



Federal Communications Commission
Washington, D.C. 20554

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DA 13-1138

Small Entity Compliance Guide

Improved Access to Spectrum for Wireless Broadband Operations in the 6875-6975 MHz, 7025-7125 MHz and 12700-13150 MHz Bands

FCC 12-87

WT Docket No. 10-153

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This Guide is prepared in accordance with the requirements of Section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996. It is intended to help small entities—small businesses, small organizations (non-profits), and small governmental jurisdictions—comply with the new rules adopted in the above-referenced FCC rulemaking docket(s). This Guide is not intended to replace the rules and, therefore, final authority rests solely with the rules. Although we have attempted to cover all parts of the rules that might be especially important to small entities, the coverage may not be exhaustive. This Guide may, perhaps, not apply in a particular situation based upon the circumstances, and the FCC retains the discretion to adopt approaches on a case-by-case basis that may differ from this Guide, where appropriate. Any decisions regarding a particular small entity will be based on the statute and regulations.

In any civil or administrative action against a small entity for a violation of rules, the content of the Small Entity Compliance Guide may be considered as evidence of the reasonableness or appropriateness of proposed fines, penalties or damages. Interested parties are free to file comments regarding this Guide and the appropriateness of its application to a particular situation; the FCC will consider whether the recommendations or interpretations in the Guide are appropriate in that situation. The FCC may decide to revise this Guide without public notice to reflect changes in the FCC's approach to implementing a rule, or to clarify or update the text of the Guide. Direct your comments and recommendations, or calls for further assistance, to the FCC's Consumer Center:

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fccinfo@fcc.gov

I. OBJECTIVES OF THE PROCEEDING

The Commission launched this proceeding to remove regulatory barriers and lower costs for the wireless microwave backhaul facilities that are important components of many mobile wireless networks. Broadband is indispensable to the digital economy, and wireless technology is an increasingly important source of broadband connectivity. Microwave backhaul facilities are often used to transmit data between cell sites, or between cell sites and network backbones – a type of Fixed Service (FS) – and FS providers’ use of microwave links as an alternative to traditional copper circuits and fiber optic links has been increasing. Microwave is a particularly important high-capacity backhaul solution in certain rural and remote locations.

In the *Second Report and Order and Order on Reconsideration (Backhaul Second R&O)*, the Commission continued these efforts by increasing flexibility in the use of microwave services licensed under its Part 101 rules. The steps the Commission took will remove regulatory barriers to make better use of FS spectrum and provide additional flexibility to enable FS licensees to reduce operational costs and facilitate the use of wireless backhaul in rural areas. By enabling more flexible and cost-effective microwave services, the Commission is helping to accelerate deployment of 4G mobile broadband infrastructure across America.

II. TERMINOLOGY

Shown below are definitions of some of the terms that are used throughout this guide. Other technical terms that appear only in specific discussions are defined before the paragraphs in which they appear.

Backhaul -- in the context of this proceeding, telecommunications channels between cellular communication base stations or between cellular base stations and landline network backbones.

Fixed Service (FS) -- radio communication between specified fixed points, typically but not always using directed beams.

Bit -- a unit of computer information equivalent to the result of a choice between two alternatives (as yes or no, on or off). Combinations of bits can represent alphanumeric characters or images.

Megabit (Mbit) – one million bits of information.

Gigabit (Gbit) – one billion bits of information.

Microwave – an electromagnetic wave that is between about one millimeter and one meter long.

Hertz – one cycle per second of a radio wave. The frequency of a radio signal is usually represented in Hertz or multiples thereof, such as megahertz (MHz), which means millions of Hertz, or gigahertz (GHz), which means billions of Hertz.

III. REGULATIONS AND POLICIES THAT THE COMMISSION ADOPTED OR MODIFIED, INCLUDING COMPLIANCE REQUIREMENTS

The Commission revised its rules to allow smaller antennas in certain frequency bands, updated rules that specify minimum data transmission rates, authorized Commission staff to issue waivers facilitating increased path links in rural areas, allowed wider channels in certain frequency bands, and limited the circumstances under which FS license applicants are required to coordinate with satellite operators. The Commission also affirmed rules and policies adopted in an earlier phase of this proceeding. Specific aspects of those decisions are summarized below.

In general, the *Backhaul Second R&O* allows FS operators to use smaller antennas in the 6, 18 and 23 GHz bands. Allowing smaller antennas reduces the costs of equipment, tower space rentals and maintenance by reducing antenna size, weight and wind resistance. The revised antenna rules appear as revisions to the table of technical requirements in Rule 101.115(b)(2), which is codified at 47 C.F.R. Section 101.115(b)(2). Previously, the Commission had two sets of antenna standards for FS operators: Category A, which required tightly focused beams for congested areas, and Category B, which allowed less tightly focused beamwidths and, by implication, smaller antennas in uncongested areas. The Commission's rules required a Category B user to upgrade to Category A if its antenna caused interference problems that would be resolved by the use of a Category A antenna. The *Backhaul Second R&O* established a third category for the 6, 18, and 23 GHz bands, called Category B2, and redesignated the existing Category B standard as Category B1. In the 6, 18 and 23 GHz bands, licensees may now use either Category B1 or Category B2 antennas to comply with the threshold antenna standards for FS operations. The performance parameters for new Category B2 and re-labeled parameters for Category B1 are shown in the table of technical requirements mentioned above, in Rule 101.115(b)(2). This bifurcation of Category B into Categories B1 and B2 applies only to the 6, 18 and 23 GHz bands. For other bands, the Commission will continue to classify antennas as Category A or Category B.

The Commission also updated its FS efficiency standards by eliminating standards based on a hierarchy of voice circuits used by telephone companies, replacing them with simplified efficiency standards defined in bits-per-second-per-Hertz. The following terms are used in this paragraph:

Payload – number of data bits per second that an FS link carries.

Traffic loading – the percentage of an FS link's payload capacity that is being used.

Efficiency – an FS link's payload capacity and traffic loading.

The Commission's new payload capacity standards require that, for FS links operating on frequencies between 3,700 MHz and 13,250 MHz, those using less than or equal to 5 megahertz of bandwidth must be capable of conveying at least 2.4 bits per second per Hertz of bandwidth, and those using between 5 and 20 megahertz of bandwidth must be capable of conveying at least 4.4 bits per second per Hertz of bandwidth. For FS links using more than 20 megahertz of bandwidth, those operating on frequencies between 3,700 and 10,550 MHz must be capable of conveying at least 4.4 bits per second per Hertz, and those operating on frequencies between 10,550 and 13,250 MHz must be capable of conveying at least 3.0 bits per second per Hertz. The Commission did not change its payload capacity requirements for higher frequencies because they were already specified in bits-per-second-per-Hertz. All of these modulation requirements appear in Section 101.141 of the Commission's Rules, which is codified at 47 C.F.R. Section 101.141.

The Commission also directed its Wireless Telecommunications Bureau to give favorable consideration to waiver applicants seeking permission to reduce their data transmission rates in uncongested rural areas, thereby enabling many of those applicants to double their microwave path lengths and eliminate the need for intermediate relay stations. The new waiver policy applies to all FS applicants that are subject to minimum transmission rate requirements, *i.e.*, those proposing to use digital modulation techniques on frequencies below 25.25 GHz. The Commission noted that this could save applicants as much as \$500,000 per link and make it economically feasible to provide affordable microwave connections to places where broadband communication was previously available only by satellite. Favorable consideration of these waiver requests will be available where the interference environment allows the applicant to use a less stringent Category B, B1 or B2 antenna as contrasted with the higher performance Category A antennas required in congested areas, and where each end of the proposed microwave link is located in a county with a population density of 100 persons per square mile or less. The applicant must also avoid locating in a recognized antenna farm and must acknowledge its duty to upgrade to a Category A antenna if necessary to resolve an interference conflict with a proposed microwave link in the future, and, if that happens, to comply with the Section 101.141 efficiency requirements.

The Commission expanded the maximum bandwidths allowed in the Lower 6 GHz band from 30 to 60 megahertz, and in the 11 GHz band from 40 to 80 megahertz. In this context, the Lower 6 GHz band refers to frequencies between 5925 and 6425 MHz, and the 11 GHz band includes frequencies between 10,700 and 11,700 megahertz. Allowing wider bandwidths enables licensees to transmit at faster data rates.

Finally, the Commission modified its rules to require FS operators pointing microwave beams in the direction of geostationary communication satellites to obtain waivers only if their signal strengths exceed the values specified in Article 21 of the International Telecommunication Union's Radio Regulations (available at http://www.itu.int/dms_pub/itu-s/oth/02/02/S020200001A4501PDFE.pdf). The Commission decided to harmonize its rules with those international regulations, which are less restrictive than the rules formerly applied by the Commission. The following terms are used in this paragraph:

Geostationary satellite – a satellite that is positioned above the equator and orbits the earth every 24 hours, thus appearing to remain motionless relative to the ground below.

Geostationary-satellite orbital arc a circle high above the equator where geostationary satellites are placed to achieve a geostationary orbit.

Decibel watt (dBW) – a measure of electromagnetic energy expressed on a logarithmic scale.

Isotropic – a term applied to radio antennas that radiate equal amounts of energy in all directions, as distinguished from directional antennas, which concentrate signals along defined pathways.

Effective Isotropic Radiated Power, also called *Equivalent Isotropic Radiated Power (EIRP)* – the amount of power that would be transmitted in a specified arc from an omnidirectional antenna operating at a given power level. EIRP is typically used to express the power being transmitted from a directional antenna.

Revised Section 101.145 of the Commission's rules requires FS license applicants to seek waivers when they propose to send transmissions in the 2655-2690 MHz band or the 5925-7025 MHz band that would be aimed within 2 degrees of the geostationary-satellite orbital arc and would generate more than 35 dBW, or 3,162 watts, of EIRP, and to proposed FS transmissions in the 12.7-13.25 GHz band that would be aimed within 1.5 degrees of the geostationary-satellite orbital arc and would generate more than 45 dBW, or 31,623 watts, of EIRP.

IV. INTERNET LINK AND CITATIONS

“Second Report and Order, Second Further Notice of Proposed Rulemaking, Second Notice of Inquiry, Order on Reconsideration, and Memorandum Opinion and Order”

Report and Order:

http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-12-87A1.doc

27 FCC Rcd 9735 (2012) (including correction), *modified at* 27 FCC Rcd 12600 (2012), 77 Fed. Reg. 54421 (2012), corrected at 77 Fed. Reg. 73956 (2012).