolocation database can accommodate reallocation of part of the band to mobile carriers or any other service.¹³ P2MP equipment similarly could be reconfigured to adapt to other higher-priority uses that the Commission might permit in the band in the future.

Consistent with analysis previously submitted to the Commission,¹⁴ Google believes that there is substantial opportunity for co-channel sharing between P2MP and existing FSS operations in C-Band. With co-channel sharing, concerns with accommodating a sudden change of transponders or other dynamic frequency effects fade away,¹⁵ because coexistence with the FSS system, even on the same frequency, has been assured based on location and beam characteristics. FSS systems are free to modify or expand their frequency use with little or even no notice, without creating a conflict with P2MP operations. Even with FSS operations condensed into a smaller portion of the band after clearing for flexible use, opportunity will exist for P2MP systems to share with FSS operations, particularly in rural areas where earth station deployment is sparse.

¹² *See id.* at 22.

¹³ *Id.*

¹⁴ *See* Letter from Stephen E. Coran, Counsel to the Wireless Internet Service Providers Association, to Marlene H. Dortch, Secretary, FCC, at Broadband Access Coalition/Google Attachment 2, GN Docket No. 17-183, RM-11791 (filed Mar. 29, 2018) (with attachments offering detailed technical analysis that demonstrates P2MP networks' ability to protect FSS operations in large, rural parts of the country on a co-channel basis).

¹⁵ *See, e.g.*, Comments of Comcast Corporation and NBCUniversal Media, LLC at 16, 34, GN Docket No. 18-122 (filed Oct. 29, 2018) (Comcast-NBCUniversal Comments); Comments of the Content Companies at 3-4, GN Docket No. 18-122 (filed Oct. 29, 2018) (Content Companies Comments).

Commenters who claim that sharing between P2MP and FSS is impracticable fail to consider beamforming technologies.¹⁶ As discussed by BCAC, the highly directional nature of P2MP permits coordination of sectors even when co-channel earth stations are in the area, but located outside of the base station's beam.¹⁷ Network planning tools and technologies such as adaptive null forming can be used to avoid interference to registered earth stations even if they are both nearby and co-channel. As BCAC explains, "co-channel sharing is possible by P2MP deployments in areas that do not have any nearby earth stations, or by using directional antennas that point away from earth stations that are close enough that interference is a risk."¹⁸ Reliance on these technologies can resolve content companies' concerns about P2MP emissions.¹⁹ While installation of P2MP systems will not be possible everywhere, the Commission should offer fixed system operators flexibility to employ technologies that address the FSS industry's concerns. Any calls to reject sharing between P2MP and FSS without serious technical evaluation should be rejected.

B. An Accurate and Current IBFS Database Is Essential to Maximizing the Utility of the C-Band.

Because of the crucial role it plays in expanding opportunities for use of C-Band spectrum, an accurate IBFS database must not come with an expiration date. FSS licensees should be required to certify the accuracy of their earth station facilities and keep their registrations up-to-date if operational parameters change.

¹⁶ See, e.g., Comcast-NBCUniversal Comments at 36.

¹⁷ BCAC Comments at 19-20.

¹⁸ BCAC Comments at 20.

¹⁹ Content Companies Comments at ii.

The Commission already requires detailed, accurate registrations in the 3.5 GHz CBRS band, and they are equally important here.²⁰ In non-co-channel sharing scenarios, frequency coordinators and prospective C-Band users alike need this information on an ongoing basis to ascertain how much spectrum and which specific frequencies are available in a geographic area. In co-channel sharing cases, knowing actual pointing direction(s) or range(s) of FSS dishes maximizes sharing opportunities.

Calls to excuse FSS licensees from submitting complete and accurate information about their existing earth station operations should therefore be rejected.²¹ FSS licensees already are required to keep their Commission registration information up to date.²² Annual certification requirements would help to ensure that the data in IBFS remains accurate, as would denying interference protection to earth stations with inaccurate location or frequency information in IBFS.

Allowing FSS licensees to cut corners when populating the IBFS database would defeat the purpose of allowing potential entrants to gauge actual spectrum use. For instance, collecting accurate information for only an initial sample of geographic areas²³ would not be sufficient to identify unused spectrum for use by terrestrial operations in the long term. Likewise, if the nationwide database did not reflect actual spectrum use

²⁰ 47 C.F.R. § 96.17(d).

²¹ See, e.g., Comments of GCI Communication Corp. at 24, GN Docket No. 18-122 (filed Oct. 29, 2018) (GCI Comments); Comments of NCTA at 32-37, GN Docket No. 18-122 (filed Oct. 29, 2018) (NCTA Comments); Comments of C-Band Alliance at 52-53, GN Docket No. 18-122 (filed Oct. 29, 2018) (C-Band Alliance Comments).

²² See 47 C.F.R. § 25.162 (prescribing “termination” of protection if an earth station is inactive or operates in a manner inconsistent with its registration). See also FCC Form 312 at 4 (requiring applicants to provide “true, complete and correct” registration information, and to keep the information on file with the Commission current).

²³ See BAC Comments at 18 (explaining that collecting “information for an initial sample of areas would be wholly insufficient.”).

and actual pointing azimuths, then some shared uses of the band could be blocked in order to protect FSS frequencies and pointing directions that are not actually used.²⁴

C. Immediately Authorizing Fixed P2MP Services Will Benefit the Public Interest.

The Commission should decline Ericsson’s proposals to delay authorization of P2MP systems and permit them only “under the same flexible use licenses that allow mobile broadband.”²⁵ As noted above, opportunistic uses are possible *today* on a non-interfering basis by employing databases and existing spectrum sharing techniques.

The benefits of enabling 5G fixed P2MP services at this time, while C-Band spectrum is being cleared for flexible-use mobile services, are substantial. DSA explains that making repurposed C-Band spectrum available for fixed P2MP will help the Commission address the nation’s “ever-increasing wireless broadband needs, connect rural and underserved communities, and advance U.S. leadership in 5G deployment.”²⁶

PISC observes that the C-Band offers a

prime opportunity . . . to authorize robust band-sharing rules that achieve a win-win-win trifecta of critical public policy goals: first, to enable fixed wireless providers to bring high-speed broadband access to unserved and underserved rural, tribal and other areas; second, to reallocate a substantial portion of the band available for mobile 5G networks; and third, to protect incumbent [FSS] licensees from undue disruption or harmful interference.²⁷

²⁴ See C-Band Alliance Comments at 52 (opposing answering “questions seeking detailed usage and technical parameters”); NCTA Comments at 34 (requiring submission of “specific azimuth and elevation” would be a new, overly-burdensome information collection requirement for operators).

²⁵ Comments of Ericsson at 17, GN Docket No. 18-122 (filed Oct. 29, 2018) (Ericsson Comments).

²⁶ DSA Comments at 1.

²⁷ Comments of Public Interest Spectrum Coalition in GN Docket No. 18-122 at 33 (filed Oct. 29, 2018) (PISC Comments).

Microsoft notes how, particularly in rural areas, fixed P2MP broadband service in the C-Band “is an important tool in the toolbox to extend wireline networks and reach more locations or upgrade underserved locations with faster speeds.”²⁸ As Robert Bosch highlights, using C-Band spectrum to establish private 5G networks for manufacturing and other industrial applications promises a “great leap forward in industrial efficiency and output.”²⁹

Allowing P2MP to share the upper part of the band with FSS operations would not adversely affect aviation systems operating above 4.2 GHz.³⁰ In fact, P2MP operations are inherently more compatible than mobile with adjacent-band aviation uses because, unlike uncontrolled mobile antennas, P2MP antennas are installed to point horizontally. With mobile operations allocated only to a lower portion of the C-Band, interference concerns from upward-pointing or dense mobile deployments would not arise near 4.2 GHz.

Undoubtedly, allowing P2MP systems in the C-Band will have its complications, but that is inherent in putting underutilized spectrum like the C-Band to more productive, shared use. The Commission should allow industry to begin putting the spectrum to work right away.

²⁸ Comments of Microsoft Corporation at 3, GN Docket No. 18-122 (filed Oct. 29, 2018) (Microsoft Comments).

²⁹ Comments of Robert Bosch LLC et al. at 5, GN Docket No. 18-122 (filed Oct. 29, 2018).

³⁰ *See generally* Comments of Aerospace Industries Association and the General Aviation Manufacturers Association, GN Docket No. 18-122 (filed Oct. 29, 2018).

D. Extending the Freeze on New Earth Station Registrations Would Increase Certainty for New Entrants.

Some commenters urge maintaining the ban on registering “new” C-Band earth stations.³¹ That approach would make access to the C-Band more predictable for P2MP operators, and thus further facilitate their entry. Even without extension of the ban, however, both new earth station registrations and updates to existing registrations should be relatively infrequent given the general lack of growth in C-Band delivery, making it feasible for shared users to accommodate FSS changes.

E. Protective “Full-Band, Full-Arc” Registrations Should Be Eliminated.

Coordination of new uses with protected FSS earth stations should be based on the earth stations’ actual spectrum usage, rather than excessively protective “full-band, full-arc” registrations. Current Commission policy allows large portions of the band that are unused by full-band, full-arc licensees/registrants to lie fallow, as new providers must coordinate with incumbents “as if they used the entire 500 MHz along the entire geostationary arc from the earth station location.”³² These aggressive registrations are all the more concerning given the C-Band Alliance’s eagerness to sell rights to licensed C-Band frequencies, which leaves no doubt that there is “gross underutilization of the spectrum” today.³³

A particularly egregious use of full-band, full-arc licensing is even evident in the new registration data—data entered after the wasteful nature of full-band, full-arc registrations became a policy issue. One licensee alone submitted 3185 registrations for

³¹ Comments of CTIA at 11, GN Docket No. 18-122 (filed Oct. 29, 2018) (CTIA Comments).

³² DSA Comments at 15.

³³ Microsoft Comments at 5.

previously unregistered earth stations. In all but 13 instances, the licensee claimed the full 500 MHz of spectrum use.³⁴ In all but one of the registrations, the licensee claimed use of the entire visible geostationary arc. However, technical data provided on the licensee's own website³⁵ show that, in the U.S. and Canada, the licensee's system uses only a single transponder (36 MHz) of spectrum on a single satellite. The information on the web page has not changed since June 19, 2017 (approximately 18 months ago), thereby invalidating the claim that the licensee requires ongoing full-band, full-arc protection.

Vastly overclaiming spectrum use is easy when there is no associated cost to the licensee and apparently no repercussions for doing so. It is precisely this behavior that allows the satellite industry to claim it is unable to share spectrum, when sharing would be straightforward if actual spectrum use was accurately documented.

FSS incumbents' arguments that they need the full-band, full-arc system to accommodate switching transponders or frequencies are incorrect. Using an "automated spectrum management database would provide flexibility to FSS operations while still enabling vastly greater use of the band."³⁶ Similar databases are presently functioning successfully in more complex and dynamic spectrum sharing environments, including the CBRS band. Database technology can support changes to transponder and frequency use by reserving specific back-up transponders or frequencies in case of emergency while still preserving large amounts of spectrum available for more intensive

³⁴ The 13 exceptions list 3700 MHz as the lower frequency and 0 for the upper frequency. Therefore, the intended range cannot be deciphered.

³⁵ The Church of Jesus Christ of Latter-Day Saints, *Worldwide Satellite Carriers* (last updated July 19, 2017) <https://www.lds.org/help/support/satellite-carriers?lang=eng>.

³⁶ DSA Comments at 15.

use. Indeed, FSS operators like Intelsat offer back-up transponder capacity as a commercial service,³⁷ a practice that can be taken into account by the licensing regime the Commission adopts to replace the full-band, full-arc system.

Instead of continuing to allow overly broad full-band, full-arc registrations, the Commission should, as CTIA suggests, investigate whether incumbents' operations actually "require the flexibility to move among any transponder on any satellite across the full arc, or whether all or certain users' licenses or registrations should be limited to only those frequencies, azimuths, and elevation angles reported as in regular use."³⁸ This review would address the concern expressed by satellite operators that full-band, full-arc registrations are needed to support redundant backup capacity.³⁹

In addition to backups, FSS operators claim they need full-band, full-arc flexibility to "manage their spectrum to suit their business needs, automatically account for agreed upon protection zones, and facilitate secondary markets transactions."⁴⁰ None of those needs, however, requires instantaneous changes to earth station operations. All can be coordinated through the database-managed interference protection system, freeing up valuable spectrum.

³⁷ See Intelsat S.A., Form 6-K at 13 (July 2018), <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9Njk4MDcyfENoaWxkSUQ9NDA5NDA5fFR5cGU9MQ==&t=1> (stating that Intelsat provides "back-up transponder capacity that is held on reserve for certain customers on agreed-upon terms.").

³⁸ CTIA Comments at 14.

³⁹ *Id.*

⁴⁰ Comments of Federated Wireless, Inc. at 2, GN Docket No. 18-122 (filed Oct. 29, 2018) (Federated Wireless Comments).

III. REPURPOSING UNNEEDED FSS SPECTRUM TO ADVANCE MOBILE 5G IS FEASIBLE WITHOUT USING A RISKY PRIVATE-ADMINISTRATOR APPROACH.

As confirmed by a wide variety of commenters, surplus C-Band spectrum exists that can be made available for 5G services. FSS companies themselves agree that they can operate successfully with hundreds of megahertz less spectrum than is currently allocated to satellite services in the C-Band. Record evidence discussed below confirms that this is the case because the C-Band is dramatically underutilized, content providers and distributors have alternative satellite-band options, fiber usage can replace some current C-Band operations, and content delivery can be accomplished by new terrestrial wireless operations.

But the stakes in the global race to 5G are too high to gamble on an unproven approach to repurposing valuable C-Band spectrum, without careful consideration. Before betting against the time-tested practice of assigning repurposed spectrum through an auction, the Commission would need to tackle head on all the numerous uncertainties and risks involved in using a private transition facilitator.

A. C-Band Spectrum Can Be Repurposed Without Endangering Content Delivery.

The C-Band holds the potential to support more intensive use,⁴¹ and commenters confirm that the band has excess capacity to give. Indeed, C-Band Alliance members self-report that they have enough surplus mid-band spectrum for the Commission to “make up to 200 MHz” available for 5G “while ensuring that satellite operators can

⁴¹ NPRM ¶¶ 2, 57 (emphasizing a desire to “promote more efficient and intensive fixed use of the band” while asking about current and prospective intensity of band usage).

protect the services their customers' businesses" require.⁴² Using a smaller frequency range would continue to provide FSS companies with enough spectrum for current operations, while allowing for future growth.⁴³ As the C-Band Alliance admits, FSS operators are able to release spectrum without compromising the "quality, reliability and certainty that customers need to successfully operate and grow their businesses."⁴⁴

Commenters demonstrate how moving FSS operations to a substantially smaller frequency range is feasible and consistent with Commission policy goals. Google agrees with Ericsson that "earth stations can be repacked into a portion of the C-Band given the excess capacity that exists today" because "only 37 percent of C-Band satellites have any significant transponder usage, and transponder equivalent . . . demand is expected to decline by 26 percent over the ten year period from 2017 to 2026."⁴⁵ And as CTIA notes, allowing "large amounts of spectrum [to] 'go needlessly unused,'" is "contrary to the core principles of spectrum management."⁴⁶

Commenters including CTIA and AT&T explain that history need not dictate current or future uses of the C-Band or delivery methods for video programming and

⁴² See C-Band Alliance Comments i. See also Letter from Jennifer D. Hindin, Counsel to C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 17-183, 18-122 (filed Oct. 23, 2018); Comments of AT&T Services at 2, GN Docket No. 18-122 (filed Oct. 29, 2018) (AT&T Comments) (noting that the C-Band Alliance recently has suggested that 200 MHz of C-Band spectrum "could be reallocated to accommodate terrestrial flexible use while continuing to meet satellite needs.").

⁴³ See Letter from Jennifer D. Hindin, Counsel to C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, at 2, GN Docket Nos. 17-183, 18-122 (filed Oct. 17, 2018).

⁴⁴ *Id.*

⁴⁵ See Ericsson Comments at 14-15. See also *S&P Warns of Difficulties Facing Satellite Industry*, *Eutelsat, Inmarsat, SES*, *Comm. Daily*, 10 (Nov. 23, 2018) (noting that the overall demand for satellite service could decline if broadcasters "consolidate services on existing capacity via compression technology or internal initiatives," and due to competition from other distribution networks, including fiber).

⁴⁶ See CTIA Comments at 13-14; AT&T Comments at 8.

other content.⁴⁷ Instead, FSS operators can transition to alternative transmission media or new technologies as C-Band spectrum is being repurposed.⁴⁸ Other satellite bands, including the Ku-band and the Ka-band, can replace C-Band offerings without creating significant disruptions to customers.⁴⁹ Alternatively, satellite providers can employ compression technologies to “deliver the same amount of traffic using a smaller number of transponders” to free up spectrum.⁵⁰

Fiber distribution is another option that allows the Commission to repurpose a portion of the C-Band for more efficient uses. Content providers can “connect[] more headends to a fiber distribution system” to “reduce the spectrum needed for this service.”⁵¹ In many cases, as CTIA explains, fiber delivery is superior to distribution via C-Band FSS: “fiber offers security from radiofrequency interference; much greater capacity; significantly lower latency; and improved economics compared to the cost of deploying and maintaining satellites.”⁵²

Opening the C-Band to terrestrial broadband would provide yet another distribution option for content owners. As Ericsson notes, “alternative means of delivery” for “current C-Band earth station traffic” include “wireless broadband, e.g. 5G.”⁵³ The Commission’s proposal to permit P2MP operations would strengthen these systems as

⁴⁷ See CTIA Comments at 16-17; AT&T Comments at 9 (noting that there likely is some ability to shift certain kinds of C-Band uses to alternative frequencies or other transmission technologies).

⁴⁸ CTIA Comments at 16-17.

⁴⁹ See *id.* at 18-19. See also Ericsson Comments at 14–15.

⁵⁰ CTIA Comments at 19.

⁵¹ Comments of ITIF at 3, GN Docket No. 18-122 (filed Oct. 29, 2018) (ITIF Comments).

⁵² CTIA Comments at 17.

⁵³ Ericsson Comments at 15.

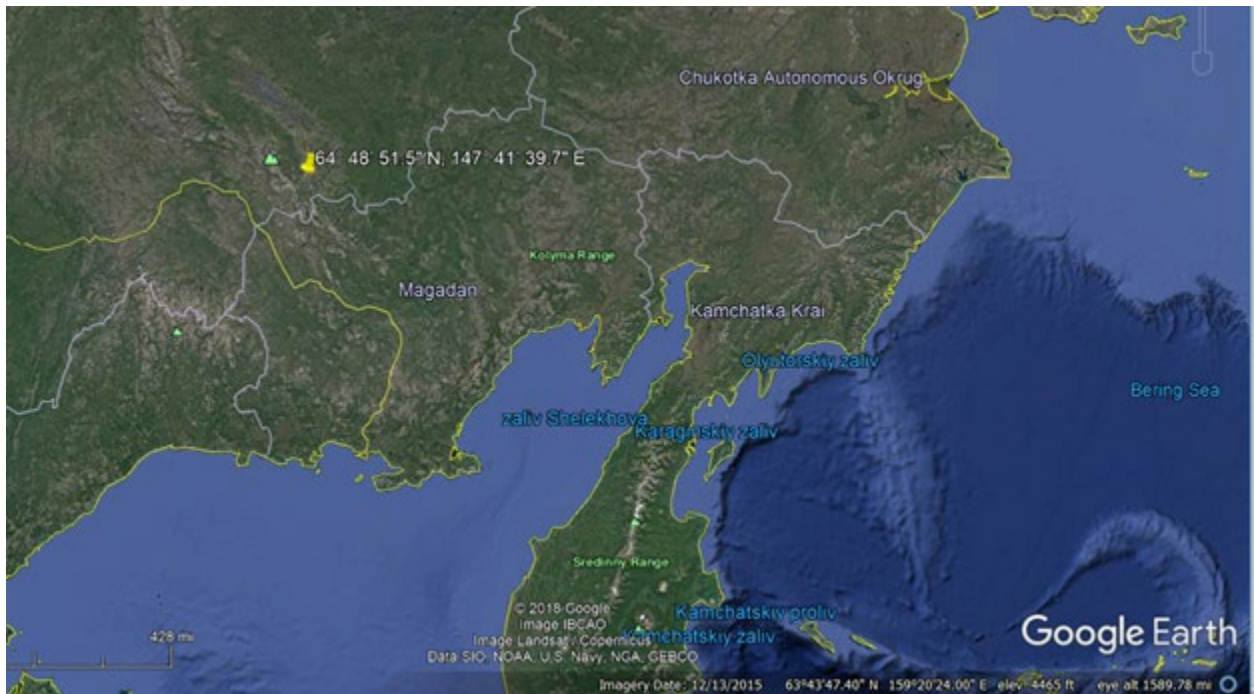
a complement to both fiber and terrestrial mobile networks, extending their range and strengthening their ability to distribute content.

FSS and content companies argue that despite the evidence of underutilization and abundant alternatives, recent new registrations in the Commission's IBFS earth station database suggest that FSS is intensively utilizing the band. This assertion not only fails to address whether 500 MHz of C-Band spectrum will be needed for satellite operations *in the future*, but also distorts the facts today. New earth station registrations indicate that information entered into IBFS may not always accurately represent operational earth stations. Until the Commission addresses outdated and erroneous registrations in IBFS, basing any analysis of band utilization primarily on the number of registrations, new or old, would be inappropriate.

Indeed, new registrations highlight problems with IBFS, rather than solving them. Even a partial analysis of new registrations reveals earth stations at locations suggesting the registration is an error or otherwise improper. For example, recent registrations include earth station coordinates for locations in the middle of the ocean, at the North Pole, and in Siberia.



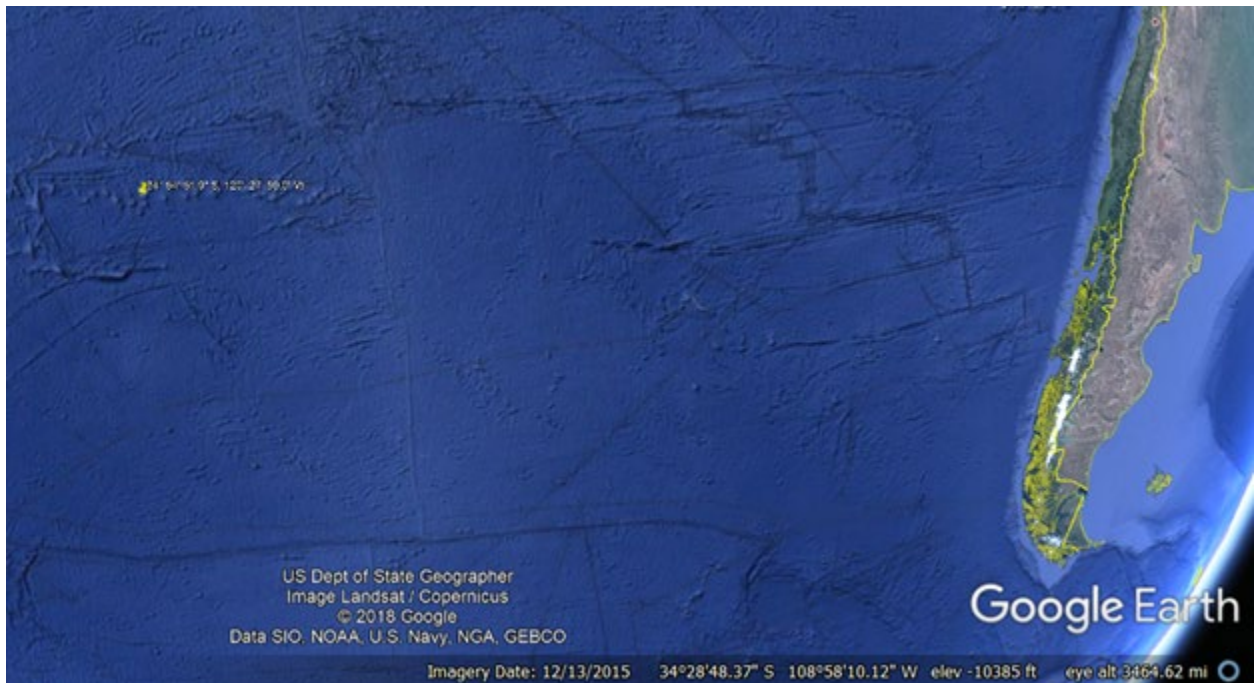
(87° 38' 36.46" N, 180° 0' 0.0" W (Geographic North Pole); Licensee: EnTouch; File Number: SES-REG-INTR2018-06686)



(64° 48' 51.5" N, 147° 41' 39.7" E (Siberia); Licensee: Gray Television Licensee, LLC; File number: SES-REG-INTR2018-06004)

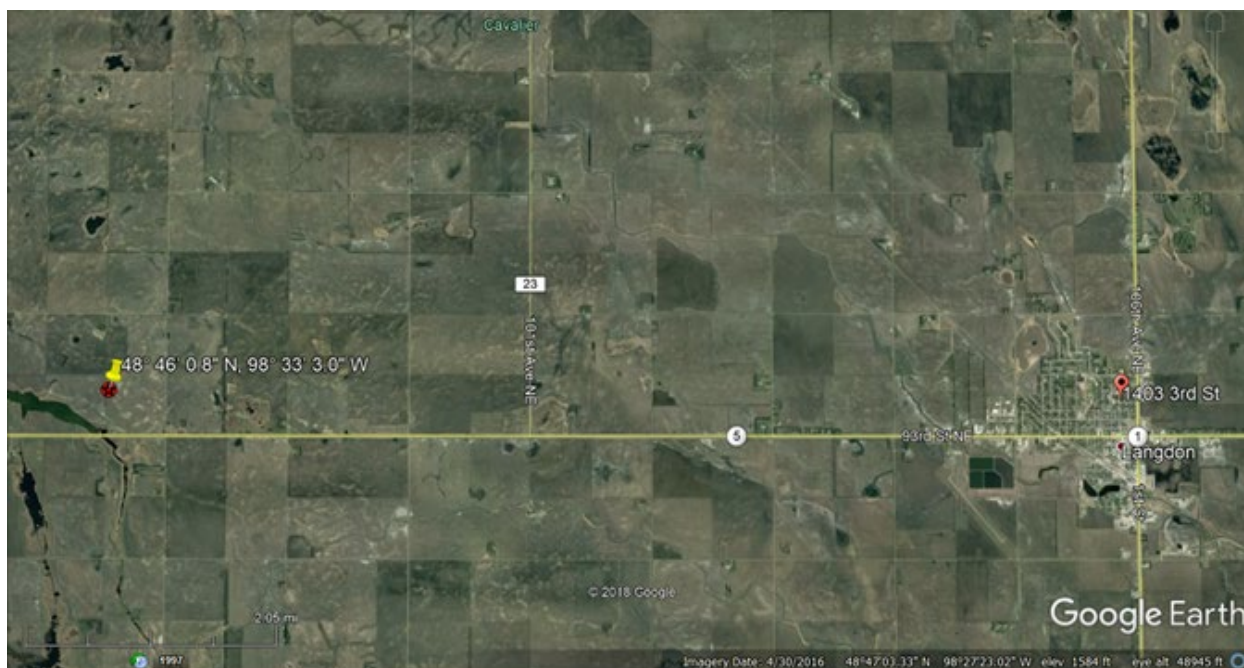


(37° 35' 54.0" N, 49° 19' 60.0" W (Atlantic Ocean); Licensee: Nex-Tech LLC; File Number: SES-REG-INTR2018-08020)



(34° 54' 51.9" S, 120° 27' 50.0" W (South Pacific Ocean); Licensee: Entravision Holdings, LLC; File Number: SES-REG-INTR2018-05159)

While these registrations contain apparent errors that are obvious from the latitude and longitude given in the registration, they also suggest that problems with new earth station registrations may run much deeper. Inaccurate registrations in areas that could possibly support an earth station, but actually contain no such facility, are much harder to identify. For example, the application for one recent registration lists “1403 Third Street, Langdon, ND, 58249” as the location of the earth station site. However, the coordinates provided on the application ($48^{\circ} 46' 0.8''$ N, $98^{\circ} 33' 3.0''$ W) are for a location approximately eight miles west of that address, suggesting an error in calculating or entering the coordinates:



($48^{\circ} 46' 0.8''$ N, $98^{\circ} 33' 3.0''$ W; Licensee: Simmons Broadcasting, Inc.; File Number: SES-REG-INTR2018-06417)

Thus, although the coordinates provided in the application describe a location that could possibly support an earth station, the location does not contain an earth station. The address provided on the application shows that the earth station is actually located in

the town of Langdon. Until the Commission identifies and resolves such registration errors, reliance on the number of registrations as per se evidence of intensity of use would be inadvisable.

Even factoring in valid new registrations, moreover, the C-Band remains tremendously underutilized. Nearly half of FSS sites are in urban areas. Suburban and rural areas have a low concentration of sites, leaving huge areas of the country where there is no nearby earth station at all.⁵⁴ When considering whether there is surplus spectrum in the band that could be used for terrestrial services, there is no reason to ignore earth-station-free rural areas. Even in areas with valid earth station registrations, real-world operation of an FSS system means that most frequencies in the band continue to be unused due to the allowance of full-band, full-arc registrations that inefficiently block other uses of these empty frequencies. Given the intense demands on spectrum resources for terrestrial operations, the congressional requirement in the MOBILE NOW Act that the Commission identify new spectrum for broadband,⁵⁵ and the alternatives available to content owners, continued underuse of the C-Band lacks justification.

B. Numerous Issues Would Need to be Resolved Before the Commission Could Forego an Auction and Rely on a Private Administrator to Repackage C-Band Spectrum.

While repacking FSS operations in order to free spectrum for flexible use is the right path, using a private approach as suggested by the C-Band Alliance poses

⁵⁴ See Comments of Google LLC at 3, GN Docket No. 18-122 (filed Oct. 29, 2018) (Google Comments).

⁵⁵ See Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, Div. P, Title VI (MOBILE NOW Act) § 603(a).

significant risks.⁵⁶ Repurposing excess C-Band spectrum through an auction provides much greater certainty.⁵⁷ NCTA correctly notes that the Commission is obliged to manage spectrum in a way that promotes the public interest in this shared resource, and caution is necessary before ceding that responsibility to a private administrator.⁵⁸ Among the numerous challenges of using a private transition facilitator are optimizing the utility of repurposed spectrum for the nation (rather than for profit maximization by C-Band licensees), promoting development of 5G networks, and ensuring that all C-Band licensees receive equitable treatment.⁵⁹ As the record reflects, use of an untested private-administrator approach jeopardizes achievement of these goals.⁶⁰

i. The Private-Administrator Approach Is Not Guaranteed to Optimize Spectrum Availability and May Undermine Competition.

Maximizing the overall utility of the C-Band—not serving the individual interests of a small set of companies—should be the goal of repurposing spectrum.⁶¹

Recognizing this, the Commission correctly questioned in the NPRM whether a private administrator would produce “the most economically efficient allocation of the band

⁵⁶ See C-Band Alliance Comments at 3-5.

⁵⁷ See Comments of American Cable Association at 15-16, GN Docket No. 18-122 (filed Oct. 29, 2018) (ACA Comments); Comments of Competitive Carriers Association at 7-8, GN Docket No. 18-122 (filed Oct. 29, 2018) (CCA Comments); DSA Comments at 16; Comments of Nokia at 2, GN Docket No. 18-122 (filed Oct. 29, 2018) (Nokia Comments); PISC Comments at 22-27; T-Mobile Comments at 5; Comments of U.S. Cellular at 4, GN Docket No. 18-122 (filed Oct. 29, 2018) (U.S. Cellular Comments). Some commenters who potentially support a private sale approach nevertheless emphasize that safeguards and Commission oversight would be necessary. AT&T Comments at 15-16; Comments of Charter at 4, GN Docket No. 18-122 (filed Oct. 29, 2018) (Charter Comments); Global Eagle Comments at 4.

⁵⁸ NCTA Comments at 28.

⁵⁹ See NPRM ¶¶ 2-5.

⁶⁰ See U.S. Cellular Comments at 11; T-Mobile Comments at 11-12; DSA Comments at 17; Comcast-NBCUniversal Comments at 23-30; CCA Comments at 7-8; NCTA Comments at 28-29; PISC Comments at 31-32.

⁶¹ See Nokia Comments at 7-8, 10.

between services,”⁶² or instead would “result in a situation in which those sellers offer a lower quantity than is socially efficient.”⁶³ Concerns are prevalent that the private-administrator approach would not produce an efficient outcome that best serves the public interest.⁶⁴ As T-Mobile observes, a private transition mechanism is “not likely to generate true market-based results.”⁶⁵

In a private sale, a subset of C-Band operators could seek to maximize their profit by “negotiating to reduce payments” to Commission licensees “that do not elect to participate” or by suppressing the supply of spectrum to raise prices.⁶⁶ Because of their control over exclusive government permissions, these satellite operators would likely demand higher prices than those supported by a competitive market, leading to a less than “socially optimal amount of spectrum” being made available for terrestrial use.⁶⁷ Furthermore, unlike a Commission auction, the private approach might not be designed to attract wide participation from potential mobile wireless broadband providers. Exacerbating this uncertainty, the private approach removes direct participation by the Commission, making improper favoritism of particular companies harder to detect.

The Commission can remove these risks by relying on its time-tested auction mechanism.⁶⁸ An auction can be structured to optimize competitive bidding, to incentivize existing FSS operators to repurpose spectrum resources, and to maximize

⁶² NPRM ¶ 57.

⁶³ *Id.* ¶ 71.

⁶⁴ AT&T Comments at 15; T-Mobile Comments at 12-13; U.S. Cellular Comments at 8-11.

⁶⁵ T-Mobile Comments at 13.

⁶⁶ DSA Comments at 17.

⁶⁷ T-Mobile Comments at 13.

⁶⁸ *See, e.g., id.* at 5-7; DSA Comments at 17; PISC Comments at 22 (“Without full transparency and close FCC supervision, a private sale is also likely to distort competition in the mobile market.”).

C-Band utility.⁶⁹ A private transition, however, might be conducted in a way that minimizes band sharing and perpetuates inefficient use of C-Band spectrum.⁷⁰

ii. C-Band Licensees and Potential Buyers May Not Receive Equitable Treatment in a Private Sale.

Smaller satellite operators explain that if a consortium of a few large operators is allowed to “determine eligibility based on their own, self-determined criteria,” then the sellers “will have every incentive to exclude smaller operators from participating: they would maximize their gains from the repurposing, with the added benefit of crippling their smaller competitors.”⁷¹ The C-Band Alliance appears to anticipate such exclusion, opining that “[g]iven the market share of the satellite operators already participating, additional satellite operator members are not essential to the success of the Market-Based Approach.”⁷² Concerns of smaller FSS licensees therefore appear to be well grounded.

FSS earth station operators, which buy service from the FSS licensees, also express concerns about representation and compensation through the C-Band Alliance proposal.⁷³ GCI Communications observes that the “interests of satellite operators often conflict with the interests of their customers,” and that “[t]he lack of opportunity for earth station operators to have a voice in the transition or cost recovery process would be

⁶⁹ CCA Comments at 7.

⁷⁰ PISC Comments at 32; DSA Comments at 16 (explaining that “parties to private transactions would have a disincentive for allowing opportunistic sharing in the planned flexible-use portion of the band if they believe it will reduce the transaction price for the seller, even if it increases the intensity of use of the band, especially in rural areas.”).

⁷¹ See Comments of ABS, Hispasat, and Embratel at 10, GN Docket No. 18-122 (filed Oct. 29, 2018).

⁷² C-Band Alliance Comments at 22.

⁷³ See GCI Comments at 16-18; Global Eagle Comments at 9; NCTA Comments at 22-24; Comments of PSSI Global at 17, GN Docket No. 18-122 (filed Oct. 29, 2018).

concerning seeing as their services would be the most impacted by the proposed potential modifications” to the C-Band.⁷⁴

The private-administrator approach also could disfavor prospective terrestrial wireless licensees. Commission auctions are designed to allow independent participation from a wide range of potential bidders. Collusion among bidders is prohibited, and small businesses and other designated bidders receive participation incentives. A single transition administrator arranging private transactions would not necessarily share this goal of maximizing opportunity.⁷⁵ The C-Band Alliance already has made clear that its focus is on the largest and most well-funded purchasers instead of the wider range of businesses and entities that could bid on spectrum in an auction, stating that its members may enter into transactions with as few as one potential wireless broadband provider.⁷⁶ Dozens of potential bidders could be shut out of a private placement.⁷⁷ As U.S. Cellular notes, “auctions allow for, and attract, broad participation, with each bidder being provided a reasonable opportunity to compete pursuant to a set of predefined rules and procedures.”⁷⁸ These advantages should not be undervalued.

iii. A Private Sale May Take Longer Than an Open Auction.

Proponents of the private-administrator approach contend that the undeniable risks associated with their novel plan are outweighed by the benefits of bringing

⁷⁴ GCI Comments at 17.

⁷⁵ DSA Comments at 17-18.

⁷⁶ T-Mobile Comments at 13 (citing Joint Comments of Intelsat License LLC and Intel Corporation at 8, GN Docket No. 17-183 (filed Oct. 2, 2017)).

⁷⁷ PISC Comments at 25.

⁷⁸ U.S. Cellular Comments at 10.

spectrum resources to the market more quickly.⁷⁹ Delegation to a private administrator, however “does not assure faster deployment than assignment through an auction.”⁸⁰

The C-Band Alliance acknowledges that its proposal does not change the fact that clearing spectrum for terrestrial mobile operations will be “arduous, complex, and costly.”⁸¹ Although the C-Band Alliance has retained a consulting firm to develop a plan to streamline secondary market transactions, it “has not decided on a final plan.”⁸² Rather, it has merely “begun preliminary discussions with prospective purchasers to explore desired band plans and technical parameters.”⁸³ Given the amount of further planning required to develop a framework and to adequately design new Commission rules and policies, the 18 to 36 month timeline provided by the C-Band Alliance seems unrealistic for clearing and repurposing spectrum in the C-Band using a private transition administrator.

Furthermore, opposition by the C-Band Alliance and its supporters to Commission supervision of the repurposing process casts doubt on their willingness to cooperate with the careful Commission oversight required under such a system. In fact, the C-Band Alliance has asserted that extensive Commission oversight of and “approval

⁷⁹ See C-Band Alliance Comments at 5, 8-21 (proposing to clear 200 MHz within 18 to 36 months, and contending that the private transaction approach is the only way to clear spectrum quickly); see *also* Comments of ASRI at 7, GN Docket No. 18-122 (filed Oct. 29, 2018); ITIF Comments at 4; Nokia Comments at 7; Comments of Verizon at 5-6, GN Docket No. 18-122 (filed Oct. 29, 2018); Comments of TIA at 5, GN Docket No. 18-122 (filed Oct. 29, 2018).

⁸⁰ See DSA Comments at 18; see *also* U.S. Cellular Comments at 11 (explaining that the 18 to 36-month timeframe “largely is speculative given the untested, and likely extremely complex, nature of this approach and the large number of parties that would need to voluntarily make binding commitments and take specific actions within rather tight timeframes.”).

⁸¹ C-Band Alliance Comments at 17.

⁸² *Id.* at 5, n.7.

⁸³ *Id.*

for the formation of the Transition Facilitator or a specific participation benchmark” are unnecessary.⁸⁴ If the Commission resorts to a private-administrator approach, then these types of rules are *essential* to protect the public interest.⁸⁵ Resistance to such guardrails would undermine the very process for which the C-Band Alliance advocates and make implementation disputes, with associated substantial delay, a virtual certainty.

A process led by a private transition administrator also would be vulnerable to delays from litigation.⁸⁶ One potential source of litigation is disagreement surrounding whether Section 309(j) of the Communications Act authorizes the use of a private transition facilitator or requires an auction.⁸⁷ If the Commission’s decision to forgo its traditional auction approach for a delegation to a private administrator is challenged in court, substantial delay will follow. Furthermore, reliance on private parties and their consultants to transition spectrum resources still runs the risk of substantial delays, as demonstrated by the 800 MHz rebanding that began with a 36-month timeline and has

⁸⁴ See *id.* at 22; see also Comments of Eutelsat at 9-10, GN Docket No. 18-122 (filed Oct. 29, 2018) (arguing that the Commission “should not impose qualification requirements on the Alliance,” and should “refrain from attempting to micromanage the contractual arrangements that exist between C-band satellite operators and their customers.”); Joint Comments of Intel, Intelsat License LLC, and SES Americom, Inc. Comments at 4, 7, GN Docket No. 18-122 (filed Oct. 29, 2018) (advocating for “minimal FCC intervention” and “[l]imiting Commission oversight”).

⁸⁵ See Google Comments at 1, 13; see also AT&T Comments at 15-16; Charter Comments at 4; Global Eagle Comments at 4.

⁸⁶ See DSA Comments at 18 (explaining that the private placement approach, as proposed, “invites lengthy litigation. The Commission learned this lesson in the pre-auction era, when license assignments were often stuck in legal challenges for years, leading it to adopt the transparency and certainty of auctions.”).

⁸⁷ 47 U.S.C. § 309(j). The C-Band Alliance contends that its proposed approach comports with Section 309(j) because it avoids mutually exclusive applications and would not require use of a competitive bidding system under Section 309(j)(1). See C-Band Alliance Comments at 29-30. PISC disagrees, contending that the C-Band Alliance’s proposal contravenes Congressional intent and undermines Commission obligations. PISC Comments at 22-25.

continued for more than twelve years with various outside consultants retained along the way.⁸⁸ By contrast, the Commission's extensive experience with spectrum auctions allows it to impose objective, concrete, and enforceable deadlines.⁸⁹

IV. CONCLUSION

The C-Band offers a unique opportunity to foster more robust and productive wireless service by flexible-use, FSS, and fixed P2MP service providers. The Commission should continue compiling accurate and complete information about spectrum usage from FSS operators. The Commission also should expeditiously enable fixed P2MP operations into the C-Band, eliminate the use of outdated full-band, full-arc coordination methods, and thoughtfully determine a way to repurpose spectrum for flexible use that serves the public interest without unfairly favoring or disfavoring certain parties or disrupting current FSS operations.

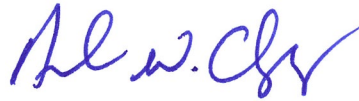
⁸⁸ See Google Comments at 12-13. See also Request for Consent to the Transfer of Control of 800 MHz Transition Administrator, LLC and Notice of Replacement of BearingPoint, Inc. with Deloitte Consulting LLP with respect to the 800 MHz Transition Administrator Team, WT Docket No. 02-55 (filed May 7, 2009).

⁸⁹ U.S. Cellular Comments at 11 (explaining that the industry's and Commission's extensive experience with spectrum auctions allow them to "reliably predict how quickly some or all" of the C-Band spectrum "could be cleared through an auction process involving concrete and readily enforceable deadlines that are not largely established and policed by those responsible for the actual clearing of the spectrum."); T-Mobile Comments at 14 (arguing that as in the broadcast incentive auction, the Commission should "impose a schedule for relocation of incumbent operations out of whatever portion of the band is relicensed at auction. That schedule should associate payment to the satellite consortium with band clearing to ensure prompt clearing of the band. While the satellite consortium may receive a down payment at the conclusion of the auction, it should not receive the majority of the payment until the auction winners have use of the spectrum."). Even Nokia, which is of the view that a private placement approach could repurpose spectrum quickly, observes that "speed must be balanced against other public interest factors that could favor a public auction or other process." Nokia Comments at 7-8.

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