



July 27, 2009

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

Re: ***Request for Interpretation of Section 101.141(a)(3) of the Commission's Rules to Permit the Use of Adaptive Modulation Systems, WT Docket No. 09-106.***

Dear Ms. Dortch:

Verizon and Verizon Wireless (collectively "Verizon")¹ respectfully submit these comments on the request submitted by Alcatel-Lucent, Dragonwave Inc., Ericsson Inc., Exalt Communications, The Fixed Wireless Communications Coalition, Harris Stratex Networks, and Motorola, Inc. ("Petitioners") for interpretation of Section 101.141(a)(3) of the Commission's Rules as it relates to the use of adaptive modulation systems in the 4, 6, 10, and 11 GHz bands in the fixed wireless services.² As further described below, the Commission should not interpret the rule as requested because it would undermine the fundamental intent of the rule, which is to promote spectral efficiency in the frequency bands that are employed for fixed services. To the extent the Commission wishes to facilitate the use of adaptive modulation beyond what is already permitted in its rules, it should impose appropriate and enforceable limits or conditions that would ensure its spectral efficiency goals are met.

As described in the Public Notice soliciting comments on the Request for Interpretation, Section 101.141(a)(3) of the Commission's Rules sets forth capacity and loading requirements that must be met by point-to-point fixed equipment operating in the 4, 6, 10, and 11 GHz bands.³

¹ In addition to Verizon Wireless, the Verizon companies participating in this filing are the regulated, wholly owned subsidiaries of Verizon Communications Inc.

² Alcatel-Lucent, Dragonwave Inc., Ericsson Inc., Exalt Communications, The Fixed Wireless Communications Coalition, Harris Stratex Networks, and Motorola, Inc., Request for Interpretation of Section 101.141(a)(3) of the Commission's Rules to Permit the Use of Adaptive Modulation Systems, WT Docket No. 09-106 (May 8, 2009) ("Request for Interpretation").

³ *Wireless Telecommunications Bureau Seeks Comment on Request of Alcatel-Lucent, et al. for Interpretation of 47 C.F.R. § 101.141(a)(3) to Permit the Use of Adaptive Modulation Systems*, Public Notice, WT Docket No. 09-106, DA 09-1427 (June 25, 2009).

Designed to promote the efficient use of scarce spectrum, Section 101.141(a)(3) specifies a minimum payload capacity, expressed in megabits per second, for the various channel widths that are available in each band.⁴ Without such minimum performance requirements, fixed wireless applicants could occupy large bandwidth channels to deliver low capacity payloads. Ultimately, such inefficient use limits the amount of spectrum available for other, future, users of the band.

The Request for Interpretation states that the fixed wireless industry has generally construed these minimum payload requirements to apply at all times when the link is in service.⁵ The Petitioners argue, however, that there is no FCC decision that requires this reading of the rule.⁶ Accordingly, the Petitioners seek a revised interpretation of Section 101.141(a)(3) to allow compliance with the minimum performance requirements on an average basis.⁷ More specifically, the Petitioners request that the FCC allow links to transmit data rates lower than the minimum required during brief periods when the link would otherwise be temporarily out of service, such as during short, atmospherically-caused decreases in received signal strength.⁸

There are potential benefits that can be attained through the use of adaptive modulation under certain circumstances. Provided that the minimum payload capacity specified in Section 101.141 for the appropriate frequency band and channel bandwidth is met for each modulation that is employed by the system, the existing rules already permit the use of adaptive modulation systems without further interpretation by the Commission's staff. As recognized by the Petitioners, licensees must be first authorized to use all modulation types that are capable of being employed by the adaptive modulation system.⁹ Of course, the instant Request for Interpretation asks the FCC to consider systems that would allow data rates below those required by Section 101.141.

As acknowledged in the Request for Interpretation, links are routinely designed to achieve 99.999 percent or higher levels of availability (outages for approximately five minutes a year or less) at data rates meeting or exceeding Section 101.141(a)(3) requirements.¹⁰ For links designed to perform at such high levels of reliability, which is typical today in the fixed services, there are clear benefits of adaptive modulation systems to keep the link operational during severe fading events. However, without appropriate restrictions, allowing any operation below the

⁴ *Id.* at 1, 2. Applying the minimum payload requirement over a fixed channel bandwidth imposes a *de facto* minimum data rate requirement for fixed links.

⁵ Request for Interpretation at 2.

⁶ *Id.*

⁷ *Id.* at 2; 3-4.

⁸ *Id.* at 2. As indicated in the Request for Interpretation, reducing a link's data rate during periods of severe fading can help ensure that communications is maintained during these events. *Id.*

⁹ *Id.* at 4.

¹⁰ *Id.* at 3.

Section 101.141 minimum payload requirements has the potential to result in long-term harm that could more than offset the potential benefit.

Significantly, the interpretation sought by Petitioners is not limited to permitting the use of adaptive modulation systems with such high-performing links. The Request for Interpretation seeks a revised reading of the rule that would permit “a transmitter to *temporarily* reduce the data rate below the value in the rule” on the condition that “links would still have to comply with the minimum payload capacity in *ordinary* operation, and would also have to maintain the minimum on *average*.”¹¹ Without some specific and enforceable limits as to how long a link can operate below the rule’s requirements or how to calculate average minimum payload – a parameter that is not defined in the Request for Interpretation¹² – the requested interpretation could give rise to system designs that are not consistent with the Commission’s spectrum efficiency requirements.

For example, a 6 GHz link using a 30 MHz channel could operate at 155 Mbps for 84 percent of the time and then reduce its data rate to a minimal 1 bps/Hz (30 Mbps) for the remaining 16 percent of the time and still meet Petitioners’ proffered interpretation that would require maintaining payload capacity “on average.” Allowing operation below the 135 Mbps minimum for such extended periods of time (*e.g.*, 16 percent) would be a significant relaxation of spectral efficiency requirements when 6 GHz links are typically designed for 99.999 percent availability at 135 Mbps or higher data rates. Under this example, the 155 Mbps “normal” payload rate could be used to obscure the fact that the link is designed for the availability and payload capacity that a 1 bps/Hz modulation would typically provide.

It is likely that some users would be motivated to pursue such inefficient link designs if the requested interpretation is granted because the more robust, less spectrally efficient modulations generally allow implementation of lower cost paths if spectrum is available. However, to assist in maximizing the availability of the lower frequency bands for all users, spectrally efficient modulations and appropriate channel bandwidths for the user payload have been specified in Section 101.141(a)(3). The long-term consequences to spectrum availability caused by any alteration of the Section 101.141 requirements must be considered carefully.

To prevent the possible abuse that is likely to result from relaxation of current requirements, the Commission could impose any number of operational conditions that are designed to ensure that the application of adaptive modulation systems does not result in the unintended consequences outlined here. For example, the Commission could require transmission equipment vendors to implement features to strictly limit link operating time in “non-compliant” modulation states that fail to meet current Section 101.141(a)(3) requirements. Other requirements that could be implemented include specification of a well-defined absolute minimum spectral efficiency limit that is significantly above 1 bps/Hz, and equipment related

¹¹ *Id.* at 3, 4 (emphases added).

¹² Today, as recognized by the Petitioners, the industry interprets Section 101.143(a)(3) literally, *i.e.*, operations that are below the minimum payload requirements are not permitted. Request for Interpretation at 2. That interpretation, which is driven by the plain language definition of the word “minimum,” has the benefit of being clear and enforceable.

restrictions that would prevent any non-compliant operation from resulting in excessive interference potential to other users.

With the increasing demand for fixed channels to support broadband mobile and fixed services, Part 101 rules that promote spectral efficiency should not be broadly relaxed. Recently, the Commission initiated a rulemaking proceeding to make available greater bandwidths in the Upper 6 GHz band to address congestion issues on the existing wideband channels.¹³ Given the demand for longer paths required to support broadband network deployments, the Commission should not endorse an interpretation that could substantially reduce the existing spectrum efficiency requirements for wideband channels.

In summary, the requested interpretation – without the imposition of appropriate limits or conditions – would create regulatory loopholes that would permit the authorization of system implementations that undermine the Commission’s spectrum efficiency requirements. Relying on undefined terms such as “temporary” or “ordinary” or “average” threatens to render the rule unenforceable. Importantly, the Commission’s rules already permit the use of adaptive modulation without further interpretation, provided that the minimum loading requirements are met for each modulation employed by the system. In order to facilitate the use of modulation schemes that would result in data rates below those required by the rules for short periods of time, the Commission could impose limits to ensure that the spectral efficiency goals which are the basis for those rules are not substantially undermined.

¹³ *Amendment of Part 101 of the Commission’s Rules to Accommodate 30 Megahertz Channels in the 6525-6875 MHz Band; Amendment of Part 101 of the Commission’s Rules to Provide for Conditional Authorization on Additional Channels in the 21.8-22.0 GHz and 23.0-23.2 GHz Band; Fixed Wireless Communications Coalition Request for Waiver, Notice of Proposed Rule Making and Order, WT Docket No. 09-114, RM-11417, FCC 09-58 (June 29, 2009).*

Respectfully submitted,

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