Salt Lake City Fire Department
Technology Services Division

Fire Marshal Policy on Installation and Maintenance of Public Safety Radio Repeater systems in Salt Lake City

February 2025

Scope

If there's an emergency in your commercial building, we want to ensure public safety personnel can communicate effectively. Modern construction materials often block firefighter and police radio signals, which can greatly disrupt life safety and property conservation activities. That's why the State of Utah and Salt Lake City have adopted Section 403.4.5 of International Building Code, and Section 510 of the International Fire Code (IFC), which requires installation of an emergency responder communication enhancement system (ERCES).

An ERCES system typically involves placement of an antenna on a building to amplify internal radio signals and ensure first responders can communicate effectively with 911 dispatch and emergency personnel outside the building. The ERCES amplifier is connected to a distributed antenna system, consisting of discrete, strategically placed antennas on every floor of the structure. Systems are tied to the fire alarm system, which can provide a one-stop monitoring location to make sure your facility is safe and ready for any emergency.

If your building is a mid-rise 5 stories or greater, or a high-rise (greater than 75'), including Type I or Type II construction (including podium construction), it can be anticipated that you will meet the requirements to install and maintain an ERRCS system. Structures that do not meet these criteria will likely not require a system. If there is uncertainty consult with your Salt Lake City Building Department plan review representative.

Code Reference

Per International Fire Code section 510.1 new buildings shall have approved radio coverage for emergency responders within the building based on the existing coverage levels of the public safety communication system. Exceptions are listed in the code.

International Fire Code section 510.2 indicates existing buildings shall be provided with approved radio coverage for emergency responders.

Permit Process

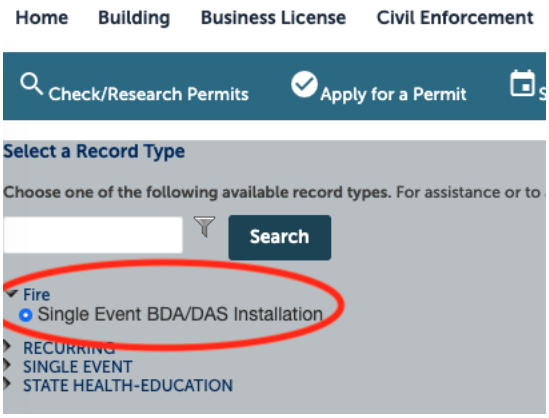
All ERCES systems in Salt Lake City require a permit from the Fire Department. We permit these systems to ensure they're going to work well when needed during an emergency, and to ensure systems don't cause problems on the statewide radio network, which happens occasionally. Also, the FCC requires the consent of our radio system license holder before a system can be placed into commission. Here's the process:

1. Review the 'Technical Requirements' section of this document before creating the system design.

2. Apply for a retransmit agreement from our radio provider, the Utah Communications Authority (UCA). UCA will provide the donor radio site, effective radiating power of the site, and associated frequencies. You'll need your retransmit letter before applying for a permit. Apply here:

https://www.uca911.org/Application-for-Letter-of-Consent-to-operate-a-Bidirectional-Amplifier

3. Apply for a permit at our website, https://aca.slcfire.com. The application is under the general "Fire" section. Be sure to upload the following documents:
    a. iBwave or comparable design drawings
    b. Link budget
    c. Installer general radio operator license certificate, NICET certification, or system specific certification
    d. Cable sweep test results, (this may be submitted after the system is installed)
    e. Cut sheets of the equipment being installed and the proposed design.
    f. Contact information of whomever will be monitoring your system in the long-term.



4. Upon receipt of the application, the plans provided, and proposed equipment will be evaluated by our radio team. We will commonly schedule a plan review meeting with the applicant in case there are any questions.
5. Once ready for commission, UCA requires notification before the system will be activated for the first time, so they can monitor the radio sites for interference. Contact them at this number:

UCA On-Call Hotline: **801-840-4216**

Loaner radios are available for testing by installers. As reinspection fees will be assessed if a new system fails inspection, it is highly recommended loaner radios be used for testing by installers before we perform system inspection. To obtain loaner radios please email Dan Dialogue with UCA at ddialogue@uca911.org.

An inspection will need to be scheduled with an SLC radio technician, who will test effectiveness, including but not limited to:

a. Delivered audio quality

b. Near-far testing
c. Frequency check
d. Donor antenna placement
e. Time delay interference

6. Upon successful inspection, a permit valid for 5 years will be provided

Note: your temporary certificate of occupancy may be withheld until this process has been completed.

Permit Fees

Salt Lake City Fire charges a permit fee of $205.00, which includes plan review and public safety delivered audio quality (DAQ) inspection.

Recertification

Your radio repeater system will need to be inspected by the original installer or qualified 3rd party every two years for proper function. Testing requirements include:

1. Donor antenna inspection for correct placement
2. Passive antenna failure
3. Alarm company or building automation notification upon system or component failure
4. Battery backup load test

Building owners will receive a letter requesting documentation of these inspection items every two years after an ERCES permit is required.

ERCES Waiver

Although building code requires public facilities to install ERCES systems, it is understood certain types of construction may not warrant a system, or a system may only be required in places where radio communications are hampered, such as below grade or in parking areas. Salt Lake City Fire may provide a waiver if it's determined radio communications are suitable in an existing building, or structures under construction that are at substantial completion, (exterior completed and drywall up).

Those designing new structures are encouraged to incorporate a wiring fire protection strategy between the potential location of the head-end equipment and the donor antenna on the roof of the building and should obtain bids for an ERCES system in case one is needed. If it's determined a system is required, a delay in issuance of the temporary certificate of occupancy may occur until the system is installed.

To apply for a waiver, follow the instructions on the handout located at the end of this document.

ERCES Systems at Adjacent Facilities

To ensure systems do not interfere with each other, or cellular provider networks, under no circumstances should multiple ERCES donor antennas be installed on buildings adjacent to each

other within a single project. An exception may be granted if adjacent buildings will be sold to third parties in the future.

A cost-effective solution to meeting this requirement is to install a single donor antenna on a structure, then link the system to other buildings using a fiber connection.

ERCES in Expansion Projects

An ERCES may be required for certain expansion projects in existing buildings. If the existent building does not have an ERCES system already installed, a DAQ inspection will be required for areas not included in the expansion. Installation of a system may be required based upon test results.

If the existent building already has an ERCES, it may require an upgrade if it's found to be not compatible with the new system being installed or is not in compliance with the requirements outlined in this document.

System Monitoring

Salt Lake City requires robust system monitoring for ERCES systems. An audible alarm at the head-end equipment is not acceptable by itself. Examples of acceptable monitoring include connection to a 3rd party monitored fire alarm system, or connection to a building automation system capable of sending real time alerts to facility personnel. An annunciator panel with system status must be installed in the Fire Command center if present.

Authority Having Jurisdiction

Salt Lake City Fire Prevention Bureau
Attention: SLC Fire Marshal
PO Box 145520
Salt Lake City, UT 84114-5520

Primary Contact
David Herrmann
Salt Lake City Fire Department
801-799-3510

FCC License Holder
Utah Communications Authority
Dan Dialogue
801-840-4200

Salt Lake City ERCES Technical Requirements

Requirement	Required Y/N	Notes
Annual Recertification	Required	An annual inspection of an installed ERCES system is required. This includes checking the position of the donor antenna, looking for alarms, and conducting radio checks as applicable.
Annunciator / Alarm Panel / Building Automation Integration	Required	The system must be connected to a building automation system, or fire alarm monitoring so a notification of an inoperable system or component can be immediately received by on site personnel. An annunciator panel with system status must be installed in the Fire Command center if present
Building Types Requiring ERCES	Conditional	Type I construction, Type II construction, High-Rise, Mid-Rise with below grade areas
Channels for Amplification	Required	The public safety channels required for amplification will be provided once a retransmit agreement has been completed with the Utah Communications Authority
Donor Antenna	Conditional	A single donor antenna is required for a system providing coverage to multiple buildings. In some instances, a high isolation may be required if the system installed is in close vicinity to other installations. Proximity to other ERCES installations will be evaluated at the time of plan review. If an ERCES is planned for the downtown area, this will likely be a requirement.
Donor Site	Conditional	The donor site will be provided once a retransmit agreement has been completed with the Utah Communications Authority. Once donor site has been obtained, specifications for each site follow.
Donor Site - City Creek Peak	Conditional	40.8071667, -111.8808333 ERP 282.000, maximum propigation delay_____
Donor Site - Public Safety Building	Conditional	40.7591667, -111.8811944 ERP 250.000, maximum propigation delay _____
Donor Site - UCA Mahagony Peak	Conditional	40.6315278, -112.1316667, ERP 282.000, maximum propigation delay _____
Horizontal / Vertical Wire Protection	Required	Horizontal wiring between head end equipment and passive antennas does not require fire protection other that what is specified in international fire code. Wiring between head end equipment, the donor antenna, and passive antennas on each floor requires a fire protection strategy
IFC Section 510 Compliance	Required	2021 edition
Installer Certification	Required.	The installer of ERCES system must have one of the following certifications. General radio-operator license, NIICET certification, or a certification from the system being installed
Maximum DB Uplink Power	Required	Uplink power for any sysetem may not exceed 65 decibels
NFPA 1221 Compliance	Required	2019 edition
NFPA 1225 Compliance	Not Required	This code has not been adopted by the State of Utah, but is considered to contain best practice
NFPA 70 Compliance	Required	2021 edition
Oscillation Prevention	Required	Systems installed must include oscillation and feedback prevention

On-Site Documentation	Required	A system installed must include paper documentatation attached to the head end equipment, including password to access system configuration, channels being amplified, and any other information that may be rquired by third parties in the future. Additionally, if a sled mount is used for the donor antenna, a sign must be posted on or near the vicinity of the antenna stating "Per order of the Fire Marshal, do not move this antenna without authorization".
Radio Frequencies and Control Channel Listing	Required	The listing of radio frequencies is based upon the donor radio site selected by the Utah Communications Authority when a retransmit agreement is obtained. Systems must be capable of retransmitting frequencies in the 700/800 MHz range
Retransmit Agreement	Required	A retransmit agreement must be completed by the Utah Communications Authority in advance of system installation. They provide the donor site, and appropriate transmit and receive frequencies
Spectrum Analyzer Specifications	Required	Spectrum analyzer equipment used for determining if an ERCES system is required in a structure must be capable of capturning RSSI, SNR, and BER. A report with a floor plan overlaid with captured data is required for all ERCES permits. Testing is against the City Creek Peak radio site. Control channels are as follows: 769.15625 and 774.68125
System Class	Required	Only Class A systems are permitted on the Utah Communications Authority radio network. Class B systems are not permitted
System Design	Required	System designs should be generated in iBwave or comparable solution by a quailfied radio engineer
Waiver Testing	Required	Any request for an ERCES waiver for mid-rise, wood-frame construction must include grid testing from a 3rd party the abitity to test SINR, RSSI, and bit-error rate, usiing a calibrated SeeHawk or comparable spectrum analyzer. The report must include a floorplan, and preferably contain a heat-map. Waver testing may only be completed after building is completed or at substantial completion, (exterior is complete and drywall is up).