Emergency Responder Radio Coverage Systems

TECHNICAL BULLETIN
FIRE-5-1

City of San Diego
Development Services Department
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MARCH 2017

The purpose of this Technical Bulletin is to provide guidelines for compliance with the requirements in Section 510 of the California Fire Code (CFC) and Section 916 of the California Building Code (CBC) for emergency responder radio coverage systems.

Documents referenced in this Information Bulletin

- California Building Code, (CBC)
- California Electrical Code (CEC)
- California Fire Code (CFC)

I. WHERE REQUIRED?

A. New Buildings

All new buildings and structures are required to comply with this Technical Bulletin except for the following:

1. Group R-3 occupancies (single family homes, duplexes, and townhomes) as defined by the CBC.
2. Open parking garages with no subterranean portions.
3. Buildings or structures that are three (3) stories or less in height and that do not have subterranean storage or parking.
4. Buildings or structures that are primarily constructed of wood and do not have subterranean storage or parking.

B. Existing Buildings

Existing buildings are required to comply with the requirements of this technical bulletin if a previously required two-way wired fire department communication system is removed.

II. SUBMITTING FOR BUILDING PERMIT

A. Architectural Drawings

The following notes must be added to the architectural drawings for buildings required to meet the requirements for emergency responder radio coverage as listed above:

1. This project is required to meet the requirements in CFC Section 510 for Emergency Responder Radio Coverage.
2. If this building does not meet the signal strength requirement of -95 dB into and out of the building in 95% of all areas on each floor of the building, a radiating cable system, a distributed antenna system with FCC certified signal boosters, or other system approved by the San Diego Fire Department will be provided to achieve the required coverage.

B. Fire Alarm Plans

If two-way communication is not provided for a building because an emergency responder radio coverage system is proposed, provide notes on fire alarm plans stating that emergency radio coverage is provided in lieu of two-way communication

C. Electrical Plans

The electrical plans must include an approved secondary source of power required for the emergency responder radio coverage system as specified below.

III. DESIGN RADIO COVERAGE SYSTEM

A. Amplification Systems Allowed

Buildings that cannot support the required level of radio coverage must be equipped with one of the following:

1. A radiating cable system,
2. An internal multiple antenna system with Federal Communications Commission (FCC)- certified bi-directional amplifiers, or
3. Systems otherwise approved by the City radio system Communications Engineer in order to achieve the required radio coverage.

B. Radio Signal Strength

The building is considered to have acceptable emergency responder radio coverage when the signal strength

measurements in 95 % of all areas on each floor of the building meet the following signal strength requirements:

1. A minimum signal strength of -95 dBm must be receivable within the building.
2. A minimum signal strength of -95 dBm must be received by the Agency's radio system when transmitted from within the building.

C. Frequency Range

The frequency range which must be supported shall be as follows:

1. 800 MHZ uplink band 806 MHZ– 824 MHZ
2. 800 MHZ downlink band 851 MHZ–869 MHZ
3. 700 MHZ uplink band 799 MHZ– 805 MHZ
4. 700 MHZ downlink band 769 MHZ-775 MHZ

D. Power Supply

An approved secondary source of power must be provided for radio coverage systems requiring electrical components per CFC 604. The secondary power supply shall be capable of operating the radio coverage system for at least 24 hours. The secondary power supply shall be either a battery system, ups or an emergency generator. All batteries must be contained within a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.

E. Signal Booster

If used, signal boosters must be contained within a NEMA 4-type waterproof case. The signal booster and battery system must be electronically supervised and monitored by a supervisory service (can be tied into fire alarm system). If no fire alarm system is provided in the building, then the signal can be sent to a constantly attended location approved by the City of San Diego.

F. Approval Prior to Installation

No amplification system capable of operating on frequencies used by the Regional 700 and 800 MHz Radio Systems may be installed without prior coordination and approval of the radio system licensee, City of San Diego Information Technology/Wireless Services Division. Any such system shall comply with any standards adopted by this agency.

IV. INSTALLATION

A. Qualifications of Personnel

The system designer and the lead installation personnel must have the following minimum qualifications.

1. A valid FCC–issued general radio operator license and
2. Certification of in–building system training issued by a nationally recognized organization, school such as Associated Public Safety Communications Officials International (APCO), National Association of Business and Education Radio (NABER), Personal Communications Industry Association (PCIA) or the International Association for Radio, Telecommunications and Electromagnetics, Inc. (iNARTE) or a certificate issued by the manufacturer of the equipment being installed.

B. Acceptance Test

Upon completion of the installation, the system is required to be tested after construction is complete in order to ensure that the two-way coverage on each floor of the building is a minimum of 90%. The test procedure shall be as follows:

1. Each floor of the building must be divided into a grid of 20 approximately equal test areas.
2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency of jurisdiction talking through the agency's radio communications system in both receive and transmit modes.
3. Failure of a maximum of two nonadjacent test areas shall not result in failure of the test.
4. In the event that three of the test areas fail the test, the floor shall be permitted to be divided into 40 equal test areas. Failure of a maximum of four nonadjacent test areas shall not result in failure of the test. If the system fails the

40-area test, the system must be altered to meet the 90% coverage requirement.

5. A test location approximately in the center of each test area must be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location is considered a failure of that test area. Additional test locations are not permitted.
6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept of file with the building owner so that the measurements can be verified during annual tests.
7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation.
8. System installed must be registered with the FCC. Proof of registration must be provided to the City.

C. Final Report

Prior to issuance of a certificate of occupancy, a final acceptance report shall be submitted to the Structural Inspector containing a floor plan and the signal strengths at each location tested and other relevant information stamped and signed by the FCC-certified technician or Engineer with a statement specifying that the building complies with all of the requirements of CFC 510.

V. MAINTENANCE

A. Testing

Testing is required both annually and whenever structural modifications are made that will impact the system. See CFC 510.6.1 for requirements for testing.

B. Additional Frequencies

The building owner is responsible for modifying or expanding the emergency responder radio coverage system at their expense if the FCC requires changes or if additional frequencies are made available by the FCC.