

**Carlsbad Fire Department
Fire & Life Safety Division**

**Guideline for
Emergency Responder Radio
Coverage**



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Guideline for Emergency Responder Radio Coverage

PURPOSE

The purpose of this document is to provide guidelines for compliance with the requirements in Section 510 of the 2022 California Fire Code (CFC) and Section 918 of the 2022 California Building Code (CBC) for emergency responder radio coverage systems (ERRCS).

SCOPE

This Guideline provides specific requirements for the installation of emergency responder radio coverage.

SUBMITTAL REQUIREMENTS

1. General Requirements

- A. Submit three (3) sets of legible, scaled plans with one (1) set of current and complete technical data sheets/manufacturer's specifications to Carlsbad Fire & Life Safety Division.
- B. Plans shall be submitted for approval to the City of Carlsbad before any equipment is installed or remodeled.
- C. Plans shall be drawn in accordance with section 510 of the California Fire Code, section 918 of the California Building Code, and NFPA 1221.

2. Place the following notes verbatim on plan

- A. A construction permit for the installation of or modification to emergency responder radio coverage systems and related equipment is required as specified in section 105.6.4 of the California Fire Code. Maintenance performed in accordance with the California Fire Code is not considered a modification and does not require a permit.
- B. The pre-construction emergency communications study and a final field emergency communication study shall be submitted to the Carlsbad Fire Department, as a Technical Report for review and approval.
- C. Applicable Building and Fire Code editions shall be stated on plans.
- D. Equipment required to provide in-building, two-way emergency responder communication coverage shall be listed in accordance with UL 2524.
- E. Buildings that cannot support the required level of radio coverage must be equipped with one of the following:
 - 1) A radiating cable system, or

- 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 to achieve the required radio coverage
- F. 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
- G. The frequency range which must be supported shall be as follows:

03	*3A DISP	*3B ADMIN	*3C	*3D	*3E	*3P EMG
	503	495	451	479	481	1363
	H 1F7	H 1EF	H 1C3	H 1DF	H 1E1	H 553
PRI	851.1875	851.1875	853.3375	853.3375	853.3375	851.1875
SEC	854.2625	854.2625	855.8875	855.8875	855.8875	854.2625

- H. An approved secondary source of power must be provided for radio coverage systems requiring electrical components per CFC 510.4.2.3. The secondary power supply shall be capable of operating the radio coverage system for at least 12 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.
- I. 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) or where approved by CFD, shall sound at a constantly attended on-site location. Automatic supervisory signal shall include the following:
- 1) Loss of normal AC power supply
 - 2) System battery charger(s) failure
 - 3) Malfunction of the donor antenna(s)
 - 4) Failure of active RF-emitting device(s)

- 5) Low-battery capacity at 70-percent reduction of operating capacity
 - 6) Failure of critical system components
 - 7) The communications link between the fire alarm system and the emergency responder radio enhancement system
- J. 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, Carlsbad Fire Department. Any such system shall comply with any standards adopted by this agency.
- K. 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.

3. Acceptance Test

- A. Upon completion of the installation, the system is required to be tested after construction is complete 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) If three of the test areas fail, 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 on 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) Installed systems must be registered with the FCC. Proof of registration must be provided to the Carlsbad Fire Department.

4. Final Report

- A. Prior to issuance of a certificate of occupancy, a final acceptance report shall be submitted to Carlsbad Fire Department 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 the requirements of CFC 510.

5. Maintenance

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

6. Additional Frequencies

- A. 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.