MCCA

Toolkit for In-Building Public Safety Communications

Property Owners, Developers, Operators

In-Building Wireless Solutions | Public Safety Communications

Take a Look Inside ERRCS Coverage Requirements

Most local fire and building codes now include specific requirements for public safety communications infrastructure, otherwise referred to as emergency responder radio communications systems (ERRCS) Communications. *In this document, we'll go over what you need to know about:*

- Why these requirements are in place
- What the consequences of non-adherence might be
- How to achieve compliance (in a general sense), and where there may be similarities in existing infrastructure
- Why your building/organization should have a Wireless Infrastructure Master Plan
- The Myths, truths, and best practices of In-Building Public Safety Communications Systems

Why Did We Create This Toolkit?

We want to work together with building owners and property managers to ensure that each building in their portfolio meets the local, state, and federal in-building public safety requirements and that their systems do so in the most reliable and cost-effective manner.

As new buildings are erected, they have to undergo a variety of inspections, including plumbing and electrical, to receive their Certificate of Occupancy. However, many building codes now require public safety communications systems, and your building could be denied its Certificate of Occupancy without one. Adding an in-building public safety communications system after construction has been completed can be an incredibly costly endeavor and could delay the opening of your building by months.

Public Safety ERRCS

The Information in This Guide Was Created to Help You Avoid Costly Delays

In today's mobile, wireless age, having a strong, reliable RF signals within your buildings has rapidly become a non-negotiable requirement. In fact, nearly 80% of all wireless data traffic originates or terminates within a building. In addition to ensuring that building occupants can conduct their business and personal activities - ranging from voice or video calls to operating wireless POS systems - property owners must also ensure the safety of building tenants, visitors, and any first responders who may arrive on the scene.

Pillar of In-Building Public Safety Communications*

Mobile 911 Calls and Texts

The primary function of in-building public safety communications is to ensure that in an emergency, 911 calls made from mobile devices are able to be completed and that location accuracy is achieved.

Mobile Mass Notification

During accidental, purposeful, natural, or human engineered disasters and or events that require an emergency situations, mobile mass notification alerts must reach all building occupants to ensure their safety.

First Responder Communications

As first responders (police, fire, and EMS teams) arrive on the scene at your building, they must be able to communicate clearly, efficiently, effectively, and reliably to coordinate their life saving activities.

What Are Emergency Responder Radio Communications Systems?

Sometimes also referred to as Emergency Responder Communication Enhancement Systems (ERCES) such systems ensure that upon arriving at the scene of an incident, first responders and other public safety personnel have the ability to communicate effectively and efficiently both inside and outside of the building. In large buildings, public safety communications equipment is unlikely to work with an ERCES to distribute signals throughout the entire building. This is especially true for specific areas within the building, like stairwells, elevators, storage closets, and below-grade rooms and parking garages.

*These are the three pillars as outlined by the Safer Building Coalition of which we are a member

What is a Distributed Antenna System (DAS)?

Distributed Antenna Systems amplify existing signals and circumvent physical obstacles that prevent the signal from reaching its entire intended coverage area. One of the ways this is accomplished is by positioning antennas outside of a building to capture the signal and then positioning the antenna so that it's pointed in the direction that needs coverage.

Public Safety Communications systems frequently us private radio frequency bands that are licensed for use by the FCC. However, an ERRCS is also likely to include access to the nationwide public safety broadband network, supported by the FirstNet Authority.

In order to ensure that they meet the requirements of the NFPA and IFC, DAS must be designed, installed, maintained, and monitored by qualified personnel. Additionally, the FCC has a large amount of oversight into ERCES to ensure that they do not interfere with existing public safety radio systems or other users on licensed radio frequencies — even going so far as to require written permission from them to rebroadcast any part of the licensed spectrum.

What is the Nationwide First Responder Broadband Network?

After the events of September 11, 2001 (9/11), public safety agencies throughout the United States banded together and successfully lobbied Congress to establish a single, interoperable network dedicated to voice and data communications and to be administered by a new entity called the FirstNet Authority.

Designated by Congress as a dedicated public safety spectrum, the 700-800 MHz Band is unavailable to commercial operators, has excellent properties for first responder communications, and can easily penetrate buildings and walls, as well as cover large geographic areas.

Types of Distributed Antenna Systems

Property developers can choose between two primary types of Distributed Antenna Systems - active DAS and passive DAS - to provide an amplified signal to their properties. However, the two solutions are not equal, with each option being better suited to specific scenarios than the other. While an Active DAS can essentially generate its own network signal, a Passive DAS relies on an already adequate signal to pull from in order to redistribute and amplify it. More often than not, especially within larger buildings, owners choose a hybrid system that utilizes both passive and active components.

Active DAS

An active DAS system utilizes fiber optic cables to efficiently distribute signals between the signal source and strategically placed 'remote nodes' throughout the building. Depending on the building's size, the signal source can be either a Bi-Directional Amplifier (BDA) or Base Station. Active DAS offers comprehensive coverage, increased capacity, and scalability, making it ideal for larger structures like stadiums, university campuses, hospitals, and office buildings.

Passive DAS

A passive DAS relies on a signal source, typically a BDA, to amplify and redistribute the incoming Over the Air (OTA) signal to a network of passive antennas. Passive DAS are more limited in coverage and capacity. It typically receives its RF signal source from a donor cell or public safety radio tower. While passive DAS offers lower coverage and scalability versus active DAS, it can still be a viable solution for smaller-scale environments such as residential buildings, small offices, or retail spaces.

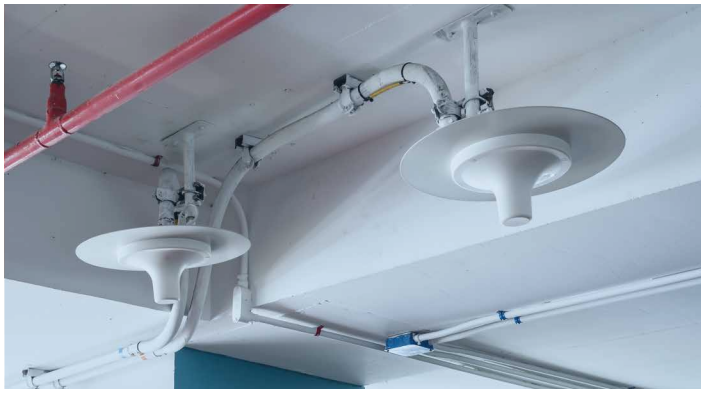
Public Safety ERRCS

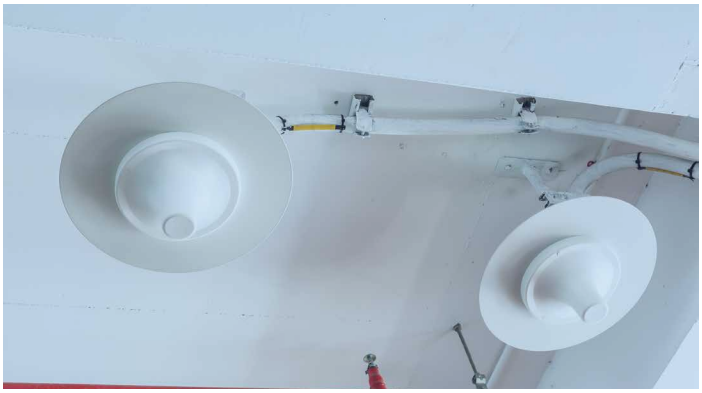
Did You Know?

1. Building owners have the responsibility to ensure public safety radio coverage in code-enforced areas.
2. Cell phones and data devices are essential tools for first responders as well.
3. Relying solely on Wi-Fi is inadequate for meeting communication needs.
4. Mitigating risk and legal liability is crucial, and investing in a DAS is a cost-effective preventive measure compared to potential lawsuits.

The need for reliable wireless systems extends to the general public as well as it releates to commercial cellular frequencies. In-building and in-tunnel communications have become increasingly vital for both public safety agencies and wireless providers, as ensuring dependable coverage in such environments can pose significant challenges. When cellular coverage is poor and the public is unable to reach emergency services through 911, the response to emergencies is hindered.

Accordingly, it is crucial to address cellular communications through system enhancements to guarantee the safety of building occupants, employees, and the general public. Regardless of location within your building, individuals should be able to text and call 911 and receive important notifications during critical situations. The responsibility falls on the building owner to ensure that these essential communication capabilities are in place for times of crisis.





System Integrator Checklist

- [ ] Integrator has a combination of technical, regulatory, and project management expertise
- [ ] Integrator has provided ERCES installations for at least 5 years
- [ ] Integrator has both a National Institute Certification in Engineering Technologies (NICET) and General Radiotelephone Operator License (GROL)
- [ ] Integrator has training, certification, and access to iBwave *(or similar RF Design software)*
- [ ] Integrator has the necessary training and certification from relevant equipment manufacturers

Wireless Infrastructure Master Planning

Why You Need It and What To Include

By maintaining a wireless infrastructure master plan, you will be able to easily visualize and inventory the various components of the wireless networks supporting your building's operations. This will, in turn, help you to ensure coverage and remain competitive.

Ensuring Adequate Coverage Levels

Your plan will help you ensure that your building provides services for voice and cellular services, first responder communications, IoT devices, and the next generation of wireless services.

Keeping Your Properties Technologically Competitive

As a property owner, you must ensure your buildings are safe, secure, and in line with various health, safety, and building codes. Moreover, ensuring buildings have a solid network infrastructure increases their value, especially when those systems are built to easily accommodate future upgrades.

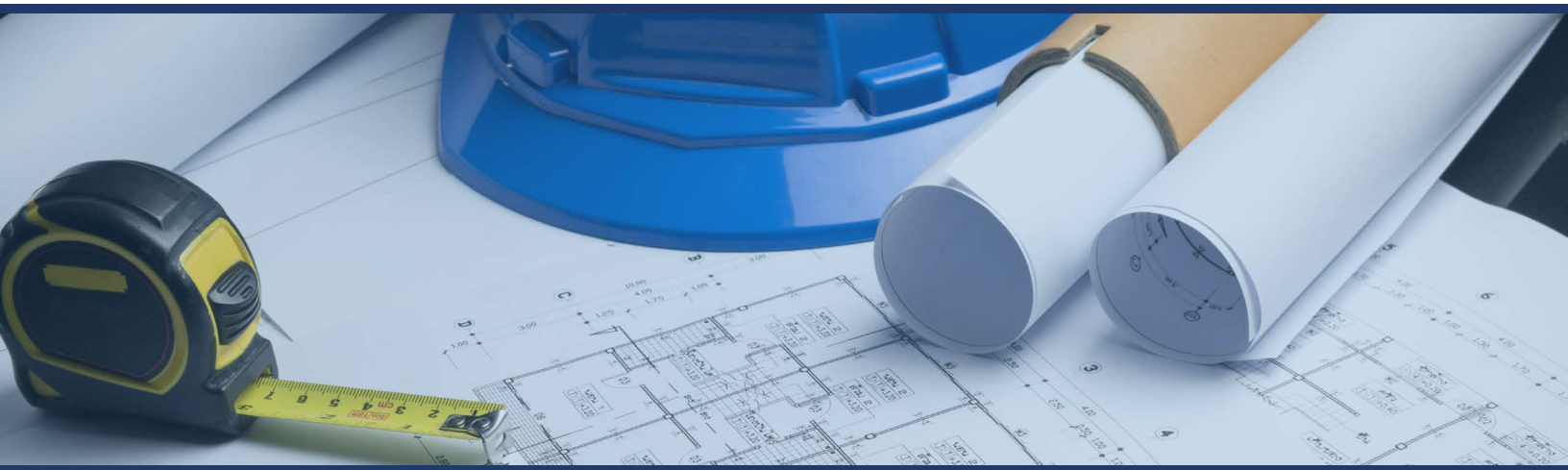
Planning for Adequate Cabling Infrastructure

A comprehensive and cost-effect approach to cabling ensures adequate infrastructure in building risers, considering pathways, fiber, power, and space for current and future needs. Fire-rated and non-fire-rated pathways support multiple cabling systems, including fiber and coaxial cables, offering flexibility and scalability.

Despite Being Wireless Systems, They Use A Lot of Wires

Wireless systems, in reality, use a large amount of wiring. In new construction, early designation of pathways is vital. For existing buildings, especially older ones, a thorough assessment of the infrastructure becomes essential. Often requiring the removal of abandoned cabling prior to installing the new infrastructure.

Modern building infrastructure plans encompass a wide range of building and communication systems that are integrated or migrated to the building network. It is essential for property owners to incorporate a wireless framework into their master plans. While organizations like WiredScored and TIA can provide guidelines, it is crucial a Registered Communications Distribution Designer *(RCDD)* conduct a thorough building evaluation. Such an evaluation ensures that the building's cable pathways are designed to meet the needs of the present and future technological landscape.



Glossary | Terms & Concepts

Codes and Standards

To obtain a Certificate of Occupancy *(COO)*, all new and existing buildings undergoing significant renovation or expansion must provide full indoor coverage as required by the International Fire Code *(IFC)* for public safety. Additionally, each municipality has its own specifications for public safety radio, making it necessary to have a unique configuration. For Public Safety DAS to comply, it must meet the codes set by IFC and/or NFPA.

AHJ: Authority Having Jurisdiction

In the USA, there are tens of thousands of Authority Having Jurisdiction (AHJ) entities, all of which may vary in its scope and responsibilities. The AHJ could be the fire department, fire marshal, radio shop, sheriff's department, or inspector who provides the final sign-off for occupancy permission. Some AHJs work independently on these systems, while others collaborate to create a compliant system that satisfies all parties.

Common Acronyms

- **AHJ:** Authority Having Jurisdiction
- **BBU:** Battery Back-Up Unit
- **BDA:** Bi-Directional Amplifier
- **DAS:** Distributed Antenna System
- **ERCES:** Emergency Responder Communication Enhancement System
- **ERRCS:** Emergency Responder Radio Communication System
- **HEU:** Head-End Unit
- **IFC:** International Fire Code
- **NFPA:** National Fire Protection Association
- **RF:** Radio Frequency

Also note, each AHJ may interpret codes differently. Therefore, the design, installation, commissioning, and testing of a DAS System must adhere to that specific interpretation to obtain approval for the Emergency Responder Communication Enhancement System (ERCES). To avoid delays in the approval process, it is highly recommended to engage with the AHJ early in the project. Delays may occur due to alarming, cable pathway protection, battery backup, and insufficient RF coverage in critical areas like stairwells and boiler rooms.

License Holder

The Federal Communications Commission (FCC) is accountable for regulating and granting licenses for private radio frequencies, also known as wireless spectrum, to both commercial and non-commercial users, such as local, county, and state governments. These users include those of public safety, commercial and non-commercial fixed and mobile wireless services, broadcast television and radio, satellite services, and other services. The Commission's role in granting spectrum licenses is to foster effective and dependable access to the spectrum for innovative applications while also prioritizing public safety and emergency response efforts. www.fcc.gov/licensing-databases/licensing

System Integrators

Engineering and installation companies, like MCA, with a specialization in Emergency Responder Communication Enhancement System (ERCES) are commonly known as System Integrators. They usually collaborate with electrical contractors to provide all components and expertise necessary for a comprehensive ERCES solution, including design, project management, and testing. When selecting a systems integrator, it is recommended to opt for one with certified RF engineers proficient in in-building design, construction/installation standards, and processes.

Two industry-standard propagation tools for simulating in-building wireless systems' functionality are iBwave and RANplan. A competent integrator should have experienced construction project managers familiar with the principles of RF propagation and well-versed in the in-building system requirements for public safety and cellular enhancement, including NFPA, IFC, and electrical building codes. System Integrators can handle the entire project as a turnkey solution or provide parts and expertise to a local installation contractor.

System Integrators work with local Authority Having Jurisdiction (AHJs) to comprehend and integrate each system's requirements, resulting in a code-compliant ERCES for the building owner.

Myths, Truths, and Best Practices

Myth: Codes and standards are uniform across all jurisdictions.

Truth: While international codes serve as a baseline, different jurisdictions may have additional requirements, including published documents or bulletins outlining their interpretations of the codes. It is crucial to adhere to the AHJ's interpretation of the code stated in their published documents.

Best Practice: Familiarize yourself with your AHJ and its standards before installing a system

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Myth: Once an ERCES is installed, there's no need to stay up to date on annual inspections like the Fire Alarm system.

Truth: IFC and NFPA codes require property owners to maintain the ERCES by conducting annual inspections. Without maintenance, various factors could impact the system after installation, leading to costly consequences.

Best Practice: Schedule the annual ERCES inspection along with the Fire Alarm inspection and stay up to date with annual inspections to ensure compliance with requirements and prevent possible negligence fines.

Counting the Costs

6 Consequences of Delaying Your ERCES Project

1. Escalating material prices
2. Substantial increases in construction costs
3. Limited product availability
4. Additional design costs resulting from the lack of early-stage coordination
5. Requirement for rated pathways
6. Inability to open your building

Failing to plan for an ERCES project can lead to higher expenses, challenges in sourcing materials, and potential delays to construction and building occupancy.

Myth: Anyone can install these systems.

Truth: It's essential to hire experienced RF engineers and installers to design, install, and test the systems to meet local jurisdictions' requirements and work in an emergency.

Best Practice: Verify that the same equipment is quoted in the Bill of Materials and ask the systems integrator for their credentials, including manufacturer certification, design certification, test equipment certification, General Radio Operator License (GROL), and a history of work performed in corresponding jurisdictions. Consider NICET certification for in-building public safety communications.

Myth: If a system is well-designed, it will work flawlessly.

Truth: While a well-designed system is a great start to building a Distributed Antenna System (DAS), it's crucial to have a skilled installation team to install the components of the DAS correctly, including connectors, couplers, jumpers, and antennas. Coaxial cables may seem robust and durable, but they are fragile and easily damaged. A faulty installation can cause signal interference and impair the system's performance.

Best Practice: Check the acceptance test documentation provided by the integrator to ensure that all tests have been passed. A thorough commissioning team should have a strong understanding of RF principles and know how to operate RF test equipment to ensure that the DAS operates flawlessly and does not cause harmful interference.

Critical Recommendations for Business Owners

When it comes to ensuring effective and compliant communication systems in your building, there are several key considerations to keep in mind. *By taking the following steps, you can proactively address potential challenges and lay a solid foundation for seamless connectivity:*

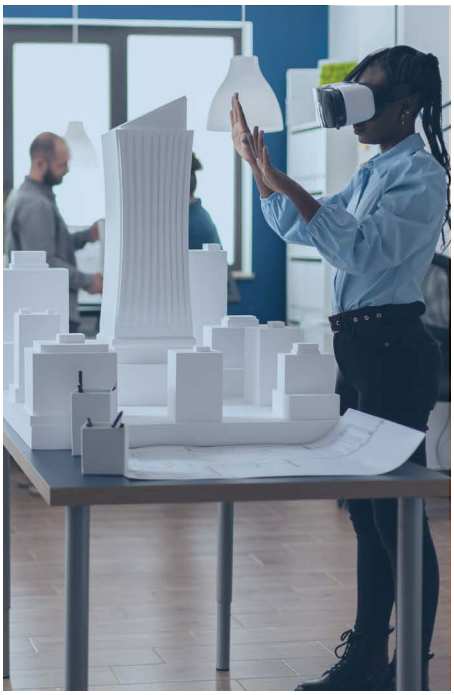
1. **Complete a baseline RF assessment of your building:** Assessing your premises' RF environment is crucial to identify weak coverage areas and implement suitable solutions.
2. **Become familiar with your jurisdiction's current code requirements:** Stay compliant by keeping up with local regulations and code requirements specific to public safety and wireless communication systems in your area.
3. **Ensure that your Systems Integration partner is well-qualified:** Selecting a reputable Systems Integration partner is vital. They play a crucial role in designing, installing, and maintaining your communication systems. Verify their qualifications and expertise for a successful partnership.
4. **Consider any future building developments, renovations, or expansions:** Plan for future building changes to ensure a scalable communication infrastructure. Consider potential developments, renovations, or expansions to prevent costly retrofits down the line.
5. **For new construction, install components and leave space:** In new construction projects, design and install conduits, pathways, and leave ample space for future communication equipment needs. This proactive approach ensures access for system upgrades, minimizes disruptions, and prevents space constraints, facilitating enhanced connectivity and allowing for easy future system expansion.
6. **Obtain written authorization for all system frequencies:** Ensure every system frequency has proper written authorization from the FCC. Adhering to authorization protocols is crucial for legal compliance and optimal performance.

Questions and Concerns for Property Owners

In recent years, property owners have begun to recognize the importance of installing public safety systems in their buildings. However, the initial budget for these systems often does not include the necessary safety measures, and installation may cause unexpected damage. Our objective is to educate property owners on the market's requirements, proper installation processes, trusted partners for installation, and the critical role of Emergency Responder Communication Enhancement Systems (ERCES) in ensuring community safety.

To evaluate your property's safety preparedness, consider the following questions:

1. Can your building(s) facilitate communication between first responders?
2. Is there a clear and reliable means for your employees and customers in the building(s) to contact 911 on their cell phones?
3. Is there an emergency mass notification system in place?
4. Do you have a disaster recovery program for your properties?
5. Have you implemented a "smart building" strategy to address energy communication, security, and other relevant areas?



About MCA

MCA is one of the largest and most trusted integration partners in the United States, offering world-class voice, data, and security solutions that enhance the quality, safety, and productivity of customers, operations, and lives.

More than 65,000 customers trust MCA to provide carefully researched solutions for a safe, secure, and more efficient workplace. As your trusted advisor, we reduce the time and effort needed to research, install, and maintain the right solutions to improve your workplace.

Our team of certified professionals across the United States delivers a full suite of reliable technologies with a service-first approach. The MCA advantage is our extensive service portfolio to support the solution life-cycle from start to finish.

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