



STATE OF WASHINGTON  
**STATE BUILDING CODE COUNCIL**

May 2018  
Log No. \_\_\_\_\_

**1. State Building Code to be Amended:**

- |   |   |
|---|---|
| <input type="checkbox"/> International Building Code          | <input type="checkbox"/> International Mechanical Code        |
| <input type="checkbox"/> ICC ANSI A117.1 Accessibility Code   | <input type="checkbox"/> International Fuel Gas Code          |
| <input type="checkbox"/> International Existing Building Code | <input type="checkbox"/> NFPA 54 National Fuel Gas Code       |
| <input type="checkbox"/> International Residential Code       | <input type="checkbox"/> NFPA 58 Liquefied Petroleum Gas Code |
| <input checked="" type="checkbox"/> International Fire Code   | <input type="checkbox"/> Wildland Urban Interface Code        |
| <input type="checkbox"/> Uniform Plumbing Code                |   |

For the Washington State Energy Code, please see specialized [energy code forms](#)

**Section(s): 2021 IFC Chapter 5 Sections 510.1, 510.2, 510.3, 510.4, 510.4.1, 510.4.1.1, 510.4.2, 510.4.2.1, 510.4.2.2, 510.4.2.3, 510.4.2.4, 510.4.2.5, 510.4.2.6, 510.4.2.7, 510.4.2.8, 510.5, 510.5.4, 510.5.5, 510.6, 510.6.1, 510.6.2, 510.6.3, Chapter 11 Section 1103.2 and Section 918 of the IBC**

**Title: Emergency Responder Communication Coverage**

**2. Proponent Name (Specific local government, organization or individual):**

**Proponent: Ken Brouillette (Seattle Fire Department)**

**Title: Technical Code Program Manager**

**Date: 2/23/2021**

**3. Designated Contact Person:**

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**4. Proposed Code Amendment.** Reproduce the section to be amended by underlining all added language, striking through all deleted language. Insert new sections in the appropriate place in the code in order to continue the established numbering system of the code. If more than one section is proposed for amendment or more than one page is needed for reproducing the affected section of the code additional pages may be attached. (Examples on the SBCC [website](#))

Code(s) 2021 IFC and IBC \_\_\_\_\_  
918 of IBC

Section(s) IFC Chapter 5 and 11, Section

Enforceable code language must be used; see an example [by clicking here](#).  
Amend sections to read as follows:

**510.1 Emergency responder communication coverage in new buildings.** Approved in-building, ~~two-way emergency responder communication coverage~~ emergency responder communications enhancement system (ERCES) for emergency responders shall be provided in all new buildings. In-building, ~~two-way emergency responder communication coverage~~ ERCES within the building shall be based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

**Exceptions:**

1. Where approved by the building official and the fire code official, a wired communication system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained instead 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.

**510.2 Emergency responder communication enhancement system coverage in existing buildings.** Existing buildings shall be provided with approved in-building, ~~two-way emergency responder communication coverage~~ communications enhancement system for emergency responders as required in Chapter 11.

**510.3 Permit required.** A construction permit for the installation of or modification to in-building, ~~two-way~~ emergency responder communication enhancement coverage systems and related equipment is required as specified in Section 105.6.4. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

**510.4 Technical requirements.** Equipment required to provide in-building, ~~two-way~~ emergency responder communication enhancement system coverage shall be listed in accordance with UL 2524. Systems, components and equipment required to provide the in-building, ~~two-way~~ emergency responder communication enhancement coverage system shall comply with Sections 510.4.1 through 510.4.2.8.

**510.4.1 Emergency responder communication enhancement coverage system signal strength.** The building shall be considered to have an acceptable in-building, ~~two-way~~ emergency responder communication enhancement system coverage where signal strength measurements in 95 percent of all areas and 99 percent of areas designated as critical areas by the fire code official on each floor of the building meet the signal strength requirements in Sections 510.4.1.1 through 510.4.1.3.

**510.4.2 System design.** The in-building, ~~two-way~~ emergency responder communication enhancement coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.8 and NFPA 1221.

**510.4.2.1 Amplification systems and components.** Buildings and structures that cannot support the required level of in-building, ~~two-way~~ emergency responder communication coverage system shall be equipped with systems and components to enhance the radio signals and achieve the required level of in-building, ~~two-way~~ emergency responder communication coverage enhancement system specified in Sections 510.4.1 through 510.4.1.3. In-building, ~~two-way~~ emergency responder communication enhancement systems utilizing radio-frequency-emitting devices and cabling shall be approved by the fire code official. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.

**510.4.2.2 Technical criteria.** The fire code official shall maintain a document providing the specific technical information and requirements for the inbuilding, ~~two-way~~ emergency responder communication coverage enhancement system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in microseconds, the applications being used and other supporting technical information necessary for system design.

**510.4.2.3 Standby power.** In-building, ~~two-way~~ emergency responder communication enhancement radio coverage systems shall be provided with dedicated standby batteries or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 1203. The standby power supply shall be capable of operating the in-building, ~~two-way~~ emergency responder communication coverage enhancement system at 100-percent system capacity for a duration of not less than 12 hours.

**510.4.2.4 Signal booster requirements.** If used, signal boosters shall meet the following requirements:

1. All signal booster components shall be contained in a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.

2. Battery systems used for the emergency power source shall be contained in a NEMA 3R or higher-rated cabinet.
3. Equipment shall have FCC or other radio licensing authority certification and be suitable for public safety use prior to installation.
4. Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.
5. Active RF-emitting devices used for in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement systems shall have built-in oscillation detection and control circuitry.
6. The installation of amplification systems or systems that operate on or provide the means to cause interference on any in-building, ~~two-way~~ emergency responder communication enhancement system network shall be coordinated and approved by the fire code official.

**510.4.2.5 System monitoring.** The in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system shall be monitored by a listed fire alarm control unit, or where approved by the fire code official, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signals 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 in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system.
8. Oscillation of active RF-emitting device(s).

**510.4.2.6 Additional frequencies and change of frequencies.** The in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system shall be capable of modification or expansion in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority.

**510.4.2.7 Design documents.** The fire code official shall have the authority to require “as-built” design documents and specifications for in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement systems. The documents shall be in a format acceptable to the fire code official.

**510.4.2.8 Radio communication antenna density.** Systems shall be engineered to minimize the near-far effect. In-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system designs shall include sufficient antenna density to address reduced gain conditions.

**Exception:** Systems where all portable devices within the same band use active power control features.

**510.5 Installation requirements.** The installation of the in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system shall be in accordance with NFPA 1221 and Sections 510.5.2 through 510.5.5.

**510.5.4 Acceptance test procedure.** Where an in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement 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 95 percent. The test procedure shall be conducted as follows:

1. Each floor of the building shall 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 talking through the agency’s radio communications system or equipment approved by the fire code official.
3. Failure of more than one test area shall result in failure of the test.
4. In the event that two 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 two 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 95-percent coverage requirement.
5. 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 communications to and from the outside of the building through the public agency’s radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered to be a failure of that test area. Additional test locations shall not be 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. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to reestablish the gain values.
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 and at subsequent annual inspections.
8. Systems shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One portable radio shall be positioned not greater than 10 feet (3048 mm) from the indoor antenna. The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 510.4.1.1 and 510.4.1.2.

**510.5.5 FCC compliance.** The in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system installation and components shall comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.

**510.6 Maintenance.** The in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system shall be maintained operational at all times in accordance with Sections 510.6.1 through 510.6.4.

**510.6.1 Testing and proof of compliance.** The owner of the building or owner’s authorized agent shall have the in-building, ~~two-way~~ emergency responder communication ~~coverage~~ enhancement system 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:

1. In-building coverage test as described in Section 510.5.4.
2. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance or set to optimize the performance of the system.
3. Backup batteries and power supplies shall be tested under 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.
4. All active components shall be checked to verify operation within the manufacturer's specifications.

At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.4, shall be submitted to the fire code official.

**510.6.2 Additional frequencies.** The building owner shall modify or expand the in-building, ~~two-way~~ emergency responder communication ~~coverage enhancement~~ system at his or her expense in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority. Prior approval of an in-building, ~~two-way~~ emergency responder communication ~~coverage enhancement~~ system on previous frequencies does not exempt this section.

**510.6.3 Nonpublic safety system.** Where other nonpublic safety amplification systems installed in buildings reduce the performance or cause interference with the in-building, ~~two-way~~ emergency responder communication ~~coverage enhancement~~ system, the nonpublic safety amplification system shall be corrected or removed.

**1103.2 Emergency responder communication ~~coverage enhancement~~ in existing buildings.** Existing buildings other than Group R-3, that do not have approved in-building, ~~two-way~~ emergency response communication-~~coverage enhancement~~ for emergency responders in the building based on existing coverage levels of the public safety communication systems, shall be equipped with such coverage according to one of the following:

1. Where an existing wired communication system cannot be repaired or is being replaced, or where not approved in accordance with Section 510.1, Exception 1.
2. Within a time frame established by the adopting authority.

**Exception:** Where it is determined by the fire code official that the in-building, ~~two-way~~ emergency responder communication ~~coverage enhancement~~ system is not needed.

## 2021 International Building Code

### SECTION 918 EMERGENCY RESPONDER COMMUNICATION COVERAGE ENHANCEMENT.

[F] **918.1 General.** In-building ~~two-way~~ emergency responder communication ~~coverage enhancement~~ shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.

#### 5. Briefly explain your proposed amendment, including the purpose, benefits and problems addressed.

The purpose of this proposal is simply to align the terminology being used by industry. The revisions shown simply go through and revise that terms within IFC Section 510 and 1103.2 and IBC Section 918.1. This is also proposed code change F32-21 in the Group A proposed changes to the 2024 IFC and IBC. It was approved as submitted by the committee.

#### 6. Specify what criteria this proposal meets. You may select more than one.

- The amendment is needed to address a critical life/safety need.
- The amendment clarifies the intent or application of the code.
- The amendment is needed to address a specific state policy or statute.
- The amendment is needed for consistency with state or federal regulations.
- The amendment is needed to address a unique character of the state.
- The amendment corrects errors and omissions.

#### 7. Is there an economic impact: Yes No

Explain:

If there is an economic impact, use the tool below to estimate the costs and savings of the proposal on construction practices, users and/or the public, the enforcement community, and operation and maintenance. If preferred, you may submit an alternate cost benefit analysis.

Provide your best estimate of the construction cost (or cost savings) of your code change proposal? (See OFM Life Cycle Cost [Analysis tool](#) and [Instructions](#); use these [Inputs](#). [Webinars on the tool can be found \[Here\]\(#\) and \[Here\]\(#\)](#))

\$Click here to enter text./square foot (For residential projects, also provide \$Click here to enter text./dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

Please send your completed proposal to: [sbcc@des.wa.gov](mailto:sbcc@des.wa.gov)

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.