



**Federal Communications Commission**  
Washington, D.C. 20554

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DA 13- 1143

## **Small Entity Compliance Guide**

### **Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission's Rules to Improve Wireless Coverage Through the Use of Signal Boosters**

FCC 13-21

WT Docket No. 10-4

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:

1-888-CALL-FCC (1-888-225-5322)  
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## I. OBJECTIVES OF THE PROCEEDING

In the *Report and Order* in WT Docket No. 10-4, the Commission adopted new technical, operational, and registration requirements for signal boosters. The new rules created two classes of signal boosters – Consumer and Industrial – with distinct regulatory requirements for each.<sup>1</sup> The term “signal booster” in the *Report and Order* is intended to include all manner of amplifiers, repeaters, boosters, distributed antenna systems, and in-building radiation systems that serve to amplify signals between a device and a wireless network. The use of the term “signal booster” does not include femtocells. Femtocells are different from signal boosters. Femtocells are similar to small base stations inside homes or offices and only work in a provider’s licensed area. Femtocells are not covered by the rules adopted in the *Report and Order*.

The rules and policies adopted in the *Report and Order* will enhance wireless coverage for consumers, particularly in rural, underserved, and difficult-to-serve areas by broadening the availability of signal boosters while ensuring that boosters do not adversely affect wireless networks. Mobile voice and mobile broadband services are increasingly important to consumers and to our nation’s economy. While nearly the entire U.S. population is served by one or more wireless providers, coverage gaps that exist within and at the edge of service areas can lead to dropped calls, reduced data speeds, or complete loss of service. Robust signal boosters can bridge these gaps and extend coverage at the fringe of service areas. Signal boosters are particularly useful in rural and difficult-to-serve indoor environments, such as hospitals. Signal boosters can also improve public safety communications by enabling the public to connect to 911 in areas where wireless coverage is deficient or where an adequate communications signal is blocked or shielded. Signal boosters represent a cost-effective means of improving our nation’s wireless infrastructure and should lead to more robust service for many Americans at home, at work, and on the road.

The new regulatory framework adopted in the *Report and Order* will allow consumers to realize the benefits of using signal boosters while preventing, controlling, and, if necessary, resolving interference to wireless networks. In the *Report and Order* the Commission took the following actions, as described more fully below:

- Adopted technical and operational requirements for Consumer Signal Boosters.
- Adopted operational requirements for Industrial Signal Boosters.
- Revised technical and operational requirements for duly-licensed Part 90 Private Land Mobile Radio (PLMR), Industrial Signal Boosters.
- Established a two-step transition process for equipment certification for both Consumer and Industrial Signal Boosters sold and marketed in the United States.

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<sup>1</sup> Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission's Rules to Improve Wireless Coverage Through the Use of Signal Boosters, *Report and Order*, 28 FCC Rcd 1663 (2013) (*Report and Order*).

## **II. REGULATIONS AND POLICIES THAT THE COMMISSION ADOPTED OR MODIFIED, INCLUDING COMPLIANCE REQUIREMENTS**

### **A. Signal Boosters in Subscriber-Based Services**

#### **1. Consumer Signal Boosters**

The Commission defined Consumer Signal Boosters as devices that are marketed to and sold for personal use by individuals. These devices allow an individual within a limited area such as a home, car, boat or RV, to improve wireless coverage. Consumer Signal Boosters are designed to be used “out-of-the-box” and do not need fine-tuning or other technical adjustments. Individuals should be able to install Consumer Signal Boosters without third party, professional assistance.

Consumer Signal Boosters can be designed to cover multiple wireless providers (Wideband Consumer Signal Boosters) or a single provider (Provider-Specific Consumer Signal Booster). Both Wideband and Provider-Specific Consumer Signal Boosters can be either fixed or mobile. The Commission defined a fixed Consumer Signal Booster as a Consumer Signal Booster designed to operate in a fixed location in a building and a mobile Consumer Signal Booster as a Consumer Signal Booster designed to operate while moving, *e.g.*, in a vehicle or boat, where both uplink and downlink transmitting antennas are at least 20 cm from the user or any other person.

#### **a. Authorization for Consumer Signal Boosters**

The Commission determined that Consumer Signal Boosters should be authorized under provider licenses as subscriber equipment subject to certain requirements. The authorization requirements are summarized here and are explained in more detail below. In order to use a Consumer Signal Booster, a consumer must:

- Have some form of consent from his/her wireless provider to operate the Consumer Signal Booster. (Verizon Wireless, T-Mobile, Sprint, AT&T, and the Rural Telecommunications Group (RTG) member companies have made voluntary commitments to consent to all Consumer Signal Boosters that meet the Network Protection Standard. Therefore, the subscribers of these companies will not need to specifically seek consent from these providers, or other providers who make similar “blanket” consent commitments, for Consumer Signal Boosters that meet the Network Protection Standard.)
- Register the Consumer Signal Booster consistent with the procedures of his/her wireless provider.
- Operate the Consumer Signal Booster only on certain frequencies used for the provision of subscriber-based services.
- Operate a Consumer Signal Booster on a secondary, non-interference basis and shut down the booster if it is causing harmful interference.
- Use a Consumer Signal Booster that meets the Network Protection Standard and has been equipment certified consistent with the new rules.
- Use a Consumer Signal Booster which is appropriately labeled consistent with the rules in the *Report and Order* and use the device only with manufacturer-specified antennas, cables, and/or couplings.
- Not deactivate any features of the Consumer Signal Booster which are designed to mitigate harmful interference to wireless networks.

All of these prongs of the authorization process must be satisfied for use of Consumer Signal Boosters to stay in compliance with the Commission's rules.

**b. Blanket Authorization Under Provider Licenses**

The Commission amended Part 20 of its rules to provide that the authority for wireless subscribers to operate Consumer Signal Boosters is “included in the authorization held by the licensee providing service to them” subject to certain requirements.<sup>2</sup> The first of these requirements is consent. Under the regulatory framework adopted in the *Report and Order*, a subscriber must have the consent of a wireless provider to operate a Consumer Signal Booster. Subscribers may obtain provider consent in a variety of ways. For example, all four nationwide wireless providers – Verizon Wireless, T-Mobile, Sprint, and AT&T – and the member companies of RTG, have voluntarily committed to allow their subscribers to use properly certificated<sup>3</sup> Consumer Signal Boosters on their networks; this voluntary “blanket” commitment constitutes sufficient licensee consent for a subscriber to operate a Consumer Signal Booster on that provider's network. Thus, once a Consumer Signal Booster has been certificated under new rules, these companies' subscribers need only register their Consumer Signal Boosters with their wireless providers prior to operation; subscribers generally need not seek further consent from their wireless provider. The Commission also notes that a signal booster manufacturer could seek authorization for use of a particular booster model on behalf of all subscribers of individual providers. However, if a Consumer Signal Booster causes actual harmful interference, once the subscriber is notified of the interference event by a wireless provider or the Commission, the subscriber must shut down the device immediately or as soon as practicable.

The Commission required all nationwide wireless service providers to file certain information with the Commission regarding their consent for their subscribers to use Consumer Signal Boosters.<sup>4</sup> Specifically, on March 1, 2015 and March 1, 2016, all nationwide wireless providers must publicly indicate their status regarding consent for each Consumer Signal Booster that has received FCC certification as listed in a Public Notice to be released by the Wireless Telecommunications Bureau 30 days prior to each reporting date. For each listed Consumer Signal Booster, wireless providers should report whether they (1) consent to use of the device; (2) do not consent to use of the device; or (3) are still considering whether or not they will consent to the use of the device. This reporting requirement will provide the Commission with valuable information regarding providers' treatment of Consumer Signal Boosters, including the level of consumer access. This information will be used to determine whether it is necessary to revisit Consumer Signal Booster authorization mechanism.

**c. Registration**

The Commission determined that the public interest will be served by requiring subscribers to register their Consumer Signal Boosters with their wireless providers prior to operation and as a condition of authorization.<sup>5</sup> This requirement applies to operators of all Consumer Signal Boosters—new and existing. Direct registration with the serving provider, rather than a third-party or the Commission, will

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<sup>2</sup> 47 C.F.R. § 20.21(a)(1).

<sup>3</sup> Properly certificated Consumer Signal Boosters must meet the Network Protection Standard. *See Report and Order* at ¶¶ 57-76.

<sup>4</sup> *Id.* at ¶ 34.

<sup>5</sup> 47 C.F.R. § 20.21(a)(2).

enhance the ability of licensees to retain control of their networks. Direct registration also provides a convenient opportunity for consumers to obtain licensee consent prior to operation; a completed Consumer Signal Booster registration provides evidence of licensee consent to operation of the registered booster. In addition, providers' access to registration information should vastly improve the ability to locate these devices in the case of interference.

In the event a consumer switches service providers, it must obtain consent from and register with the new provider or cease operations. If a consumer purchases a Consumer Signal Booster for use in a location where subscribers of multiple serving providers will access the device regularly, each such subscriber must register the device with their provider. Consumers who purchase wireless service from resellers must also register their boosters. Wireless providers must therefore establish a process for these consumers to register either directly with the serving provider (*i.e.*, the underlying facilities-based provider) or with the applicable reseller.

By March 1, 2014, all providers who voluntarily consent to the use of Consumer Signal Boosters on their networks must establish a free registration mechanism for their subscribers.<sup>6</sup> Providers may not charge a fee for registration. At a minimum, providers 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. Wireless providers may determine how to collect such information and how to keep it up-to-date. Wireless providers must develop their own registration processes to facilitate provider control and interference resolution. Providers should collect only such information that is reasonably related to achieving these dual goals. This approach adequately balances regulatory requirements with industry flexibility to implement them. Providers that have not consented to the use of Consumer Signal Boosters by March 1, 2014, must establish a free registration mechanism for their subscribers within 90 days of consenting to such use.

*Access to Registration Information.* The Commission encouraged providers to share registration information as necessary to address and remedy cases of interference.<sup>7</sup> However, it must be ensured that consumer privacy is protected when registration information is shared, as it is likely to include signal booster operators' personally identifiable information. To the extent providers share signal booster registration information to address interference issues, they must protect the confidentiality of proprietary information and comply with Customer Proprietary Network Information (CPNI) requirements, as necessary. Because this information is proprietary, only those with a legitimate need for the registration information may have access to it. Therefore, a provider may share registration information with another licensed wireless provider solely for the purpose of mitigating network interference caused by Consumer Signal Boosters, including the ability to locate interfering boosters and perform associated outreach. The Commission will require wireless licensees to share registration information with the Commission upon request in cases to resolve interference issues that are brought to the Commission's attention.

#### **d. Spectrum Limitations**

The Commission concluded that the public interest will be served by enabling the use of Consumer Signal Boosters in the wireless radio service spectrum bands used for the provision of subscriber-based services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS-1, 700 MHz Lower

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<sup>6</sup> 47 C.F.R. § 20.21(h).

<sup>7</sup> See *Report and Order* at ¶¶ 108-109.

A-E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter.<sup>8</sup> Consumer Signal Boosters will be installed by individuals with no technical expertise and are highly portable, favoring their use in select bands. When subscriber-based services are offered in additional bands in the future, the Commission can seek comment on how best to expand the signal booster framework to accommodate such additional bands.

*800 MHz Specialized Mobile Radio Service Band.* The Commission determined that the public interest will be served by permitting the use of Consumer Signal Boosters in the 800 MHz Specialized Mobile Radio (SMR) band, once nationwide reconfiguration of the band is substantially completed. Accordingly, the Commission directed the Public Safety and Homeland Security and Wireless Telecommunications Bureaus to determine when the nationwide reconfiguration is sufficiently complete to permit the use of Consumer Signal Boosters in the 800 MHz SMR band, and to issue a Public Notice announcing the date Consumer Signal Boosters may be used in the band.

*Broadband Radio Service and Educational Broadcast Service 2.5 GHz Band.* The Commission determined that the 2.5 GHz band contains legacy educational and commercial video systems that would not be compatible with the use of signal boosters. Therefore, the Commission will not permit the use of Consumer Signal Boosters in the BRS/EBS 2.5 GHz band at this time.

#### **e. Secondary, Non-interfering Operations**

Consumer Signal Booster operations are limited to secondary status.<sup>9</sup> Consumer Signal Boosters may operate only 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. In the event that harmful interference does occur, 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.

#### **f. Network Protection Standard**

The Commission determined that the public interest will be served by requiring all Consumer Signal Boosters to comply with a Network Protection Standard,<sup>10</sup> which is a flexible set of technical requirements that will facilitate the development of safe, economical signal boosters today, while encouraging technological booster innovation going forward. As discussed in more detail below, under the Network Protection Standard, all Consumer Signal Booster must: (1) comply with existing technical parameters for the applicable spectrum band of operation; (2) automatically self-monitor certain operations and shut down if not in compliance with the new technical rules; (3) automatically detect and mitigate oscillations in the uplink and downlink bands; (4) power down or shut down automatically when a device is not needed, such as when the device approaches the base station with which it is communicating; (5) be designed so that these features cannot be easily defeated; and (6) incorporate interference avoidance for wireless subsystems.

*Existing Technical Parameters.* The Commission adopted the requirement that all

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<sup>8</sup> 47 C.F.R § 20.21(a)(4).

<sup>9</sup> 47 C.F.R § 20.21(d).

<sup>10</sup> 47 C.F.R § 20.21(e). Please consult Section 20.21(e), which contains detailed specifications for complying with the Network Protection Standard.

Consumer Signal Boosters must meet all applicable technical specifications for the relevant band(s) of operation as they apply to mobile units (*i.e.*, not base station technical specifications).<sup>11</sup> Existing technical rules set the “ceiling” for parameters such as power level, emission limitations, and frequency tolerance; Consumer Signal Boosters which meet the Network Protection Standard cannot exceed the power, emissions, and frequency tolerance levels set forth in the existing rules.

*Anti-Oscillation and Automatic Self-Monitoring Features.* Under the new rules, Consumer Signal Boosters must detect and mitigate oscillation (such as may result from insufficient isolation between the antennas) in both the uplink and downlink bands.<sup>12</sup> This safeguard is particularly important for consumer-targeted devices where installation will be undertaken by individuals without the technical expertise to identify and correct faulty installation. Under the Network Protection Standard, an improperly installed Consumer Signal Booster that goes into oscillation will either stop the oscillation or shut down before it can cause harmful interference to nearby wireless networks.

In conjunction with an anti-oscillation feature, Consumer Signal Boosters must have certain self-monitoring features.<sup>13</sup> Specifically, all Consumer Signal Boosters must monitor the device’s compliance with applicable noise and gain limits. If the device is operating outside of these technical parameters, the device must be capable of self-correcting or shutting itself down automatically. These features, when combined with the additional safeguards adopted in this *Report and Order*,<sup>14</sup> will substantially minimize the interference potential of Consumer Signal Boosters.

*Power/Shut Down When Approaching Any Affected Base Station.* The Commission concluded that harmful interference from Consumer Signal Boosters can be greatly minimized if the devices operate only when they are needed to provide an adequate signal and cease operations when they are unnecessary. Therefore, the Commission required a Consumer Signal Booster operating in a mobile environment to power down or shut down as the device approaches the base station with which it is communicating.<sup>15</sup> Further, because signal boosters operating at full power pose a substantial interference risk to any nearby base station, not just the base station with which the booster is communicating, the Commission required Consumer Signal Boosters to automatically power down or shut down as they approach any affected base station. This safeguard will protect wireless networks by mitigating excess noise to base stations from signal boosters operating at full power within close proximity.

*Safeguards Cannot be Easily Defeated.* Each application for equipment certification of a Consumer Signal Booster must contain an explanation of all measures taken to ensure that the technical safeguards designed to inhibit harmful interference and protect wireless networks cannot be deactivated by the user.<sup>16</sup> Consumer Signal Boosters should not have user-accessible controls (*e.g.*, buttons, knobs, switches, codes), which would allow a consumer to deactivate the device’s safeguards. Further, if a Consumer Signal Booster casing is opened, an individual with basic technical skills should not be able to defeat the device’s safeguards by re-soldering a connection, clipping a wire, or moving a switch.

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<sup>11</sup> See *Report and Order* at ¶¶ 59-60.

<sup>12</sup> 47 C.F.R. § 20.21(e)(5).

<sup>13</sup> 47 C.F.R. § 20.21(e)(4).

<sup>14</sup> See generally 47 C.F.R. § 20.21(e).

<sup>15</sup> 47 C.F.R. § 20.21(e)(6).

<sup>16</sup> 47 C.F.R. § 20.21(e)(2)(ii).



Alternatively, a manufacturer could prevent a consumer from tampering with a device by coating it with epoxy or using tamper-proof screws for assembly. Each applicant must certify that it has taken measures to ensure that these safeguards cannot be easily defeated.

*Additional Safeguards.* Pursuant to this safeguard, consumer boosters using unlicensed, e.g., Part 15, or other frequency bands, for wireless transmissions between donor and server subsystems for their internal operations, must employ interference avoidance methods to prevent interference from being transmitted into authorized spectrum bands.<sup>17</sup> This safeguard will further serve to mitigate the potential for harmful interference from Consumer Signal Boosters and thus require all Consumer Signal Boosters to incorporate this feature.

*Wideband and Provider-Specific Consumer Signal Boosters.* The Commission also adopted technical specifications for two types of boosters -- Wideband Consumer Signal Boosters and Provider-Specific Consumer Signal Boosters. Wideband Consumer Signal Boosters may operate on the frequencies and in the market areas of multiple licensees. Because Wideband Consumer Signal Boosters operate across multiple bands and in spectrum licensed to multiple wireless providers, these devices require tight technical specifications to ensure they do not cause harmful interference in adjacent bands. The technical specifications for Wideband Consumer Signal Boosters can be found at 47 C.F.R. § 20.21(e)(8). Provider-Specific Consumer Signal Boosters are designed to operate only on a particular licensee(s)'s frequencies and in that licensee(s)'s market areas. Thus, Provider-Specific Consumer Signal Boosters may only receive FCC equipment certification and may be operated only with the consent of the licensee(s) whose frequencies are being amplified by the device. Accordingly, any application to the FCC for equipment certification of a Provider-Specific Consumer Signal Booster must include a certification, made under penalty of perjury (*see* 47 C.F.R. § 1.16), that the applicant has received the consent of the relevant licensee(s) to manufacture the device. The technical specifications for Provider-Specific Consumer Signal Boosters can be found at 47 C.F.R. § 20.21(e)(9). The Commission determined that these two approaches satisfy the requirements of the Network Protection Standard and will result in safe, economical Consumer Signal Boosters, which do not harm wireless networks.

*Equivalent Protections.* Any entity seeking FCC equipment certification for a Consumer Signal Booster which does not meet the enumerated safeguards contained in the Network Protection Standard may request a determination of "equivalent protection" from the Wireless Telecommunications Bureau.<sup>18</sup> Such requests will be placed on Public Notice and interested parties will have an opportunity to comment. If the Wireless Telecommunications Bureau determines that the proponent has shown equivalent protection that satisfies the Network Protection Standard, the proponent may then seek equipment certification from the Office of Engineering and Technology.

*Future Signal Booster Capabilities.* The Commission directed the Wireless Telecommunications Bureau to release a Public Notice no later than March 1, 2016, seeking comment on additional technologies that may enhance the interference-mitigating features of signal boosters already required by the FCC rules. Issues to be addressed in the Public Notice should include, but are not limited to, the performance and effectiveness of new Consumer Signal Boosters and whether additional safeguards can be implemented using existing network infrastructure, or whether these features require modifications to wireless network operations, the effectiveness of the registration system, and the effectiveness of the FCC's enforcement efforts. The Public Notice will serve as a starting point for issues that will inform

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<sup>17</sup> 47 C.F.R. § 20.21(e)(7).

<sup>18</sup> 47 C.F.R. § 20.21(e)(10).

whether further action in this area is warranted.

**g. Labeling and the Use of Approved Antennas, Cables and/or Coupling Devices**

In order to receive authorization to operate a Consumer Signal Booster, subscribers must also use a device that is appropriately labeled by the manufacturer consistent with the Commission's rules.<sup>19</sup> In addition, a consumer may operate a Consumer Signal Boosters only with approved antennas, cables, and/or coupling devices (collectively "special accessories") as specified by the manufacturer of the Consumer Signal Booster.<sup>20</sup> This requirement will protect wireless networks from interference and will protect consumers from levels of RF exposure in excess of the RF exposure guidelines.

**h. Safeguards Must be Enabled and Operating**

A subscriber's Consumer Signal Booster authorization is contingent on use of a Consumer Signal Booster with all safeguards enabled and operating.<sup>21</sup> If a subscriber disables or deactivates any safeguard incorporated in the Consumer Signal Booster, it will void the subscriber's authorization to operate the device.

**i. De Minimis, Third-Party Use**

The Commission concluded that the public interest is best served if consumers have a variety of choices to meet their individual communications needs. The Commission recognized, however, that use of wideband Consumer Signal Boosters (*i.e.*, boosters which can be used with multiple service providers) will not necessarily be limited to the purchaser of the device. Therefore, the Commission found it in the public interest to authorize *de minimis*, *i.e.*, occasional, incidental use of a Consumer Signal Booster by a third party under the license of the third party's wireless provider and modified providers' licenses to permit such use.<sup>22</sup> The Commission stated that the *de minimis* authorization would not extend to routine, continued use of the signal booster by a third party (*e.g.*, housemates or family members with different wireless providers). Thus, if a third party intends to use a Consumer Signal Booster on a regular, sustained basis, the third party must seek its provider's consent to do so. The benefits associated with authorizing such occasional, incidental uses for consumers outweigh the costs of such use.

**j. Enhanced 911**

The Commission determined that well-designed, well-made signal boosters will serve the public interest by promoting public safety. While signal boosters can affect E911 location accuracy for network-based E911 solutions in certain limited circumstances, the Network Protection Standard will reduce these instances by limiting the use of signal boosters to areas with limited or no coverage, such as rural areas and dead zones within covered areas and indoors. Consumers will benefit from using signal boosters to place and complete their emergency calls in rural areas and indoors, even if the location accuracy is affected in some cases, because absent a booster, consumers would lack any access to emergency services in these areas.

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<sup>19</sup> 47 C.F.R. § 20.21(f). Further details about the labeling requirements are summarized below in Section C-1 of this Guide.

<sup>20</sup> 47 C.F.R. § 20.21(a)(3).

<sup>21</sup> 47 C.F.R. § 20.21(a)(6).

<sup>22</sup> 47 C.F.R. § 20.21(b).

*Labeling.* Knowing that signal boosters may affect the accuracy of E911 location information, consumers can determine whether a signal booster is an appropriate choice for their individual circumstances. Therefore, manufacturers must label all consumer signal boosters with the following language: WARNING. E911 location information may not be provided or may be inaccurate for calls served by using this device.<sup>23</sup>

*Liability.* Licensees must continue to comply with current E911 location accuracy regulations.

## **2. Industrial Signal Boosters**

The Commission defined Industrial Signal Boosters as all signal boosters other than Consumer Signal Boosters. The classification of Industrial Signal Boosters covers a wide variety of devices that are designed for installation by licensees or qualified installers. Industrial Signal Boosters may be fixed or mobile.

Industrial Signal Boosters include large, high powered devices intended for professional or enterprise use. These devices tend to have more expansive functionality than Consumer Signal Boosters and the output power and gain for Industrial Signal Boosters are typically multiple times the power and gain of Consumer Signal Boosters. These devices are designed to serve multiple users simultaneously and cover larger areas such as stadiums, shopping malls, office buildings, tunnels, and campuses. Industrial Signal Boosters also include signal boosters deployed in the Private Land Mobile Radio (PLMR) bands by PLMR licensees or those with the consent of PLMR licensees.

Industrial Signal Boosters also include devices that are tailored to serve individual subscribers. Providers may continue to use all types of signal boosters to serve their subscribers' needs. However, if a provider allows an individual subscriber to operate a signal booster that does not meet Consumer Signal Boosters requirements, *i.e.*, the device does not include the required interference safeguards, the provider must install and configure such a device for its subscriber.

The Commission concluded that it will continue to require Industrial Signal Booster operators to have a valid FCC license or express licensee consent prior to operating an Industrial Signal Booster and explicitly codified this requirement in the FCC rules.<sup>24</sup> Express licensee consent may be reflected, for example, by "a letter, email or other record sent from a licensee or agent of a licensee to an operator, owner, or installer of [an Industrial Signal Booster] acknowledging that the [Industrial Signal Booster] will retransmit the specified frequency bands of the licensee."

The coordination process between the Industrial Signal Booster operator and wireless licensees provides licensees with sufficient control over these devices to comply with the requirements of Section 310(d) of the Act. Industrial Signal Booster operators must have express licensee consent prior to operating a signal booster. In addition, Industrial Signal Boosters will only be authorized on a secondary, non-interference basis and thus must be shut down in the event the device causes harmful interference to the communications of any primary licensed service.<sup>25</sup>

Consistent with current practice, the Commission will not limit the use of Industrial Signal Boosters to specific spectrum bands; such boosters are typically professionally installed and closely

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<sup>23</sup> 47 C.F.R. § 20.21(f).

<sup>24</sup> 47 C.F.R. § 20.21(c).

<sup>25</sup> 47 C.F.R. § 20.21(d).

coordinated with affected licensees, thereby limiting the potential for interference even in bands undergoing reconfiguration or in areas where the deployment of multiple technologies and services may be the norm.

### **3. Equipment**

#### **a. Labeling**

The Commission adopted a labeling requirement to aid consumers in distinguishing between Consumer and Industrial Signal Boosters.<sup>26</sup> A prominently displayed label on a device's packaging will immediately inform consumers whether the device is suitable for personal use in a home or vehicle setting or whether a device is designed for large-scale commercial uses. Providing appropriate consumer disclosures on signal booster labels and in product manuals and on-line marketing materials will educate consumers about which boosters to purchase, their registration requirements, and their obligation to turn off the booster if it is causing interference. Absent an appropriate label, a consumer will be unable to distinguish between a Consumer Signal Booster, which is appropriate for their use, and an Industrial Signal Booster, which is inappropriate for their use. An appropriate label will also inform consumers about the potential effect of signal boosters on E911 location accuracy. The Commission noted however, that if a device will have no effect on E911 communications, such a consumer notification is unnecessary.

All signal boosters, except for Part 90 signal boosters,<sup>27</sup> marketed on or after March 1, 2014, must 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:

#### **Required Label for all 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.

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<sup>26</sup> 47 C.F.R. § 20.21(f).

<sup>27</sup> Different labeling requirements apply to Part 90 signal boosters. Those requirements are discussed further below.

#### **Required Label for all 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.

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.

#### **4. RF Exposure Requirements**

The Commission adopted a new rule, 47 C.F.R. § 20.2, to cross-reference the RF exposure requirements in Sections 1.1307, 2.1091, and 2.1093 of the Commission's rules. The Commission also required all Consumer Signal Boosters to be sold together with antennas, cables, and/or coupling devices that meet the requirements addressed in the *Report and Order*.<sup>28</sup> Also, all Consumer Signal Boosters must be sold with user manuals which specify the special accessories that meet the requirements of this section and must be labeled to indicate that the device may only be operated using approved special accessories as specified by the manufacturer of the Consumer Signal Booster. The labeling requirements for subscriber transceiver antennas in Table 1 of Section 1.1307(b)(1) also apply to these types of signal boosters.

#### **5. Treatment of Existing Signal Boosters**

The Commission will permit consumers to operate existing (nonconforming) signal boosters provided they (1) have the consent of their serving provider, and (2) register their booster with that provider.<sup>29</sup> A subscriber must obtain its provider's consent, by phone or email for example, to use an existing signal booster on its provider's network. If a consumer does not have the consent of its service provider to use an existing booster, he or she must immediately cease operation until consent is obtained. Where a signal booster operator has consent to operate the device, the operator must also register the booster with their service provider. Wireless providers who choose to consent to Consumer Signal Booster use have until March 1, 2014, to establish a free registration mechanism for their subscribers. And after establishing a registration mechanism, providers will need to advise subscribers of their registration process. The Commission will require consumers to register their existing boosters within 90 days of being notified by their service provider of the registration process. Registration of existing boosters will ensure that service providers and the Commission can efficiently identify, investigate, and resolve interference complaints should they arise. No licensee is obligated to consent to the use of an existing signal booster on its network. However, where a licensee does consent to the use of an existing signal booster, the licensee can determine whether such use should continue.

#### **6. Equipment Certification**

As of the release date of the *Report and Order*, the Commission no longer accepts applications

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<sup>28</sup> 47 C.F.R. § 20.21(a)(3).

<sup>29</sup> R&O at ¶ 127.

for equipment certification of Consumer or Industrial Signal Boosters that do not comply with the new rules and will cease certification of devices that do not comply with the new rules.<sup>30</sup> Further, on or after March 1, 2014, all Consumer and Industrial Signal Boosters sold and marketed in the United States must meet the above-mentioned new requirements.<sup>31</sup> The Commission believes this is a reasonable timeframe to allow manufacturers to develop and the Commission to certify devices that meet the new rules and will result in an orderly transition to better signal boosters. Manufacturers and retailers may no longer sell non-conforming signal boosters on or after March 1, 2014. However, consumers and others may use non-conforming signal boosters with the consent of their wireless provider.

## 7. Other Issues

*Enforcement Issues.* The Enforcement Bureau investigates, tracks, and resolves complaints of signal booster interference, has taken enforcement action where warranted, and will continue to do so. To the extent additional information may be necessary to track and identify patterns of interference involving particular booster manufacturers or models affecting multiple wireless provider networks, the Enforcement Bureau will continue to leverage the expertise of the Commission's field engineers to obtain the relevant data. The Commission will closely monitor any complaints involving new Consumer Signal Boosters, and will take appropriate enforcement action against operators, retailers, manufacturers, or other entities that violate the signal booster rules.

*Consumer Outreach.* The rules adopted in the *Report and Order* created a new framework for the manufacture, sale, and authorization of signal boosters and an aggressive consumer outreach campaign will promote compliance with these new rules. The Consumer and Governmental Affairs Bureau, in connection with the Wireless Telecommunications Bureau, will conduct a consumer outreach campaign regarding the new regulatory regime for signal boosters. In addition, the Commission directed the Consumer and Governmental Affairs Bureau to issue a Consumer Advisory regarding new booster rules. This Advisory, among other things, will indicate that subscribers must turn off a booster if they receive a request to do so from the FCC or any wireless provider.

### B. Signal Boosters for Public Safety and Private Land Mobile Radio Service Operations under Part 90

The Commission also took a number of actions regarding signal boosters used in public safety and Private Land Mobile Radio Service operations under Part 90 of its rules. These actions are summarized here and discussed more fully below.

- Clarified the rules to make it clear that non-licensees who seek to operate signal boosters must obtain the consent of the licensee[s] whose signals they intend to amplify;
- Adopted a registration requirement for existing and future Class B signal booster installations;
- Permitted Part 90 licensees to deploy Class A (narrowband) signal boosters in both fixed and mobile environments provided that they do not cause interference to other licensed services in the band. Prohibited mobile deployment of Class B (wideband) signal boosters, but allowed fixed deployment of Class B signal boosters;

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<sup>30</sup> *Report and Order* at ¶ 133.

<sup>31</sup> 47 C.F.R. § 20.21(g).

- Required system integrators and installers to consider the potential adverse effects of the increased noise floor on PLMR systems and established additional emission limits to reduce the interference potential of signal boosters;
- Updated equipment authorization process to differentiate between Class A and Class B signal boosters and testing procedures; and
- Established labeling requirements to promote compliance with the rules.

### **1. Authorization for Part 90 Signal Boosters**

The Commission amended Section 90.219 of its rules. It found that allowing third parties to operate signal boosters with express licensee consent serves the public interest by promoting reliable communications, particularly reliable public safety communications. The Commission concluded that the public interest is best served if Part 90 PLMR licensees and others with licensee consent continue to be able to install and operate Part 90 PLMR signal boosters to meet their communications needs, particularly where the devices facilitate public safety communications. Accordingly, PLMR signal boosters may be operated in the Part 90 bands so long as the operator has a license or the consent of the licensee whose signals are intended to be amplified. Revisions to Section 90.219 are intended to clarify the authorization process for signal boosters without fundamental changes to existing practices.

### **2. Part 90 Signal Booster Classifications and Operational Restrictions**

#### **a. Part 90 Signal Booster Classifications**

The Commission determined that it is in the public interest to maintain both classes of signal boosters currently specified in Part 90: wideband signal boosters (Class B) and those that can be adjusted to amplify a narrow bandwidth (Class A). There is a need for both wideband and narrowband signal booster solutions to meet different deployment scenarios. Properly designed Class A and Class B signal boosters can be effectively deployed without a significant increased potential for harmful interference. The Commission amended the rules to reflect that signal boosters defined as Class A must have a passband per channel no larger than 75 kHz.<sup>32</sup> This bright line test will reduce confusion in the marketplace as to whether a particular signal booster is a Class A or Class B device. The Commission believed that a 75 kHz passband per channel is sufficient to accommodate the group delay issue associated with Class A signal boosters. In the equipment authorization process, the Commission will distinguish whether signal booster equipment types can meet this passband requirement to determine whether they qualify as Class A or Class B signal boosters.

In addition, the Commission adopted a definition to distinguish signal boosters from signal amplifiers.<sup>33</sup> A signal amplifier is a device that is physically attached at one end to a radio and at the other to an external antenna to achieve higher power, whereas a signal booster is not physically attached to the radio unit.

#### **b. Part 90 Class B Signal Booster Operation**

The Commission modified its current rule to allow Part 90 licensees and those operating with licensee consent to deploy Class B signal boosters both in confined areas and outdoors.<sup>34</sup> Eliminating

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<sup>32</sup> 47 C.F.R. § 90.219(c).

<sup>33</sup> See 47 C.F.R. § 90.7.

<sup>34</sup> 47 C.F.R. § 90.219(d)(4).



Class B signal boosters or substantially restricting their use could harm U.S. manufacturers and public safety entities that rely on these devices in both enclosed and outdoor environments. As discussed further below, however, the Commission determined that Class B mobile signal boosters will be prohibited as of November 1, 2014.

*Part 90 Class B Signal Booster Registration.* The Commission adopted a registration requirement for all existing and future Class B signal booster installations.<sup>35</sup> Class B signal booster registration will be a valuable tool to help resolve interference should it occur and it will impose only a minimal burden on the operators of signal boosters. A registration requirement will provide an additional source of information and control for licensees. By creating a permanent record of all Class B signal booster installations in a searchable database, licensees will be able to electronically search for signal booster installations if they experience interference or other degradations to their system. This will allow licensees to identify and shut down devices causing harmful interference as necessary. Part 90 PLMR licensees are well acquainted with the interference resolution process as these licensees operate on shared frequencies. A registration database is thus particularly well suited for operators in Part 90 PLMR frequencies.

The Part 90 PLMR signal booster registration database should allow licensees experiencing interference to identify Class B signal boosters that have been deployed in the area and provide a point of contact for each deployment to investigate interference. Thus, at a minimum, registration information shall include the following: (1) operating range of the Class B signal booster; (2) the physical location of the signal booster; and (3) contact information for the individual(s) responsible for the signal booster's operation.

The Commission delegated authority to the Wireless Telecommunications Bureau to design and manage the online registration tool, including the ability to seek additional information or add features that the Bureau may deem necessary. The Commission will maintain the Part 90 PLMR registration database. Part 90 PLMR licensees are well-accustomed to using the Commission's databases to provide the Commission with information about their service areas, tower locations, contact information, etc. Class B signal booster registration will employ a similar process. Further, an FCC-based system should provide licensees with access to information necessary to resolve interference; a licensee-based system would not sufficiently aggregate such information.

The Wireless Telecommunications Bureau will perform outreach regarding this registration requirement and will release a Public Notice detailing the specifics of the registration process once it is available. The FCC will require licensees and signal booster operators to register existing Class B signal booster installations with the Commission by November 1, 2014. This period will allow sufficient time for public outreach, website development, and regulatory approval of this process. After November 1, 2014, operation of an existing, unregistered Class B signal booster will be unauthorized and subject to enforcement action. Any new Class B signal booster installed after November 1, 2014 must be registered prior to operation. To encourage compliance with this new requirement, registration will be free of cost to the operator and/or licensee.

**c. Part 90 Mobile Signal Boosters**

The Commission will permit Part 90 licensees to deploy Class A signal boosters in a mobile environment provided that they do not cause interference to other licensed services. If a Class A signal

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<sup>35</sup> 47 C.F.R. § 90.219(d)(5).



booster causes interference, it must be shut down. While all signal boosters have the potential to cause interference if they are poorly made, poorly installed, or malfunction, Class A boosters have a lower potential to cause interference because of their narrow passbands. That is, if a signal booster is improperly installed and causes interference, a Class A device will affect fewer channels than a Class B device. In addition, it may be easier to identify the operating licensee of a Class A device by comparing the operating range of the device (using test equipment) to a list of licensees in that area over the relevant channel range.

The Commission concluded, however, that Class B signal boosters may not be deployed in a mobile environment on Part 90 PLMR frequencies because a Class B device operating in a mobile environment has the potential to affect hundreds of other licensees' channels. Some entities have deployed Class B signal boosters in vehicles. The FCC finds that the potential for interference outweighs the benefits of such devices, especially because there are alternatives, such as Class A boosters and vehicular repeaters that pose less potential for interference. Licensees who are currently operating mobile Class B signal boosters must transition their operations to alternate, permissible devices by November 1, 2014.

**d. Technical and Other Issues for Part 90 PLMR Signal Boosters**

*Emission Limits for Part 90 Signal Boosters.* Device specifications for Part 90 signal boosters are contained in Section 90.219(e) of the Commission's rules. The Commission will require both Class A and Class B signal boosters to suppress spurious, *i.e.*, unintended, emissions such that they do not exceed -13 dBm within any 100 kHz measurement bandwidth. This level of suppression is consistent with out-of-band emission limits used for other Part 90 transmitters and should reduce the level of spurious emissions generated by signal booster devices. The Commission also limited the noise figure of a signal booster not to exceed 9 dB in either direction.

The Commission will require Part 90 PLMR signal boosters to suppress emissions outside of the service band for which the operator is authorized and to deploy signal boosters with the minimum passband necessary to achieve the desired communications. The Commission amended rules to make it clear that operators may not amplify service bands where they do not have a license or licensee consent. The FCC also prohibited a single Class B signal booster device from amplifying both commercial services (such as Enhanced Specialized Mobile Radio (ESMR) and Cellular Radiotelephone) and Part 90 Land Mobile and Public Safety Services. This new requirement should address the situation in the 800 MHz spectrum where both subscriber-based systems and PLMR systems operate on adjacent bands, and the same signal booster is used to amplify both. Because signal boosters amplify thermal noise, as well as the desired signals (and add random noise of their own), the Commission believes that limiting the passband of devices to the intended service band of the licensee will further limit the interference potential of the device. This does not apply to distributed antenna systems (DAS) because they involve a higher level of design and implementation to address the needs of each service. While this requirement may make it difficult for a licensee to install one device in an enclosed structure capable of boosting a wide range of operators, the Commission believes it is needed to reduce the risk of interfering with licensees in other services.

The Commission determined that it would be beneficial for system integrators and installers to consider the potential adverse effects of increased noise floor on PLMR systems. However, because of the wide range of deployment scenarios in congested and uncongested areas, the Commission found it would be difficult to adopt a uniform noise limit for all Part 90 bands. Instead, it adopted a rule requiring

“good engineering practice” to be used when installing signal boosters.<sup>36</sup> This flexible approach will allow installers to consider the spectral environment of each deployment to determine whether an increased noise floor could interfere with nearby noise-limited services. Compliance with these levels will be deemed satisfaction of the good engineering practice requirement. Specifically, in a 10 kHz measurement bandwidth: (1) the ERP of intermodulation products within the signal booster passband should not exceed –30 dBm; (2) the ERP of noise within the signal booster passband should not exceed –43 dBm; and (3) the ERP of noise on spectrum more than 1 MHz outside of the signal booster passband should not exceed –70 dBm.

*Signal booster power limits.* The Commission determined that the limit of 5 watts ERP per channel continues to be appropriate for both classes of signal boosters used on Part 90 PLMR channels. Also, the 5 watts ERP limit will be applied to each channel for which the signal booster is designed to amplify, regardless of whether it is a Class A or Class B signal booster. The Commission will limit signal booster operations to only the power necessary to achieve the intended communications. If licensees need more than 5 watts ERP per channel for a particular deployment, they can use other allowances in Part 90, including obtaining an additional authorization for a repeater or base station. All PLMR signal boosters are required to comply with the RF exposure requirements of Sections 1.1307, 2.1091, and 2.1093 for fixed and mobile exposure conditions. Many Part 90 mobile radios could otherwise qualify for the higher occupational exposure limits, but the Commission will require that all signal boosters comply with the more restrictive general population exposure limits given that they may commonly be in locations proximate to the general public who would be unaware of their exposure.

#### **e. Equipment Authorization and Labeling for Part 90 Signal Boosters**

*Equipment Authorization.* The Commission concluded that it is necessary to test signal booster devices with multiple signals to ensure they function properly under a variety of conditions that could occur in deployment by PLMR entities and directed the Office of Engineering and Technology to update its Knowledge Database to reflect the testing procedure to ensure that approved devices meet the technical requirements adopted in the *Report and Order*. In addition, devices submitted for equipment authorization should be properly categorized as Class A, Class B, or amplifier.

The Commission established a two-step process for equipment authorization to allow time for manufacturers to design and obtain equipment authorization for signal boosters that meet the requirements adopted in this *Report and Order*. Specifically, as of the release date of this *Report and Order*, the Commission will no longer accept applications for equipment certification of Industrial Signal Boosters, including Part 90 signal boosters, that do not comply with the new rules and will cease certification of devices that do not comply with the new rules. Further, starting on March 1, 2014, all Part 90 signal boosters sold and marketed in the United States must meet the new requirements adopted in the *Report and Order*. This is a reasonable timeframe to allow manufacturers to develop and the Commission to certify devices that meet the new rules and will result in an orderly transition to better signal boosters.

*Labeling Requirements.* The Commission imposed new requirements for labeling Part 90 signal boosters and for Part 90 signal Booster operating manuals, in order to increase rule compliance and remind signal booster operators about proper implementation of the devices. Thus, all Part 90 signal

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<sup>36</sup> 47 C.F.R. § 90.219(d)(6).

boosters marketed or sold on or after March 1, 2014, must include the following language:<sup>37</sup>

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. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at [www.fcc.gov/signal-boosters/registration](http://www.fcc.gov/signal-boosters/registration). Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

In addition, the Commission will require labels and operating manuals for Part 90 signal boosters to indicate whether the booster is a Class A or Class B device. These disclosures must be included: (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.

**f. 800 MHz Rebanding**

Under the new rules, signal boosters may only operate within the service bands for which they are authorized and the Commission will not issue equipment certification for single signal boosters that amplify both commercial services (*e.g.*, ESMR, Cellular Radiotelephone) and Part 90 Land Mobile and Public Safety Services. Thus, once rebanding is complete, a single wideband signal booster will no longer be able to amplify both subscriber-based ESMR and public safety frequencies within the same passband. Changes to the technical requirements for Class B signal boosters, coupled with registration and rebanding, will reduce the instances of signal booster interference going forward. The approach adopted in the *Report and Order* is an appropriate balance between allowing signal booster operation now and in the future, without creating a formal licensing and coordination process to address signal booster operations in bands where public safety and non-public safety entities operate in adjacent spectrum.

**g. Treatment of Existing Part 90 Signal Boosters**

The Commission determined that the public interest will be best served by permitting the continued use of existing Part 90 signal boosters provided operators: (1) have a license or the consent of the licensee whose signals are intended to be amplified by the device, and (2) Class B signal boosters are registered with the Commission. If a Part 90 signal booster operator does not have consent to use an existing booster, it may not do so. In addition, the Enforcement Bureau will rigorously investigate any complaint of harmful interference associated with unauthorized signal booster use.

**h. Local Zoning Laws**

Local governments are not preempted from adopting zoning laws requiring the installation of signal boosters in buildings to facilitate communications by public safety first responders. However, such signal boosters must comply with all Commission's rules applicable to signal boosters, including the new rules adopted in the *Report and Order*.

**III. WEBLINK**

The *Report and Order*, FCC 13-21, was adopted February 20, 2013 and released February 20, 2013. Final rules adopted in the *Report and Order* are effective on May 13, 2013, except for amendments to §§ 1.1307(b)(1), 20.3, 20.21(a)(2), 20.21(a)(5), 20.21(e)(2), 20.21(e)(8)(i)(G), 20.21(e)(9)(i)(H), 20.21(f), 20.21(h), 22.9, 24.9, 27.9, 90.203(q), 90.219(b)(1)(i), 90.219(d)(5), and

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<sup>37</sup> 47 C.F.R. § 90.219(e)(5).

90.219(e)(5), which contain new or modified information collection requirements that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act (PRA), WILL BECOME EFFECTIVE after the Commission publishes a notice in the Federal Register announcing such approval and the relevant effective date.

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