

DRAFT

Universal In-Building Radio Communications Code

By: Jack Daniel 7-23-07

Comment: This draft is derived from existing local codes and is intended to enable local code enforcement while allowing individual agencies to include locally specific requirements. It is indexed in a manner consistent with most codes.

In order to permit maximum flexibility for local authorities, some specific detail may be reassigned to Addendums, as is common practice.

Draft codes similar to these are being considered by NFPA and IFC.

Section NNN. Public Safety Radio Coverage in Buildings

NNN.1 Building Radio Coverage. Except as otherwise provided no person shall maintain, own, erect, or construct, any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for public safety entities, including, but not limited to, firefighters, emergency medical services and police officers.

"Agency" as used in this code means the local governmental authority enacting this code.

Exceptions:

1. This section shall not apply to single family residential buildings; any building constructed of wood frame; any building thirty-five (35) feet high or less; as long as none of the aforementioned buildings make primary use of metal or concrete construction or contain below grade storage or parking areas. For purposes of this section, parking structures are included in the definition of building, and stair shafts are included in the definition of all parts of a building, but elevators may be excluded.
2. Buildings constructed prior to the implementation of this section shall not be required to comply with public safety radio coverage provisions of this section. However, should exempted structures undergo renovation, restoration, or significant modification to the original structure, exemption from the provisions of this Ordinance shall not apply.

NNN.1.1 Minimum Radio Coverage into building. A minimum signal strength of -95 dBm available in all areas of the building when transmitted from the agency's radio system. For purposes of this section, 90% building coverage is considered to be all areas of the building.

NNN.1.2 Minimum Signal Strength out of building. A minimum signal strength of -100 dBm received by the agency's radio system when transmitted from all areas of the building. For purposes of this section, 90% building coverage is considered to be all areas of the building.

NNN.1.3 Technical criteria maintained by the Agency. The agency shall maintain a document of technical information specific to their requirements. This document shall contain as a minimum; the frequencies required, the location and effective radiated power (ERP) of radio sites used by the in-building system, the maximum propagation delay (in microseconds) and other supporting technical information.

NNN.3 Amplification Systems Allowed. Buildings and structures which cannot support the required level of radio coverage shall be equipped with a radiating cable system and/or a distributed antenna system (DAS) with FCC certified signal boosters (aka bi-directional amplifiers), or systems otherwise approved by the agency in order to achieve the required adequate radio coverage.

NNN.3.1 Battery Systems. The active components of the installed system or systems shall be capable of operating on an independent battery system for a period of at least twelve (12) hours without external power input. The battery system shall automatically charge in the presence of external power input.

NNN.3.2 Signal Booster requirements. If used, signal boosters shall meet the following requirements as well as any other requirements determined by the agency;

- a. All signal booster components shall be contained in one NEMA4 type water proof cabinet. Permanent external filters and attachments are not permitted.
- b. The battery system shall be contained in one NEMA4 type water proof cabinet.
- c. The system shall include automatic alarming of malfunctions of the signal booster and battery system. Any resulting alarm shall be transmitted to the agency's designated recipient by means specified by the agency, including, but not limited to, automatic standard telephone dial-up circuit, TCP/IP network circuit, RS232 interface, etc.
- d. FCC Certification prior to installation. Pending FCC certification is not acceptable.
- e. All signal boosters must be compatible with both analog and digital communications simultaneously at the time of installation. The agency will provide the maximum acceptable propagation delay

f. Optionally, only equipment that is pre-approved by the agency may be used. This section cannot be used by the agency to limit equipment to one manufacturer.

NNN.3.3 Additional frequencies and change of frequencies. The building owner will be required to modify or expand the public safety in-building system at their expense in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC. This is an advisory statement that the building owner may select equipment and distribution components that are capable of such changes. Prior approval of an in-building system on previous frequencies does not exempt this section.

NNN.3.4 Approval Prior to Installation. No amplification system capable of operating on frequencies licensed to the agency by the FCC shall be installed without prior coordination and approval of the agency. This is a FCC requirement.

NNN.4.1 Testing and Proof of Compliance. Each owner shall submit at least one in-building coverage test:

1. Acceptance testing prior to occupancy of any newly constructed building.
2. Whenever structural changes occur including additions to buildings that would materially change the original field performance tests
3. Annually
4. When repairs or alterations are made to amplification systems The performance test shall demonstrate that adequate radio coverage is available in all required areas of the building. At the conclusion of the testing a report shall be submitted to the agency which shall verify compliance with Section NNN.1.

NNN.4.2 Acceptance Test Procedure. When an in-building radio system is required, and upon completion of installation, it will be the building owner's responsibility to have the radio system tested to ensure that two-way coverage on each floor of the building is a minimum of 90 percent.

Each floor of the building shall be divided into a grid of approximately 20 equal areas. A maximum of two nonadjacent areas will be allowed to fail the test.

In the event that three of the areas fail the test, in order to be more statistically accurate, the floor may be divided into 40 equal areas. A maximum of four nonadjacent areas will be allowed to fail the test. After the 40-area test, if the system continues to fail, it will be the building owner's responsibility to have the system altered to meet the 90 percent coverage requirement.

The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system.

A test location approximately in the center of each grid area will be selected for the test, then the radio will be enabled to verify two-way communications to and from the outside of the building through the agency's radio communications system. Once the test location has been selected, prospecting for a better spot within the grid area will not be permitted.

The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building owner so that the measurements can be verified each year during the annual tests. In the event that the measurement results become lost, the building owner will be required to rerun the acceptance test to reestablish the gain values.

As part of the installation a spectrum analyzer or other suitable test equipment shall be utilized to insure spurious oscillations are not being generated by the subject signal booster due to coupling (lack of sufficient isolation) between the input and output antenna systems. This test will be conducted at time of installation and subsequent annual inspections.

NNN.4.3 Annual Tests. When an in-building radio system is required, it shall be the building owner's responsibility to have all active components of the system, such as signal boosters, power supplies and backup batteries tested to a minimum of once every 12 months. Signal boosters shall be tested to ensure that the gain is the same as it was upon initial installation and acceptance. Backup batteries and power supplies shall be tested under load of a period of one hour to verify that they will properly operate during an actual power outage. If within the one hour test period, and in the opinion of the agency's representative, the battery exhibits symptoms of failure, the test shall be extended for additional one hour periods until the integrity of the battery can be determined. All other active components shall be checked to determine that they are operating within the manufacturers specifications for the intended purpose.

NNN.4 Field Testing. Police and Fire Personnel shall at any time have the right to enter onto the property to conduct its own field-testing to be certain that the required level of radio coverage is present

NNN.5 Minimum qualifications of personnel. The minimum qualifications of the system designer and lead installation personnel shall include

- a. A Valid FCC issued General Radio Operators License, and
- b. Certification of in-building system training issued by a nationally recognized organization, school or a certificate issued by the manufacturer of the equipment being installed.

The agency may waive these requirements upon successful demonstration of adequate skills and experience that's is satisfactory to the agency.

NNN.6 Other code compliance. The in-building system installation and components shall comply with all applicable local codes, including but not limited to, Federal Communications Rules (47 CFR 90.219), NEC, NFPA, IBC, IFC, etc.

End of draft : Version 7-23-07