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### **Requirements for Emergency Responder Radio Coverage in Buildings and Structures Revised August 8, 2021**

The North Attleboro Fire Department has developed these requirements in conjunction with the requirements of Massachusetts Building Code.

Radio coverage requirements shall apply to ALL new buildings and all existing buildings undergoing extensive renovations. Exceptions are identified within.

The North Attleboro Fire Department will administer all aspects of this document for each agency identified within.

Installation and operation of radio based emergency responder communications systems for the North Attleboro Fire Department and the North Attleboro Police Department must comply with this document.

Voluntary installation of a bi-directional communication system must comply with all of the requirements of this document.

Emergency communications have been proven to be the lifeline for firefighters, police officers and EMS personnel inside of large structures. Research and investigations into Line of Duty Deaths (LODDs) and injuries to Fire, Police and EMS personnel show that the loss of reliable communications inside of such buildings is a contributing factor in death and injuries to emergency personnel.

Reliable in-building communications is a paramount requirement for the safety of emergency personnel as well as that of the public and is major factor in the successful outcome of emergency operations inside of large buildings. These requirements were created to enhance emergency communications in buildings that could be subject to communications breakdown due to size, building materials, design, geography and other impediments to radio communications.

**Radio surveys SHALL NOT be conducted without the approval of the North Attleboro Fire Department. Contact 508-699-0140 x5605 after applying online (Section C.1) to schedule a radio survey.**

**Radio surveys are subject to delay, postponement, or cancellation where they are deemed intrusive or otherwise in conflict with public safety radio communications at the time.**

## **A. Emergency Responder Radio Coverage in Buildings**

1. Emergency responder radio coverage shall be provided in all new buildings. For the purpose of this document the term “Emergency responder” is intended to define any employee of the North Attleboro Fire Department and or the North Attleboro Police Department.
2. Buildings shall have approved radio coverage for emergency responders within the building based upon the existing coverage levels for their respective agency at the exterior of the building. This shall not require improvement of the existing North Attleboro Fire or Police Radio Systems.
3. Exceptions:
  - One and 2 family dwellings
  - Buildings that have sufficient levels of radio coverage
  - Wood framed buildings < 6 units.
  - Wood framed residential townhouses.
4. Buildings and structures that cannot support the required level of radio coverage shall be equipped with a system that includes a bi-directional amplifier(s) to achieve the required level of radio coverage.
5. RF emitting devices and cabling used in the installation of the BDA (Bi-Directional Amplifier) system shall be approved by the North Attleboro Fire Department. All RF emitting devices shall have the certification of the FCC and be suitable for public safety use prior to installation.

## **B. Waiver of Radio Coverage System**

1. Buildings that have sufficient levels of radio coverage to satisfy the requirements may request a waiver (see C-1) by submitting a waiver application along with an RF survey showing sufficient levels of radio coverage. Coverage will be verified by North Attleboro Fire Department radio technicians.
2. Waivers are valid for 5 years and must be renewed.
3. For buildings that received a waiver for coverage as a result of their initial testing, an RF survey must be conducted a minimum of once every five (5) years to ensure that radio coverage has not deteriorated to a point that would require a BDA system according to standards for new construction.
4. All test reports shall be forwarded to the North Attleboro Fire Department.
5. In the event of a failure of the RF survey, the building owner shall install a BDA system within ninety (90) days of the date of the failed test. Any BDA system installed must comply with this standard.
6. If at any time it is determined by the North Attleboro Fire Department, or the North Attleboro Police Department that radio coverage is not adequate for their respective agency, the waiver will be withdrawn and the property owner is then required to provide radio coverage as required.

### **C. Permit to install BDA**

1. Prior to the installation of a Bi-Directional Communication System, a permit for the installation of a signal booster must be submitted to the North Attleboro Fire Department

Waiver and BDA Permit applications: <https://northattleboroughma.viewpointcloud.com>

2. The permit application shall include:
  - a. Detailed drawings showing the location of the amplification equipment and associated antenna systems which includes a view showing building access to the equipment
  - b. Schematic drawings of the electrical system, backup power, antenna system and any other associated equipment relative to the amplification equipment including panel locations and labeling.
  - c. Manufacturer's data sheets on all equipment to be installed.
  - d. Plan review fee (as per current fee structure).
3. Upon approval, a permit for the installation of a signal booster(s) will be issued. Any field changes that occur during construction shall be incorporated into new As-Built plans, including any manufacturer's data sheets for any equipment changes not submitted in the original submittal. As-Built plans, if required due to system changes, shall be submitted for approval.
4. All documents related to a waiver, permit to install, or request for inspection must be included with their respective permit. Upload all documents as required to avoid delays.
5. The town of North Attleboro Fire and or Police Department assumes the responsibility of registering approved signal boosters with the FCC. Installed boosters remain the responsibility and property of the building owner at all times.
6. Property owners who maintain compliance with this document are granted permission to operate a signal booster on frequencies licensed to the North Attleboro Fire and or North Attleboro Police Department by the Federal Communications Commission. The failure to maintain compliance with this specification will result in the automatic withdrawal of said permissions.

### **D. Radio Coverage**

1. General building areas shall be provided with 95 percent floor area radio coverage.
2. Critical areas, including fire command centers, fire pump rooms, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical, shall be provided with 99 percent floor area radio coverage.

**E. System Design**

**1. Must utilize only Class A Signal Boosters**

- 2.** The distributed antenna system may be a radiating cable, fixed antennas or a combination of both.
- 3.** The system must comply with all applicable sections of FCC Rules. (Appendix A).
- 4.** Permanent external filters or attachments shall not be permitted.
- 5.** Assembly/installation of all components shall comply with the National Electrical Code.
- 6.** Survivability from attack by fire shall meet NFPA 72.
- 7.** All system components shall be installed, tested, inspected, and maintained in accordance with the manufacturers' published instructions.
- 8.** The system design, and installation, shall not exceed the FCC's OET 65 standards.
- 9.** The system shall be normally powered on and continuously provide passing of required frequencies.
- 10.** Shall be compatible with both analog and digital communications, simultaneously at the time of installation.
- 11.** BDA systems shall have lightning protection that complies with NFPA 780.
- 12.** Maximum propagation delay is 15us (microseconds)

## **F. Signal Strength**

1. Minimum inbound (downlink) signal strength of -95 dBm shall be provided throughout the coverage area. The inbound signal level shall be sufficient to provide a minimum of DAQ 4.0 for either analog or digital signals.
2. Minimum outbound (uplink) strength of -95 dBm shall be provided at the North Attleboro Fire Department receivers. The outbound signal level shall be sufficient to provide a minimum of DAQ 4.0 for either analog or digital signals.

## **G. Isolation**

1. Antenna isolation shall be maintained between the donor antenna and all inside antennas to a minimum of 20dB under all operating conditions.

## **H. Pathway Survivability**

1. Levels shall be as described in Section 5.10. (IFC, 2009)
2. Shall have a pathway survivability of Level 1, Level 2, or Level 3.
3. Radiating cable shall not be required to be installed in metal raceway.
4. Feeder and riser coaxial cables shall be rated as plenum cables.
  - A. Feeder coaxial cables shall be connected to the riser coaxial cable using hybrid coupler devices of a value determined by the overall design.
  - B. Riser coaxial cables shall be rated as riser cables and routed through a 2-hour-rated enclosure.
5. The connection between the riser and feeder coaxial cables shall be made within the 2- hour-rated enclosure, and passage of the feeder cable in and out of the 2-hour-rated enclosure shall be fire-stopped to 2-hour ratings.

## **I. Non-Interference and Non-Public Safety System Degradation**

1. No amplification system capable of operating on frequencies or causing interference on frequencies assigned to the North Attleboro Fire and or the North Attleboro Police Departments by the FCC shall be installed without prior coordination and approval of the North Attleboro Fire Department.
2. The property owner shall suspend and correct equipment installations that degrade the performance of the North Attleboro Fire and or the North Attleboro Police radio systems or the BDA.
3. BDA Systems that share infrastructure with non-public safety services shall ensure that the coverage and performance of the public safety communications channels are not degraded below the required level of performance, regardless of the amount of traffic carried by the non- public safety services.
4. Secondary users must furnish a complete list of transmit and receive frequencies along with an intermodulation (IM) study that will accompany the permit application. The IM Study will consist of the following calculations:  $IM= Q_1 * F_1 + Q_2 * F_2$ ,  $IM= F_1 + F_2 + F_3$ ,  $IM= F_1 + F_2 - F_3$ ,  $IM= Q_1 * F_1 + Q_2 * F_2$ , and  $IM= Q_1 * F_1 - Q_2 * F_2$  for all frequencies up-link and down-link. These calculations will be done to the 5th order.

## **J. System Radio Frequencies**

1. The BDA shall be capable of transmitting all radio frequencies assigned to the North Attleboro Fire and Police Departments, and be capable of using any modulation technology by either agency.

2. Assigned Frequencies:

Channel	Downlink	Uplink	PL/NAC **
FIRE 1	453.5125	458.5125	D074
FIRE 2	453.6000	458.6000	D114
POLICE 1	470.8875	473.8875	1AF
POLICE 2	471.3625	474.3625	2AF

\*\*PL/NAC are used on channel up/down links.

3. Class A Amplifier Pass Band

The downlink (from NAFD) pass band of the BDA shall have a center frequency of 453.2 +/- 75Khz.

The uplink (to NAFD) pass band of the BDA shall have a center frequency of 458.2 +/- 75Khz.

The downlink (from NAPD) pass band of the BDA shall have a center frequency of 474.0 +/- 75Khz.

The uplink (from NAPD) pass band of the BDA shall have a center frequency of 471.0 +/- 75Khz.

## **K. Frequency Changes**

1. The BDA system shall be upgradeable to allow for changes or additions to system frequencies to maintain radio system coverage as it was originally designed.

## **L. Radio Survey**

The building owner shall have the in-building radio system tested to insure that two-way radio coverage on each floor of the building meets or exceeds the required signal strength. **Radio surveys SHALL NOT be conducted without approval of the North Attleboro Fire Department. Contact 508-699-0140 x5605 after applying online (see Section C.1) to schedule a radio survey.**

1. Each floor of the building shall be divided into a grid of approximately twenty (20) equal areas. A maximum of one (1) area will be allowed to fail the test per floor. A spot located approximately in the center of a grid area will be selected for the test. Once the spot has been selected, prospecting for a better spot within the grid area will not be permitted. Field strength testing instruments are to be calibrated annually and of the frequency selective type incorporating a flexible antenna similar to the ones used on NAFD / NAPD handheld transceivers.
2. RF plots indicating the initial assessment of radio coverage and the enhanced coverage shall be submitted at the time of acceptance testing.
3. All compliance testing to be done with 50 ohm loads in place of the donor antenna to avoid interference to ANY radio system. The North Attleboro Dispatch Center is to be notified prior to any testing. (508-695-1212)
4. All testing and inspections are to be conducted, documented and signed by a person in possession of an FCC GROL.
5. Unattended operation of a BDA is not permitted until the completion of acceptance testing.

### **M. Power Supplies**

1. At least two independent and reliable power supplies shall be provided for all RF emitting devices and any other components of the system.
2. The Primary Power Source Shall be supplied from a dedicated branch circuit and comply with NFPA 72.
3. The Secondary Power Source Shall consist of a storage battery dedicated to the system with 12 hours of 100% system operation capacity.

### **N. Component Enclosures**

1. All BDA components, RF filters, and battery system components shall be contained in a NEMA4- or NEMA4X-type enclosure(s).
2. The cabinet shall be large enough to dissipate internal heat without venting the inside of the cabinet to the outside atmosphere. External or exposed RF filters are unacceptable.
  - 2.1 Dedicated battery cabinets may be vented.
3. The cabinet shall be painted red, equipped with a locking mechanism and labeled (in bright yellow):

**NORTH ATTLEBORO PUBLIC SAFETY**

**BDA Permit #**

**Serviced by: (Vendor name / Telephone)**

### **O. System Monitoring**

1. A sign will be located at the dedicated monitoring panel with the name and telephone number of the radio service provider indicating that they shall be notified of any alarm.
2. Trouble signals must be immediately reported to the radio service provider.
3. The North Attleboro Fire Department must be notified of any failures that extend past the two(2) hour time limit.

**4.** The building's Fire Alarm system shall include automatic supervisory signals for malfunctions of the BDA system that are annunciated by the fire alarm system in accordance with NFPA 72, and shall comply with the following:

- (1) Monitoring for integrity of the system shall comply with NFPA 72, Chapter 10.*
- (2) Transmission of Supervisory Malfunction Alarm to the dispatch center via Signal Communications DTX-16 radio system.*
- (3) System supervisory signals shall include the following:*
  - (a) Donor antenna malfunction*
  - (b) Active RF emitting device failure*
  - (c) Low-battery when 70% of the 12-hour operating capacity has been depleted*
  - (d) System component failure*
- (4) Power supply supervisory signals shall include the following for each RF emitting device and system component:*
  - (a) Loss of normal ac power*
  - (b) Failure of battery charger*
- (5) The communications link between the fire alarm system and the BDA must be monitored for integrity.*

**5.** A dedicated monitoring panel shall be provided within the fire command center to annunciate the status of all RF emitting devices and system component locations. The monitoring panel shall provide visual and labeled indications of the following for each system component and RF emitting device:

- (a) Normal ac power*
- (b) Loss of normal ac power*
- (c) Battery charger failure*
- (d) Low battery capacity (to 70 percent depletion)*
- (e) Donor antenna malfunction*
- (f) Active RF emitting device malfunction*
- (g) System component malfunction*

**6.** The communications link between the dedicated monitoring panel and the two-way radio communications enhancement system must be monitored for integrity.

## **P. Acceptance Testing**

**1.** Delivered audio quality (DAQ) testing will be conducted by North Attleboro Fire Department radio personnel to ensure that two way radio coverage, on each floor of the building, meets the minimum coverage requirements. Tests will be scheduled with at least 5 days advance notice.

**2. It is the building owner's responsibility to ensure that acceptance testing occurs prior to Fire Alarm System testing for the building.**

**3. At the time of this test, the following are also required:**

- A. The approved radio technician shall certify that the in-building radio system was installed and tested in accordance with the manufacturer and the current requirements of the current North Attleboro Fire departments In-Building Radio Specification.
- B. An approved radio service company shall certify that a maintenance contract is in effect that provides 24 hour by 7 day response within 2 hours of notification of a problem. This contract must be for a period of at least 1 year.
- C. RF Survey results, gain values of all amplifiers including screen shots
- D. Small scale drawings (11" x 17" maximum) of the structure shall be provided by the owner/contractor. The plans shall show each floor divided into the grids. Each grid shall be labeled to indicate the DAQ result from the RF Survey.
- E. As built drawings (if needed)
- F. BDA Manufacturer, Model #, Serial #, FCC Certification #
- G. Link budget

**Q. Testing Procedures:**

**1.** For testing system signal strength and quality, the testing shall be based on the DAQ system. A DAQ level below 4.0 shall be considered a failed test for a given grid cell.

**2.** Delivered Audio Quality Definitions:

*DAQ 1: Unusable, speech present but unreadable.*

*DAQ 2: Understandable with considerable effort. Frequent repetition due to noise / distortion.*

*DAQ 3: Understandable with slight effort. Occasional repetition required due to noise/distortion.*

*DAQ 4: Speech easily understood; occasional noise/distortion.*

**3.** A number of cells per floor shall be selected at random. Signal strength measurements shall be taken at the center of each cell. DAQ assessments will be tested at all critical area.

**4.** A maximum of one grid cell per floor will be allowed to fail the test. In the event that two of the areas fail the test, in order to be more statistically accurate, the testing grid may be adjusted. The town reserves all rights to determine any level of adjustment.

5. If the number of grid cells is adjusted, the number of failed cells permitted shall be adjusted accordingly to meet the 95% coverage requirement.
6. Failures *shall not be allowed in critical areas*, including but not limited to the Fire Command Center, Fire Pump Room, Emergency Generator Room, Stairwells with a standpipe, Elevator Lobbies serving the or other areas as identified by any department.
7. Both inbound and outbound signals shall be measured on each and every floor above and below ground including stairwells, basements, penthouse facilities and parking areas of the structure.
8. Measurements shall be made with the antenna held in a vertical position at three (3) to four (4) feet above the floor. (Portable radio worn on the belt or turnout coat pocket.)

## **R. Annual Test**

1. Annual tests will be conducted by an authorized company, at the expense of the building owner.
2. All active components of the in-building radio system, including but not limited to amplifier, power supplies, and back-up batteries, shall be inspected a minimum of once every twelve (12) months.
3. Amplifiers shall be tested to insure that the gain is the same as it was upon initial installation and acceptance. The original gain shall be noted and any change in gain shall be documented.
4. Back-up batteries and power supplies shall be tested under load for a period of one (1) hour to verify that they will operate during an actual power outage.
5. Active components shall be tested to verify they are operating as designed by the manufacturer.
6. If communications appear to have degraded or if the tests fail to demonstrate adequate system performance, the owner of the building or structure is required to remedy the problem and restore the system in a manner consistent with the original approval criteria.
7. At no time will the Town of North Attleboro, NAFD or NAPD be required to bear the costs for installation, modification or repair of a BDA system required by this document, policy or law.

**S. Five Year RF Survey**

1. An RF Survey be conducted a minimum of once every five (5) years to insure that the radio system continues to provide the required level of radio coverage.
2. Five year RF Survey costs will be conducted by an authorized company, at the expense of the building owner.
3. The procedure set forth in Section L shall apply to such tests.

**T. Maintenance & Servicing:**

1. At final acceptance the building owner shall supply a letter to the North Attleboro Fire Department accepting the property owner's responsibilities. These responsibilities are as follows:
  - A. Upgrades to system as directed by the North Attleboro Fire Department;
  - B. Maintenance contract in place with name of authorized company, who will provide a 24 hour by 7 day emergency response within two (2) hours after notification. The system shall be maintained in accordance with FCC requirements.
  - C. Maintain a list of contact personnel with phone numbers at the BDA cabinet. The contact personnel shall have knowledge of the building and the BDA system and be available to respond to the building in the case of an emergency.
  - D. Annual Inspections
  - E. 5-year RF surveys
  - F. Documentation of all testing all testing, maintenance and repairs shall be kept on site and a copy forwarded to the North Attleboro Fire Department. Electronic submissions of these reports are preferred.
  - G. This letter is to be on company letterhead signed by the property owner or a legal representative.

## **U. Modifications**

1. Modification of an existing BDA System requires prior approval from the North Attleboro Fire Department.
2. A permit application shall be submitted which includes a description of the work to be performed and drawings showing intended modification.
3. Modification work must not degrade radio coverage at any time.
4. An RF Survey must be completed and submitted after any modification to an existing antenna system.

## **V. System Installation**

### **1. Approved Radio Service Provider**

An approved Radio Service Provider is a company whose normal course of business involves the installation, repair and servicing of portable radios, mobile radios, signal boosters, base stations and associated infrastructure.

### **2. Senior Technician**

The Design, Installation and Commissioning shall be conducted, documented, and certified by a radio technician who is in possession of all of the following:

- A. FCC General Radiotelephone Operator License
- B. ETA Senior Certified Electronics Technician (CETsr) or equivalent Certification from an industry organization acceptable to the North Attleboro Fire Department.
- C. Manufacturer's Certification

### **3. Radio Technician**

The inspection, repair and preventative maintenance shall be conducted, documented, and certified by a radio technician who is in possession of all of the following:

- A. FCC General Radiotelephone Operator License
- B. ETA Certified Electronics Technician (CET) or equivalent Certification from an industry organization acceptable to the North Attleboro Fire Department.
- C. Manufacturer's Certification

4. Radio service providers will be issued call signs for use when transmitting on the North Attleboro Fire Radio System.

5. Annual inspection reports and 5-year RF Surveys must be submitted to the North Attleboro Fire Department in a timely manner.
6. The North Attleboro Fire Department shall be notified in writing at least thirty (30) days prior to cancellation of a maintenance contract. Such notice shall contain the date and time such cancellation is to take effect, BDA location, and BDA Permit #.
7. The North Attleboro Fire Department shall be notified in writing upon the procurement of contractual agreements relating to in-building radios covered by this specification.

**W. Inspections by Public Safety Agencies -**

1. Upon reasonable notice/request, the building owner shall provide access to the North Attleboro Fire Department, the North Attleboro Police Department and its escorted radio communications vendors. Should it be determined that a BDA system as installed is operating in such a way that it is negatively impacting communications of the North Attleboro Fire or Police departments, the system(s) may be shut down or be otherwise disabled by either agency or its designated service agent. Notice of any such action will be made to the building owner or representative.

**X. Disclaimer**

1. The North Attleboro Fire Department does not endorse, recommend or specify any specific product, service provider or configuration as the means to comply with this specification.

***Revision History***

July 19, 2016	creation of BDA document
January 7, 2020	reformat and technical update
October 20,2020	added online permitting
August 8, 2021	change to NAFD CH2 DPL

## ***Appendix A FCC Regulations***

### **Title 47: Telecommunication**

### **PART 90—PRIVATE LAND MOBILE RADIO SERVICES**

### **Subpart I—General Technical Standards**

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#### 90.219 Use of signal boosters.

This section contains technical and operational rules allowing the use of signal boosters in the Private Land Mobile Radio Services (PLMRS). Rules for signal booster operation in the Commercial Mobile Radio Services under part 90 are found in §20.21 of this chapter.

(a) *Definitions.* The definitions in this paragraph apply only to the rules in this section.

*Class A signal booster.* A signal booster designed to retransmit signals on one or more specific channels. A signal booster is deemed to be a Class A signal booster if none of its passbands exceed 75 kHz.

*Class B signal booster.* A signal booster designed to retransmit any signals within a wide frequency band. A signal booster is deemed to be a Class B signal booster if it has a passband that exceeds 75 kHz.

*Coverage area of a PLMRS station.* All locations within the normal reliable operating range (service contour) of a PLMRS station.

*Deploy a signal booster.* Install and/or initially adjust a signal booster.

*Distributed Antenna System (DAS).* A network of spatially separated antenna nodes connected to a common source via a transport medium that provides wireless service within a geographic area or structure.

*Operate a signal booster.* Maintain operational control over, and responsibility for the proper functioning of, a signal booster.

*Signal booster.* A device or system that automatically receives, amplifies, and retransmits signals from wireless stations into and out of building interiors, tunnels, shielded outdoor areas and other locations where these signals would otherwise be too weak for reliable communications. Signal booster systems may contain both Class A and Class B signal boosters as components.

(b) *Authority to operate.* PLMRS licensees for stations operating on assigned channels higher than 150 MHz may operate signal boosters, limited to the service band for which they are authorized, as needed anywhere within the PLMRS stations' service contour, but may not extend the stations' service contour.

(1) PLMRS licensees may also consent to operation of signal boosters by non-licensees (such as a building owner or a signal booster installation contractor) within their

service contour and across their applicable frequencies, but must maintain a reasonable level of control over these operations in order to resolve interference problems.

(i) Non-licensees seeking to operate signal boosters must obtain the express consent of the licensee(s) of the frequencies for which the device or system is intended to amplify. The consent must be maintained in a recordable format that can be presented to an FCC representative or other relevant licensee investigating interference.

(ii) Consent is not required from third party (unintended) licensees whose signals are incidentally retransmitted. However, signal booster operation is on a non-interference basis and operations may be required to cease or alter the operating parameters due to a request from an FCC representative or a licensee's request to resolve interference.

(2) [Reserved]

(c) *Licensee responsibility; interference.* PLMRS licensees that operate signal boosters are responsible for their proper operation, and are responsible for correcting any harmful interference that signal booster operation may cause to other licensed communications services. Normal co-channel transmissions are not considered to be harmful interference. Licensees are required to resolve interference problems pursuant to §90.173(b). Licensees shall act in good faith regarding the operation of signal boosters and in the resolution of interference due to signal booster operation. Licensees who are unable to determine the location or cause of signal booster interference may seek assistance from the FCC to resolve such problems.

(d) *Deployment rules.* Deployment of signal boosters must be carried out in accordance with the rules in this paragraph.

(1) Signal boosters may be used to improve coverage in weak signal areas only.

(2) Signal boosters must not be used to extend PLMRS stations' normal operating range.

(3)(i) Except as set forth in paragraph (d)(3)(ii) of this section, signal boosters must be deployed such that the radiated power of each retransmitted channel, on the forward link and on the reverse link, does not exceed 5 Watts effective radiated power (ERP).

(ii) Railroad licensees may operate Class A signal boosters transmitting on a single channel with up to 30 Watts ERP on frequencies 452/457.9000 to 452/457.96875 MHz in areas where communication between the front and rear of trains is unsatisfactory due to distance or intervening terrain barriers.

(4) Class B signal boosters may be deployed only at fixed locations; mobile operation of Class B signal boosters is prohibited after November 1, 2014.

(5) Class B signal booster installations must be registered in the FCC signal booster database that can be accessed at the following URL: [www.fcc.gov/signal-boosters/registration](http://www.fcc.gov/signal-boosters/registration).

(6) Good engineering practice must be used in regard to the radiation of intermodulation products and noise, such that interference to licensed communications

systems is avoided. In the event of harmful interference caused by any given deployment, the FCC may require additional attenuation or filtering of the emissions and/or noise from signal boosters or signal booster systems, as necessary to eliminate the interference.

(i) In general, the ERP of intermodulation products should not exceed  $-30$  dBm in 10 kHz measurement bandwidth.

(ii) In general, the ERP of noise within the passband should not exceed  $-43$  dBm in 10 kHz measurement bandwidth.

(iii) In general, the ERP of noise on spectrum more than 1 MHz outside of the passband should not exceed  $-70$  dBm in a 10 kHz measurement bandwidth.

(7) Signal booster passbands are limited to the service band or bands for which the operator is authorized. In general, signal boosters should utilize the minimum passband that is sufficient to accomplish the purpose. Except for distributed antenna systems (DAS) installed in buildings, the passband of a Class B booster should not encompass both commercial services (such as ESMR and Cellular Radiotelephone) and part 90 Land Mobile and Public Safety Services.

(e) *Device Specifications.* In addition to the general rules for equipment certification in §90.203(a)(2) and part 2, subpart J of this chapter, a signal booster must also meet the rules in this paragraph.

(1) The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.

(2) The noise figure of a signal booster must not exceed 9 dB in either direction.

(3) Spurious emissions from a signal booster must not exceed  $-13$  dBm within any 100 kHz measurement bandwidth.

(4) A signal booster must be designed such that all signals that it retransmits meet the following requirements:

(i) The signals are retransmitted on the same channels as received. Minor departures from the exact provider or reference frequencies of the input signals are allowed, *provided that* the retransmitted signals meet the requirements of §90.213.

(ii) There is no change in the occupied bandwidth of the retransmitted signals.

(iii) The retransmitted signals continue to meet the unwanted emissions limits of §90.210 applicable to the corresponding received signals (assuming that these received signals meet the applicable unwanted emissions limits by a reasonable margin).

(5) On or after March 1, 2014, a signal booster must be labeled to indicate whether it is a Class A or Class B device, and the label must include the following advisory

(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:

“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.”

