

June 15, 2018

**Ex Parte**

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street, SW  
Washington, DC 20554

**Re: *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz, GN Docket No. 17-183; Expanding Flexible Use of the 3.7 GHz to 4.2 GHz Band, GN Docket No. 18-122***

Dear Ms. Dortch:

The record in response to the Commission’s August 2017 Notice of Inquiry—and the recent comments filed in response to the Commission’s call for input on the report required by MOBILE NOW—make clear that much more information is required before the Commission can make an informed decision on expanding terrestrial wireless broadband access in the 3.7-4.2 GHz band (C-band). As the Commission prepares a Notice of Proposed Rulemaking in the coming weeks, the undersigned organizations representing television and radio broadcasters, content providers, and cable operators—the largest end-users of C-band spectrum—urge the Commission to ask questions that explore in more detail: (1) how the various proposals for expanding terrestrial wireless use of the band would work as a technical matter, while enabling the continued provision of services that rely on C-band today to American households and businesses without interruption or technological constraint; (2) how such proposals would impact the quality and cost of video and audio programming delivered to Americans, and the day-to-day operations and costs of existing users of C-band spectrum, including C-band satellite customers and earth station owners and operators; and (3) if the proposals result in higher prices for C-band users, how they will be compensated for this additional cost.

Cable operators, content companies, and radio and television broadcasters all rely on 3.7-4.2 GHz C-band spectrum for video and audio content distribution. Much of the programming that Americans enjoy on television and on the radio, at one point or another, transits the 3.7-4.2 GHz band. Video content received using C-band spectrum reaches over 100 million American households (including 51.9 million cable video customers)<sup>1</sup> and public radio content reaches over 42 million Americans each week.<sup>2</sup> In other words, the C-band “forms the backbone of the

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<sup>1</sup> Comments of NCTA – The Internet & Television Association, GN Docket No. 18-122, at 1 (filed May 31, 2018) (NCTA Comments).

<sup>2</sup> Comments of National Public Radio, Inc., GN Docket No. 18-122, at 3 (filed May 31, 2018) (NPR Comments).

infrastructure for delivering video content to American consumers.”<sup>3</sup> As other commenters have made clear, the 3.7-4.2 GHz band is also critical to the delivery of broadband and other services in remote areas.<sup>4</sup>

C-band users have raised questions regarding how much spectrum will remain available to accommodate the existing services that Americans enjoy today,<sup>5</sup> whether and how harmful interference to C-band services can be mitigated,<sup>6</sup> whether potential alternatives to C-band offer the same affordability, availability, and reliability,<sup>7</sup> and what the costs to consumers and existing spectrum users would be of repacking or co-channel sharing.<sup>8</sup> The undersigned therefore respectfully request that the Commission explore these issues in further detail in the forthcoming NPRM by including the following questions:<sup>9</sup>

***I. Repacking/Arc Reduction Questions***

- If the band is repacked, how will related interference risks be mitigated, and what evidence have proponents of repacking provided that any mitigation strategies will be effective?

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<sup>3</sup> Comments of the Content Companies, GN Docket No. 18-122, at 2 (filed May 31, 2018) (Content Companies Comments); *see also* Comments of Comcast Corporation and NBCUniversal Media, LLC, GN Docket No. 18-122, at 5 (filed May 31, 2018) (Comcast Comments); Comments of the National Association of Broadcasters, GN Docket No. 18-122, at 1-2 (filed May 31, 2018) (NAB Comments) (“Virtually every U.S. television and radio household relies on C-band satellite operations for content distribution in some manner.”).

<sup>4</sup> Comments of General Communication, Inc., RM-11791, at 4-11 (filed Aug. 7, 2017); *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, 32 FCC Rcd 6373, 6376 ¶ 8 (2017).

<sup>5</sup> *See, e.g.*, NCTA Comments at 6.

<sup>6</sup> Content Companies Comments at 7; NAB Comments at 2-3; NPR Comments at 11; Comments of the Satellite Industry Association, GN Docket No. 18-122, at 6 (filed May 31, 2018) (SIA Comments).

<sup>7</sup> Comments of the American Cable Association, GN Docket No. 17-183, at 16 (filed Oct. 2, 2017) (ACA Comments); Comcast Comments at 13-17; Content Companies Comments at 3; NAB Comments at 2; NPR Comments at 7 (asking that any alternative means of transmission be available, reliable, and affordable).

<sup>8</sup> *See* ACA Comments at 16-17; Comcast Comments at 4, 12, 14-15; SIA Comments at 3-4 (“Attempting to replace the C-band satellite communications backbone would also be extremely costly and would strand billions of dollars in space and ground station infrastructure.”).

<sup>9</sup> These questions build on the questions filed by Comcast in its recent comments on the FCC’s MOBILE NOW report public notice. *See* Comcast Comments at 11-17.

- In a repacked band, how much spectrum would remain available for today's C-band services? Could that more limited amount of spectrum accommodate all of today's services, or would some C-band services need to be transitioned to alternative distribution mechanisms? Do repacking proponents envision that more spectrum would eventually be cleared over time? How much time is needed to transition and clear the spectrum, and what are the factors that dictate the duration? What transition methodology would be adopted to prevent any discontinuity in satellite services?
- How would any repacking mitigation strategy accommodate innovation and change in video technology, including increasing bandwidth demands associated with UHD or 4K video? How would any repacking mitigation strategy accommodate changes in audio technology?
- In a repacked environment, what steps would need to be taken to ensure that C-band earth stations would not experience harmful interference from mobile devices?
- Would new filters on earth stations be required to mitigate interference risks? Would new filters work with all the C-band earth station equipment deployed in the field today, or would new equipment be required to accommodate filtering? What other costs would be associated with installing filters on earth stations? What remedies should exist if filtering is ineffective in preventing harmful interference?
- What role might the adoption of strict out-of-band emission limits play in protecting C-band earth stations from terrestrial mobile wireless devices?
- What role might wireless broadband providers play in addressing harmful interference caused by mobile wireless devices? What role should the Commission play in resolving harmful interference issues? What process should the Commission adopt to expedite the resolution of harmful interference issues?
- Would exclusion zones be required to protect C-band earth stations? If so, how large would they need to be, and how would those zones be managed?
- What size guard band would be required between the new mobile band and repacked C-band users?
- Would repacking have any interference or other impacts on international users of C-band spectrum? Will Canada and other countries need to repack to follow the U.S. band plan? How will the costs of non-U.S. repacking be covered? How will cross-border coordination be handled as, even if all countries repack to follow the U.S. band plan, it is unlikely they will do so on the same schedule?
- How would repacking affect the resiliency and reliability of video and audio distribution networks?
- Since downlink channels are linked with uplink channels in C-band distribution, would changes to the amount of downlink spectrum impose new requirements on uplink spectrum? Would repacking result in underutilization of uplink spectrum? What would be the financial and operational impacts to uplink users, and how could those impacts be mitigated?

- If the reallocation of cleared spectrum is handled through private market transactions, what framework would be instituted to maximize the utility of the spectrum, to ensure fair and nondiscriminatory access, and to safeguard the investments not only of incumbent satellite licensees, but also their customers, earth station operators, and mobile users?
- If spectrum is repacked and auctioned by the FCC, how should the FCC reimburse both existing C-band operators and customers and for what costs?
- Satellite operators have suggested that surplus demand and future growth could be met with the launch of additional satellites. How much orbital capacity exists, i.e. slots in which to position new vehicles? What would be the payload capacity of these new satellites? How many would be needed to meet the expected demand for the next fifteen years? How quickly could they become operational?
- How would repacking affect the flexibility currently provided by full-band, full-arc coordination, including with respect to itinerant uses? If the Commission were to eliminate full-band, full arc coordination, what new safeguards would be required to accommodate unplanned satellite outages?
- How would repacking affect the use of C-band for emergency services, emergency alerting, and dissemination of public safety information, such as in disasters and recovery efforts?
- If the band is repacked and C-band spectrum is made available in some markets but not others, would this affect programmers' ability to send their content nationwide? Would C-band users in markets unaffected by a repack or mobile use nevertheless experience limitations in the programming they receive via C-band, due to a repack in other markets? Will there continue to be a viable market for delivering content via C-band if C-band no longer provides nationwide coverage, due to repacking in some markets and not others?
- If earth station users are limited in their ability to access satellites in the entire geostationary arc, would that limit the programmers' choices of providers? If the available arc is narrowed, what steps should the Commission take to enable robust competition among C-band providers?
- If choice in providers is reduced as a result of either spectrum repacking or arc reduction, will prices for C-band users—and ultimately, in some cases, their end user customers—be expected to increase? If prices increase, how will C-band users be compensated for the added cost?

## *II. Alternative Distribution Questions*

- What alternative arrangements would be available to replace C-band capabilities, and at what cost? How and for how long would current operators and customers be reimbursed for (i) costs of transition and (ii) any increased operating costs?
- Are there any feasible alternatives to the C-band for itinerant services such as covering breaking news or live sporting events? What would it cost to transition itinerant services to alternative distribution platforms and who would bear those costs?
- Would Ku- or Ka-band satellite spectrum be equivalent to C-band spectrum in terms of affordability, availability, and reliability?
- If existing Ku- and Ka-band systems would have to be augmented to overcome inherently greater atmospheric losses, how might that be done to ensure that Ku- and Ka-band systems would provide equivalent reliability as replacements for C-band services?
- Is there, in fact, idle capacity in the Ku- and Ka-bands? Is any such idle capacity sufficient to meet the video and audio distribution needs currently being met by the C-band? How is that capacity projected to change over time and will it be adequate to meet future video and audio distribution needs?
- What would the costs be for a C-band earth station operator to move earth stations to a new location to receive satellite signals from non-C-band sources? Who should bear those costs?
- To what extent would new earth stations have to be installed or existing earth stations modified to receive signals from non-C-band sources, and at what cost? Would there be adequate space at existing MVPD and television and radio broadcast locations to accommodate these new facilities?
- What technically trained crews would be required to perform these installations or modifications, and are there sufficient resources to conduct this work for all impacted existing users?
- What additional costs would be incurred from abandoning existing C-band operations, and who would bear those costs?
- To what extent is fiber feasible as a replacement for C-band in all geographic areas that are currently served by video and audio services that rely on the band today? What costs would be associated with deploying fiber to areas currently served by the C-band, and how do those costs vary by geography or topography? Who would bear such costs?
- To the extent fiber is contemplated as a replacement for C-band service, what redundancy and backup capabilities would be necessary to address potential loss of service on an operator's primary fiber line and what would be the additional cost?
- How do these costs compare to the costs of installing earth stations and paying for satellite delivery of video and audio to headends and television and radio broadcast stations?
- Can fiber provide adequate redundancy, particularly during national emergencies, natural disasters, or severe weather events? Are there instances in which fiber cannot practically

or economically be deployed due to legal or regulatory requirements, challenging climate conditions, geographic remoteness, low population density, or other circumstances?

- Would fiber backup require handoffs from multiple fiber network vendors and how would such handoffs affect service quality and reliability issues?
- How does the expense of fiber backup compare to existing C-band?

### *III. Sharing Questions*

- What information would be necessary to make an informed assessment as to the feasibility of co-channel sharing in the C-band, whether for fixed or mobile services?
- If co-channel sharing were found to be feasible, what steps would need to be taken to ensure that C-band earth stations would not experience harmful interference from mobile devices and/or new fixed links? What would the impact be on the reliability and availability of content delivery?
- Would exclusion zones be required to protect C-band earth stations? If so, how large would they need to be, and how would those zones be managed?
- Would the introduction of expanded fixed or mobile sharing impact the ability to repack existing C-band services?
- How would coordination be managed? What information would be required of terrestrial and earth station operators in order to facilitate coordination beyond what is currently required by the FCC's rules?
- To the extent that parties contemplate the use of a database for coordination, including those developed for other spectrum bands, how could the Commission guarantee that a similar approach to terrestrial wireless use of the C-band spectrum would avoid harmful interference to C-band earth stations, given the high level of reliability required for essential C-band services?
- What role might wireless broadband providers play in addressing harmful interference caused by mobile wireless devices or fixed wireless transmissions in a co-channel sharing environment? What role should the Commission play in resolving harmful interference issues? What process should the Commission adopt to expedite the resolution of harmful interference issues?
- How would co-channel sharing affect the flexibility currently provided by full-band, full-arc coordination, including with respect to itinerant uses?
- Would sharing have any interference or other impacts on international users of C-band spectrum?

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June 15, 2018  
Page 7

Respectfully Submitted,

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