

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

In the Matter of)	
)	
Amendment of Part 101 of the Commission's)	
Rules to Facilitate the Use of Microwave for)	
Wireless Backhaul and Other Uses and to)	WT Docket No. 10-153
Provide Additional Flexibility to Broadcast)	
Auxiliary Service and Operational Fixed)	
Microwave Licensees)	
)	
Request for Interpretation of Section)	
101.141(a)(3) of the Commission's Rules)	WT Docket No. 09-106
Filed by Alcatel-Lucent, Inc., <i>et al.</i>)	
)	
)	
Petition for Declaratory Ruling Filed by)	
Wireless Strategies, Inc.)	WT Docket No. 07-121
)	
)	
Request for Temporary Waiver of Section)	
101.141(a)(3) of the Commission's Rules)	
Filed by Fixed Wireless Communications)	
Coalition)	

COMMENTS OF T-MOBILE USA, INC.

Kathleen O'Brien Ham
Steve Sharkey
T-Mobile USA, Inc.
401 Ninth Street, N.W.
Suite 550
Washington, D.C. 20004
(202) 654-5900

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COMMENTS OF T-MOBILE USA, INC.

I. INTRODUCTION AND SUMMARY

T-Mobile USA, Inc. (“T-Mobile”) supports the Commission’s efforts in the Notice of Proposed Rulemaking and Notice of Inquiry in the above-referenced proceeding to facilitate the use of spectrum for wireless backhaul communications (“*NPRM/NOI*”).¹ Demand for advanced wireless services continues to grow exponentially. For example, data use for Android-based smartphone devices runs nearly 20 times greater than for 2G devices,

¹ Amendment of Part 101 of the Commission’s Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees, *Notice of Proposed Rulemaking and Notice of Inquiry*, 25 FCC Rcd 11246 (2010) (“*NPRM/NOI*”).

and the trend for the latest generation of super smartphone devices, such as the Vibrant™ and G2™, is likely to double that to nearly 40 times the data of the average 2G T-Mobile customer. Although future developments are sometimes difficult to predict, in this case the trends appear to be moving in the direction of progressively more data usage by consumers. Backhaul availability has become a key competitive factor in the wireless marketplace as carriers require additional backhaul facilities to carry the increased traffic.

The National Broadband Plan observed that “[w]ireless broadband is poised to become a key platform for innovation in the United States” and “promises to continue to be a significant contributor to U.S. economic growth in the coming decade.”² But without access to adequate and affordable backhaul facilities, especially in rural areas where backhaul alternatives are scarce, service providers face a “communications bottleneck” that will obstruct the provision of broadband services and frustrate the goals of the National Broadband Plan.³ Accordingly, T-Mobile supports the Commission’s efforts to promote more efficient use of spectrum, particularly for wireless backhaul communications. Several of the proposals set forth in the *NPRM/NOI* have merit. In particular, T-Mobile agrees that fixed microwave operations should be allowed in the 6875-7125 MHz (“7 GHz”) and 12700-13200 MHz (“13 GHz”) bands. The additional spectrum would help meet demand for wireless backhaul solutions and would facilitate more efficient use of that spectrum. With proper frequency coordination, incumbent Broadcast Auxiliary Service (“BAS”) and

² FCC, *Connecting America: The National Broadband Plan*, at 75 (Mar. 16, 2010) (“National Broadband Plan”).

³ Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, *Fourteenth Report*, 25 FCC Rcd 11407, 11581 (2010) (“*CMRS Competition Report*”).

Cable TV Relay Service (“CARS”) operations would remain protected from any harmful interference.

Similarly, T-Mobile does not oppose elimination of the “final link” rule, which would allow broadcasters to use spectrum more effectively and efficiently, so long as its elimination does not adversely affect fixed microwave operations. T-Mobile also supports the use of adaptive modulation techniques by fixed microwave licensees to prevent degradation or loss of service due to atmospheric fading. The Commission’s rules, however, must be narrowly tailored to limit the use of adaptive modulation only in cases of anomalous signal fading to prevent licensees from deploying spectrally inefficient fixed microwave systems.

Although T-Mobile generally supports introducing additional flexibility into the Commission’s rules to promote wireless backhaul solutions, the Commission should ensure that any changes to the rules do not result in over-congestion of fixed services spectrum or otherwise hinder carriers’ ability to make use of this spectrum for wireless backhaul communications. Specifically, the Commission should reconsider its proposal to allow fixed microwave licensees to operate auxiliary stations. The potential harm from operating auxiliary stations is well documented, and outweighs any potential benefits that may arise from their use. The Commission also should be cautious when considering additional changes to its Part 101 rules. For example, although the Commission’s proposal to allow fixed microwave licensees to use smaller antenna has certain advantages, it also could result in reducing the efficient use of the spectrum and increased congestion because such antennas allow more radio frequency (“RF”) energy to transmit in directions other than the target

point-to-point link, resulting in larger coordination zones.⁴ Accordingly, the Commission should thoroughly evaluate the technical implications of any additional proposals before adopting new rules.

II. WIRELESS BACKHAUL SOLUTIONS WILL HELP PROMOTE BROADBAND DEPLOYMENT AS ENVISIONED BY THE NATIONAL BROADBAND PLAN

The volume of wireless traffic in the United States has increased exponentially and will continue to do so. Wireless data use in particular is growing at a record pace, placing greater capacity demands on service providers. For example, customers of T-Mobile's webConnect™ USB Laptop Stick use, on average, 200 times the data of the average T-Mobile voice customer.⁵ The increasing demand for wireless data services also is due to the proliferation and use of Internet-connected wireless devices, the roll out of fourth generation ("4G") technologies, the development and adoption of higher-bandwidth applications (*e.g.*, Internet video), and the availability of new wireless service and rate plans that make wireless broadband usage more affordable.

The Commission has acknowledged that access to backhaul facilities, which constitutes a large part of a wireless carrier's operating costs, is "a key factor in promoting robust competition in the wireless marketplace."⁶ The growing consumption of bandwidth, however, is straining the backhaul solutions that are currently available to wireless service providers.⁷ The availability and cost effectiveness of backhaul solutions directly impacts a wireless carrier's ability to deploy wireless broadband services, particularly in rural and less

⁴ See *NPRM/NOI*, 25 FCC Rcd at 11270-72.

⁵ See Reply Comments of T-Mobile USA, Inc., WC Docket No. 05-25, RM-10593, at 4 (Feb. 24, 2010) ("T-Mobile Reply Comments").

⁶ *CMRS Competition Report*, 25 FCC Rcd at 11582.

⁷ See *id.* at 11581, 11582-83.

populated areas. In fact, without sufficient and reasonably priced backhaul facilities, no wireless carrier can provide the types of mobile data and voice services that customers demand.⁸

Removing unnecessary regulatory barriers to facilitate the efficient use of microwave spectrum for backhaul solutions would help meet the growing need for affordable backhaul facilities. Microwave systems can serve as a cost-effective substitute for copper or fiber lines, particularly in rural and underserved areas where the use of microwave links may be the only reasonable means of carrying traffic between base stations and mobile switching centers and between the networks of other service providers.⁹ In addition, the savings in operational costs that service providers enjoy from using more cost-effective microwave solutions can help them sustain reasonable rates, expand their service areas, and support new technologies and services, all to the benefit of consumers.

III. MANY OF THE COMMISSION'S PROPOSALS, IF PROPERLY IMPLEMENTED, WOULD IMPROVE SPECTRUM EFFICIENCY AND FACILITATE WIRELESS BACKHAUL SOLUTIONS

A. Making Additional Spectrum Available For Fixed Microwave Operations Would Help Meet the Growing Demand for Wireless Backhaul

T-Mobile supports the Commission's proposal to allow fixed microwave operations in the 7 GHz and 13 GHz bands, now occupied by the mass media industry for BAS and CARS operations.¹⁰ The conversion from analog- to digital-based BAS and CARS systems already has made the use of spectrum in the 7 GHz and 13 GHz bands more efficient. The Commission now has the opportunity to maximize those efficiencies by allowing these

⁸ See T-Mobile Reply Comments at 4-5.

⁹ See National Broadband Plan at 93.

¹⁰ See *NPRM/NOI*, 25 FCC Rcd at 11253-54.

bands also to be used for fixed microwave services. This infusion of 750 MHz of spectrum would help address the pressing need for the additional spectrum to support wireless backhaul systems discussed in Part II above. Both the 7 GHz and 13 GHz bands are well suited for, and are adjacent to spectrum already allocated to fixed microwave operations.¹¹ Furthermore, as the *NPRM/NOI* notes, the 13 GHz band was previously available for certain fixed systems, and “is well suited for short to medium length backhaul microwave applications.”¹²

To the extent the Commission revises its rules to expand the permissible uses of this spectrum, T-Mobile agrees that incumbent BAS and CARS stations in the 7 GHz and 13 GHz bands should be protected from harmful interference. With proper frequency coordination, however, fixed microwave systems can successfully share these bands without affecting BAS and CARs operations. The Commission has long used frequency coordination measures to maximize utilization of shared bands while eliminating interference issues.¹³ In fact, the Commission and operators have used coordination procedures successfully for years for a wide range of licensees and services.¹⁴ There is no

¹¹ *See id.* at 11252.

¹² *See id.* at 11254.

¹³ *See, e.g.*, Frequency Coordination in the Private Land Mobile Radio Services, *Report and Order*, 103 F.C.C.2d 1093 (1986) (explaining that frequency coordination helps ensure that spectrum will most effectively meet a licensee’s needs while minimizing interference to others already operating in the same frequency band).

¹⁴ *See, e.g.*, 47 C.F.R. § 24.237(a) (requiring broadband PCS licensees to coordinate their frequency usage with the co-channel or adjacent channel incumbent fixed microwave licensees in the 1850-1990 MHz band); *id.* § 25.203(c) (requiring frequency coordination for satellite earth stations); *id.* § 27.1131 (requiring advanced wireless service licensees to coordinate their frequency usage with certain incumbent fixed-point-to-point microwave licensees operating in the 2110-2155 MHz band); *id.* § 74.638 (setting forth the frequency coordination procedures for BAS stations); *id.* § 78.36 (setting forth the frequency coordination procedures for CARS stations); *id.* § 90.35 (setting forth the frequency coordination procedures for industrial/business pool stations); *id.* § 101.103 (setting forth the frequency coordination procedures for fixed microwave services).

reason to believe that similar measures cannot be used successfully in the 7 GHz and 13 GHz bands.

To take full advantage of the 7 GHz and 13 GHz bands, the Commission should ensure that the service and technical rules governing fixed microwave services are sufficiently flexible for, and do not restrict, use of the spectrum for wireless backhaul solutions. Furthermore, whatever channelization scheme is applied in these bands should provide licensees – regardless of whether the spectrum will be used for BAS, CARS, backhaul or other fixed services – with the ability choose sufficient bandwidths for their proposed operations. Licensees can then select an individualized amount of spectrum for their operations, maximizing spectrum use.

B. Elimination of the “Final Link” Rule Should Not Adversely Affect Fixed Microwave Operations

All licensees, including broadcasters, need sufficient regulatory flexibility to use the limited spectrum resources as effectively and efficiently as possible, subject to the requirement that they not interfere with the operations of other licensees. Elimination of the “final link” rule,¹⁵ which prohibits broadcasters from using microwave stations licensed under Part 101 of the Commission’s rules as the final RF link in the distribution chain for broadcast program materials, could provide broadcasters with that flexibility.

Accordingly, T-Mobile does not oppose the elimination of the final link rule so long as it does not adversely affect fixed microwave operations in the Part 101 spectrum bands. Specifically, overcrowding, which could limit or prevent the use of microwave stations for backhaul, remains a valid concern. The final link rule should therefore be retained (or other

¹⁵ 47 C.F.R. § 101.603(a)(7).

restrictions adopted) if its deletion would result in unacceptable congestion in the band or otherwise restrict the ability to use Part 101 spectrum for wireless backhaul solutions.

C. Properly Tailored Adaptive Modulation Requirements Would Promote More Efficient Use of the Spectrum

Atmospheric fading caused by changes in environmental conditions can significantly degrade fixed microwave communications or result in a complete loss of communications. Although many fixed service operators incorporate fade margins into their radio links to help mitigate the effects of atmospheric fading, changes in propagation conditions can still cause a reduction of power and loss of communications.¹⁶ Links that require re-synchronization after a fading event also suffer interruptions for several additional minutes while the system resets.¹⁷ This degradation or loss of service can have severe consequences when voice and data communications are interrupted.¹⁸

Advancements in equipment and technology have allowed radio systems to use spectrum more efficiently and intensively. Specifically, adaptive modulation has become a widely used technique to increase the efficiency of wireless communications. In this case, it would allow the data rates of fixed service links subject to atmospheric fading to briefly fall below the minimum capacity requirements established in Section 101.141 the Commission's

¹⁶ See Request of Alcatel-Lucent, et al. for Interpretation of 47 C.F.R. § 101.141(a)(3) to Permit Use of Adaptive Modulation Systems, WT Docket No. 09-106, at 3 (May 8, 2009) (“Alcatel Request”).

¹⁷ See *id.*

¹⁸ See *id.* at 4 (noting that adaptive modulation would preserve “network synchronization through a fade, eliminating several additional minutes of outage that can threaten real-time applications such as public safety backhaul, electric grid and pipeline control, and cell site backhaul”); Comments of AT&T, Inc., WT Docket No. 09-106, at 3 (July 27, 2009) (“AT&T Comments”) (explaining that “intermittent signal interruptions caused by atmospheric fading would otherwise impair or result in the loss of... vital communications” such as “traffic related to public safety (such as the provision of 911 service) and homeland security”).

rules without severing the communications on that link until the acceptable thresholds are reestablished.

Permitting fixed microwave licensees to use adaptive modulation could have several benefits. For example, it could improve reliability and performance by allowing links to remain operational when they would otherwise be out of service.¹⁹ It also could promote more efficient spectrum use by maximizing the data carrying capabilities of backhaul infrastructure. Enhancing the reliability and efficiency of the links would make them a more viable option for wireless backhaul communications.²⁰ Furthermore, using adaptive modulation could save operational costs associated with loss of service and reinstatement of the link.

The minimum payload capacity requirements of Section 101.141, however, also serve an important role in ensuring that fixed microwave operators use scarce spectrum resources efficiently. Consistent failure to meet the payload capacity thresholds could result in spectrally inefficient, low data rate systems.²¹ For example, without payload capacity limitations licensees would have fewer incentives to utilize smaller channels with higher capacity payloads. The use of larger channels with lower capacity payloads would ultimately and unnecessarily limit spectrum availability for future users.

Accordingly, the Commission must ensure that its rules are narrowly tailored to limit the use of adaptive modulation to anomalous signal fading conditions. T-Mobile agrees with the Commission that allowing fixed microwave licensees to comply with the minimum

¹⁹ See AT&T Comments at 2; Comments of United States Cellular Corporation, WT Docket No. 09-106, at 2 (July 27, 2009).

²⁰ See AT&T Comments at 3.

²¹ See Letter from Katharine R. Saunders, Verizon, and Donald C. Brittingham, Verizon Wireless, to Marlene H. Dortch, FCC, WT Docket No. 09-106, at 3-4 (July 27, 2009).

payload capacity requirements only “on average” and “during normal operation” is vague and fails to meet the goal of ensuring spectrally efficient operations.²² Rather, in defining “anomalous signal fading,” the Commission should consider providing examples of the types of circumstances that would trigger adaptive modulation (*e.g.*, adverse weather conditions). Limiting the period of time a microwave link could fall below the minimum capacity requirements, after which communications must cease until the payload capacity thresholds can be satisfied, also might help define anomalous signal fading events.

D. The Potential Harm of Operating Auxiliary Stations Outweighs the Potential Benefit

Although T-Mobile supports introducing additional flexibility into Part 101 of the Commission’s rules to promote wireless backhaul solutions, the potential harm of operating auxiliary stations outweighs the potential benefits. Permitting auxiliary stations would in effect create a backdoor to deploying point-to-multipoint systems that are exempt from the technical rules governing such systems. It also would increase congestion, ultimately making spectrum unavailable for backhaul and other microwave applications. In light of these factors, as the Commission correctly acknowledges, “further experience with system operation” of auxiliary stations is needed.²³ Accordingly, licensees should not be allowed to operate auxiliary stations in conjunction with existing microwave links at this time.

Risk exists that auxiliary stations will interfere with broadcast and other fixed microwave licensees, impairing operations and the reliability of existing systems.²⁴ Efforts

²² See *NPRM/NOI*, 25 FCC Rcd at 11261.

²³ See *id.* at 11267.

²⁴ See Comments of Harris Stratex Networks, Inc. WT Docket No. 07-121, at 8 (July 19, 2007); Comments of TerreStar Networks, Inc. and Mobile Satellite Ventures Subsidiary LLC, WT Docket No. 07-121, at 4 (July 19, 2007); Comments of Comsearch, WT Docket No. 07-121, at 6-9 (July 19,

to share spectrum and effectively coordinate with other users also will be more complex with the introduction of auxiliary stations. As the Commission recognizes in the *NPRM/NOI*, operation of auxiliary stations presents significant technical hurdles. For example, there is some question whether there are ways to sufficiently protect primary links from incremental interference created by auxiliary stations.²⁵ In addition, the Commission proposes to exempt auxiliary stations from the antenna standards and minimum path length requirements that apply to primary links.²⁶ Although licensees may experience limited cost savings by using smaller, less expensive antennas, this unrestricted use could cause additional interference to other operators. Exempting auxiliary stations from loading requirements, or allowing licensees to aggregate loading on the main link and auxiliary stations, could create similar operational issues.²⁷

Auxiliary stations also could adversely affect the growth of prior coordinated systems. For example, the Lower 6 GHz band (5925 MHz – 6435 MHz) has become so congested that operators find it difficult, if not impossible, to coordinate larger blocks of bandwidth.²⁸ Permitting auxiliary stations in the 7 GHz and 13 GHz bands similarly could prevent the use of those bands for wideband wireless backhaul solutions, which would be antithetical to the goals of the National Broadband Plan and this proceeding.

2007); Reply Comments of the Fixed Wireless Communications Coalition, WT Docket No. 07-121, at 3 (Aug. 20, 2007).

²⁵ The *NPRM/NOI* notes that incremental inference “possibly” may be avoided by “alternating transmissions between the primary station and the auxiliary stations on a time-division multiplexed basis.” *NPRM/NOI*, 25 FCC Rcd at 11266.

²⁶ *See id.* at 11267.

²⁷ *See id.*

²⁸ *See* Amendment of Part 101 of the Commission’s Rules to Accommodate 30 Megahertz Channels in the 6525-6875 MHz Band; *Report and Order*, 25 FCC Rcd 7760, 7762-64 (2010).

IV. CONCLUSION

For the reasons discussed above, T-Mobile supports the Commission's efforts to increase more efficient use of spectrum and enable more flexible and cost-effective fixed microwave operations – particularly for wireless backhaul communications – in the 7 GHz and 13 GHz bands.

Respectfully submitted,

/s/ Kathleen O'Brien Ham

Kathleen O'Brien Ham

Steve Sharkey

T-Mobile USA, Inc.

401 Ninth Street, N.W.

Suite 550

Washington, D.C. 20004

(202) 654-5900

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