



**Manatee County**  
**Information Technology Services**  
**Radio Division**

*Business Value through Partnership...the Service Provider of Choice*

**In-Building Two-Way Radio Communications  
Enhancement System Technical Requirements**

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**May 2021**

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## INTRODUCTION

Manatee County, Florida, by way of Ordinance, has adopted the Florida Fire Prevention Code NFPA 1, 11.10, which details the requirements for in-building Public Safety Radio Communications coverage. The goal of this action is to ensure the life and safety of Manatee County residents and the first responders that serve them.

Florida and Manatee building codes have been adopted to address the unique environmental challenges coastal areas face. Buildings are heavily reinforced to counteract storm wind loads. New buildings are designed to be energy efficient by utilizing special window coatings that reflect the sun's heat. While these requirements are effective in reaching goals of occupant safety and energy consumption, they have the unintended consequence of hindering public safety communications. The County makes every effort to deploy a Public Safety Radio System that maximizes system coverage, but current construction techniques make it nearly impossible to guarantee effective building coverage. To overcome any lack of in-building communication coverage, Public Safety Radio Enhancement systems are used to extend the coverage of the radios' system to the interior of the building. These specialized bi-directional amplifiers (BDA) and Distributed Antenna Systems (DAS) are used to propagate signals within a building in a controlled manner.

These systems must be designed, installed, and maintained by competent and qualified personnel to ensure that in-building coverage requirements are met without generating harmful interference to the radio system as a whole.

Manatee County operates a Motorola P25 phase 1 simulcast radio system that serves all public safety entities within the County.

This document is intended to provide guidance to building owners and DAS system firms that have current projects or are contemplating projects within Manatee County.

## SUMMARY OF OWNER REQUIREMENTS

All commercial, multi-unit residential, governmental, and educational occupancies must have reliable inbuilding public safety radio communications coverage that meets the most current adopted version of the Florida Fire Prevention Code referenced NFPA requirements.

### INITIAL DETERMINATION

- In all new buildings and existing buildings that are modified, minimum radio signal strength as determined by the AHJ must be provided. An applicant submits building plans to the Manatee County ITS Radio Division and AHJ for review.
- Fire plan review staff will include comments as part of the fire permit review process stating that compliant public safety radio coverage is required for the occupancy, including the installation of a two-way radio communication enhancement system, if necessary, to meet code requirements.
- The applicant proceeds with the Radio Communications Enhancement System Implementation Process described below (Page 19).
- Once construction is complete, and prior to occupancy, owners/developers must submit all test documentation and a Certificate of Radio Coverage Compliance, approved by Manatee ITS Radio Division to the Fire Marshal (AHJ), stating that the public safety radio system coverage reliability within the occupancy was tested in accordance with the provisions outlined in NFPA 1221-2016 9.6 (1-14).
- The Certificate of Radio Coverage Compliance shall be posted at the fire alarm control panel or at the main electrical panel if no fire alarm control panel is present. An additional copy is to be placed in the building manager's office.
- **The implementation of a Public Safety BDA system is time consuming; it is recommended by Manatee County to engage the process early in construction phase to minimize any time delays.**

## OCCUPANCIES MEETING COVERAGE RELIABILITY REQUIREMENTS WITHOUT RADIO COMMUNICATIONS ENHANCEMENT SYSTEMS:

In some occupancies, such as those with smaller footprints or those located in close proximity to one of the radio transmission sites, it may be possible to achieve reliable public safety radio communications coverage throughout the occupancy and meet code requirements without the use of a radio communications enhancement system. Public safety radio coverage in these occupancies must meet the same reliability requirements as those occupancies that require a radio communications enhancement system.

- All tests shall be documented and signed by a person in possession of a current FCC General Radiotelephone Operator License issued by the FCC.
- Building owners/developers must submit all test documentation and a Certificate of Radio Coverage Compliance (“CORCC”), stating that the P25 public safety radio systems coverage reliability within the occupancy meets the requirements outlined in the currently adopted Florida Fire Prevention Code.
- The Certificate of Radio Coverage Compliance shall be posted at the fire alarm control panel or at the main electrical panel if no fire alarm control panel is present. An additional copy to be placed in the building manager’s office. For buildings not equipped with two-way radio communications enhancement systems, testing for coverage reliability compliance and certification must be performed when all construction and interior finishing work is complete.

## OCCUPANCIES REQUIRING RADIO COMMUNICATIONS ENHANCEMENT SYSTEMS TO MEET COVERAGE RELIABILITY REQUIREMENTS:

In occupancies where two-way radio communications enhancement systems are required in order to meet code requirements, two-way radio communications enhancement systems and related equipment must meet all Florida Fire Prevention Code adopted versions of NFPA 72 and NFPA 1221 requirements, and additional requirements described in this document.

- Building owners/developers are required to submit design plans of the proposed two-way radio communications enhancement systems to the Manatee County BADS for review and approval of the designated donor site.
- Building owners/developers must apply for and obtain a Provisional Retransmission Authorization from Manatee County ITS Radio Division prior to commissioning the two-way radio communications enhancement system. The Retransmission Authorization is required by the FCC and is the system operator’s proof that Manatee County ITS Radio Division has granted permission to operate equipment that uses radio frequencies licensed to the County. Provisional Retransmission Authorizations are issued for initial system activation, optimization, and testing.

- Final Retransmission Authorizations are issued upon successful commissioning of the system and are valid for a period of five years from the date of issuance.
- Equipment used by the two-way radio communications enhancement system must be the type accepted by the FCC.
- The two-way radio communications enhancement system must be operated in accordance with FCC rules and regulations at all times.
- The two-way radio communications enhancement system shall not cause interference to the County's Public Safety radio systems or equipment, or to systems or equipment operated by any other FCC licensee.
- Building owners/developers must submit as-built documentation, including the CORCC, in soft copy format (e.g., PDF) to Manatee County ITS Radio Division after testing is completed.
- The in-building radio system shall be capable of modification or expansion in the event frequency changes are required by the County, the FCC, another federal agency, or in the case that additional frequencies are allocated to the County. In particular, the in-building radio system shall be expandable to operate on the FirstNet 700 MHz National Public Safety Broadband Network frequencies 758-768/ 788-798 MHz upon notification by the County.

## BDA CONTRACTOR QUALIFICATIONS

The Contractor must provide proof of previous experience in deployments of in-building RF radio coverage solutions for Public Safety systems, specifically in the 800 MHz band.

To ensure personnel safety, all construction tasks shall be conducted in accordance with OSHA safety and/or local safety regulations (whichever is more stringent). Contractors must comply with applicable Federal, State, and Local Codes and requirements, including the Florida Building and Fire Codes. All site development and equipment installation work shall comply with all applicable codes in use by the County. Government and local codes shall take precedence over the requirements of this document provided they offer added safety.

The system designer must be a Florida licensed Professional Engineer (P.E.), lead installation personnel, and personnel conducting radio system tests shall be qualified to perform the work. Design documents and all tests shall be documented and signed by a person in possession of a current FCC General Radio Operator License (GROL).

## GENERAL SCOPE OF WORK

- The DAS Integrator Designer/Installer shall provide a "turn-key" solution for the design, installation, and testing of an in-building RF coverage system capable of meeting the requirements detailed in this document.

- Should the contractor of record fail to have radio RF communications installation and repair experience with Distributed Antenna Systems, the contractor of record shall sub-contract the installation or repair of non-fire alarm function to a qualified company, having knowledge of Radio RF communications installation and repair.
- For the downlink signal, a minimum signal strength of negative (-) 102 dBm throughout the entire facility OR a DL/UL Delivered Audio Quality (DAQ) of 3.0 or better, as indicated by the testing procedure.
- For General Structure Areas, the in-building RF solution shall provide the above-specified coverage in 90% of the floor area as directed in this document and NFPA1221-2016. General Structure Areas are defined as living areas, basements, parking garages, administrative offices, and conference rooms.
- For Critical Areas, the in-building RF solution shall provide the above-specified coverage in 99% of the floor area. Critical Areas are defined as mechanical and utility rooms, stairwells, exit stairs, exit passageways, elevator lobbies, fire pump rooms, sprinkler sectional valve locations, and other areas considered by the County. The Designer/Installer shall consult the AHJ.
- The system shall provide the required coverage in the frequency bands or channels specified by the County.
- The in-building RF Public Safety radio coverage system and other radio systems operating within (or in the vicinity of) the facility shall not interfere with each other.
- When multiple buildings are to be enhanced, an active fiber DAS is recommended and should be considered. **Under no circumstance will multiple BDA's be permitted on a parcel.**

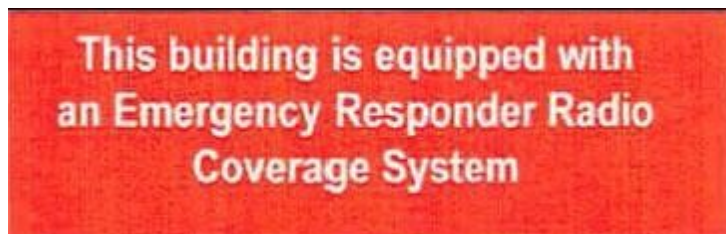
## BDA INFORMATION

- The in-building radio system shall use a channelized BDA. The BDA shall be certified Class "A" FCC-type accepted and must operate in accordance with FCC rules. The system must also be compatible and fully operational with both P25 Phase 1 and P25 Phase 2 for all channels.
- The filter bandwidth for the BDA should be selected addressing increased TDI concerns. Narrower bandwidth filters can be utilized if the design addresses concern.
- **The BDA shall also provide a squelch capability for uplink.** Some BDAs meet the requirements only when the relevant features are configured appropriately, so the vendor will ensure that it is the case.
- The selected BDA shall be capable of "AGC per channel" and "Oscillation Control" features. This includes, but is not limited to, an alarm and automatic shutdown for oscillating amplifiers.



- The signal booster shall be installed in a fire-engine-red NEMA 4 (or 4X) enclosure with a locking mechanism with 2" high contrasting letters. Include the following information:
  1. Fire Department Signal Booster
  2. Permit Number: \_\_\_\_\_
  3. Serviced by: Vendor name and telephone
  4. FCC Registration ID
- Maximum VSWR measured in any RF branch of the DAS shall not exceed 1.5:1 (14 dB Return Loss).
- Buildings equipped with an Emergency Responder Radio Coverage system shall be identified by a sign located on or near the Fire Alarm Control Panel stating: "This building is equipped with an Emergency Responder Radio Coverage System."
- Generally, fire protection and related equipment are identified by a red sign with minimum one-inch white letters, as shown below.

Example:



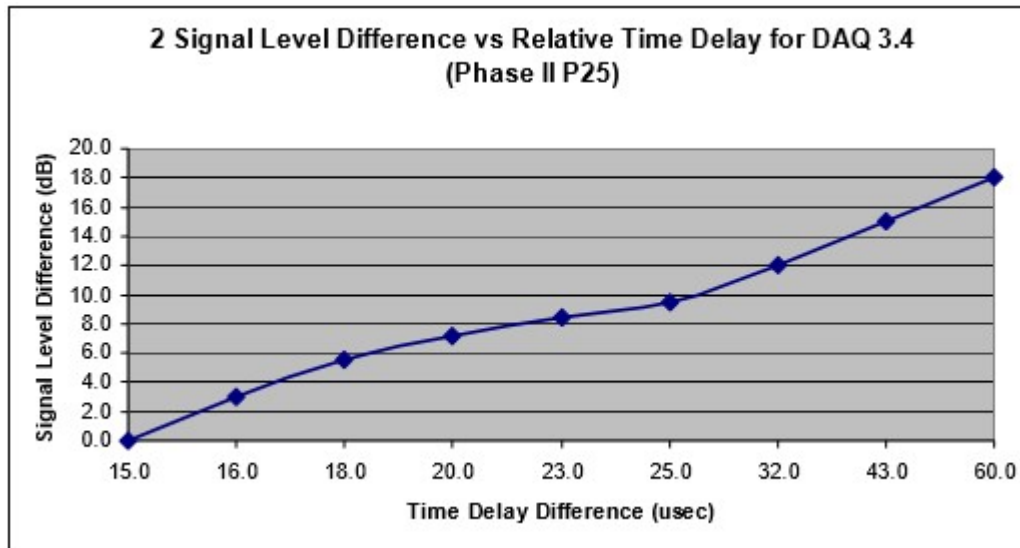
## ELECTRICAL POWER REQUIREMENTS

- All active components of the DAS shall be powered from a power source via a dedicated ("home run") circuit. No other devices may be powered on the same circuit as the BDA. In addition, a twelve-hour battery backup for the in-building system operating at 100% capacity is required.
- Surge protection device(s) can be used to protect active components of the DAS from electrical transients.

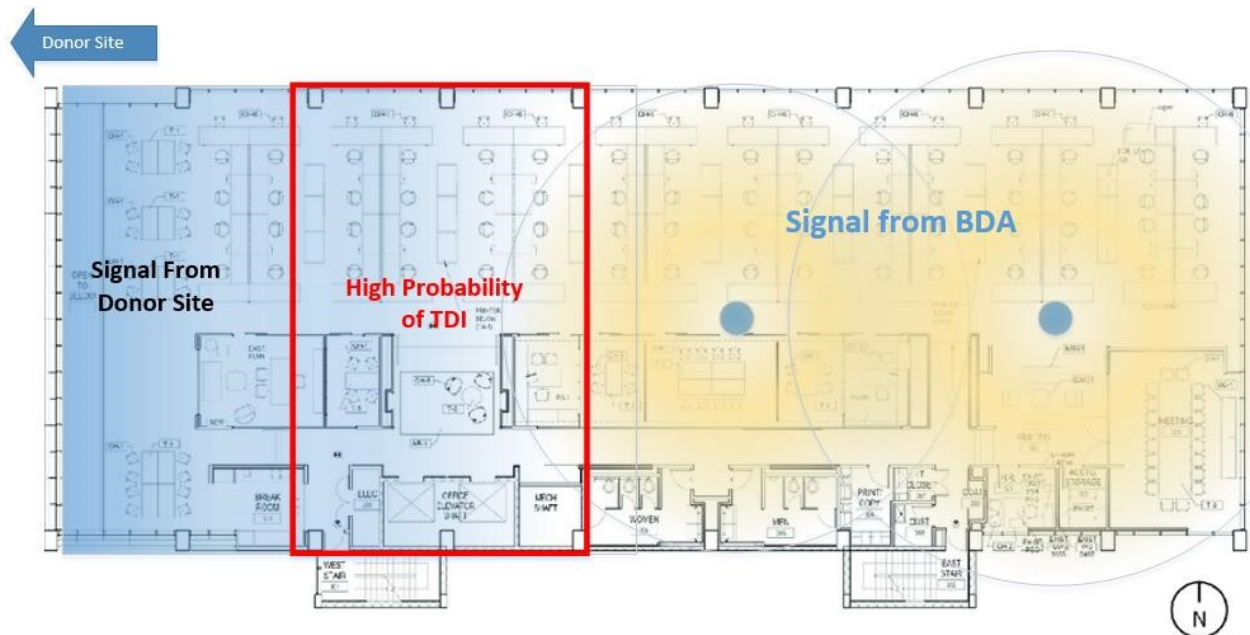
## ALARM AND MONITORING SYSTEM

- Local indication of the in-building radio system status to the Fire Alarm system shall include the BDA (and fiber DAS if applicable) system component malfunction summary alarms visible at the fire alarm annunciator panel.
- In accordance with NFPA requirements, the alarms visible in the Fire Control Center shall include the following:
  1. Loss of Normal AC Power
  2. Battery Charger Failure
  3. Low Battery capacity (to 70 percent depletion)
  4. System component malfunction
  5. Donor antenna malfunction (VSWR)
- Additionally, in case that an in-building solution based on RF/Fiber Optics converters is selected, the system shall also be capable of alarming in the event of malfunction of the main and the expansion hubs.
- When alarms are detected, the Building Managers shall be notified of the alarm condition as well and must be responsive within 4 hours. Upon detection, the Building Managers must immediately notify the County of any system outage. The county will then notify radio system users of the outage.
- The system must monitor and produce an alarm in the event of an antenna system malfunction or signal booster failure.
- A separate alarm for oscillating amplifiers is also required. The selected signal booster shall be capable of “AGC Overdrive” and “Oscillation Control” features. This includes, but is not limited to, an alarm and automatic shutdown for oscillating amplifiers. These features are intended to minimize interference due to the oscillation of the signal booster(s).
- Power supplies must, at a minimum, alarm at loss of ac power, failure of the battery charger, and low battery charge (defined as 70% of capacity).

## PROPAGATION DELAY



The maximum radio signal propagation delay introduced by the in-building coverage solution shall not exceed 55  $\mu$ s utilizing a 25 kHz filter bandwidth. If a delay greater than 55  $\mu$ s is expected by design, then further analysis should be conducted in conjunction with the County to evaluate potential signal degradation in areas where the direct signal coming from a radio site interacts with the BDA output signal. To reliably overcome TDI issues, the signal from the BDA must be 16dB higher than ambient signals from the donor site.



TDI will be prevalent in designs where only certain areas of a floor are serviced by the BDA due to a large TDI zone from the lack of signal level difference. To counteract this, designs should be designed to service floors in their entirety.

## EXTERIOR ANTENNA SYSTEM

- The orientation of the donor antenna shall be determined in coordination with Manatee County ITS Radio Division.
- If required by FAA regulations, obstruction lighting and/or marking shall be installed.
- Antennas will be installed in accordance with the manufacturer's specifications in locations noted on the final approved plans.
- All exterior antennas are to be narrowband, high-gain, vertically polarized, and designed for the specified frequency band. Yagi or corner reflector-type antennas are accepted.
- Any antenna that requires painting will be painted with a non-metallic paint that is approved by the antenna manufacturer.
- All exterior-mounted antennas and associated hardware must be rated for 160 MPH wind gusts or higher.
- The antenna installation, including the shield of the coaxial cable, shall be suitably connected to the building's electrical ground system at the base of the antenna mast and at the coaxial lightning protector as per Motorola R56 and Harris Site Grounding and Lightning Protection Guidelines.
- Typical requirements for coaxial lightning protectors are the following:
  - Impedance: 50  $\Omega$
  - Frequency range: as needed to the respective bands
  - VSWR: 1.1:1 or better
  - Insertion Loss: 0.1 dB or better
  - Impulse Discharge Current: 10KA or better
  - Turn-on voltage: 600 V
  - Turn-on Time: 2.5 nS for 2kV/nS
  - Energy Throughput Rating: 5 joules for 3 kA (8/20 $\mu$ S waveform)
  - Continuous handling RF power: 100 W or better at the respective frequency bands
  - Rated for 150 MPH wind gusts or higher
- A rooftop donor antenna installation shall meet the wind loading requirements of the Florida Building Code and ANSI/TIA-222-G.

## IN-BUILDING ANTENNAS

The in-building antenna system shall consist of enough antennas, distributed wisely within the building to meet the coverage criteria previously specified and not excessively penetrate outside of the building. Installation is unobstructed for 24" of the radiation pattern.

## LABELING

- All cables will be labeled at every end in accordance with the approved labeling plan.
- The installation contractor will tag and label all coax, CAT5e, Fiber, or braided coaxial cables at both ends, indicating the active device, antenna number, and any other required information.
- The installation contractor will label all internal antennae with the assigned antenna number provided in the approved construction drawings. Labels will be applied to the outer diameter edge of the base plate on an omnidirectional antenna or on the side edge of a panel and be visible from the ground.
- All cable ID labels will be machine-generated, non-metallic, fade-resistant, and designed for communication cable application. P-Touch labeling device will be used to generate the labels unless otherwise stated in the approved plans.

## FUTURE EXPANSION AND MODIFICATIONS

The in-building radio system shall be capable of modification or expansion in the event frequency changes are required by the County, the FCC, another federal agency, or in the case that additional frequencies are allocated to the County. In particular, the in-building radio system shall be expandable to operate on the FirstNet 700 MHz National Public Safety Broadband Network frequencies 758-768/788-798 MHz upon notification by the County.

- Where projects include multiple buildings, a fiber DAS system must be used to reduce the risk of causing interference or oscillation. With one Headend Class A BDA authorized to rebroadcast Manatee P25 frequencies.
  - The DAS system must be independent of commercial carrier circuits and service only the Public Safety Radio System. Dedicated Headend, optical units, fiber, and remotes must be used.
  - The donor antenna must be positioned in such a way that it does not feed RF signals back into its own service antennas. The same isolation requirements for BDA systems must be met for fiber DAS systems.
  - All DAS equipment must be installed per the guidelines on pathway survivability.

# TEST PROCEDURES AND MEASUREMENT PARAMETERS

## SYSTEM ISOLATION

Once the DAS is deployed, and before turning up the active components of the DAS, the very first test the Contractor shall perform is to verify that the isolation between the donor and the in-door antenna systems is at least 20 dB greater than the total possible gain of the DAS. Example Below:

Unit Max Gain 80 dB

80 dB Max Gain + 20 dB Isolation Value = 100 dB Total Minimum Isolation

## DOWNLINK AMPLIFIER

- Downlink signal levels shall be measured to ensure the system meets the requirements of a minimum RF signal level of  $>-102$  dBm OR DAQ 3.0, throughout the entire facility and attached structures under the conditions described in this document 90% of the time.
- If the signal readings are conducted using a unity-gain antenna attached to a spectrum analyzer and considering the signal attenuation due to “body effect,” the average pick levels previously obtained is an indication reasonably good of the received channel power under fading conditions in each tile. Received channel power is precisely what should be determined during the baseline study to verify the need for a DAS in the facility under study.
- For the benchmarking of the facility, the Contractor shall reflect on the appropriate floor plan(s) the average hold readings obtained at each test point. For the final report or As-built documentation, the Vendor should develop floor plans showing “before” and “after” measurements of the average hold readings.
- The contractor shall provide a floor plan heat map that color-codes the received levels (the map needs to demonstrate that all floors, stairwells elevators have been tested exhaustively).

## UPLINK

- Manatee ITS Radio Division will provide 2 county radios, one will have a lapel mic for inside the building under test, with radio on belt, other radio outside facility under test responding to the traffic on EVENT-8 channel. DAQ Metrics from 0-5 where 0 is no PTT and 5 is Speech easily understood.
- The test procedures should be conducted, considering the following:
  - Size of the building
  - Classification of the area under test (General Structure or Critical Area)

## DEFINING THE UL/DL REQUIREMENTS AS PER THE SIZE OF THE BUILDING

1. For small commercial buildings, due to the small number of readings to be taken, no “Fail” conditions should be allowed. Therefore 100% of the floor area shall show >-102 dBm signal strength OR DAQ 3.0.
2. For medium and large buildings, 90% and 99% of the readings should show >-102 dBm signal strength OR DAQ 3.0 for General Structure and Critical Areas, respectively, per floor. Each floor may be broken up into multiple zones made up of a minimum of 20 grids per floor.
3. In all cases, the signal strength measurements should be reflected on a building floor plan to show “Before and After” measurements. The contractor shall provide a floor plan heat map that color-codes the received levels (the map needs to demonstrate that all floors, stairwells elevators have been tested exhaustively).

## DESIGNER/CONTRACTOR RESPONSIBILITIES

Based on the survey provided to the contractor by the third-party tester demonstrating the necessity of an in-building RF solution in the new building, the contractor will then submit the survey with a scope of work to the Manatee County ITS Radio Division.

- Design, commissioning, and testing of an in-building RF coverage solution that guarantees a minimum RF signal level of >-102 dBm OR DAQ 3.0 throughout the entire facility and attached structures under the conditions described in this document.
- Sealed floor plans showing radio coverage for critical and general areas using industry-standard radio frequency computer-generated propagation modeling.
- Notation that the system is upgradable for frequency band coverage changes, including at a minimum both 700/800 MHz.
- Record all appropriate signal levels after the system implementation, as previously detailed.
- Prepare and submit to the County the “Before and After” floor plans showing signal levels.
- Provide a floor plans heat map that color-codes the received levels.
- Address any in-building RF coverage issue discovered during the Acceptance Test.
- Address any reported RF interference issue related to the new DAS installation.

- Provide the Building Owner with project documentation including but not limited to “As-built” documentation, and floor heat maps, in soft copy format (e.g., PDF), system documents, technical manuals, Return Loss or VSWR readings of the RF lines, diagrams showing equipment placement and routing for antennas, coaxial cables, fiber optics interconnections, and AC power.
- Coaxial cables shall be certified sweep tested over the frequency range in which being utilized. Certification of sweep test shall be furnished to Manatee County ITS Radio Division approval prior to acceptance.

## RADIO COMMUNICATIONS ENHANCEMENT SYSTEM IMPLEMENTATION PROCESS

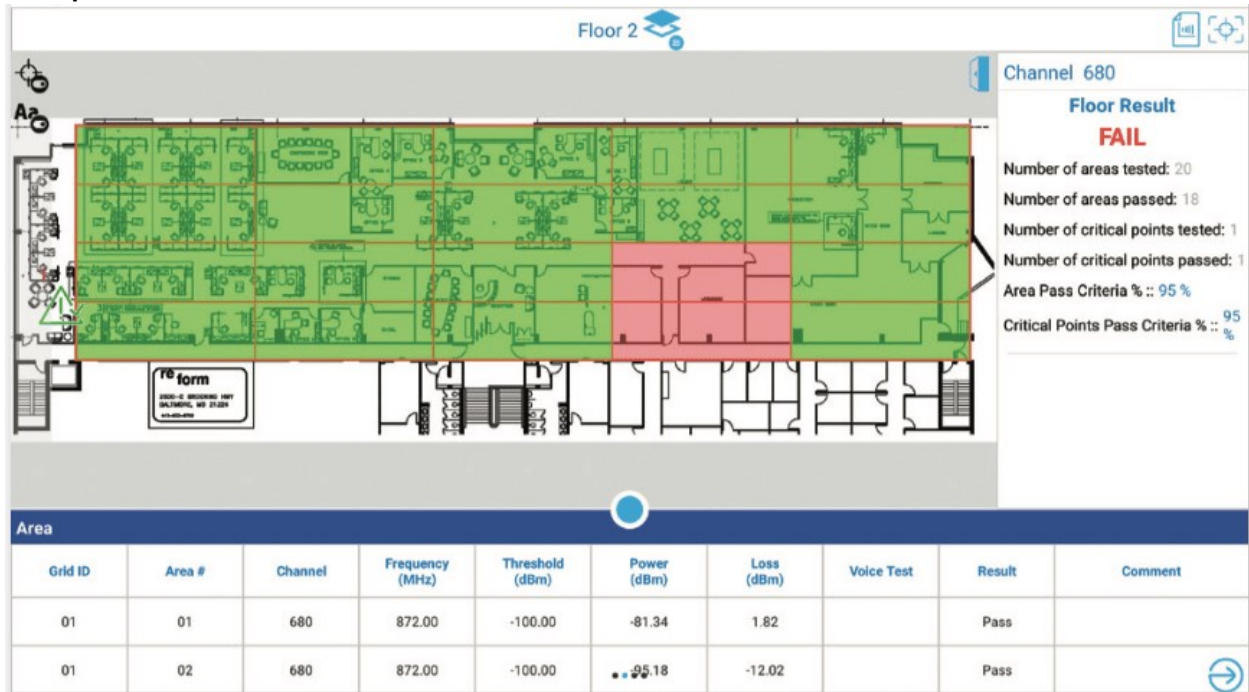
The Manatee County ITS Radio Division has defined the following process for owners or developers planning new occupancies or modifications to existing occupancies that require a radio communications enhancement system to ensure operation of the public safety communication systems inside buildings.

### 1. SUBMIT ASSESSMENT REQUEST

The owner or their representative submits an Initial Assessment Request to the Fire District AHJ (Appendix C). A third-party tester will conduct an NFPA compliant needs assessment of the project when building is closed in (roof, outside walls, windows and doors intact) which will be submitted to the Manatee County ITS Radio Division for review. The owner, at their own discretion, may choose to preemptively install materials in preparation of an enhancement system. This can be done prior to the assessment to simplify the system installation later. Owners may choose to do this based on expected coverage failures or to limit the project impact a later installation may cause. Access panels must be made available for inspection purposes during final inspection and subsequent reinspection.



## Example Grid Test



## 2. CONDUCT SYSTEM PLANNING AND DESIGN

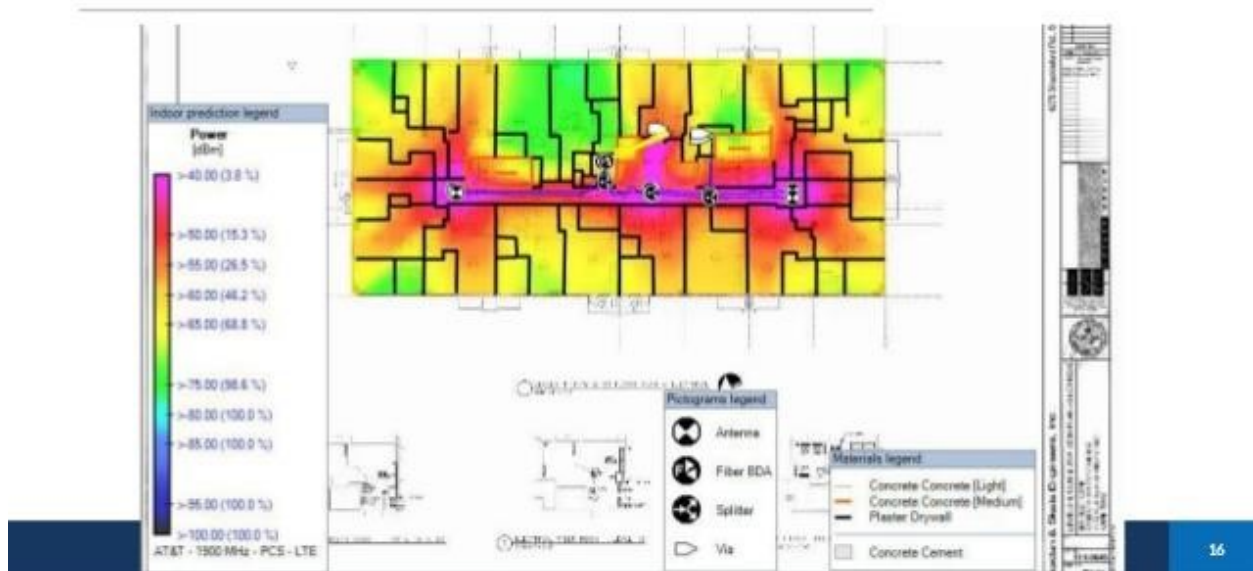
If an enhancement system is required, the applicant shall include an RF Professional Engineer (PE) designed NFPA compliant two-way radio communication enhancement system in the design requirements for the project. A qualified integrator or installation firm is hired to install, test, and activate the two-way radio communications enhancement system as a part of the building project. Manatee County ITS Radio Division shall aid the integrator/installer in directing the selection of the donor sites for the proposed two-way radio communications enhancement system for the public safety communication systems.

The applicant must obtain the proper fire and building permits to cover the installation of the two-way radio communication enhancement system. Note: The fire alarm contractor is responsible for the fire alarm permit application and integration of the radio communications enhancement system into the fire alarm supervisory notification/alarm panel.

## 3. SUBMIT RETRANSMISSION APPLICATION

The integrator/installer shall complete a Retransmission Application for each BDA headend in the system design (Appendix D). Retransmission Applications must include the Permit Number assigned for the work. The owner shall submit Retransmission Application(s), proposed design documentation, system design diagrams, bill of materials (including specification sheets), floor plan diagrams, which include a heat map that color-codes the received levels, maps that demonstrate that all floors, stairwells, elevators have been tested exhaustively, to Manatee County ITS Radio Division for review.

# iBwave Heat Map Sample



## 4. ENTRY IN FCC SIGNAL BOOSTER DATABASE

Federal Communications Commission (FCC) Registration Requirement BDA/DAS system owners are required by the FCC to register their BDA/DAS system (which the FCC identifies as 'signal boosters') with the FCC. This applies to those systems already placed in operation, in permitting or under construction. The FCC Rule requiring registration is CFR 47, FCC Part 90.219(d) (5). FCC registration can be found at <https://signalboosters.fcc.gov/signal-boosters/>

A copy of this registration shall be submitted to Manatee County ITS Radio Division.

## 5. OBTAIN COUNTY REVIEW AND PROVISIONAL RETRANSMISSION AUTHORIZATION

The Manatee County ITS Radio Division will conduct a technical review of the proposed design along with the heat map that color-codes the received levels (the map needs to demonstrate that all floors, stairwells, elevators have been covered). Upon approval of the design, Manatee County ITS Radio Division will issue a signed Provisional Retransmission Authorization ( Appendix E) to the applicant, which authorizes the operation of the system for the purposes of installation, testing, and optimization. The Provisional Retransmission Authorization is valid for a period of one year from the date of issuance.

## 6. PERFORM SYSTEM INSTALLATION

The integrator/installer proceeds with the installation of the approved system(s) in accordance with the project's plan and schedule. Substantial design changes from those specified in the initial design must be approved by the Manatee County ITS Radio Division (e.g., selection of a different donor site, selection of different model BDA, selection of a different donor antenna, additions or changes to the number of line amplifiers in the design, and changes to the equipment room location in building).

An updated Manatee County ITS Radio Division review and approval are not required for minor changes that do not impact the number of active amplification devices used by the system or impact the donor site (e.g., changes to the location or minor increase of indoor coverage antennas in the design).

The two-way radio communication enhancement system shall not be activated for optimization and testing without prior Manatee ITS Radio Division/AHJ approval. Manatee County ITS Radio Division may, at their sole discretion, require that an initial desense test be conducted prior to initial activation to ensure that no harmful interference occurs to the public safety radio system.

Integration with supervisory notification/alarm panel(s) must be compliant with the requirements of NFPA and must be completed prior to fire alarm and two-way radio communication enhancement system testing.

## 7. PERFORM PRE-COMMISSIONING ACTIVATION AND OPTIMIZATION

DAS Integrator/installer posts the Provisional Retransmission Authorization at the headend location(s). The integrator/installer shall notify the Manatee County ITS Radio Division when ready to activate the system for the first time.

## 8. PERFORM FIRE ALARM/TWO-WAY RADIO COMMUNICATIONS ENHANCEMENT SYSTEM TESTING

The DAS integrator/installer coordinates the scheduling of system testing with the fire alarm contractor at the site. Testing shall include integrator/installer staff, fire alarm contractor staff, AHJ staff, and its third-party representatives.

The test participants conduct NFPA compliant coverage testing and supervisory notification/alarm panel testing on the scheduled date.

The Manatee County ITS Radio Division reviews the integrators test documentation and completes an evaluation of the system to ensure documentation accuracy and evaluate the impact on the Public Safety Radio System.

Upon completion of the evaluation, the Manatee County ITS Radio Division will submit their findings to the AHJ along with approval recommendations.

## 9. SUBMIT AS-BUILT DOCUMENTATION

The DAS integrator/installer provides test results, including the heat map and full system as-built documentation to Manatee County ITS Radio Division in soft copy (e.g., PDF) format. With the recommendation of the AHJ, Manatee County ITS Radio Division issues a Final Retransmission Authorization (Appendix F) valid for a period of five years from the date of issuance. The Final Retransmission Authorization must be posted at the headend location. The Manatee County ITS Radio Division files the as-built documentation to the system archives.

## 10. ISSUE CERTIFICATE OF OCCUPANCY

After all requirements for occupancy are met, including successful testing of the two-way communications enhancement system, supervisory notification/alarm panel interface and donor site desense, receipt of required documentation, and posting of Final Retransmission Authorization(s) at the system headend and manager's office, the Manatee County BADS issues a Certificate of Occupancy.

## 11. ANNUAL TESTING/MAINTENANCE/RETRANSMISSION AGREEMENT RENEWAL

The building owner will be required to retain services of a qualified firm having the knowledge of RF installation with training and experience with two-way radio communication enhanced radio systems to maintain the installed system.

The building owner coordinates annual testing of the two-way radio communications enhancement system with annual testing of other fire alarm and fire safety systems. Annual testing of two-way radio communications enhancement systems shall be performed in accordance with the requirements of NFPA. Retransmission Authorizations are valid for five years from the date of issuance but is contingent on the owner completing annual maintenance and verification. Documentation pertaining to annual maintenance is required to be submitted to the local AHJ at time of document submittal.

## APPENDIX A – 47CFR90.219, FCC RULES GOVERNING USE OF SIGNAL BOOSTERS

§90.219 Use of signal boosters.

This section contains technical and operational rules allowing the use of signal boosters in the Private Land Mobile Radio Services (PLMRS). Rules for signal booster operation in the Commercial Mobile Radio Services under part 90 are found in §20.21 of this chapter.

(a) Definitions. The definitions in this paragraph apply only to the rules in this section.

**Class A signal booster.** A signal booster designed to retransmit signals on one or more specific channels. A signal booster is deemed to be a Class A signal booster if none of its passbands exceed 75 kHz.

**Coverage area of a PLMRS station.** All locations within the normal reliable operating range (service contour) of a PLMRS station.

**Deploy a signal booster.** Install and/or initially adjust a signal booster.

**Distributed Antenna System (DAS).** A network of spatially separated antenna nodes connected to a common source via a transport medium that provides wireless service within a geographic area or structure.

**Operate a signal booster.** Maintain operational control over and responsibility for the proper functioning of a signal booster.

**Signal booster.** A device or system that automatically receives, amplifies, and retransmits signals from wireless stations into and out of building interiors, tunnels, shielded outdoor areas and other locations

where these signals would otherwise be too weak for reliable communications. Signal booster systems may contain both Class A and existing Class B signal boosters as components.

(b) Authority to operate. PLMRS licensees for stations operating on assigned channels higher than 150 MHz may operate signal boosters, limited to the service band for which they are authorized, as needed anywhere within the PLMRS stations' service contour, but may not extend the stations' service contour.

- (1) PLMRS licensees may also consent to operation of signal boosters by non-licensees (such as a building owner or a signal booster installation contractor) within their service contour and across their applicable frequencies, but must maintain a reasonable level of control over these operations in order to resolve interference problems.
  - (i) Non-licensees seeking to operate signal boosters must obtain the express consent of the licensee(s) of the frequencies for which the device or system is intended to amplify. The consent must be maintained in a recordable format.

that can be presented to an FCC representative or other relevant licensee investigating interference.
  - (ii) Consent is not required from third party (unintended) licensees whose signals are incidentally retransmitted. However, signal booster operation is on a noninterference basis and operations may be required to cease or alter the operating parameters due to a request from an FCC representative or a licensee's request to resolve interference.

(2) [Reserved]

(c) Licensee responsibility; interference. PLMRS licensees that operate signal boosters are responsible for their proper operation and are responsible for correcting any harmful interference that signal booster operation may cause to other licensed communications services. Normal co-channel transmissions are not considered to be harmful interference. Licensees are required to resolve interference problems pursuant to §90.173(b). Licensees shall act in good faith regarding the operation of signal boosters and in the resolution of interference due to signal booster operation. Licensees who are unable to determine the location or cause of signal booster interference may seek assistance from the FCC to resolve such problems.

(d) Deployment rules. Deployment of signal boosters must be carried out in accordance with the rules in this paragraph.

- (1) Signal boosters may be used to improve coverage in weak signal areas only.
- (2) Signal boosters must not be used to extend PLMRS stations' normal operating range.
- (3) Signal boosters must be deployed such that the radiated power of each retransmitted channel, on the forward link and on the reverse link, does not exceed 5 Watts effective radiated power (ERP).
- (4) Class A signal boosters may be deployed only at fixed locations.

- (5) Class A signal booster installations must be registered in the FCC signal booster database that can be accessed at the following URL:  
<https://signalboosters.fcc.gov/signal-boosters/>
  - (6) Good engineering practice must be used in regard to the radiation of intermodulation products and noise, such that interference to licensed communications systems is avoided. In the event of harmful interference caused by any given deployment, the FCC may require additional attenuation or filtering of the emissions and/or noise from signal boosters or signal booster systems, as necessary to eliminate the interference.
    - (i) In general, the ERP of intermodulation products should not exceed  $-30$  dBm in 10 kHz measurement bandwidth.
    - (ii) In general, the ERP of noise within the passband should not exceed  $-43$  dBm in 10 kHz measurement bandwidth.
    - (iii) In general, the ERP of noise on spectrum more than 1 MHz outside of the passband should not exceed  $-70$  dBm in a 10 kHz measurement bandwidth.
  - (7) Signal booster passbands are limited to the service band or bands for which the operator is authorized. In general, signal boosters should utilize the minimum passband that is sufficient to accomplish the purpose. Except for distributed antenna systems (DAS) installed in buildings, the passband of a Class A booster should not encompass both commercial services (such as ESMR and Cellular Radiotelephone) and part 90 Land Mobile and Public Safety Services.
- (e) Device Specifications. In addition to the general rules for equipment certification in §90.203(a)(2) and part 2, subpart J of this chapter, a signal booster must also meet the rules in this paragraph.
- (1) The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.
  - (2) The noise figure of a signal booster must not exceed 9 dB in either direction.
  - (3) Spurious emissions from a signal booster must not exceed  $-13$  dBm within any 100 kHz measurement bandwidth.
  - (4) A signal booster must be designed such that all signals that it retransmits meet the following requirements:
    - (i) The signals are retransmitted on the same channels as received. Minor departures from the exact provider or reference frequencies of the input signals are allowed, provided that the retransmitted signals meet the requirements of §90.213.

- (ii) There is no change in the occupied bandwidth of the retransmitted signals.
  - (iii) The retransmitted signals continue to meet the unwanted emissions limits of §90.210 applicable to the corresponding received signals  
  
(assuming that these received signals meet the applicable unwanted emissions limits by a reasonable margin).
- (5) On or after March 1, 2014, a signal booster must be labeled to indicate whether it is a Class A or Class B device, and the label must include the following advisory.
  - (1) In on-line point-of-sale marketing materials,
  - (2) In any print or on-line owner’s manual and installation instructions,
  - (3) On the outside packaging of the device, and
  - (4) On a label affixed to the device:

“WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at [www.fcc.gov/signal-boosters/registration](http://www.fcc.gov/signal-boosters/registration). Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.” [78 FR 21564, Apr. 12, 2013]

## APPENDIX B - ARTICLE 800 • COMMUNICATIONS CIRCUITS 800.179

### (NATIONAL ELECTRICAL CODE HANDBOOK 2014)

TABLE 800.179 Cable Markings

#### Cable Marking Type

CMP	Communications plenum cable
CMR	Communications riser cable
CMG	Communications general-purpose cable
CM	Communications general-purpose cable
CMX	Communications cable, limited use

CMUC Undercarpet communications wire and cable

Informational Note: Cable types are listed in descending order of fire resistance rating.

Informational Note: One method of defining a cable that is low-smoke producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2011, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

See the commentary following the informational note to 725.179(A).

(B) Type CMR. Type CMR communications riser cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

Informational Note: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2011, Standard Test for Flame Propagation Height of Electrical and Optical Fiber Cable Installed Vertically in Shafts.

See the commentary following the informational note to 725.179(B).

(C) Type CMG. Type CMG general-purpose communications cables shall be listed as being suitable for general-purpose communications use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.



Informational Note: One method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001 , Test Methods for Electrical Wires and Cables.

See the commentary following the informational note to 725.179(C).

(D) Type CM. Type CM communications cables shall be listed as being suitable for general-purpose communications use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.

Informational Note: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the 'SUL Flame Exposure, Vertical Flame Tray Test" in ANSI/UL 16852011, Standard for Safety for Vertical-Tray Fire Propagation and Smoke-Release Test for Electrical and Optical Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test— Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

See the commentary following the informational note to 725.1790.

(E) Type CMX. Type CMX limited-use communications cables shall be listed as being suitable for use in dwellings and for use in raceway and shall also be listed as being resistant to flame spread.

Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the VW-I (vertical-wire) flame test in ANSI/UL 1581-2011, Reference Standard for Electrical Wires, Cables and Flexible Cords.

(F) Type CMUC Undercarpet Wires and Cables. Type CMUC undercarpet communications wires and cables shall be listed as being suitable for undercarpet use and shall also be listed as being resistant to flame spread.

Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the VW-I (vertical-wire) flame test in ANSI/UL 1581-201 1, Reference Standard for Electrical Wires, Cables and Flexible Cords.

(G) Circuit Integrity (CI) Cable or Electrical Circuit Protective System. Cables that are used for survivability of critical circuits under fire conditions shall be listed and meet either or (2) as follows:

Informational Note: The listing organization provides information for circuit integrity (CI) cable and electrical circuit protective systems, including installation requirements required to maintain the fire rating.

(1) Circuit Integrity (CI) Cables. Circuit integrity (CI) cables specified in 800.179(A) through (E), and used for survivability of critical circuits, shall have an additional classification using the suffix "CI." In order to maintain its listed fire rating, circuit integrity (CI) cable shall only be installed in free air.

Informational Note: One method of defining circuit integrity (CD cable is by establishing a minimum 2hour fire resistance rating for the cable when tested in accordance with ANSI/UL 2 196-2006, Standard for Tests of Fire-Resistive Cable.

(2) Fire-Resistive Cables. Cables specified in 800.179(A) through (E) and 800.179(G)(1), that are part of an electrical circuit protective system, shall be fire-resistive cable identified with the protective system number on the product, or on the smallest unit container in which the product is packaged, and shall be installed in accordance with the listing of the protective system.

Informational Note No. 1: One method of defining an electrical circuit protective system is by establishing a minimum 2-hour fire resistance rating for the system when tested in accordance with UL Subject 1724, Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems.

Informational Note No. 2: The listing organization provides information for electrical circuit protective systems (FHIT), including installation requirements for maintaining the fire rating.

(H) Communications Wires. Communications wires, such as distributing frame wire and jumper wire, shall be listed as being resistant to the spread of fire.

Informational Note: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Flame Tray Test" in ANSI/XUL 16852010, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test— Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

(I) Hybrid Power and Communications Cables. Listed hybrid power and communications cables shall be permitted where the power cable is a listed Type NM or NM-B, conforming to the provisions of Part III of Article 334, and the communications cable is a listed Type CM, the jackets on the listed NM or NM-B, and listed CM cables are rated for 600 volts minimum, and the hybrid cable is listed as being resistant to the spread of fire.

Informational Note: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Flame Tray Test" in ANSI/UL 16852010, Standard for Safety for Vertical-Tray Fire Propagation and Smoke-Release Test for Electrical and Optical Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA 02.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

#### 800.180 Grounding Devices

Where bonding or grounding is required, devices used to connect a shield, a sheath, or non—current-carrying metallic members of a cable to a bonding conductor or grounding electrode conductor shall be listed or be part of listed equipment.

#### 800.182 Communications Raceways and Cable Routing Assemblies

Communications raceways and cable routing assemblies shall be listed in accordance with 800.182(A) through (C).

Informational Note: For information on listing requirements for both communications raceways and cable routing assemblies, see ANSI/UL 2024-4-2011, Signaling, Optical Fiber and Communications Raceways and Cable Routing Assemblies.

(A) Plenum Communications Raceways and Plenum Cable Routing Assemblies. Plenum communications raceways and plenum cable routing assemblies shall be listed as having adequate fire-resistant and low-smoke producing characteristics.

(B) Riser Communications Raceways and Riser Cable Routing Assemblies. Riser communications raceways and routing assemblies shall be listed as having adequate fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

(C) General-Purpose Communications Raceways and General Purpose Cable Routing Assemblies. General-purpose communications raceways and general-purpose cable routing assemblies shall be listed as being resistant to the spread of fire.

The application of communications raceway and cable routing assemblies are summarized in Tables 800.154(b) and (c). The installation location will dictate the type of cable permitted within the raceway or assembly as summarized in Table 800.154(a).

A raceway marked "plenum" is suitable for use in ducts, plenums, or other spaces used for environmental air in accordance with 800.154. These are identified by a marking on its surface or on a marker tape indicating "plenum." A "plenum" raceway assembly is also suitable for installation in risers, for general purpose use, and for dwellings.

A raceway or routing assembly marked "riser" is suitable for installation in risers in accordance with 800.154. These are identified by a marking on its surface or on a marker tape indicating "riser." A "riser" raceway or routing assembly is also suitable for general-purpose use and for dwellings.

A raceway or routing assembly marked "general purpose" is suitable for installation in general-purpose areas in accordance with 800.154 and for dwellings.

Pliable raceway is raceway that can be bent by hand without the use of tools. The smallest radius of the curve of the inner edge of any bend to which the raceway can be bent without cracking either on the outer surface or internally is not less 2 ½ times the outside diameter of the raceway.

Informational Note: The general term grounding conductor as previously used in this article is replaced by either the term bonding conductor or the term grounding electrode conductor (GEC) where applicable, to more accurately reflect the function of the conductor.



# MANATEE COUNTY

## ITS RADIO DIVISION

### CERTIFICATE OF RADIO COVERAGE COMPLIANCE

PROJECT NAME: \_\_\_\_\_

PROJECT ADDRESS: \_\_\_\_\_

ENGINEER REVIEWER: \_\_\_\_\_

TEST DATE AND TIME: \_\_\_\_\_

(Testing for compliance and certification shall be performed after construction and interior finishing work is complete)

I have responsible charge, and I certify that the occupancy identified above was tested for Manatee County public safety radio systems radio RF coverage levels and meets the requirements outlined in the currently adopted Florida Fire Prevention Codes and all referenced codes for Two-Way Radio Communications Enhancement System. I further certify that the building was tested under the provisions outlined in the currently adopted version of the Florida Fire Prevention Codes and all referenced codes to the best of my knowledge, information, and belief, the radio RF coverage levels for the occupancy meet or exceed those required by the current adopted version of the Florida Fire Prevention Code.

Professional Certification: I hereby certify that these testing documents were prepared or approved by me.

Respectfully submitted,

---

Signature of Engineer

Date



# MANATEE COUNTY ITS RADIO DIVISION

## Initial Assessment Request In-Building Public Safety Radio Enhancement

**COMPLETE AND SUBMIT:** NO LATER THAN ABOVE CEILING INSPECTIONS, TO DETERMINE IF A SIGNAL BOOSTER/RADIO ENHANCEMENT SYSTEM IS NEEDED

PROJECT NAME:	
CONTACT NAME:	PERMIT APP#
CONTACT EMAIL:	CONTACT PHONE:
SITE ADDRESS:	
SITE INFORMATION	
CIRCLE APPLICABLE	Total Building Sq. Ft:
NEW CONSTRUCTION      EXISTING BUILDING	Number of Floors:
BUILDING OWNER RESPONSIBILITIES	
Provide the name and contact information of the individual that will escort evaluators. The escort must have access to all areas of the building	
Escort Name:	
Escort Phone:	
EVALUATOR RESPONSIBILITIES	

Generate Testing Documents that satisfy AHJ requirements for Public Safety Communications in-Building Coverage

Conduct Signal Testing per Testing Documentation

Compile Testing Results and Provide Recommendations to AHJ

**ACKNOWLEDGMENT AND APPLICANT SIGNATURE**

**By signing and submitting this document, the building owner acknowledges that if signal enhancements are required; no Certificate of Occupancy, Certificate of Completion, or Project Finals will be issued or approved until an AHJ approved signal enhancement system is implemented and a Retransmission Authorization form is issued by Manatee County ITS Radio Division. All enhancement systems must meet the currently adopted NFPA standards for coverage and installation unless otherwise stated in writing by the AHJ.**

**It is the sole responsibility of the building owner to fund the testing, equipment purchase, and system installation required to satisfy NFPA requirements**

Applicant Signature:

Printed Name and Date:

**\*\*\*Official Use Only\*\*\***

Reviewer Name:

Signature:

Date Received:

Fee:



# MANATEE COUNTY

## ITS RADIO DIVISION

### Retransmission Application

<b>In-Building Public Safety Radio Enhancement Retransmission Application</b>	<b>Manatee County ITS Radio Division</b>
<i><b>EACH RETRANSMITTING DEVICE REQUIRES A SEPARATE APPLICATION</b></i>	
<b>1. SITE INFORMATION</b>	
Site Name:	
Site Address:	
Fire Permit Number:	
Building Description:	
Site Coordinates:	
<b>2. BDA/DAS INFORMATION</b>	
Headend Equipment Manufacturer and Model:	Class: <b>A</b>
FCC Registration Number:	
Headend Location: (Floor and Room Number)	
Line Amplifier Manufacturer and Model:	Qty of Line Amps.:
Type of System:           Public Safety Only	
<b>3. OWNER CONTACT INFORMATION</b>	
<p><i>Should the installed system be found to negatively impact the Public Safety Radio System, the system must be disabled immediately. Corrective action must be taken to make the unit operable within 5 calendar days. Coordination with the Manatee County ITS Radio Division is required prior to the unit being returned to service. The owner is responsible for all fees generated by the County ITS Radio Division for support, including identifying system interference and support during repair activities.</i></p>	
Owner:	

Owner Address:	
Point of Contact:	Email:
Work Phone	Mobile Phone:
<b>4. SITE ACCESS INFORMATION</b>	
Name:	Email:
Company:	
Address:	
Work Phone:	Mobile Phone:
After Hours Phone:	
<b>5. SYSTEM INTEGRATOR/MAINTAINER INFORMATION</b>	
Name:	Email:
Company:	
Address:	
Work Phone:	Mobile Phone:
After Hours Phone:	
<b>6. PREPARER SIGNATURE AND DATE</b>	
Signature:	Date:
Print Name and Title:	





# MANATEE COUNTY

## ITS RADIO DIVISION

### **PROVISIONAL** Retransmission Authorization

Manatee County ITS Radio Division hereby grants provisional authorization to

\_\_\_\_\_ [System Owner/Operator] to operate a public safety radio enhancement system on the County's FCC licensed 800 MHz frequencies under call signs WRAC826, WQUP811, WQPZ834, WNKA279 at the following location.

Site Name: \_\_\_\_\_

Site Address: \_\_\_\_\_

Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

FCC Registration ID: \_\_\_\_\_

Site Contact: \_\_\_\_\_

Phone #: \_\_\_\_\_ Email: \_\_\_\_\_

This Authorization is subject to the following conditions:

1. This Retransmission Authorization is issued for the purpose of and must be obtained prior to system installation, optimization, testing, and commissioning. This authorization is valid for a period not to exceed one (1) year from the date of issuance. Upon completion of final inspection and testing, a Final Retransmission Authorization will be issued, which shall last five (5) years from the issuance date. Renewal of the Final Authorization shall be granted upon the receipt of an acceptable Retransmission Application.
2. The system shall not cause interference to the Manatee County Public Safety Radio System or any of its licensed users.
3. The system owner or operator shall promptly resolve any interference of the County's Radio System. *As the licensed owner of the frequencies being retransmitted, the County reserves the right to have the system deactivated 24/7/365 should it be deemed the system presents a significant risk to radio user safety.* Repair activities must be coordinated with the County to ensure minimal impact on system users. All repairs must be completed within 5 days of deactivation.
4. The operator shall provide access to the authorized system upon request by the County, its representatives, and the FCC.
5. This authorization is valid for one (1) headend device, Class A. Each headend device must be issued its own authorization.

\_\_\_\_\_ Date: \_\_\_\_\_

Manatee County ITS Radio Division



# MANATEE COUNTY ITS RADIO DIVISION

## **FINAL** Retransmission Authorization

Manatee County ITS Radio Division hereby grants provisional authorization to

\_\_\_\_\_ [System Owner/Operator] to operate a public safety radio enhancement system on the County's FCC licensed 800 MHz frequencies under call signs WRAC826, WQUP811, WQPZ834, WNKA279 at the following location.

Site Name: \_\_\_\_\_

Site Address: \_\_\_\_\_

Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

FCC Registration ID: \_\_\_\_\_

Site Contact: \_\_\_\_\_

Phone #: \_\_\_\_\_ Email: \_\_\_\_\_

This Authorization is subject to the following conditions:

1. This Retransmission Authorization is valid for five (5) years from the issuance date. Renewal of the Final Authorization shall be granted upon the receipt of an acceptable Retransmission Application and supporting service documents.
2. The system must be tested annually by the building owner's contractor to ensure it is operating per manufacturer and engineering specifications. Any deficiency found must be rectified prior to the issuance of authorization renewal.
3. The system shall not cause interference to the Manatee County Public Safety Radio System or any of its licensed users.
4. The system owner or operator shall promptly resolve any interference of the County's Radio System. *As the licensed owner of the frequencies being retransmitted, the County reserves the right to have the system deactivated 24/7/365 should it be deemed the system presents a significant risk to radio user safety.* Repair activities must be coordinated with the County to ensure minimal impact on system users. All repairs must be completed within 5 days of deactivation.
5. The operator shall provide access to the authorized system upon request by the County, its representatives, and the FCC.
6. This authorization is valid for one (1) headend device, Class A. Each headend device must be issued its own authorization.

\_\_\_\_\_ Date: \_\_\_\_\_  
Manatee County ITS Radio Division



# MANATEE COUNTY ITS RADIO DIVISION

## MANATEE COUNTY RADIO ENHANCEMENT SYSTEM, PERMIT & INSPECTION REQUIREMENTS

Property Name: \_\_\_\_\_

Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_ Inspection Date: \_\_\_\_\_

System Installer: \_\_\_\_\_ Phone: \_\_\_\_\_

FA Installer: \_\_\_\_\_ Phone: \_\_\_\_\_

FA Monitoring Company: \_\_\_\_\_ Phone: \_\_\_\_\_

### DESIGN INSPECTION

1. The enhancement system designer is a Florida Licensed RF Professional Engineer.
2. If a new dedicated power receptacle was added, a completed Building Department commercial electrical permit application was submitted and routed through the BADS with the plans, specs, and documents. (Fees Required)
3. Personnel installing and optimizing the enhancement system are qualified and have submitted certifications to the Manatee County ITS Radio Division for the work being performed.
4. All plans, specs, and documents are stamped and signed by a Florida licensed RF professional engineer.
5. Initial Assessment testing has been completed, and documents have been included with the radio enhancement plans prior to installation.
6. The organization or contractor responsible for the electrical system upgrade is identified.
7. All system components are approved, and compatible with the Public Safety Radio System and are reflected in RF Professional Engineer design.

8. Provisional Retransmission Authorization has been approved and supplied to the building owner prior to installation.

## INSTALLATION INSPECTION

9. Technicians on-site for testing:

Fire Alarm Co.	System Installer
Fire Inspector	Radio Sys. Rep.
10. System components used are the same as those identified in the RF Professional Engineer's design. If not the same, supporting documents must be provided that shows the same specifications are met.  
**Changes from the approved design may cause delays, as specifications must be verified.**
11. All active components and BBU are installed in NEMA 4 or 4X type enclosure.
12. BDA or BBU is labeled with the following information in 1-inch contrasting letters.
  - a. Public Safety Radio Enhancement
  - b. Permit #
  - c. Service Provider Name and Contact Number
  - d. FCC registration #
13. BDA/DAS Binder labeled as such permanently located with BDA with the following documents:
  - a. System Designs including heat map, initial assessment, post-install assessment
  - b. Manufacturer Spec Sheet for BDA, BBU, Donor Antenna, Couplers, cable, and indoor antennas
  - c. Maintenance Log
  - d. Maintenance Contract
  - e. Annual Testing results
  - f. Retransmission Authorization
14. Two independent power sources are installed. 1 Primary and 1 Secondary (Backup)
  - a. Primary - dedicated 20 Amp AC Circuit. Connected to the generator if applicable.
  - b. Secondary – Battery Backup, of the same manufacturer as BDA, with minimum 12-hour capacity at 100% system operation
15. Fire Alarm system supervisory and trouble signals were activated and annunciated by the FA Panel for the following:
  1. Antenna Malfunction
  2. Signal Booster Failure
  3. Low Battery Capacity
  4. Loss of Normal AC Power
  5. Failure of Battery Charger
16. The integrity of the circuit monitoring signal boosters and power supplies shall comply with the adopted NFPA 1221 2016 9.6.13.1. All monitoring of system components must provide notification of system integrity automatically within 200 seconds.

- 17. A dedicated monitoring panel providing visual and labeled notifications located in the Emergency Command Center (ECC) if one exists. If the building does not have an ECC, the panel should be located in an area where it can be monitored and checked daily.
- 18. Pathways of survivability constructed and or installed as per approved RF Professional Engineer design.
- 19. All penetrations of fire-rated walls are returned to the same fire rating utilizing Fire and Building department-approved firestop systems.
- 20. All equipment is properly grounded per National Electric Code

## SIGNAL LEVEL VERIFICATION

22. Radio Coverage was provided throughout the building per the RF Professional Engineer design. Signal levels verified by utilizing the PCTEL evaluation tool or equivalent at the hip. A second technician located offsite will assist in performing DAQ testing. Below are the testing criteria

a. Critical Areas: 99% Pass Rate per floor, >-102dBm signal level OR DAQ 3.0

- 1. Emergency Command Center
- 2. Fire Pump Room
- 3. Elevator Lobbies
- 4. Sprinkler Valve Control Locations
- 5. Stairways
- 6. Exit Passageways
- 7. Standpipes
- 8. Other AHJ identified areas

Pass / Fail
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b. General Building Areas: 90% Pass Rate per floor, >-102dBm signal level OR DAQ 3.0

- 1. Compare heat map to testing Grid results.

Pass / Fail
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## FINAL DOCUMENTATION

23. All completed documentation was provided to the County and included in the BDA binder at BDA location.

1. Initial Assessment Request Form
2. Initial Assessment Test Results
3. Final RF Professional Engineer Stamped Designs with Heat Map
4. Specification Documents on BDA, BBU, Cable, Donor Antenna, Service Antennas.
5. Provisional Retransmission Authorization Application Form
6. County Signed Provisional Retransmission Authorization
7. Installer Test Results utilizing the same grids as Initial Assessment Test
8. County's Radio Vendor Confirmation Test Results
9. Maintenance and Service Agreement documentation for BDA
10. County Signed Final Retransmission Authorization

### Notes:

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AHJ: \_\_\_\_\_ Signature: \_\_\_\_\_

System Installer: \_\_\_\_\_ Signature: \_\_\_\_\_

Property Owner: \_\_\_\_\_ Signature: \_\_\_\_\_



# MANATEE COUNTY

## ITS RADIO DIVISION

### In-Building Public Safety Radio Enhancement

#### RADIO FREQUENCY REQUIREMENTS

Manatee County IT Radio Division Public Safety Communications currently operates a Motorola P25 Phase I Simulcast system.

#### FREQUENCY LISTS

800 MHz P25 Phase I Simulcast Control Channels, channel 1 stays active unless there is a failure.

1. **855.3875**
2. **854.7375**
3. **855.9375**
4. **858.6875**