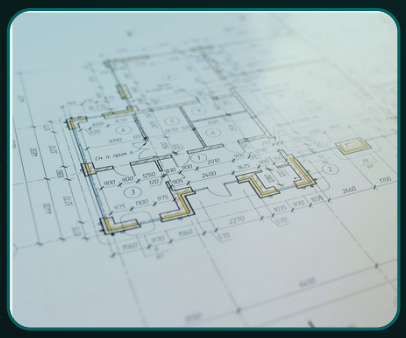


THE CALL THAT NEVER GETS THROUGH

Modern Buildings Block the Radio Signal First Responders Need Most. Code Now Requires a Fix.

By Dr. John M. Thurber, RCDD, CSI

95–99%
of every floor must hit −95 dBm signal strength

30+ dB
of signal lost crossing modern glass, steel & concrete

1 in 10
ERCES systems fail their annual recertification test

A firefighter's radio works perfectly in the parking lot and goes silent on the third floor. That isn't a defective radio — it's the building. Modern glass, steel, and concrete built to save energy are just as effective, unintentionally, at blocking the exact signal a crew needs most during the worst five minutes of their day.

Low-emissivity glass, reinforced concrete, and metal decking are excellent at what they're designed to do: keep conditioned air inside and glare down. They are just as good, by accident, at reflecting and absorbing radio frequency energy. A single pane of low-E glass can cut a signal by 15 to 40 dB; concrete and rebar add another 10 to 30. Stack a curtain wall, a concrete core, and a few interior partitions together, and a strong signal on the sidewalk can lose 30 dB or more before it ever reaches a stairwell.

That gap is exactly what crippled inter-agency communication on 9/11, when responders inside the towers couldn't reliably reach each other or command outside. The 9/11 Commission's recommendation eventually became FirstNet: a dedicated nationwide public-safety broadband network built on a reserved slice of spectrum, Band 14, funded by Congress specifically because ordinary commercial coverage isn't something a fire department can stake a life on.

Why Code Now Treats This as a Life-Safety System

Most jurisdictions have stopped treating in-building radio coverage as optional. The International Fire Code (Section 510) and NFPA 1225 both require an Emergency Responder Radio Communication System — still often called ERCES — in any building where testing shows first responder radios can't reliably reach −95 dBm across 95 to 99 percent of the floor plate, including stairwells, elevator lobbies, and fire pump rooms. The local fire marshal, acting as the Authority Having Jurisdiction, has to sign off on a passing acceptance test before the building gets its certificate of occupancy.

The obligation doesn't end at occupancy. Systems have to be listed to UL 2524, backed by twelve hours of battery runtime, and recertified annually for the life of the building — and field data shows roughly one in ten buildings with a system already in place still fails that annual retest. A building that passed on day one can fail two years later simply because a tenant added a wall, a rooftop unit went in, or a battery aged out.

A radio that works in the lobby and dies in the stairwell isn't a coverage gap. It's the five minutes a crew doesn't have during a fire.

Code no longer treats that gap as acceptable — and neither should the building that creates it.

What an ERRCS Actually Is

An Emergency Responder Radio Communication System is, at its core, a bi-directional amplifier connected to a rooftop donor antenna, distributing amplified public safety frequencies through a dedicated antenna network reaching every floor, stairwell, and mechanical space. It listens for the frequencies the local fire, police, and EMS agencies actually use — typically in the 150, 450, 700, and 800 MHz bands — and rebroadcasts them at the strength code requires, in both directions, so a firefighter on the fourth floor can talk to command in the lobby and be heard.

Why FirstNet Changed the Requirement

FirstNet added a second, related obligation. Because first responders increasingly carry FirstNet-capable devices on Band 14 alongside their land mobile radios, a modern public-safety system increasingly has to support both: the agency's LMR frequencies for voice, and Band 14 for the data, mapping, and messaging tools crews now depend on. Manufacturers such as Nextivity have built platforms — the CEL-FI QUATRA RED line among them — specifically to cover both requirements, LMR bands and multi-carrier FirstNet support, from the same head-end, in either a simple BDA configuration for a small building or a full distributed antenna system scaled to a two-million-square-foot campus.

Why This Belongs in the Design Conversation, Not the Punch List

An ERRCS designed after the building is finished is a retrofit: core drilling for antenna cable, exposed conduit where none was planned, and a fire marshal walk-through that can stall a certificate of occupancy over a problem that was baked into the shell months earlier. An RF survey and system design done alongside the low-voltage and life-safety design — before walls close and finishes go in — turns a scramble into a normal part of the telecommunications scope, pathway, and closeout documentation the rest of the building already requires.

The ABECA Standard

When public safety coverage is part of our scope, the design specifies the donor signal strategy, the amplifier platform, and the antenna layout needed to hit code before a single antenna is mounted — then coordinates directly with the local fire marshal on the acceptance test and with the owner on the annual recertification that follows for the life of the building. It's the same discipline we bring to structured cabling: get it right at the design table, and the inspection becomes confirmation, not discovery.

Dr. John M. Thurber is a Registered Communications Distribution Designer (RCDD) and a member of the Construction Specifications Institute (CSI), specializing in Division 27/28 telecommunications infrastructure design.