



**Two-Way Radio Communication
Enhancement System - Distributed
Antenna System (DAS) and/or Bi-
Directional Amplifier (BDA) Guidelines**

NUMBER

SUBJECT

EFF. DATE

TOPIC

AUTHORIZATION

DAS and/or BDA

REFERENCE:

Florida Fire Prevention Code 8th Edition

NFPA 72 (2019 version): National Fire Alarm and Signaling Code

NFPA 1221 (2019 Version): Standards for the Installation, Maintenance, and Use of Emergency Services Communications Systems

Florida Administrative Code: 61G15-33.005 Design of Communication Systems

Florida State Statutes: Title XXXVII, Insurance – Chapter 633.202(18) Fire Prevention and Control

IMPORTANT NOTES:

- **Any DAS or BDA testing and/or installation within the City of Tallahassee & Leon County requires approval and shall follow these guidelines [F.S. 633.202 (18)].**
- Permission is required through the City of Tallahassee Fire Department before any DAS/BDA testing is conducted within the jurisdiction. Permission forms are located at www.talgov.com.
- **From website Select (Service Tab, then Fire Tab, form under Additional Forms and Information)** and should be submitted to the Tallahassee Fire Department at DASTesting@talgov.com and shall be included as part of the final approved set of plans.
- All Contractors shall confirm frequency being used with the City of Tallahassee Radio Shop by contacting Tommy Richardson at thomas.richardson@talgov.com, or 850-891-5377.
- **Any installation of a system requires a permit through the Growth Management Building Permitting Process.**
- To establish whether an existing or new building requires a radio coverage solution the Building Owner or General Contractor shall produce **(through a qualified Company with G.R.O.L Certification)** a preliminary assessment or baseline report of the in-door radio signal. The report should include floor plans showing the radio signal levels throughout the facility in a grid system layout. The grid size dimension for measurement purposes shall be based on 20' x 20' (400sq.ft) max. It is recommended that the preliminary/baseline be performed after all construction personnel have left the job site and that all outer windows, sliding doors, & doors in stairwells are fully installed and closed.
- **Failure to follow the aforementioned guidelines may affect RF signal penetration, resulting in inaccurate readings.**
- **Designer/Installer Qualifications:**
 - a. The system designer shall be a Florida-licensed Professional Engineer (P.E.). All design documents shall be signed and sealed by the P.E.
 - b. The DAS and/or BDA **UL Components Declaration form** shall be signed, notarized, and submitted with the permit plans. The required form is available on the City of Tallahassee website (www.talgov.com).



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- c. The lead installation technician shall be qualified to install, inspect, and test the system. Documentation of a valid FCC General Radiotelephone Operator License (G.R.O.L.) shall be provided. **The lead technician holding the G.R.O.L. license shall be present for all required inspections.**

DISTRIBUTED ANTENNA SYSTEM or BI-DIRECTIONAL AMPLIFIER

Approval and Permit

1. All system components shall be designed, installed, tested, inspected, and maintained in accordance with the manufacturer's published instructions. Plans and supporting documentation shall be submitted for approval prior to installation in accordance with Section 9.6 [NFPA 1221:9.6.1], Fire Plans Examiner [FFPC 1.14.1], and **Florida Statute 633.332**.
2. Plans shall be submitted for approval prior to installation. [NFPA 1221:9.6.6.1]
3. Permit applications for projects within the City of Tallahassee shall be submitted through the Customer Permitting Portal on the City of Tallahassee website (www.talgov.com).

To access the Customer Permitting Portal, navigate through the following menu options:

- Services
- Growth Management
- Electronic Plans Review
- Customer Permitting Portal
- Select Create Account if you are a new contractor.

Contractors may also submit permit applications in person at:

**Renaissance Building
435 North Macomb Street
Tallahassee, Florida 32301**

4. Applications for permits within the **COUNTY** shall be submitted by a properly licensed Florida contractor who is registered with the County's permitting portal. For permitting questions or assistance, contact Leon County Development Support and Environmental Management at (850) 606-1300.
5. Electrical plans shall be submitted with the Radio Communications Enhancement System plans for approval. [FAC 61G15-33.005]



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6. Electrical engineering documents for the Radio Communications Enhancement System (RCES) shall include the following information, as applicable to the project:
 - (1) System riser diagram for each cabling system.
 - (2) Equipment legend.
 - (3) Cabling type and performance data of the transmission.
 - (4) Device type and locations.
 - (5) Backup power source(s), where applicable.
 - (6) Installation, identification, and testing requirements.
 - (7) Characteristics and locations for surge protective devices, when included in the engineering design. **[FAC.61G15-33.005]**

Wiring and Pathway Survivability

7. The backbone, antenna distribution, radiating, or any fiber-optic cables shall be rated as plenum cables. **[NFPA1221:9.6.2.1]**
8. The backbone cables shall be connected to the antenna distribution, radiating, or copper cables using hybrid coupler devices of a value determined by the overall design. **[NFPA 1221: 9.6.2.2]**
9. The backbone cables as well as the connection between the backbone cable and the antenna cables shall be made within an enclosure that matches the building's fire rating, and passage of the antenna distribution cable in and out of the enclosure shall be fire stopped. **[NFPA 1221: 9.6.2.3 & 9.6.2.4]**
10. Two-way radio communications enhancement system shall have a pathway survivability of Level 1, Level 2, or Level 3. **[NFPA72:24.3.13.8.1]** See Footnotes.
11. Where installed in buildings, conductors and fiber optic cables shall be installed in accordance with NFPA 70 in any one of the following wiring methods:
 - (1) Electrical metallic tubing
 - (2) Intermediate metal conduit
 - (3) Rigid metal conduit
 - (4) Surface metal raceways
 - (5) Reinforced thermosetting resin conduit [RTRC]
 - (6) Metallic cable trays. **[NFPA1221:5.5.2]**
12. Systems shall have lightning protection that complies with NFPA 780.
13. All repeaters, transmitters, receivers, signal boosters, optical-to-RF converters, RF-to-optical converters, external filters, batteries, and battery system components shall be contained within NEMA4 or NEMA4X enclosure(s). **[NFPA 1221: 9.6.11.2.1]**
14. Batteries that require venting shall be stored in NEMA3R-type enclosures.

Non-Interference and Non-Public Safety System Degradation



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15. No amplification system capable of operating on frequencies or causing interference to frequencies assigned to the jurisdiction by the licensing authority of the county of jurisdiction shall be installed without prior coordination and approval of the AHJ. [NFPA1221:9.6.5.1]

Radio Coverage

16. Critical areas, including the Fire Command Center, fire pump room, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, generator rooms, mechanical rooms, elevator machine rooms, electrical rooms, underground garages, underground rooms, and any other areas designated by the Authority Having Jurisdiction (AHJ), shall be provided with 99 percent floor area radio coverage. [NFPA 1221: 9.6.7.4]

NOTE: To ensure reliable portable radio communications within elevator cabs, the Tallahassee Fire Department recommends that an indoor antenna be installed near each elevator. If this is not feasible, approval to access the elevator shaft for antenna installation shall be obtained through the Florida Department of Business and Professional Regulation (DBPR) prior to installation.

17. General building areas shall be provided with 90 percent floor area radio coverage. [NFPA1221:9.6.7.4]
18. Signal strength shall be provided throughout the required coverage area. The inbound and outbound signal levels shall be sufficient to provide a minimum Delivered Audio Quality (DAQ) of 3.0 for both analog and digital radio signals. [NFPA 1221: 9.6.8.1.2 & 9.6.8.2.2]

Radio Frequencies

19. Signal boosters shall be registered with the Federal Communications Commission (FCC) prior to being placed into operation. Registration shall be completed at: <https://www.fcc.gov/signalboosters/registration>
20. Frequency Changes: The system shall be upgradeable to accommodate future changes or additions to radio system frequencies while maintaining the level of radio system coverage for which the system was originally designed.
21. All uplink signals (800-816 MHz) shall be verified using a spectrum analyzer to confirm the system oscillations. The uplink Effective Radiated Power (ERP) shall not exceed 5 watts (+37 dBm).
22. The first four (4) channels shall be configured as the system's control channels. The Radio Communications Enhancement System (RCES) shall be designed, programmed, and tested to support the frequencies identified below.

Channel	TX Frequency (MHz)	RX Frequency (MHz)
1	857.4625	812.4625



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2	857.3375	812.3375
3	857.2125	812.2125
4	856.9125	811.9125
5	856.8125	811.8125
6	856.4625	811.4625
7	855.5125	810.5125
8	856.2875	811.2875
9	855.9625	810.9625
10	855.9125	810.9125
11	855.8125	810.8125
12	855.6375	810.6375
13	855.4125	810.4125
14	855.3375	810.3375
15	855.8875	810.8875
16	855.1625	810.1625
17	855.0875	810.0875
18	855.0375	810.0375
19	854.8625	809.8625
20	855.7625	810.7625
21	857.3125	812.3125
22	854.4375	809.4375

23. Tower Locations

- 7th Avenue and Monroe St
- Myers Park
- Spray field on Tram Road
- Tom Brown Park
- HWY 59 NE Leon County
- Lantern Light Road
- Hopkins Power Plant
- Lake Talquin Dam

Power Supplies



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24. At least two (2) independent and reliable power sources shall be provided for all RF-emitting devices and other active electronic components of the Radio Communications Enhancement System (RCES). The system shall consist of one primary power source and one secondary (backup) power source. [NFPA 1221: 9.6.12]
25. Primary Power Source: The primary power source shall be supplied by a dedicated branch circuit and shall comply with the requirements of NFPA 72. [NFPA 1221: 9.6.12.1]
26. Secondary Power Source: The secondary power source shall consist of one of the following:
 - (1) A storage battery dedicated to the Radio Communications Enhancement System (RCES) with sufficient capacity to operate the system at 100 percent capacity for a minimum of 12 hours.
 - (2) An alternative power source capable of providing 100 percent system operation for a minimum of 12 hours, as approved by the Authority Having Jurisdiction (AHJ). [NFPA 1221: 9.6.12.2]

System Monitoring

27. A The system shall include automatic supervisory signals for malfunctions of the two-way radio communications enhancement system. Supervisory signals shall be announced by the building fire alarm system in accordance with NFPA 72 and shall comply with the following:

(1) System Integrity Monitoring

Monitoring for the integrity of the system shall comply with NFPA 72, Chapter 10.

(2) System Supervisory Signals

System supervisory signals shall include the following:

- (a) Donor antenna malfunction.
- (b) Active RF-emitting device failure.
- (c) Low battery capacity indication when 70 percent of the required 12-hour operating capacity has been depleted.
- (d) Active system component failure.

(3) Power Supply Supervisory Signals

Power supply supervisory signals shall include the following for each RF-emitting device and active system component:

- (a) Loss of normal AC power.
- (b) Battery power failure.

(4) Communications Link Monitoring

The communications link between the building fire alarm system and the two-way radio communications enhancement system shall be monitored for integrity. [NFPA 1221: 9.6.13.1]

Dedicated Annunciation



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28. A dedicated annunciator shall be provided within the Fire Command Center to annunciate the status of all RF-emitting devices and active system component locations. The annunciator shall provide visual, labeled indications for each RF-emitting device and active system component, including the following:

- (a) Normal AC power.
- (b) Loss of normal AC power.
- (c) Battery charger failure.
- (d) Low battery capacity (70 percent depletion).
- (e) Donor antenna malfunction.
- (f) Active RF-emitting device malfunction.
- (g) Active system component malfunction.

The communications link between the annunciator and the two-way radio communications enhancement system shall be monitored for integrity. [NFPA 1221: 9.6.13.1 & 9.6.13.2]

Post Test

29. Permission must be granted by the City of Tallahassee Radio Shop prior to transmitting for post-installation testing. Requests shall be directed to Thomas Richardson at thomas.richardson@talgov.com

Inspection & Acceptance Test by the AHJ

30. All new Radio Communications Enhancement Systems (RCES) shall have a rough-in inspection and a final acceptance test to verify that the installed system meets the performance requirements of NFPA 1221, Section 9.6. Contractors shall schedule all required inspections through the **Customer Permitting Portal using Task Code 933**.

31. When scheduling the Fire Department Acceptance Test inspection, the following personnel shall be present:

- (a) The DAS and/or BDA contractor.
- (b) The fire alarm contractor. If the contractor that installed the DAS/BDA monitoring relays is not the contractor that installed the building fire alarm system, the fire alarm system installing contractor shall also be present.

32. During the Fire Department Acceptance Test, the Authority Having Jurisdiction (AHJ) shall perform random voice quality tests and Received Signal Strength Indicator (RSSI) measurements throughout the facility to verify system performance.

The AHJ shall determine the locations within the building where RSSI measurements and voice quality testing will be conducted.

The AHJ may also require testing of the following:



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- (a) Uninterruptible Power Supply (UPS).
- (b) Fire alarm system monitoring.
- (c) System supervisory and monitoring functions.

Annual Testing

- 33. All systems shall be operationally tested at least annually to verify proper system operation during normal operating conditions.

Pathway Survivability Level 1

Pathway Survivability Level 1 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system installed in accordance with NFPA 13. All interconnecting conductors, cables, or other physical pathways shall be installed within metal raceways. [NFPA 72: 12.4.2]

Pathway Survivability Level 2

Pathway Survivability Level 2 shall consist of one or more of the following:

- 1. Two-hour fire-rated circuit integrity (CI) cable or fire-resistive cable.
- 2. Two-hour fire-rated cable system (electrical circuit protective system).
- 3. Two-hour fire-rated enclosure or protected area.
- 4. Performance alternatives approved by the Authority Having Jurisdiction (AHJ). [NFPA 72: 12.4.3]

Pathway Survivability Level 3

Pathway Survivability Level 3 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system installed in accordance with NFPA 13, and one or more of the following:

- 1. Two-hour fire-rated circuit integrity (CI) cable or fire-resistive cable.
- 2. Two-hour fire-rated cable system (electrical circuit protective system).
- 3. Two-hour fire-rated enclosure or protected area.
- 4. Performance alternatives approved by the Authority Having Jurisdiction (AHJ). [NFPA 72: 12.4.4]