



# City of Jacksonville

## **BDA Survey and Installation Requirements**

The City of Jacksonville in order to optimize fire and rescue operation communications on scenes of fire and other emergencies and to comply with the Florida Fire Prevention Code NFPA 1 Chapter 11.10 as modified by Florida Statute 633.202 (18) will require minimum radio signal strength levels for communications for all new and existing buildings. (See below for code, statutory language, and Declaratory Statement).

### **NFPA 1 Chapter 11.10**

#### *11.10 Two-Way Radio Communication Enhancement Systems*

*11.10.1 In all new and existing buildings, minimum radio signal strength for fire department communications shall be maintained at a level determined by the AHJ. **The level determined to be acceptable in the City of Jacksonville will be as stipulated in the International Fire Code Section 510.4.1 The building shall be considered to have acceptable emergency responder radio coverage when signal strength measurements are of -95 dBm in 99% in all critical areas to include all elevators (measured at the primary recall floor), stair shafts and Fire Command Centers and 95% of all general areas of the building.***

### **FS 633.202 Florida Fire Prevention Code:**

*(18) The authority having jurisdiction shall determine the minimum radio signal strength for fire department communications in all new high-rise and existing high-rise buildings. Existing buildings are not required to comply with minimum radio strength for fire department communications and two-way radio system enhancement communications as required by the Florida Fire Prevention Code until January 1, 2022. However, by December 31, 2019, an existing building that is not in compliance with the requirements for minimum radio strength for fire department communications must apply for an appropriate permit for the required installation with the local government agency having jurisdiction and must demonstrate that the building will become compliant by January 1, 2022. Existing apartment buildings are not required to comply until January 1, 2025. However, existing apartment buildings are required to apply for the appropriate permit for the required communications installation by December 31, 2022.*



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### **Notice of Declaratory Statement**

*NOTICE IS HEREBY GIVEN that Department of Financial Services has issued an order disposing of the petition for declaratory statement filed by Charles B. Parks, Chief Fire Code Official of Broward County on February 02, 2018. The following is a summary of the agency's disposition of the petition: The Amended Petition requests a determination as to whether Section 633.202(18), Florida Statutes, prohibits the enforcement of NFPA 1, section 11.10, in buildings under 75 feet in height. The Department concludes section 633.202(18), Florida Statutes, does not apply to the enforcement of NFPA 1, section 11.10, in buildings under 75 feet in height.*

### **So what does that all mean?**

- All new and existing buildings regardless of height, below required radio strength threshold must comply. If radio signal strength after signal survey is found to be below acceptable threshold, a BDA system will be required.
- Existing High-rises must comply by Jan 1, 2022 however a permit for said buildings must be pulled by Dec.31, 2019.
- Existing apartment buildings are not required to comply until January 1, 2025. However, existing apartment buildings are required to apply for the appropriate permit for the required communications installation by December 31, 2022.
- As per the 69A Dec. statement (for clarification) all other buildings not meeting minimum signal strengths as determined by a radio survey performed by a FCC licensed entity are deemed non-compliant and will be required to install a BDA. The City of Jacksonville has determined that those occupancies will be allowed to show compliance by applying for the appropriate permit for the required communications installation by December 31, 2022 with installation completed no later than Jan 1, 2025. All new construction building will be required to comply as part of their permitting process.



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### **Building Survey Requirements:**

- The city of Jacksonville utilizes a 28 channel Motorola 800 Mhz Linear simulcast P25 radio system. We have 4 available control channels transmitting in the range of 855.2100 Mhz and 856.000 Mhz . Our system frequency range is 807.000 Mhz. to 816.00 Mhz. for Base RX and 854.900 Mhz. to 861.000 Mhz. for Base TX.

Our control channels are as follows:

We are currently use channel 4 as primary.

1	855.9875	810.9875
2	855.9625	810.9625
3	855.4875	810.4875
4	855.2125	810.2125

- Once the building is substantially complete or an existing building is suspected of having compliance issues, a qualified FCC Grol licensed vendor will perform the signal survey to check the current radio signal levels inside the building.
- Vendor will measure the incoming signal levels by monitoring the AHJ radio repeater talk-out frequency. Vendor shall notify City *of Jacksonville Radio Shop* and get approval for the testing.  
***Steven Hayner Radio Systems Engineer (904) 904-255- 7418 /Email: [SHayner@coj.net](mailto:SHayner@coj.net)***

If the measurements show that the levels are above the required threshold, the FCC GROL Licensed vendor will than prepare a report stating building is in compliance with testing data attached. Survey should include grid map showing all critical and general areas with passing survey results submitted to the Office of Fire Plans review for archival purposes. If levels are below the required threshold, a BDA will be required.



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**Technical Information for BDA design:** System shall comply and meet the following requirements:

*Florida Administration Code: 61G15-33.005 Design of Communication Systems*

*Florida State Statues: Title XXXVII, Insurance – Chapter 633.202 and 633.551, Fire Prevention and Control*

*Florida Fire Prevention Code (FFPC) Sixth Edition; 69A-60.005*

*NFPA 1.11.10 Two – Way Communication*

*NFPA 1221, 2016 Edition, Standard for the installation, Maintenance, and Use of Emergency Services Communication Systems*

*NFPA 72, 2013 Edition, National Fire Alarm Code; Chapt.10 Section 6; Chapt. 24; Sections 24.5.2.21 through 24.5.2.2.3*

*Florida Building Code (FBC) 2017 Sixth Edition*

*NFPA 70, 2014 Edition, National Electrical Code*

Retrofit BDA systems will require a building permit through The City of Jacksonville's Building Department due to the rated enclosure requirements. New construction buildings that are able to show enclosure s on new construction building plans will be able to pull an associated fire permit in lieu of building permit. Additional associated electrical and fire permits may be required for electrical and fire alarm work related to BDA.

**License requirement for installation:** EC Certified Electrical Contractor, EF Certified Alarm System Contractor I, EY Registered Alarm System Contractor 1, ES Certified Two-Way Radio Communications Enhancement System Specialty along with FCC Grol License.



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**Frequencies required:** System frequency range is 807.000 Mhz. to 816.00 Mhz. for Base RX and 854.900 Mhz. to 861.000 Mhz. for Base TX

### **Location of radio sites for public safety radio enhancement system:**

- 1.) **Hogan Road** 8675 Hogan Rd.
- 2.) **Yellow Water** 2015 Yellow Water Rd.
- 3.) **Lloyd Rd.** 2630 Lloyd Rd.
- 4.) **Greenland** 14247 Old St. Augustine Rd.
- 5.) **Jax Beach** 950 10th Street South
- 6.) **Firestone** 6878 Firestone Rd.
- 7.) **SJRPP** 11201 New Berlin Rd.
- 8.) **Center Park** 2797 Kernan Rd. S
- 9.) **JEA Plaza** 21 W. Church St.

**List of specifically approved system components:** All system components shall be designed, installed, tested, inspected, and maintained in accordance with the manufacturers' published instructions and the requirements of Section 9.6. of NFPA 1221 2016.

### **Rating requirements:**

- Riser coaxial cables (**Antenna donor Cable to BDA head end**) shall be rated as riser cables and routed through a 2-hour-rated enclosure.
- The feeder and riser coaxial cables (**From BDA Head end to antennas or remotes**) shall be rated as plenum cables that match the building's fire rating and pathway survivability. **See 1221 2016 TIA 16-2**
- The connection between the riser and feeder coaxial cables shall be made within an enclosure matching the building's fire rating and pathway survivability, and passage of the feeder cable in and out of the enclosure shall be fire-stopped to the building's fire rating and pathway survivability. **See 1221 2016 TIA 16-2**

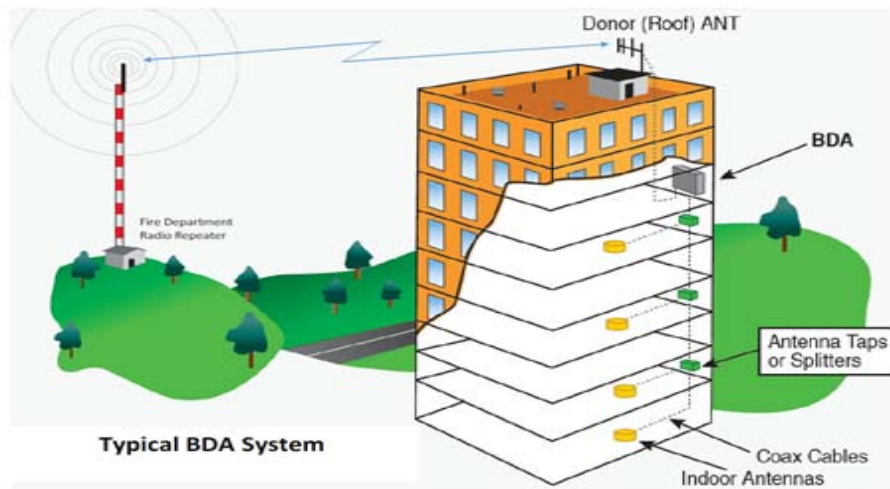


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### **Lightning protection:**

Systems shall have lightning protection that complies with NFPA 780.

### NFPA 1221 2016



### **Pathway Survivability Requirements:**

- Pathway survivability requirements will be based off currently adopted edition of NFPA 72.

For systems employing relocation or partial evacuation, Level 2 or Level 3 pathway survivability shall be required. For systems that do not employ relocation or partial evacuation, a Level 1, Level 2, or Level 3 pathway survivability shall be required.



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### **Pathway Survivability Levels Defined:**

Pathway Survivability Level 1: Pathway survivability Level 1 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, with any interconnecting conductors, cables, or other physical pathways installed in metal raceways.

Pathway Survivability Level 2: Pathway survivability Level 2 shall consist of one or more of the following: (1) 2-hour fire-rated circuit integrity (CI) cable (2) 2-hour fire-rated cable system [electrical circuit protective system(s)] (3) 2-hour fire-rated enclosure or protected area (4) 2-hour performance alternatives approved by the authority having jurisdiction.

Pathway Survivability Level 3 Pathway survivability Level 3 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and one or more of the following: (1) 2-hour fire-rated circuit integrity (CI) cable (2) 2-hour fire-rated cable system [electrical circuit protective system(s)] (3) 2-hour fire-rated enclosure or protected area (4) 2-hour performance alternatives approved by the authority having jurisdiction is a pathway in buildings that are fully protected by automatic sprinkler system and cables are installed in metal raceways.

### **Radio Coverage Requirements:**

- Critical areas to include fire command centers, fire pump rooms, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by the authority having jurisdiction, shall be provided with 99% floor area radio coverage.
- General building areas shall be provided with 95% floor area radio coverage.



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### **Signal Strength Requirements:**

- Minimum **inbound** signal strength of  $-95$  dBm shall be provided throughout the coverage area with an inbound signal level of DAQ 3.0
- Minimum **outbound** signal strength of  $-95$  dBm at the donor site shall be provided from the coverage area with an outbound signal level of DAQ 3.0

### **Isolation Requirements:**

- Isolation shall be maintained between the donor antenna and all inside antennas to a minimum of 20 dB under all operating conditions.

### **Maximum acceptable propagation Delay:**

- 15 Microseconds.

### **Frequency Changes:**

- Systems shall be upgradeable to allow for instances where the jurisdiction changes or adds system frequencies to maintain radio system coverage as it was originally designed.

### **Component Enclosure Requirements:**

- All repeater, transmitter, receiver, signal booster components, external filters, and battery system components shall be contained in a NEMA4- or NEMA4X-type enclosure(s).

### **Component Requirements:**

- RF emitting devices and cabling used in the installation of the public safety two-way radio communications enhancement systems shall be approved by the AHJ, and all RF emitting devices shall have the certification of the





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- Radio licensing authority and be suitable for public safety use prior to installation.
- RF emitting devices shall meet the following requirements in addition to any other requirements determined by the AHJ:

(1) RF emitting devices shall have the certification of the radio licensing authority prior to installation. (2) All RF emitting devices shall be compatible with both analog and digital communications, as required to be used by the radio licensing authority and the AHJ, simultaneously at the time of installation.

### **Power Supplies:**

- At least two independent and reliable power supplies shall be provided for all RF emitting devices and any other components of the system: one primary and one secondary.
- The primary power source shall be supplied from a dedicated branch circuit and comply with *NFPA 72*.
- The secondary power source shall consist of one of the following: A storage battery dedicated to the system with 12 hours of 100 percent system operation capacity
- An alternative power source of 12 hours at 100 percent system operation capacity as approved by the AHJ

### **System Monitoring Requirements:**

- The system shall include automatic supervisory signals for malfunctions of the two-way radio communications enhancement systems that are annunciated by the fire alarm system in accordance with *NFPA 72*, and shall comply with the following:



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

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 12-hour operating capacity has been depleted (d) System component failure. Power supply supervisory signals shall include the following for each RF emitting device and system component: (a) Loss of normal ac power (b) Failure of battery charger

- The communications link between the fire alarm system and the two-way radio communications enhancement system must be monitored for integrity.

### **Dedicated Panel requirements:**

- A dedicated monitoring panel shall be provided within the fire command center to annunciate the status of all RF emitting devices and system component locations. The monitoring panel shall provide visual and labeled indications of the following for each system component and RF emitting device: (a) Normal ac power (b) Loss of normal ac power (c) Battery charger failure (d) Low battery capacity (to 70 percent depletion) (e) Donor antenna malfunction (f) Active RF emitting device malfunction (g) System component malfunction. The communications link between the dedicated monitoring panel and the two-way radio communications enhancement system must be monitored for integrity.



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### **Converged Systems:**

- Radio enhancement systems BDA and DAS can share antennas and cabling as long as both comply with all the requirements in the aforementioned technical information for BDA design as previously listed.

### **Plans submittal minimum requirements:**

- Building owner and address (FAC 61G6)
- Copy of the contract with the owner or GC (FBC 118.1.4)
- Signature and seal of the Engineer of Record with experience and training in electrical engineering. The name, PE number, business name, CA number, address, and contact information shall be shown on the plans. (NFPA 72-10.5) (FAC 118.1.4) (61G15-30.003(2))
- Applicable codes and edition dates (61g15-30.003(1b))
- Building description showing building construction, building occupancy, total square footage, number of floors, total height of building (FAC 61G15)
- Floor plans showing device locations, fire-rated enclosures, conduit runs, and propagation modeling, etc. Propagation (heat) map drawings shall include the following (FBC 118.2.1.4):
  - Indoor Prediction Legend
  - Materials Legend
  - Pictogram Legend
  - Cables Legend
  - Calculations Legend
  - Number of Channels
  - Frequencies
  - Predictive propagation on floor plans
  - Name of certified designer and company
- Riser plans for systems (FAC 61G15)
- Specifications with manufacturer's parts numbers (FAC 61G15)
- Details, including firewall penetration, etc. (FAC 61G15)
- Manufacturer's specifications for equipment (FAC 61G15)
- Antenna and surge protector detail (FAC 61G15)
- Notes on plans shall state (FBC 118.4.2.2): "The system shall never be energized for testing or operation until written, or on site, approval is obtained from the FCC License Holder."



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- The BDA enclosure shall be painted red and a sign shall show permit number, vendor name and telephone number. (FBC 118.2.1.8)
- Pathway survivability level shall be 1, 2, or 3. Level 1: All coaxial cables shall be in metal conduit. (NFPA 72-12.4)
- Radio coverage shall be a minimum of 99% in critical areas and 95% in general building areas. (NFPA 72-24.5.2.2) □ 16.
- Signal strength inbound shall be a minimum of -95 dBm. Signal strength outbound shall be a minimum of -95 dBm. (NFPA 72-24.5.2.3) Note: a signal strength of less than -90 dBm as shown on the plans has a high probability of failing the final inspection of DAQ 3.0 minimum. See NFPA 72-14.4.10.3 Test Procedures; Recommend -90 dBm.
- Isolation shall be a minimum of 15 dBm above the signal booster gain under all operating conditions. (NFPA 72-24.5.2.3.3) Note: NFPA 1221 (2016) requires a minimum of 20 dBm. Any lower value may result in the probability of failing the final inspection. □
- System radio frequencies: system shall be capable of transmitting all public safety radio frequencies used by the FCC AHJ. (NFPA 72-24.5.2.4)
- Frequency changes. System shall be capable of upgrading. (NFPA 72-24.5.2.4.2) BC RCES Guidelines Part 2A DLR Draft Edition 2019-07-20 2A.8 2A.1.4 NFPA 72 (2013) Plan Review - FCC License Holder (cont.)
- System Components: Components shall be approved and compatible with the Public Safety Radio System. (NFPA 72-24.5.2.5) Show the propagation delay. Signal Boosters shall have FCC Certification. Power supplies shall have at least two independent supplies. Battery shall provide twelve (12) hour minimum operational run time.
- System Monitoring: (NFPA 72-24.5.2.6.1) The fire alarm system shall monitor the following items as a minimum: (1) Integrity of the circuit monitoring signal booster(s) and power supply(ies) shall comply with NFPA 72-24.10.6.9 and NFPA 72-12.6. (2) System and signal booster supervisory signals shall include the following: (a) Antenna malfunction (b) Signal booster failure (c) Low-battery capacity indication when 70 percent of the 12-hour operating capacity has been depleted. (3) Power supply signals shall include the following for each signal booster: (a) Loss of normal AC power (b) Failure of battery charger



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- Dedicated Panel (annunciator panel) (NFPA 72-24.5.2.6.2) (1) Normal AC power (2) Signal booster trouble (3) Loss of normal AC power (4) Failure of battery charger (5) Low battery capacity
- Technical Criteria (NFPA 72-24.5.2.7) (1) Frequencies required (2) Location of effective radiated power (ERP) of the FCC AHJ radio site (3) Maximum propagation delay (30 microseconds) (4) List of specifically approved components (5) Other support technical information as needed.

Note: The elevator code does not allow the elevator shaft to be used for coaxial cable risers. (ASME A17.1.2.) A variance shall be obtained from the State Elevator Inspection Services Section at permitting prior to any work inside an elevator shaft or elevator machine room. The variance shall be to install one or more antenna(s) in the elevator shaft(s). (ASME A17.1)

