Corona Fire Department

Guideline for Emergency Responder Radio Coverage

PURPOSE

The intent of this guideline is to provide the minimum standards necessary to meet the requirements for emergency responder radio coverage in buildings, based on existing coverage levels of the public communications systems. The requirements are prescribed in 2016 California Fire Code Section 510. Requirements for both Both VHF and 700 mHz are included.

SCOPE

All new buildings shall have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building. This guideline applies to all buildings within the City of Corona, with the following exceptions:

1. Where approved the building official and the fire code official, a wired communication system in accordance with CFC 907.2.13.2 shall be permitted to be installed or maintained in lieu of an approved radio coverage system.

2. Where it is determined by the fire code official that the radio coverage system is not needed.

3. In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the fire code official shall have the authority to accept an automatically activated emergency responder radio coverage system.

For new construction, projects are generally approved through the Development Plan Review process (DPR). Prior to Planning Commission approval, the developer shall meet with the Fire Department to ensure that the required radio study is prepared to assess existing and proposed signal strength and clarity. The radio study shall provide specific recommendations to the developer to achieve compliance. The radio study shall be submitted along with the applicant's formal application to the Community Development Department prior to Planning Commission Approval.

For existing buildings, emergency responder radio coverage shall be provided for existing buildings as required by CFC Chapter 11.

REQUIREMENTS

1. **Permit required.** A construction permit for the installation of or modification to emergency responder radio coverage systems and related equipment is required as specified in Section 105.7.5. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

2. **Technical requirements.** Systems, components and equipment required to provide the emergency responder radio coverage system for both VHF and 700 mHz systems shall comply with Sections 510.4.1 through 510.4.2.5.
   a. **510.4.1 Radio Signal Strength**. The building shall be considered to have an acceptable emergency responder radio coverage when signal strength measurements in 95 percent of all areas on each floor of the building meet the signal strength requirements in Sections 91043131 and 510.4.1.2.
      i. **510.4.1.1 Minimum signal strength into the building**. A minimum signal strength of -95 dBm shall be receivable within the building.
      ii. **510.4.1.2 Minimum signal strength out of the building**. Minimum signal strength of -95 dBm shall be received by the agency's radio system when transmitted from within the building.
   b. **510.4.2 System design.** The emergency responder radio coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.5.
      i. **510.4.2.1 Amplification systems allowed.** Buildings and structures that cannot support the required level of radio coverage shall be equipped with a radiating cable system, a distributed antenna system with Federal Communications Commission (FCC)-certified signal boosters, or other system approved by the fire code official in order to achieve the required adequate radio coverage.
      ii. **510.4.2.2 Technical criteria.** The fire code official shall maintain a document providing the specific technical information and requirements for the emergency responder radio coverage system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, effective radiated power of the radio sites, and other supporting technical information.
      iii. **510.4.2.3 Standby Power.** Emergency responder radio coverage systems shall be provided with standby power in accordance with Section 604. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours
      iv. **510.4.2.4 Signal booster requirements.** If used, signal boosters shall meet the following requirements:
         - All signal booster components shall be contained in a National Electrical Manufacture's Association (NEMA) 4-type waterproof cabinet
         - Battery systems used for the emergency power source shall be contained in a NEMA 4-type waterproof system.
         - The signal booster system and battery system shall be electrically supervised and monitored by a supervisory service, or when approved by the fire code official, shall sound an audible signal at a constantly attended location.
         - Equipment shall have FCC certification prior to installation.

v. **510.4.2.5 Additional frequencies and change of frequencies**. The emergency responder radio coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC.

3. **510.5 Installation requirements.** The installation of the public safety radio coverage system shall be in accordance with Sections 510.5.1 through 510.5.4.

a. Plans, permits, installation and testing shall be at the expense of the developer.**510.5.1 Approval prior to installation**. Amplification systems capable of operating on frequencies licensed to any public safety agency by the FCC shall not be installed without prior coordination and approval of the fire code official.

a. **510.5.2 Minimum qualifications of personnel.** The minimum qualifications of the system designer and lead installation personnel shall include both of the following:
   i. A valid FCC-issued general radio operator's license.
   ii. 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. These qualifications shall not be required where demonstration of adequate skills and experience satisfactory to the fire code official is provided.

b. **510.5.3 Acceptance test procedure**. Where an emergency responder radio coverage system is required, and upon completion of installation, the building owner shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 90 percent The test procedure shall be conducted as follows:
   i. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
   ii. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency' radio communications system.
   iii. Failure of not more than two nonadjacent test areas shall not result in failure of the test.
   iv. In the event that three of the test areas fail the test, in order to be more statistically accurate the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than four nonadjacent test areas shall not result in failure of the test, If the system fails the 40-area test, the system shall be altered to meet the 90-percent coverage requirement.
   v. A test location approximately in the center of each test area shall be selected for the test with the radio enabled to verify two-way communication to and from the outside of the building through the public agency's radio communications systems. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered failure of that test area. Additional test locations shall not be permitted.
   vi. 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. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to establish the gain values.
   vii. 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 and subsequent annual inspections.

viii. At the time of 33% occupied, the building will be required to be re-evaluated and modified if necessary.

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

4. **510.6 Maintenance**. The emergency responder radio coverage system shall be maintained operational at all times in accordance with Sections 510.6.1 through 510.6.3.

a. 510.6.1 Testing and proof of compliance. The emergency responder radio coverage syste be inspected and tested annually or where structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

i. In-building coverage test as described in Section 510.5.3.

ii. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance.

iii. Backup batteries and power supplies shall be tested under a load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.

iv. Other active components shall be checked to verify operation within the manufacturer's specifications,

v. At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.3, shall be submitted to the fire code official.

5. **510.6.2 Additional frequencies.** The building owner shall modify or expand the emergency responder radio coverage system at his or her expense in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC. Prior approval of a public safety radio coverage system on previous frequencies does not exempt this section.

6. **510.6.3 Field Testing**. Agency personnel shall have the right to enter onto the property at any reasonable time to conduct field testing to verify the required level of radio coverage.

7. **Plan Submittal**. Findings from the Emergency Communications study shall be placed on all building plans submitted to the Building Division for review and approval.

8. **Emergency Responder Radio Coverage.** All buildings shall have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

9. **Use and Occupancy.** Except as otherwise provided, no person shall own, erect, construct or occupy, any building or structure, or any part thereof, or cause the same to be done, which fails to support adequate radio coverage for City emergency services workers operating on the City of Corona Emergency Communication System. Further,

owners must maintain a reasonable standard of reliable radio communication within their buildings and structures once a Certificate of Occupancy is issued.

This chapter shall not apply to elevators.

10. **Noncompliance.** After discovery of noncompliance, the building owner is provided three months to remedy the deficiency and gain compliance, unless otherwise approved by the fire code official.

11. **Radio signal strength.** The building shall be considered to have acceptable emergency responder radio coverage when signal strength measurements in 95 percent of all areas on each floor of the building meet the signal strength requirements, as follows:

    a. **Minimum signal strength into the building**. A minimum signal strength of -95 dBm shall be receivable within the building.

    b. **Minimum signal strength out of the building.** A minimum signal strength of -95 dBm shall be received by the agency's radio system when transmitted from within the building.

12. **Amplification systems allowed.** Buildings and structures which cannot support the required level of radio coverage shall be equipped with any of the following in order to achieve adequate coverage:

    a. A radiating cable system; or

    b. A distributed antenna system with FCC-certified signal boosters, or.

    c. A Bidirectional Amplifier (DBA)

    d. Other system approved by the Fire Code Official.

13. **Secondary Power**. Emergency responder radio coverage systems shall be provided with an approved secondary power source.

14. **Radio Frequency Coverage.** The specific radio frequency bandwidths that need to be capable of being amplified are:

    154.0000 mHz to 154.8000 mHz
    155.3000 mHz to 156.2000 mHz
    158.7000 mHz to 159.2000 mHz

    This list of frequency ranges will cover the City of Corona public safety radio system. If an external directional antenna is used/needed, it shall be directed at the closest direct line-of-sight radio repeater site.

    The Grape repeater site is located at: 33° 53' 38" by 117° 32' 02";
    The Eagle Glen repeater site is located at: 33° 48' 33" by 117° 32' 38";
    The Green River repeater site is located at: 33° 51' 57.5" by 117° 37' 44.5".

There will be 700mhz channels in use and Riverside will require the use of Class A channelized equipment. The number of channels will be required to design equipment.

15. **Building Certificate of Occupancy**. A Final Emergency Communications study shall be submitted to the Fire Department, prior to issuance of the certificate of occupancy. A functional test shall be performed and accepted by the Fire Department in accordance with requirements contained in the Corona Municipal Code.

16. **Annual Tests.** When an in-building radio system is required, the building owner shall test all active components of the system, including but not limited to amplifiers, power supplies and backup batteries, a minimum of once every 12 months. The test procedure shall be approved by the fire code official and shall be consistent with minimum City of Corona communication system standards.

17. **Five-Year Tests.** In addition to the annual test, the building owner shall perform a radio coverage test a minimum of once every 5 years to ensure that radio system continues to meet the requirements of the original acceptance test. The test shall include, but not be limited to, frequency range, minimum signal strength, amplification and delivered audio quality. Where deficiencies are noted, an action plan with timelines shall be presented to the fire code official for approval."

18. Failure to comply will result in progressive enforcement as prescribed in the Corona Municipal Code.