

## 5 STEPS TO A SUCCESSFUL PUBLIC SAFETY RADIO DEPLOYMENT

For me, spring time brings with it the joy of baseball spring training and knowing that opening day is around the corner. I recently came across a quote from the great Yogi Berra that convinced me that Yogi may have had potential as a wireless network project manager. Here is what he said:

**“You’ve got to be careful if you don’t know where you are going,  
‘cause you might not get there”- Yogi Berra**

Yogi had it nailed when it comes to understanding that the success of an in-building public safety radio project is measured by understanding how the outcome of the project will be evaluated. Yogi, in his own unique style, is simply saying, “begin with the end in mind”.

For indoor public safety radio projects, the expectation of post-installation system performance and code compliance can be far more complex than merely measuring dBs in the target coverage area. To say that ordinances related to deploying a public safety radio network are inconsistently written and enforced is an understatement. Requirements related to cable survivability, uplink system performance and utilization of third-party testing services create a mish-mash of expectations. This complexity and inconsistency is a recipe for massive cost overruns. And, unique to indoor public safety radio ordinances, is a clause that threatens issuance of a certificate of occupancy if your building doesn’t provide radio service for first responders.

There are, however, several steps you can take to reduce deployment risk and navigate the complexities of public safety radio ordinances. Outlined below are 5 key steps that are the foundation of a successful installation.



## #1 Contact the Fire Marshall in Your Jurisdiction and Request the Signal Booster Ordinance

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Fire department officials are generally very willing to help, but often it is difficult to find the right contact within the department. An excellent place to start is the department website. Make a request for a copy of the signal booster ordinance related to first responder in-building signal functionality. Your request should include:

- A copy or link to the ordinance.
- The name and contact information of the individual who oversees code compliance (the authority having jurisdiction or AHJ) and the consultant or third-party testing service, if they are using one.
- Ask if they are anticipating any changes in the ordinance or personnel overseeing same.
- Provide a brief description of the project. Request to confirm the jurisdictions and agencies who may review your plan.
- Request a list of preferred installation vendors or recommendations of same.

## # 2 Diligently Review the Signal Booster Ordinance

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The ordinances can range from just a few pages to a few dozen. Study the law and keep an eye out for the following:

- References to applicable Code such as IFC, NFPA, NEC, FCC State & City Fire Code. The ordinance should include the year of each code. For example, 2015 IFC. Read and understand the application portions of the referenced codes.
- Definition of properties impacted. Typically, the requirement covers non-residential buildings of a certain number of floors or square footage.
- Permitting, Approval and Submittal requirements. What documentation is required and in what format?
- Testing procedures, pass-fail standards, reporting requirements.
- Definition of qualified installer/designer - typically described as part of IFC 510. Someone on your team may need a General Radio Operator's License (GROL) and/or verification of certification from the proposed equipment manufacturer.
- Watch out for a requirement to use a licensed engineer to stamp drawings when you are using a third-party for design and engineering services.
- Confirm the frequencies to be supported now, proposed, or pending. Understand that the building owner, in most cases, is responsible for funding any system upgrades to support new frequency bands.

## # 3 Fully Understand the Pre-Install and Post-Install Testing Standards

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Testing standards for public safety radio systems are rapidly changing. In the past, test standards included measuring and recording signal strength in the coverage area or spot-checking call quality with a fire department radio. However, more contemporary standards are addressing the potential for adverse impacts of the system on the public safety network outside of the building. Things to look for include:

- Is DAQ testing required? Delivered Audio Quality (DAQ) is an audio reference protocol using AHJ portable radios for evaluating the clarity of speech during radio communication. Confirm the procedure and who provides the equipment. Is a pre-installation signal test required, with submittals before design and installation of a new system?
- What uplink and interference mitigation testing is required? What equipment is needed to conduct those tests?
- Confirm the format of all design and testing data that is to be provided to the AHJ.

## #4 Use Design Best Practices Well-Suited to Indoor Public Safety Antenna Systems

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It is not uncommon for an experienced cellular network system designer to venture into designing systems that support public safety networks. While many of the design principals are the same, there are some design practices unique to public safety networks.

- Pay attention to the donor antenna location and transmitting sites. Public safety networks rely on towers and powerful radios that can be located miles away from buildings needing coverage. Some ordinances, like the City of Los Angeles document, will provide a directory of sites in the area.
- Complete a detailed pre-design benchmarking study. Some ordinances require this test as part of the compliance review. Verify donor signal strength and where coverage is needed. The challenge is that typically this can't be done until 80% build out. This leaves the landlord in limbo as to whether a system will be needed.
- Know frequency bands of existing or planned radio networks in the building. This impacts filtering and interference mitigation. It's not enough to merely know the frequency bands of the first responder radio network.
- Anticipate uplink testing requirements. Plan for isolation testing with a minimum of isolation of 20 dB between roof antenna and serving antenna.
- Will you be impacted by near-far issues? Plan for eliminating that problem.
- Consider PIM Components. Intermodulation issues become more relevant as you consider adding FirstNet, and critical if you are considering adding cellular service to the DAS.
- Validate horizontal and vertical pathways. Insist on confirmation of cable routes, head end rooms, and risers. Verify the survivability requirements of the cable and equipment.
- When developing the BOM, know the UL standard requirements of the AHJ and the electrical division.

## #5 Validate Construction Standards

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Each jurisdiction may have different construction and performance standards. Know that the rules may change from the time that you begin planning for the project and the point that you start the build. And the standards may be impacted by varying departments and the leeway given to a third-party consultant acting on behalf of the AHJ.

- Construction standards are typically referenced in the International Fire Code (IFC) 510 and NFPA 1221 72 Appendix O, NEC, State, and Local Electrical Codes. Know which standards are going to apply to your build.
- Pay particular attention to 2-hour survivability requirements. How are horizontal runs treated?
- Confirm the battery back-up and alarming standards.
- NEMA 4 enclosures are standard protocol. However, there is a movement to NEMA 3 enclosure especially to enclose battery backup units.
- Are there any code standards on the horizon? What are they and when might they be adopted?
- What are the UL requirements for the active components?
- Know the permitting process and who will be reviewing drawings.

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Yogi had it right. When planning an indoor public safety radio system knowing where you are going is the key to getting there. It starts with engaging your AHJ/ Fire Marshall. Become intimately familiar with codes and ordinances. When designing a system, consider requirements that are unique to first responder networks. It pays to be very curious about potential changes to requirements and the people who may be reviewing your work. Fully understand the key criteria used to evaluate approval of your system and permit. Finally, remember the ultimate goal..... protecting the lives of the public and first responders.



### About the author:

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IBW Advisors founder Mike Altman has 18 years of experience facilitating the turn-key deployment of cellular and public safety distributed antenna systems (DAS). The projects he has been involved with have provided enhanced in-building wireless coverage and capacity to venues ranging from executive residences to NFL and MLB stadiums, hospitals, corporate offices and college campuses. Mike created IBW Advisors to help building owners navigate the challenges associated with designing, procuring and implementing these systems.



**Contact us today to receive a free 30 minute consultation.**

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