affiliated incumbent LEC. The affiliate may be staffed by personnel of its affiliated incumbent LEC, housed in existing offices of its affiliated incumbent LEC, and use its affiliated incumbent LEC's marketing and other services, subject to paragraphs (a)(3) and (c) of this section.

(c) *Joint marketing.* Joint marketing of local exchange and exchange access service and CMRS services by an incumbent LEC shall be subject to part 32 of this chapter. In addition, such agreements between the affiliate and the incumbent LEC must be reduced to writing and made available for public inspection upon request at the principle place of business of the affiliate and the incumbent LEC. The documentation must include a certification statement identical to the certification statement currently required to be included with all Automated Reporting and Management Information Systems (ARMIS) reports. The affiliate must also provide a detailed written description of the terms and conditions of the transaction on the Internet within 10 days of the transaction through the affiliate's home page.

(d) *Exceptions*–(1) *Rural telephone companies.* Rural telephone companies are exempted from the requirements set forth in paragraphs (a), (b) and (c) of this section. A competing telecommunications carrier, interconnected with the rural telephone company, however, may petition the FCC to remove the exemption, or the FCC may do so on its own motion, where the rural telephone company has engaged in anticompetitive conduct.

(2) *Incumbent LECs with fewer than 2 percent of subscriber lines.* Incumbent LECs with fewer than 2 percent of the nation's subscriber lines installed in the aggregate nationwide may petition the FCC for suspension or modification of the requirements set forth in paragraphs (a), (b) and (c) of this section. The FCC will grant such a petition where the incumbent LEC demonstrates that suspension or modification of the separate affiliate requirement is

(i) Necessary to avoid a significant adverse economic impact on users of telecommunications services generally or to avoid a requirement that would be unduly economically burdensome, and

(ii) Consistent with the public interest, convenience, and necessity.

(e) *Definitions.* Terms used in this section have the following meanings:

Affiliate. ''Affiliate'' means a person that (directly or indirectly) owns or controls, is owned or controlled by, or is under common ownership with, another person. For purposes of this section, the term ''own'' means to own an equity interest (or the equivalent thereof) of more than 10 percent.

Broadband Commercial Mobile Radio Service (Broadband CMRS). For the purposes of this section, ''broadband CMRS'' means Cellular Radiotelephone Service (part 22, subpart H of this chapter), Specialized Mobile Radio (part 90, subpart S of this chapter), and broadband Personal Communications Services (part 24, subpart E of this chapter).

Incumbent Local Exchange Carrier (Incumbent LEC). ''Incumbent LEC'' has the same meaning as that term is defined in § 51.5 of this chapter.

In-region. For the purposes of this section, an incumbent LEC's broadband CMRS service is considered ''in-region'' when 10 percent or more of the population covered by the CMRS affiliate's authorized service area, as determined by the 1990 census figures, is within the affiliated incumbent LEC's wireline service area.

Rural Telephone Company. ''Rural Telephone Company'' has the same meaning as that term is defined in § 51.5 of this chapter.

(f) *Sunset.* This section will no longer be effective after January 1, 2002.

[62 FR 63871, Dec. 3, 1997, as amended at 66 FR 10968, Feb. 21, 2001]

§ 20.21 Signal boosters.

(a) *Operation of Consumer Signal Boosters.* A subscriber in good standing of a commercial mobile radio service system may operate a Consumer Signal Booster for personal use under the authorization held by the licensee providing service to the subscriber provided that the subscriber complies with paragraphs (a)(1) through (6). Failure to comply with all applicable rules in this section and all applicable technical rules for the frequency band(s) of

operation voids the authority to operate the Consumer Signal Booster.

(1) Prior to operation, the subscriber obtains the consent of the licensee providing service to the subscriber;

(2) Prior to operation, the subscriber registers the Consumer Signal Booster with the licensee providing service to the subscriber;

(3) The subscriber only operates the Consumer Signal Booster with approved antennas, cables, and/or coupling devices as specified by the manufacturer of the Consumer Signal Booster;

(4) The subscriber operates the Consumer Signal Booster on frequencies used for the provision of subscriber-based services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS–1, 700 MHz Lower A–E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. Operation on part 90 (Specialized Mobile Radio) frequencies is permitted upon the Commission's release of a public notice announcing the date Consumer Signal Boosters may be used in the band;

(5) The Consumer Signal Booster complies with paragraphs (e), (f), (g), and (h) of this section and § 2.907 of this chapter; and

(6) The subscriber may not deactivate any features of the Consumer Signal Booster which are designed to prevent harmful interference to wireless networks. These features must be enabled and operating at all times the signal booster is in use.

(b) *De minimis operation of Consumer Signal Boosters.* A third party's incidental use of a subscriber's Consumer Signal Booster operated under this paragraph is *de minimis* and shall be authorized under the authorization held by the licensee providing service to the third party.

(c) *Operation of Industrial Signal Boosters.* An individual or non-individual, other than a representative of a foreign government, may operate an Industrial Signal Booster provided that the individual or non-individual:

(1) Has an FCC license or obtains the express consent of the licensee(s) whose frequencies are being retransmitted by the device on a regular basis, and

(2) Uses an Industrial Signal Booster which complies with paragraph (f) of this section.

(d) *Operation on a secondary, non-interference basis.* Operation of signal boosters under this section is on a secondary, non-interference basis to primary services licensed for the frequency bands on which they transmit, and to primary services licensed for the adjacent frequency bands that might be affected by their transmissions.

(1) The operation of signal boosters must not cause harmful interference to the communications of any primary licensed service.

(2) Upon request of an FCC representative or a licensee experiencing harmful interference, a signal booster operator must:

(i) Cooperate in determining the source of the interference, and

(ii) If necessary, deactivate the signal booster immediately, or as soon as practicable, if immediate deactivation is not possible.

(e) *Consumer Signal Booster Network Protection Standard.* (1) All Consumer Signal Boosters must incorporate features to prevent harmful interference to wireless networks including but not limited to those enumerated in this section.

(2) *Certification requirements.* (i) A Consumer Signal Booster can only be certificated and operated if it complies with all applicable rules in this subpart and all applicable technical rules for the frequency band(s) of operation including, but not limited to: § 22.355 of this chapter, Public Mobile Services, frequency tolerance; § 22.913 of this chapter, Cellular Radiotelephone Service effective radiated power limits; § 22.917 of this chapter, Cellular Radiotelephone Service, emission limitations for cellular equipment; § 24.232 of this chapter, Broadband Personal Communications Service, power and antenna height limits; § 24.238 of this chapter, Broadband Personal Communications Service, emission limitations for Broadband PCS equipment; § 27.50 of this chapter, Miscellaneous Wireless Communications Services, power and antenna height limits; § 27.53 of this chapter, Miscellaneous Wireless Communications Services, emission limits; § 90.205 of this chapter, Private Land

Mobile Radio Services, power and antenna height limits; §90.210 of this chapter, Private Land Mobile Radio Services, emission masks; and §90.247 of this chapter, Private Land Mobile Radio Services, mobile repeater stations.

(ii) In case of any conflict between the rules set forth in this section and the rules set forth in parts 22, 24, 27, and 90 of title 47, chapter I of the Code of Federal Regulations, the rules in this section shall govern.

(iii) The application for certification must satisfy the Commission that the Consumer Signal Boosters' features designed to prevent harmful interference and protect wireless networks cannot be easily defeated and must be enabled at all times.

(3) *Frequency Bands.* Consumer Signal Boosters must be designed and manufactured such that they only operate on the frequencies used for the provision of subscriber-based services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS–1, 700 MHz Lower A–E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. The Commission will not certificate any Consumer Signal Boosters for operation on part 90 of this chapter (Specialized Mobile Radio) frequencies until the Commission releases a public notice announcing the date Consumer Signal Boosters may be used in the band.

(4) *Self-monitoring.* Consumer Signal Boosters must automatically self-monitor their operation to ensure compliance with applicable noise and gain limits and either self-correct or shut down automatically if their operation exceeds those parameters.

(5) *Anti-oscillation.* Consumer Signal Boosters must be able to detect and mitigate any unintended oscillations in uplink and downlink bands (such as may result from insufficient isolation between the antennas).

(6) *Power Down.* Consumer Signal Boosters must automatically power down or cease amplification as they approach any affected base station.

(7) *Interference Avoidance for Wireless Subsystems.* Consumer Signal Boosters using unlicensed (part 15 of this chapter) or other frequency bands for wireless transmissions between donor and server subsystems for their internal operations must employ interference avoidance methods to prevent interference transmitted into authorized CMRS spectrum bands.

(8) *Wideband Consumer Signal Boosters.* A Wideband Consumer Signal Booster will meet the Consumer Signal Booster Network Protection Standard if it complies with paragraphs (e)(1) through (e)(7) of this section and the following:

(i) *Technical Requirements*—(A) *Noise Limits.* (*1*) The transmitted noise power in dBm/MHz of consumer boosters at their uplink and downlink ports shall not exceed −103 dBm/MHz—RSSI.

Where RSSI (received signal strength indication) is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation. RSSI is expressed in negative dB units relative to 1 mW.

(*2*) The transmitted maximum noise power in dBm/MHz of consumer boosters at their uplink and downlink ports shall not exceed the following limits:

(*i*) Fixed booster maximum noise power shall not exceed −102.5 dBm/MHz + 20 Log_{10} (Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

(*ii*) Mobile booster maximum noise power shall not exceed −59 dBm/MHz.

(*iii*) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

(B) *Bidirectional Capability.* Consumer Boosters must be able to provide equivalent uplink and downlink gain and conducted uplink power output that is at least 0.05 watts. One-way consumer boosters (*i.e.*, uplink only, downlink only, uplink impaired, downlink impaired) are prohibited. Spectrum block filtering may be used provided the uplink filter attenuation is not less than the downlink filter attenuation, and where RSSI is measured after spectrum block filtering is applied referenced to the booster's input port for each band of operation.

(C) *Booster Gain Limits.* (*1*) The uplink gain in dB of a consumer booster referenced to its input and output ports shall not exceed −34 dB—RSSI + MSCL.

(*i*) Where RSSI is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation. RSSI is expressed in negative dB units relative to 1 mW.

(*ii*) Where MSCL (Mobile Station Coupling Loss) is the minimum coupling loss in dB between the wireless device and input port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

(*2*) The uplink and downlink maximum gain of a Consumer Booster referenced to its input and output ports shall not exceed the following limits:

(*i*) Fixed Booster maximum gain shall not exceed 6.5 dB + 20 Log_{10} (Frequency)

(*ii*) Where, Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

(*iii*) Mobile Booster maximum gain shall not exceed 50 dB when using an inside antenna (e.g., inside a vehicle), 23 dB when using direct contact coupling (e.g., cradle-type boosters), or 15 dB when directly connected (e.g., boosters with a physical connection to the phone).

(D) *Power Limits.* A booster's uplink power must not exceed 1 watt composite conducted power and equivalent isotropic radiated power (EIRP) for each band of operation. Composite downlink power shall not exceed 0.05 watt (17 dBm) conducted and EIRP for each band of operation. Compliance with power limits will use instrumentation calibrated in terms of RMS equivalent voltage.

(E) *Out of Band Emission Limits.* Booster out of band emissions (OOBE) shall be at least 6 dB below the FCC's mobile emission limits for the supported bands of operation. Compliance to OOBE limits will utilize high peak-to-average CMRS signal types.

(F) *Intermodulation Limits.* The transmitted intermodulation products of a consumer booster at its uplink and downlink ports shall not exceed the power level of −19 dBm for the supported bands of operation. Compliance with intermodulation limits will use boosters operating at maximum gain and maximum rated output power, with two continuous wave (CW) input signals spaced 600 kHz apart and centered in the pass band of the booster, and with a 3 kHz measurement bandwidth.

(G) *Booster Antenna Kitting.* All consumer boosters must be sold with user manuals specifying all antennas and cables that meet the requirements of this section. All consumer boosters must be sold together with antennas, cables, and/or coupling devices that meet the requirements of this section. The grantee is required to submit a technical document with the application for FCC equipment authorization that shows compliance of all antennas, cables and/or coupling devices with the requirements of this section, including any antenna or equipment upgrade options that may be available at initial purchase or as a subsequent upgrade.

(H) *Transmit Power Off Mode.* When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in ''Transmit Power OFF Mode.'' In this mode of operation, the uplink and downlink noise power shall not exceed −70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

(I) *Uplink Inactivity.* When a consumer booster is not serving an active device connection after 5 minutes the uplink noise power shall not exceed −70 dBm/MHz.

(ii) *Interference Safeguards.* Consumer boosters must include features to prevent harmful interference including, at a minimum, those enumerated in this subsection. These features may not be deactivated by the operator and must be enabled and operating at all times the signal booster is in use.

(A) *Anti-Oscillation.* Consumer boosters must be able to detect and mitigate (*i.e.,* by automatic gain reduction or shut down), any oscillations in uplink and downlink bands. Oscillation detection and mitigation must occur automatically within 0.3 seconds in the uplink band and within 1 second in the

downlink band. In cases where oscillation is detected, the booster must continue mitigation for at least one minute before restarting. After five such restarts, the booster must not resume operation until manually reset.

(B) *Gain Control.* Consumer boosters must have automatic limiting control to protect against excessive input signals that would cause output power and emissions in excess of that authorized by the Commission.

(C) *Interference Avoidance for Wireless Subsystems.* Consumer boosters using unlicensed (part 15) or other frequency bands for wireless transmissions between donor and server subsystems for its internal operations must employ interference avoidance methods to prevent interference transmitted into authorized CMRS spectrum bands and must meet applicable limits for radio-frequency exposure.

(9) *Provider-Specific Consumer Signal Boosters.* A Provider-Specific Consumer Signal Booster will meet the Consumer Signal Booster Network Protection Standard if it complies with paragraphs (e)(1) through (e)(7) of this section and the following:

(*i*) *Technical Requirements*—(A) *Noise Limits.* The transmitted noise power in dBm/MHz of frequency selective consumer boosters outside the licensee's spectrum blocks at their uplink and downlink ports shall not exceed the following limits:

(*1*) −103 dBm/MHz − RSSI

(*i*) Where RSSI is the downlink composite signal power received in dBm for frequencies in the band of operation outside the licensee's spectrum block as measured after spectrum block filtering is applied and is referenced to the booster's donor port for each band of operation. RSSI is expressed in negative dB units relative to 1 mW.

(*ii*) Boosters with MSCL less than 40 dB, shall reduce the Noise output in (A) by 40 dB − MSCL, where MSCL is the minimum coupling loss in dB between the wireless device and booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

(*2*)(*i*) Maximum downlink noise power shall not exceed −102.5 dBm/MHz + 20 Log_{10} (Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

(*ii*) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

(B) *Bidirectional Capability.* Consumer Boosters must be able to provide equivalent uplink and downlink gain and conducted uplink power output that is at least 0.05 watts. One-way consumer boosters (*i.e.*, uplink only, downlink only, uplink impaired, downlink impaired) are prohibited. Spectrum block filtering used must provide uplink filter attenuation not less than the downlink filter attenuation, and where RSSI is measured after spectrum block filtering is applied referenced to the booster's input port for each band of operation.

(C) *Booster Gain Limits.* The gain of the frequency selective consumer booster shall meet the limits below.

(*1*) The uplink and downlink gain in dB of a frequency selective consumer booster referenced to its input and output ports shall not exceed BSCL − 28 dB − (40 dB − MSCL).

(i) Where BSCL is the coupling loss between the booster's donor port and the base station's input port, and MSCL is the minimum coupling loss in dB between the wireless device and the booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

(*ii*) In order of preference, BSCL is determined as follows: determine path loss between the base station and the booster; such measurement shall be based on measuring the received forward pilot/control channel power at the booster and reading the pilot/control channel transmit power from the base station as defined in the system information messages sent by the base station; estimate BSCL by assuming that the base station is transmitting at a level of +25 dBm per channel (assume a small, lightly loaded cell) and measuring the total received signal power level within the channel in dBm (RPCH) received at the booster input port. BSCL is then calculated as 25–RPCH; or assume that the BSCL is 70

dB without performing any measurement.

(*2*) The uplink and downlink maximum gain of a frequency selective consumer booster referenced to its input and output ports shall not exceed 19.5 dB + 20 Log (Frequency), or 100 dB for systems having automatic gain adjustment based on isolation measurements between booster donor and server antennas.

Where, Frequency is the uplink midband frequency of the supported spectrum bands in MHz.

(D) *Power Limits*. A booster's uplink power must not exceed 1 watt composite conducted power and equivalent isotropic radiated power (EIRP) for each band of operation. Downlink power shall not exceed 0.05 watt (17 dBm) composite and 10 dBm per channel conducted and EIRP for each band of operation. Compliance with power limits will use instrumentation calibrated in terms of RMS equivalent voltage.

(E) *Out of Band Gain Limits*. (*1*) A frequency selective booster shall have the following minimum attenuation referenced to the gain in the center of the pass band of the booster:

(*i*) −20 dB at the band edge, where band edge is the end of the licensee's allocated spectrum,

(*ii*) −30 dB at 1 MHz offset from band edge,

(*iii*) −40 dB at 5 MHz offset from band edge.

(*2*) A frequency selective booster having maximum gain greater than 80 dB (referenced to the center of the pass band) shall limit the out of band gain to 60 dB at 0.2 MHz offset from the band edge, and 45 dB at 1 MHz offset from the band edge, where band edge is the end of the licensee's allocated spectrum.

(F) *Out of Band Emission Limits*. Booster out of band emissions (OOBE) shall meet the FCC's mobile emission limits for the supported bands of operation. Compliance to OOBE limits will utilize high peak-to-average CMRS signal types.

(G) *Intermodulation Limits*. The transmitted intermodulation products of a consumer booster at its uplink and downlink ports shall not exceed the power level of −19 dBm for the supported bands of operation. Compliance with intermodulation limits will use boosters operating at maximum gain and maximum rated output power, with two continuous wave (CW) input signals spaced 600 kHz apart and centered in the pass band of the booster, and with a 3 kHz measurement bandwidth.

(H) *Booster Antenna Kitting*. All consumer boosters must be sold with user manuals specifying all antennas and cables that meet the requirements of this section. Mobile consumer boosters must be sold together with antennas, cables, and/or coupling devices that meet the requirements of this section. The grantee is required to submit a technical document with the application for FCC equipment authorization that shows compliance of all antennas, cables, and/or coupling devices with the requirements of this section, including any antenna or equipment upgrade options that may be available at initial purchase or as a subsequent upgrade.

(I) *Transmit Power Off Mode*. When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in ''Transmit Power OFF Mode.'' In this mode of operation, the uplink and downlink noise power shall not exceed −70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

(J) *Uplink Inactivity*. When a consumer booster is not serving an active device connection after 5 seconds the uplink noise power shall not exceed −70 dBm/MHz.

(ii) *Interference Safeguards*. Consumer boosters must include features to prevent harmful interference including, at a minimum, those enumerated in this subsection. These features may not be deactivated by the operator and must be enabled and operating at all times the signal booster is in use.

(A) *Anti-Oscillation*. Consumer boosters must be able to detect and mitigate (*i.e.*, by automatic gain reduction or shut down), any oscillations in uplink and downlink bands. Oscillation detection and mitigation must occur automatically within 0.3 seconds in the uplink band and within 1 second in the downlink band. In cases where oscillation is detected, the booster must continue mitigation for at least one

minute before restarting. After five such restarts, the booster must not resume operation until manually reset.

(B) *Gain Control.* Consumer boosters must have automatic limiting control to protect against excessive input signals that would cause output power and emissions in excess of that authorized by the Commission.

(C) *Interference Avoidance for Wireless Subsystems.* Consumer boosters using unlicensed (part 15) or other frequency bands for wireless transmissions between donor and server subsystems for its internal operations must employ interference avoidance methods to prevent interference transmitted into authorized CMRS spectrum bands.

(10) *Equivalent Protections.* Consumer Signal Boosters which do not meet the technical specifications enumerated in paragraphs (e)(1) through (e)(9) of this section may also meet the Network Protection Standard if they provide equivalent protections as determined by the Wireless Telecommunications Bureau.

(f) *Signal booster labeling requirements.* (1) Signal booster manufacturers, distributors, and retailers must ensure that all signal boosters marketed on or after March 1, 2014 include the following advisories:

(1) In on-line, point-of-sale marketing materials,

(2) In any print or on-line owner's manual and installation instructions,

(3) On the outside packaging of the device, and

(4) On a label affixed to the device:

(i) For Consumer Signal Boosters:

This is a CONSUMER device.

BEFORE USE, you MUST REGISTER THIS DEVICE with your wireless provider and have your provider's consent. Most wireless providers consent to the use of signal boosters. Some providers may not consent to the use of this device on their network. If you are unsure, contact your provider.

You MUST operate this device with approved antennas and cables as specified by the manufacturer. Antennas MUST be installed at least 20 cm (8 inches) from any person.

You MUST cease operating this device immediately if requested by the FCC or a licensed wireless service provider.

WARNING. E911 location information may not be provided or may be inaccurate for calls served by using this device.

(ii) For Industrial Signal Boosters:

WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

(2) A Consumer Signal Booster label may contain an acknowledgement that particular provider(s) have given their consent for all consumers to use the device. Such an acknowledgement would be inserted prior to, ''Some wireless providers may not consent to the use of this device on their network. If you are unsure, contact your provider.'' The remaining language of the advisory shall remain the same.

(g) *Marketing and sale of signal boosters.* Except as provided in § 2.803 of this chapter, no person, manufacturer, distributor, or retailer may market, distribute or offer for sale or lease any Consumer Signal Booster that does not comply with the requirements of this section to any person in the United States or to any person intending to operate the Consumer Signal Booster within the United States at any time on or after March 1, 2014. Consumer Signal Boosters may only be sold to members of the general public for their personal use.

(h) *Registration.* Each licensee consenting to the operation of a Consumer Signal Booster must establish a free registration mechanism for subscribers and register all Consumer Signal Boosters to which it consents. A licensee must establish a registration mechanism by the later of March 1, 2014 or within 90 days of consenting to the operation of a Consumer Signal Booster. At a minimum, a licensee must collect:

(1) The name of the Consumer Signal Booster owner and/or operator, if different individuals;

(2) The make, model, and serial number of the device;

(3) The location of the device; and

(4) The date of initial operation. Licensee consent is voluntary and may be withdrawn at the licensee's discretion.

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