ERRCS and the AHJ

The FCC license holder is the key player in the deployment of the Emergency Responder Radio Coverage System (ERRCS). This article will guide all stakeholders through the connections between the governing codes that enables the FCC License holder to enforce the FCC laws. If ERRCS systems are installed without Licensee participation, their associated networks may have catastrophic or incremental failure. The following four sections will connect the dots between the Fire/Building Codes, the FCC Regulations and NFPA Standards.

Section 1. - Building and Fire Model Codes.

The 2019 IBC/IFC is the driving code that requires the ERRC system. The four sections cited below tie the building and fire codes to other applicable reference documents. The first three explain the systems needs to be FCC certified, that the AHJ is the enforcing authority, and they need to comply with FCC part 90.219. IBC/IFC Section 510 only defines a portion of the requirements that are necessary to follow. None of the Part 90 requirements are specifically called out in the building and fire codes. The last section brings in the NFPA installation requirements.

a. *Section 510.4.2.1 ... Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for the public use.*

   All active equipment needs to be lab tested by the FCC to verify that it meets the emissions guidelines. This will give the manufacturer an FCC Certification. Although the equipment (amplifier, BDA) may get this certification, it's the FCC licensee's responsibility to verify this equipment still operates under these guidelines when installed in the field. Not all certified equipment is installed appropriately. If the equipment doesn't meet the FCC criteria after it's installed, the FCC Licensee can refuse consent to operate.

b. *Section 510.5.1* ***Approval prior to installation.*** *Amplification systems capable of operating on frequencies licensed to any public safety agency by the FCC or other radio licensing authority shall not be installed without prior coordination and approval of the fire code official*.

   A key take-away from this section is "coordination and approval". A critical responsibility of the FCC licensee is to analyze each location for proper service contour coverage. This isn't as simple as a X mile radius around a location. Service contours are based on both signal levels and interference levels. There may be areas within a contour that a BDA is not legal.

c. *Section 510.5.4* ***FCC compliance.*** *The emergency responder radio coverage system installation and components shall comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219*

   This is possibly the most overlooked section in 510 yet is the gateway to the most important aspect of installing ERRC Systems.

d. Section 510.5 ***Installation requirements.*** *The installation of the public safety radio coverage system shall be in accordance with NFPA 1221 and Sections 510.5.1 through 510.5.4.*

   This is the link between the CFC and the NFPA, which also has references to FCC 90.219.

Section 2. – Federal Communications Commission.

Now that the connection between the building/fire codes are established, we can define the key factors. The Federal Communications Commission (FCC) is the Authority Having Jurisdiction (AHJ) for all radio, television, wire, satellite and cable in the United States. Federal requirements take precedence over state and local building requirements. Signal boosters, (bi-directional amplifiers- BDA) are a small portion of the Laws surrounding radio and this paragraph identifies the applicable sections. The FCC is responsible for managing and licensing the electromagnetic spectrum for commercial users and for non-commercial users including state, county and local governments. This includes public safety, commercial and non-commercial fixed and mobile wireless services, broadcast television and radio, satellite and other services. The entities that build and operate the radio networks are referred to as FCC Licensees. Some examples are City/ County radio groups (SRRCS, EBRCSA, SVRIA), and even fire alarm monitoring companies (Intrepid Electronic Systems, All Guard Alarm Systems), Cellular Carriers (AT&T, Verizon).

Title 47 Communications - Code of Federal Regulations Part 90 – Private Land Mobile Radio Services (PLMRS) covers a broad spectrum of all RF requirements. Subpart I covers the General technical standards, which includes 90.219 Use of Signal Boosters. The following sections of 219 highlights the authority of the licensee. Note that this isn't a comprehensive listing of 219, as there are other critical sections that contain performance guidelines.

a. *(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 station's service contour, but may not extend the station's service contour.*

   This states the FCC license holder has the authority to operate signal boosters within their authorized area.

b. *(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.*

   The key factor here is the Licensee MAY consent to have a building owner or contractor operate a system within his service contour (coverage area). The BDA is not the only solution to a lack of coverage within a building. For example, a fiber networked system can be used for a campus configuration rather than a standalone BDA in each building. Another option could be a new base station in the area.

c. *(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.*

   Express written consent should be issued by the licensee prior to the signal booster being placed into service.

Section 3. National Fire Protection Association.

The building/fire codes are linked to NFPA via Section 510.5. NFPA 1221 is linked to the FCC in several locations I've quoted below. 2019 NFPA 1221 Standard for the Installation, Maintenance, and use of Emergency Services Communications Systems. Most of this document covers the public emergency communication center's operations and telephone and dispatching systems. Chapter 9.6 contains the regulations related to two-way radio communications enhancement systems.

a. *9.6.2 Approval. Where the two-way radio communications enhancement system is used, the design of the system shall be approved by the AHJ.*

   This reinforces the system needs approval by the AHJ. Don't forget the FCC licensee is also an AHJ.

b. *9.6.5.1 No amplification system capable of operating on frequencies or causing interference to frequencies assigned to the jurisdiction by the licensing authority of the county of jurisdiction shall be installed without prior coordination and approval of the AHJ.*

   The key point here is we cannot install and operate a system without prior COORDINATION and approval of the AHJ. Both the fire department and the FCC licensee AHJs are applicable here. The Licensee is the responsible party for coordinating frequencies and use of the system.

c. *9.6.11.1.2 All RF-emitting devices shall have the certification of the radio licensing authority of that country and be suitable for public safety use prior to installation.*

   This repeats what is being required in CBC/CFC section 510.4.2.1. All RF equipment shall be certified by the FCC per 90.219(e) (1,2,3,4ii,4iii,).

d. *9.6.11.3(1) RF-emitting devices shall have the certification of the radio licensing authority prior to installation.*

   9.6.11.3 (2) All RF-emitting devices shall be compatible with both analog and digital communications, as required to be used by the radio licensing authority and the AHJ, simultaneously at the time of installation.

   Although this section states the same as 9.6.11.1.2, this section is intended to get approval of the licensee (preferably express written consent), which is separate from a manufacturer's certification. Section (2) emphasizes the approval from both the AHJ and the Licensee.

Section 4. – Connecting the Dots.

Now that the links have been established, we can identify a portion of the responsibilities of the Licensee. If left unchecked, and ERRCS are added in every building that fails coverage, the network will end up with system oscillations and an elevated noise level throughout the entire coverage area, which severely degrades all of the public safety communications, both indoors and out.

Building and Fire Departments should consider having the licensee participate in the building/planning process so they understand where the community is going and how they can adjust their system to avoid having to install ERRCS systems at all. Less system installs means less macro network noise. Additionally, funding should be allocated for both the management and hardware necessary to operate and maintain a system.

The FCC license holder should participate or manage the following activities:

- Develop a BDA registration form and approval process.
- Register and record each proposed location.
- Develop an express written consent form.
- Work with Fire Department to develop approval inspection process.
- Identify frequency and performance criteria needed for the systems.
- Compare new BDA location against existing BDA locations to determine feasibility.
- Verify location against service contour.
- Review benchmark surveys as well as other data in this list and offer suggestions to AHJ on pass/fail.
- Witness testing at sites and issue express written consent.

Respectfully,
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