Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:	)	
	)	
Upper C-band (3.98 to 4.2 GHz)	)	GN Docket No. 25-59
	)	

COMMENTS OF THE NATIONAL ASSOCIATION OF BROADCASTERS

I. INTRODUCTION AND SUMMARY

The National Association of Broadcasters (NAB)[1] submits comments in response to the above-captioned Notice of Inquiry.[2] Expanding spectrum opportunities is a laudable goal, and we appreciate that the Commission is taking the time to consider all the competing priorities for this valued spectrum. The Upper C-band is used extensively by broadcasters for the contribution and distribution of programming, including live productions like National Football League (NFL) games and National Association for Stock Car Auto Racing (NASCAR) races, syndicated radio programming, coverage of breaking news, and providing lifesaving information during emergencies. The intensity of broadcasters' use of the Upper C-band has increased in the wake of the Commission's auction of the "Lower C-band," which occurred

[1] The National Association of Broadcasters (NAB) is the nonprofit trade association that advocates on behalf of free local radio and television stations and broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the courts.

[2] FCC Notice of Inquiry, *Upper C-band (3.98 to 4.2 GHz)* GN Docket No. 25-59, FCC 25-13 (Feb. 27, 2025) (Notice of Inquiry or Notice).

less than five years ago.[3]

We believe that with respect to any further reorganization of this band, the Commission's priorities should be to ensure: (1) that continuing incumbent operations remain fully protected from interference to the extent there are any changes made to the Upper C-band; and (2) that the unique capabilities of C-band that are relied upon by incumbent users are fully preserved to the extent users may be transitioned to other bands or platforms. Expanded operations should only be permitted if they are technologically compatible and can realistically co-exist with incumbent operations both in the Upper C-band and in adjacent spectrum.

II. THE COMMISSION SHOULD PROTECT EXISTING C-BAND USERS

A. The C-band is Used Extensively and Intensively

Virtually every U.S. television household views content transmitted via C-band FSS operations. All the major U.S. television networks and many of the smaller ones rely on the Upper C-band for distribution of content to affiliate stations as well as to MVPD head-ends. Most broadcast television stations in the U.S. rely on Fixed Satellite Service (FSS) earth stations to receive network and other syndicated programming that these television stations then transmit to viewers. C-band operations also distribute programming to thousands of cable, DBS, and other telecommunications service provider head-ends. In addition, transportable FSS uplink and downlink systems are used for thousands of broadcast events broadcast each year, bringing viewers coverage of sporting and entertainment events. The C-band is also used for the distribution of content to local radio stations.

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[3] *Auction of Flexible-Use Service Licenses in the 3.7–3.98 GHz Band Closes — Winning Bidders Announced for Auction 107*, Public Notice, AU Docket No. 20-25, DA 21-207 (Feb. 24, 2021).

Alternatives, such as fiber or operation in other satellite bands, may supplement C-band satellite delivery in some circumstances – but cannot provide sufficiently reliable service at the same scale as C-band satellite operations. This is particularly true in the case of simultaneous distribution over very large areas. C-band satellites implement hemispheric coverage, which is not typically available in Ku-band satellites but is critical to cross-continent and intercontinental delivery. Program distribution using a single C-band satellite can therefore simultaneously cover the contiguous United States, its Caribbean territories, and Alaskan rural areas. Replication of C-band coverage from a single satellite may require leasing multiple Ku-band satellites or spot-beams, which would be far more expensive if not economically infeasible in rural areas. While fiber may be available in some areas, it does not replicate the point-to-multipoint nature of satellite service, requiring many discrete, unicast fiber links to serve the same end points. Fiber is not available in many areas, particularly head-ends serving rural America, and it is economically or practically infeasible for small providers to bring in fiber feeds. Even in those cases where fiber is a feasible alternative as a primary means of distribution, C-band operations provide critical redundancy.

The C-band is also used to distribute television and radio programming, as well as other content, from Canada and Mexico and other countries around the world and the paucity of existing "gateway" sites in the United States will complicate or eliminate the ability to provide such international programming. In short, the C-band is subject to extensive, worldwide use and fulfills a critical role in the contribution and distribution of content that cannot be replicated economically by other means. Sports and entertainment programming is often uplinked from South America and downlinked in the United States at various locations that are not presently identified for "gateway" protection. Expansion into the upper C-band will likely also require increasing the number of protected gateway sites.

B. Intensity of C-band Use is "Maxed Out"

The Upper C-band recently went through a major upgrade in efficiency and capacity following the Lower C-band auction. Programmers and the satellite operators worked together to leverage more efficient modulation and video compression technologies, as well as launching additional satellites to efficiently use the remaining C-band spectrum. As a result, the intensity of usage of Upper C-band is now at least two-and-a-half times what it was before the Lower C-band auction of 3.7 to 3.98 GHz. Incumbent users that formerly occupied the C-band's 500 MHz of spectrum across 41 satellites serving CONUS have been "repacked" into the remaining 200 MHz, and 13 additional C-band satellites have been brought into service.[4] This transition was expensive and disruptive to incumbent user operations; however, once complete, the transition demonstrated that incumbents could continue to operate in 40% of the former spectrum. The FCC should view this as a significant victory for spectrum efficiency.

In the five years since the Commission last looked at this band, there have been no major technological shifts that would make a further reallocation and "repacking" of incumbent users easier now than it was then, nor has there been any decrease in programmers' demand for C-band spectrum. Any further efficiency gains in this band are unlikely without harmful interference, both in the United States and globally. Relocation of the remaining C-band users to other platforms or bands will be dramatically more expensive, time-consuming, and complex than with the Lower C-band. Quite simply, all the "low hanging fruit" have already been picked from the C-band, and there is no reason to believe that what

[4] SES Americom, Inc., *Accelerated C-band Transition Implementation Plan*, (June 19, 2020) and *Intelsat C-Band Clearing Transition Plan* (June 19, 2020).

remains will be sufficiently valuable to offset the considerable costs of further expansion of flexible use.

C. C-band is Uniquely Reliable

The two most commonly suggested alternatives to C-band operation for program contribution and distribution are Ku-band satellite and fiber optics. While programmers often make use of one or both of these technologies in concert with C-band, these alternatives alone do not meet broadcasters' reliability standards.

Ku-band and higher-frequency satellite bands. Many programmers maintain Ku-band backups or utilize Ku-band as a primary with C-band as a backup option, but relying on Ku-band exclusively does not meet broadcast standards. Satellite systems operating above 10 GHz are subject to weather dependent path attenuation, particularly rain attenuation commonly called "rain fade," which can be severe for significant time periods.[5] The affected systems include the Ku- and Ka-bands. This causes challenges both for satellite uplinks and particularly for downlinks, especially in parts of the country that have intense rainy seasons, like the southeast and Pacific northwest regions. While rain fade on the uplink can often be mitigated by uplink power control (increasing radiated power at the uplink earth station), the power of the downlink signal radiated from the satellite is limited by regulation[6] and by the intrinsic limitations of the satellite power system. Added downlink power is also inefficient because the entire downlink footprint receives the added power, not just the site being affected. Achieving comparable reliability in the Ku-band or in other satellite bands would likely require use of site diversity; that is, construction of two or more downlink sites that are

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[5] Louis J. Ippolito, *Satellite Communications Systems Engineering*, at 207 (UK: John Wiley & Sons, 2008).

[6] 47 C.F.R. § 25.208(b).

geographically separated such that an intensive rain event is unlikely to impact both sites.[7] The costs of constructing and supporting two or more, widely-separated downlink sites, including land acquisition, permitting, and interconnection are indeterminate at this time, but will certainly far exceed the costs associated with "repacking" satellite users from the lower C-band.

Fiber Optics. In addition to being prohibitively expensive to reach some reception sites, particularly remote cable head-ends or transmission facilities, fiber is susceptible to "backhoe fade," which is the inadvertent cutting of a fiber line during road construction or other activities. A single fiber circuit does not meet broadcast reliability requirements. A well-engineered fiber solution would involve at least two physically separate, redundant paths to avoid this concern. While some production facilities and sports venues have fiber feeds for video distribution, few have the redundancy required to replace C-band entirely. Further, venues which are not used frequently for live event production may lack the capacity entirely.

Despite the enticements of cost reimbursement, many broadcasters elected to remain on C-band following the Lower C-band reallocation. This is evidence of the difficulty in replicating the unique characteristics of C-band. Substantially all the systems that could easily be transitioned out of the C-band have been relocated. The systems that now remain in Upper C-band are there because viable alternatives to C-band will be very expensive, overly complicated, or simply may not exist.

[7] Ippolito, at 214-235.

D. The Commission Must Learn from Issues that Arose During the Lower C-band Proceeding

The Notice observes that the adjacent 4.2–4.4 GHz band is used by aircraft for radio altimeters, which is an aeronautical safety system that measures the height of aircraft above terrain.[8] Interference to and need for protection of that safety system resulted in delayed rollout of the 3.7 GHz service for terrestrial use in the United States as well as voluntary restrictions on 3.7 GHz operation by wireless providers.[9] This issue arose despite there being 220 MHz of frequency separation between wireless operations in the "Lower C-band" and radio altimeters. Expanding terrestrial wireless operations into the Upper C-band is likely to exacerbate interference concerns because the frequency separation from radio altimeters will be less. The Commission must ensure that there is a managed process in place to ensure that aviation safety is not compromised and that any expanded services that may be authorized in the Upper C-band are not subject to significant restrictions after-the-fact. The Commission must not assume that technological solutions to this known conflict will magically appear and be paid for, and this safety issue is likely to have a significant impact on the ultimate outcome of this proceeding.

The Commission's Lower C-band proceeding recommended development of a multi-disciplinary group to deal with post-transition interference issues.[10] In response, several technical working groups (TWGs) were organized with participation by various incumbents as

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[8] Notice at ¶ 6.

[9] FAA, Radio Altimeters and 5G C-band Deployment (April 2022). https://www.faa.gov/air_traffic/flight_info/aeronav/acf/media/Presentations/22-01-Radio-Altimeters-5g-Deployment-Clausnitzer-Silagyi.pdf (retrieved April 23, 2025).

[10] Expanding Flexible Use of the 3.7-4.2 GHz Band, Report and Order and Order of Proposed Modification, 35 FCC Rcd 2343 at 5 (2020).

well as new users. The FCC observed those TWGs but declined to actively participate or respond to questions in any meaningful way. Without the *imprimatur* of regulatory interpretation, at least at the staff level, 3.7 GHz operators often failed to follow the agreed-upon recommendations. For example, temporary uplinks in the Upper C-band are often unable to monitor their own downlinks due to interference from nearby 3.7 GHz facilities. Despite having negotiated a procedure for resolving such interference[11] — interference that was widely predicted and acknowledged during TWG1 discussions — wireless operators have proven uncooperative in determining specific interference sources or shutting down wireless facilities to resolve interference problems. If the Commission will again rely on multi-stakeholder groups to develop recommendations and best practices to facilitate expanded operations in the Upper C-band, it must be prepared to enforce those recommendations.

III. CONCLUSION

The C-band plays a vital role in broadcasters' production and distribution of programming. As the Commission considers expanded use of the Upper C-band, it should require proponents of any expanded or alternative use to submit specific and detailed technical proposals for how any new use would operate while accommodating incumbent users, or how they would "repack" or transition to other bands or platforms. Without such specific proposals, current users cannot be expected to fully understand the potential harms associated with alternatives.

The Commission should also recognize the tremendous value of existing uses of C-band for satellite communications and not introduce new operations or close-out the entire

[11] "Best Practices for Terrestrial-Satellite Coexistence During and After the C-Band Transition," Report of Technical Working Group #1 (Nov. 13, 2020).

band, which would destroy -- not enhance -- the value of the spectrum. The C-band is subject to extensive, worldwide use based on tens of billions of dollars of investment and plays a critical role in the distribution of content. There is no available substitute that is practical or economically viable. Any consideration of expanded or alternative operations in Upper C-band must prioritize the protection of existing users.

Respectfully submitted,

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