SAFER BUILDINGS COALITION

WEBINAR: MONITORING REQUIREMENTS FOR IN-BUILDING, EMERGENCY RESPONDER RADIO COMMUNICATIONS SYSTEMS (ERRCS)

PRESENTED BY:

SAFER BUILDINGS COALITION

Microlab

Predictive

Presenters

Thomas McCabe
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CEO & Co-Founder
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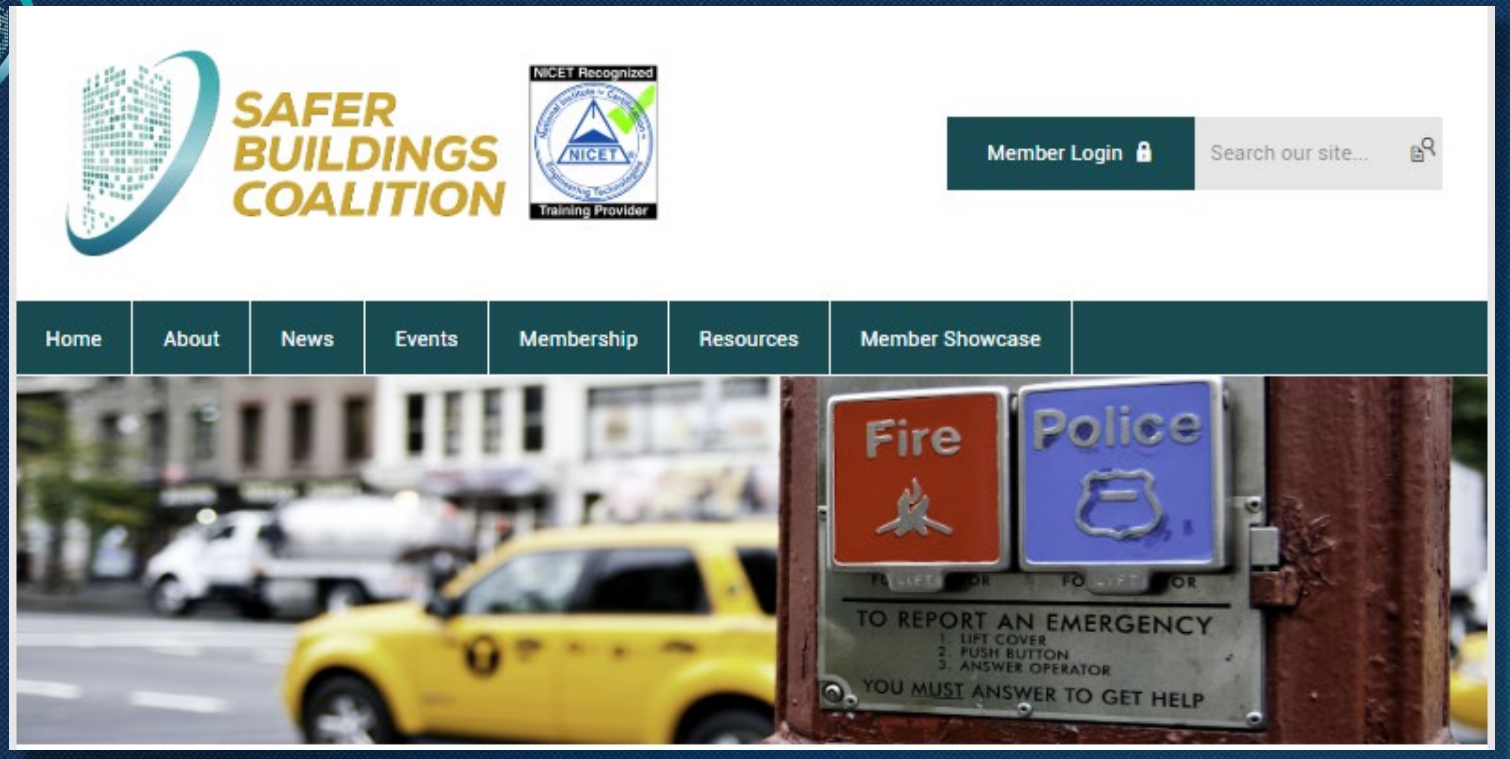

Mission...

- *Code Development*
- *Advocacy*
- *Education*
- *Industry Advancement*

The **Safer Buildings Coalition** is an independent, not for profit organization.

The Safer Buildings Coalition focuses on ensuring that every manner of communication inside buildings that would be useful during an emergency is available and functions correctly, when and where needed

SaferBuildings.org

MOST RELEVANT CODES

IFC

- **Section 510** – EMERGENCY RESPONDER RADIO COVERAGE (2018)

NFPA

- **NFPA 1** – Fire Code – Current Edition 2018
  - **Section 11.10** Two-Way Radio Communication Enhancement Systems
- **NFPA 72** - National Fire Alarm and Signaling Code – Current Edition 2019
  - **Chapter 12** – Circuits and Pathways
  - Through 2013: **Section 24.5** Two-Way, in-Building Emergency Communications Systems
  - Most Two-Way Radio Communication Enhancement Systems requirements moved to NFPA 1221 **Section 9.6** as of 2016
- **NFPA 1221** – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems - Current Edition 2019
  - **Section 9.6** Two-Way Radio Communication Enhancement Systems

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Eric Carey
CEO & Co-Founder
Predictive Technologies

Predictive

The Impact of Public Safety Communications

- Interviewed a local fire chief
- The word that stood out to me during our discussion – “Lonely”
- Think about families of the public safety communities – how would you feel if ever time your loved ones left home for work they might not come back

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- Interviewed Safe Environment Specialist in a School District
- Integrated systems are important
- 2 recent incidents where communications failed
- Funding is hard to come by

Know the Whole Story

- NFPA and IFC codes are really important to understand
- Make sure you know what is required by the local AHJ as things vary from area to area
- Work with the AHJ to follow their process completely
- RF emitting BDA is not the whole story

NFPA®

Not Just About Sprinklers

Maintenance Work Could Have a Huge Impact

- Construction and maintenance work is constantly being performed
- Work closely with the building owner
- New technologies enables monitoring of the passive legs of RF solutions
- Select the proper monitoring tool and put it into place

Use Qualified Installation and Monitoring Companies

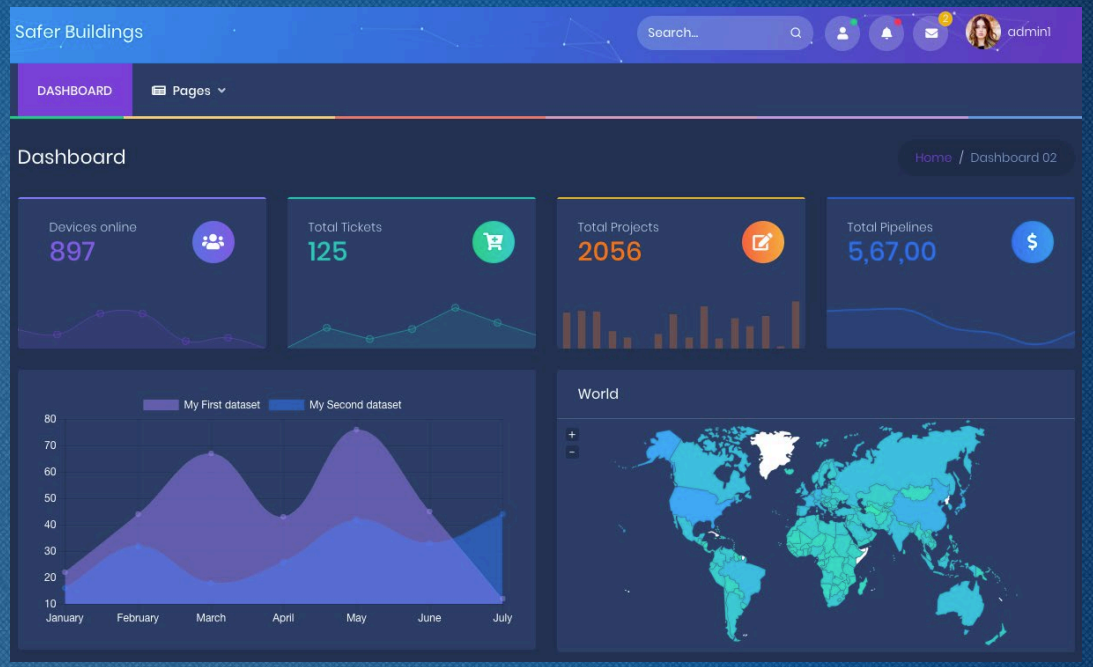
- Select the right partner for the design, it makes a difference
- Interference can be a huge problem
- Systems Integrators with the ”right” experience matters
  - Recent, Local References
- Monitoring companies that know RF can save time and money

Knowing There is an Alarm is Not Enough

- These alarms are fault outputs to a Fire Alarm System
  - Normal ac power
  - Loss of normal ac power
  - Battery charger failure
  - Low battery capacity
  - Donor antenna malfunction
  - Active RF emitting device malfunction
  - System component malfunction
- From a communications perspective there are so many more things that can be monitored and managed remotely to preserve life saving communications

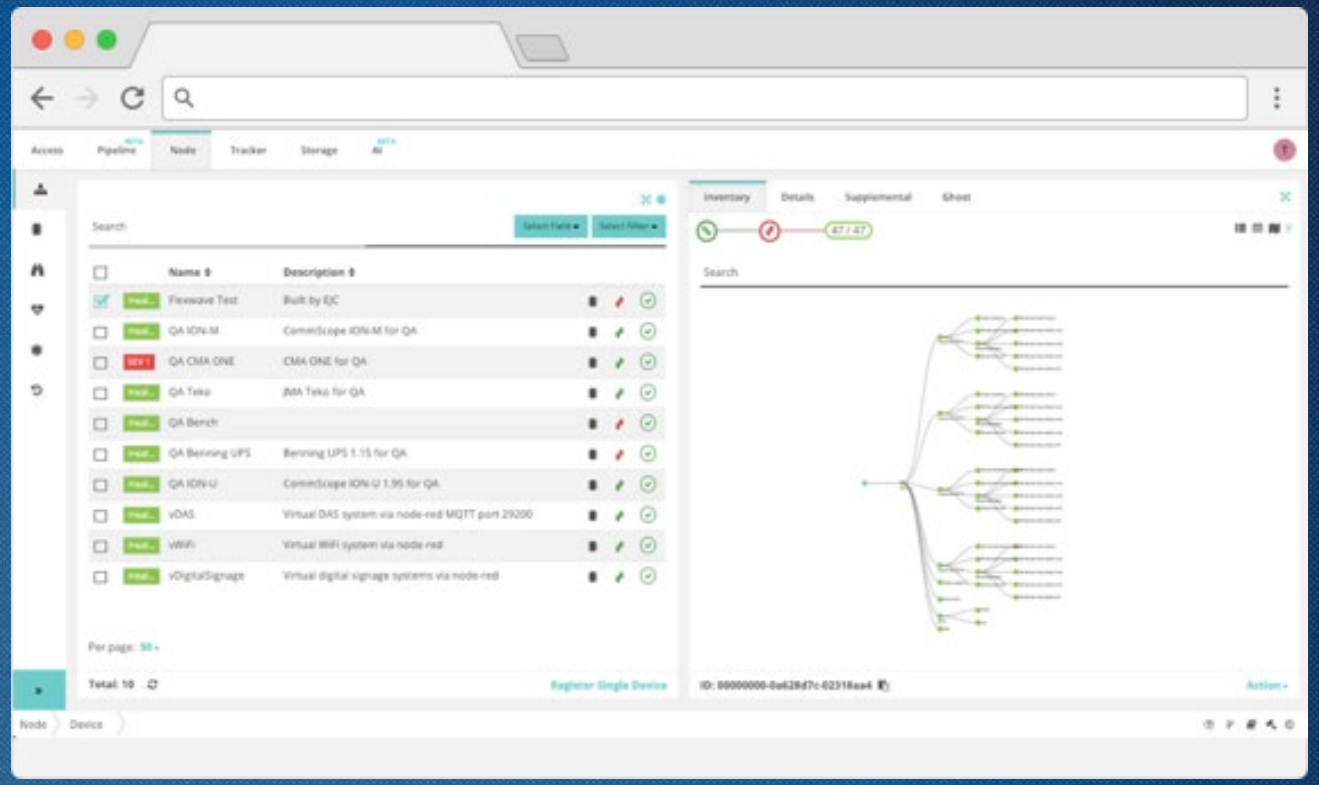
Enable Visibility and Control

- Visibility and control to the solutions are going to be increasingly important to the AHJ's
- Make sure that the monitoring solution you select can offer remote control to the responsible parties
- Offer access to the test results to the AHJ in a central location that is easy to find



Monitor/Manage the Entire Eco-system

- Monitor the entire eco-system
- Share the visibility
- Now that solutions exist, it is our duty to monitor
  the passive elements of the ERRCS



Keep Safe the Ones that Keep Us Safe

Key take-away points

- Select qualified teams to design/install/maintain/monitor
- Support legislation to promote codes and regulations to protect the public and the people that serve
- Communications systems need to work in time of need
- Monitor as much as you can, because you can!!

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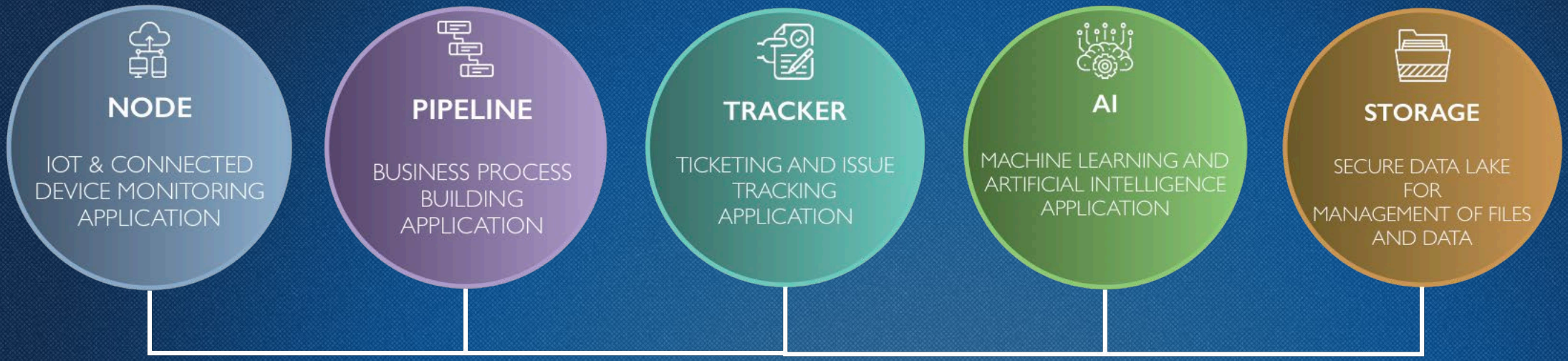
Predictive

Predictive Technologies offers independent applications designed to work seamlessly together. These applications will allow you to monitor and maintain the devices that are important to you and your customers.



PREDICTIVE TECHNOLOGIES

CONNECTING YOU TO THE DEVICES THAT MATTER.

Contact us at sales@predictivetech.io

https://predictivetech.io

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Thomas McCabe
Product Manager
Microlab

Microlab

Authority Having Jurisdiction

AHJ Determines the Need and Design for a Two-Way, Emergency Responder Radio Communications System or ERRCS within a Building

- Requirements May Exceed NFPA 1221 or IFC Sec. 510

Following Implementation the AHJ will Conduct an Acceptance Test

- Certificate of Occupancy “CO” issued for New Buildings
- Building Owner should retain Test & Measurement Results

What Happens to the DAS Coverage Integrity Until the Annual Test?

ERRCS Coverage Requirements

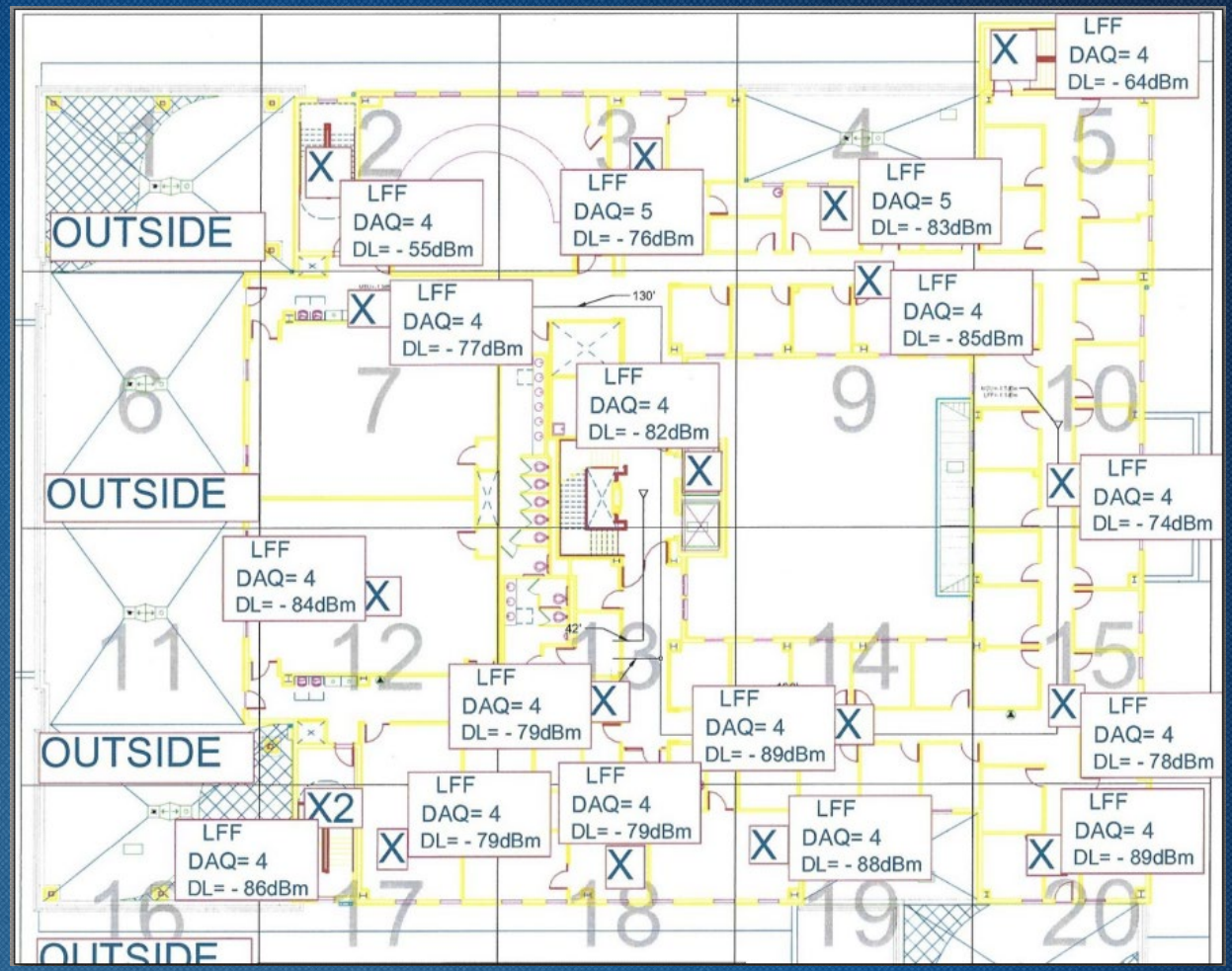
ERRCS: Where People ARE and ARE NOT

ERRCS Coverage Areas: Fire Panel and Incident Command in Lobby, Stairwells, Fire Exit Passages, AOR, Mechanical Rooms, Utility Demarcation, Fire Pump Rooms, Valve and Standpipe Areas, and AHJ Specific Locations.

Grid Maps, 20 Areas per Floor

UL and DL Assessed in Each Grid:

- RSSI
- DAQ
- Consult with AHJ



Without DAS Integrity, Overall Radio Coverage will be Poor

Delivered Audio Quality

- Greater Than 3.0
- Speech Understandable with Slight Effort
- Occasional Repetition Allowed due to Noise / Distortion

Critical Areas

99%

Coverage

General Areas

90%

Coverage

What Happens after the ERRCS is Commissioned?

Annual Radio Testing is Required

Visual Inspections

Poor Radio Coverage During an Incident

Unknown Shorted or Open RF Circuits

Renovation Damage

Building Maintenance Disconnections

Vandalism

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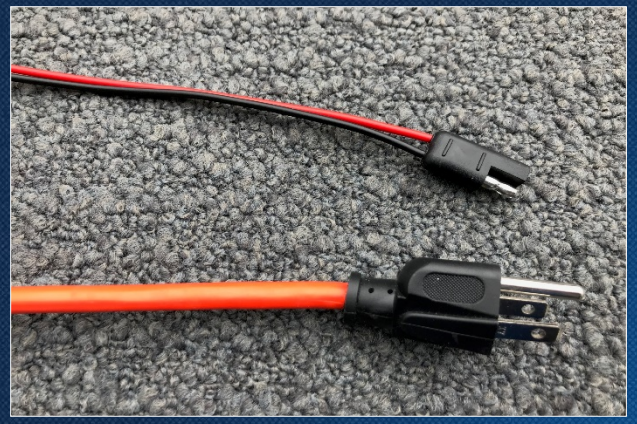
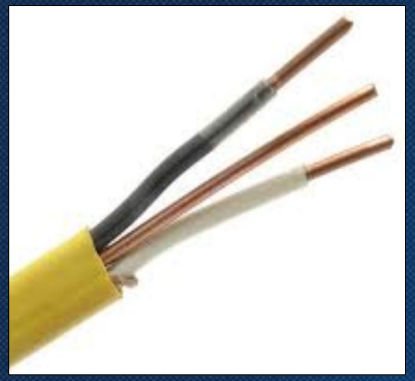
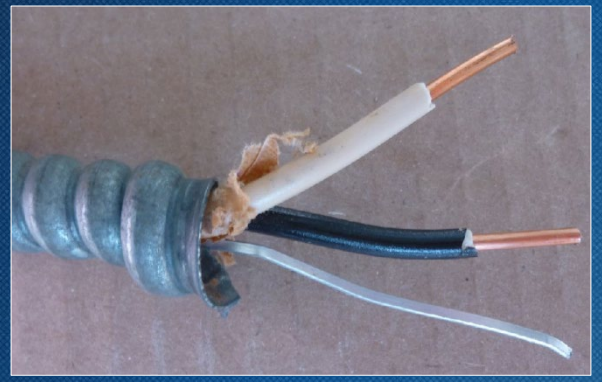
Use Care Installing RF Transmission Line







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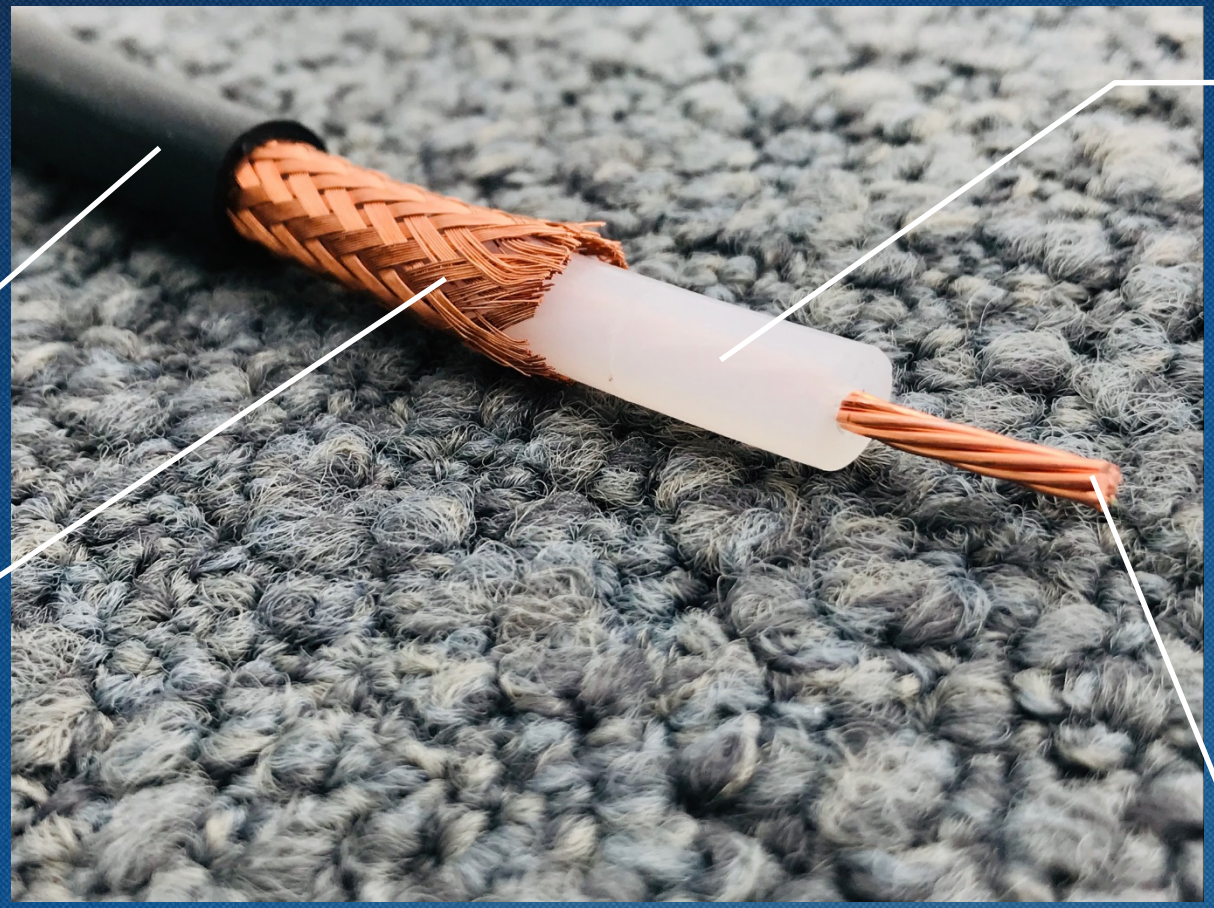
DC & AC Power Cords, AC Electrical Cabling

Radio Frequency (RF) Transmission Line

Anatomy of an RF Transmission Line



RF Transmission Lines are Tuned Circuits

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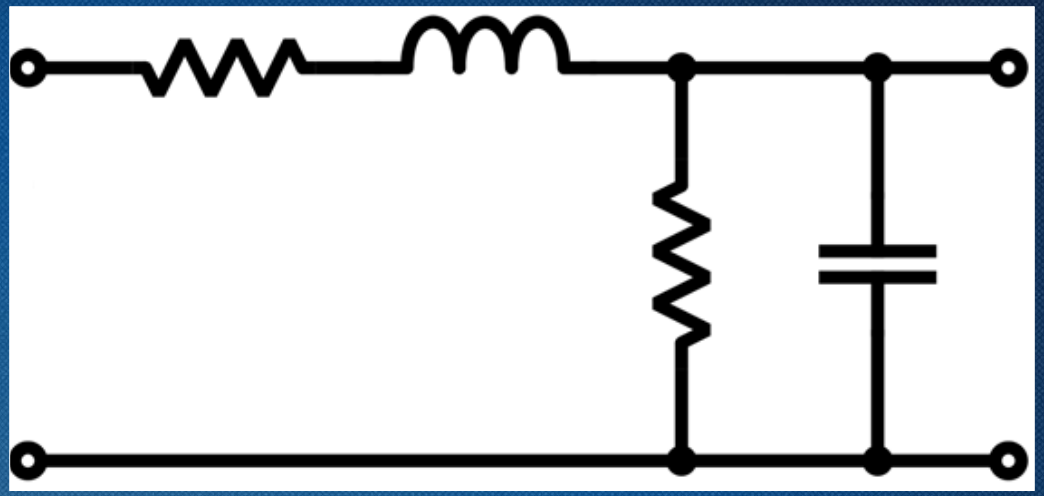
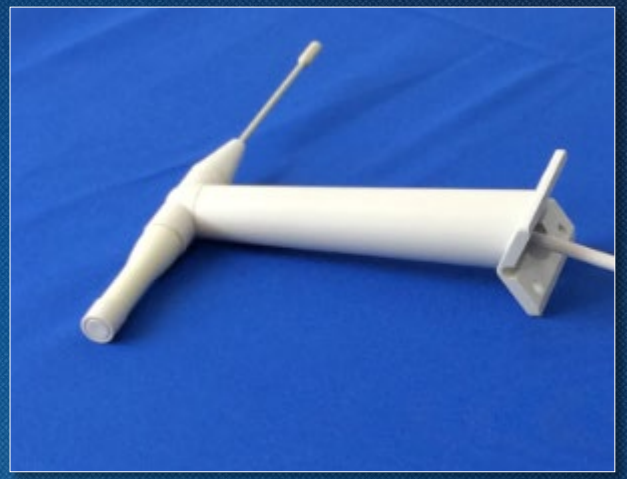


As *Flexible, Broadband, Tuned Circuits* RF Transmission Lines Exhibit:
Resistive, Inductive, and Capacitive Properties

DAS Antenna is a Transducer

50Ω RF Transmission Line Terminates with a 50Ω Antenna

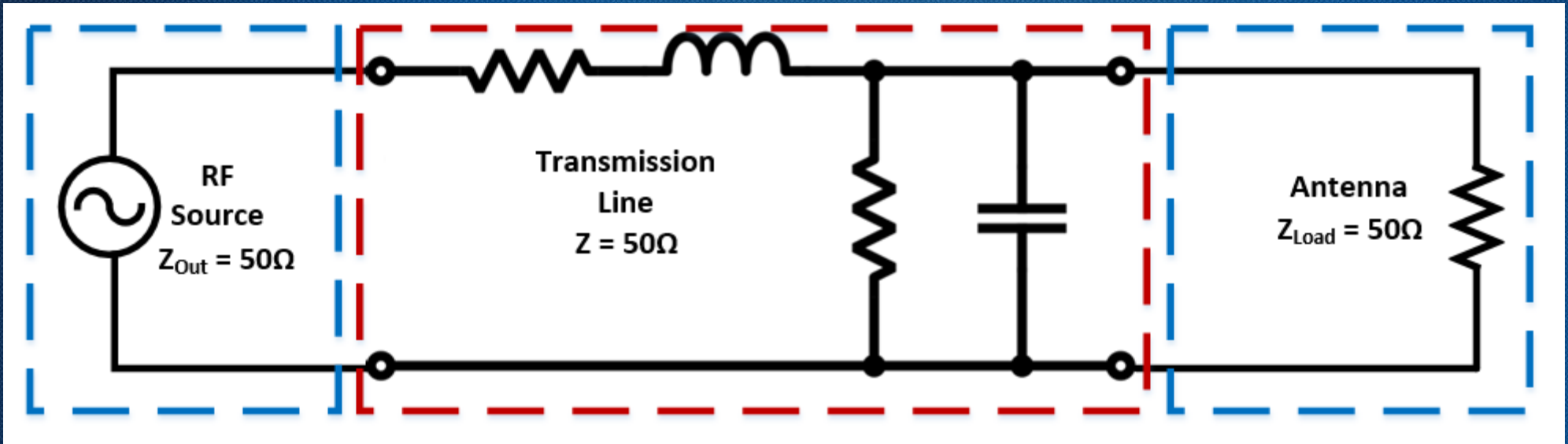
Antennas Emit the Voltage & Current Conducted through the RF Transmission Lines from a BDA or Repeater as Electromagnetic Energy



Optimum RF Coverage

Maximum RF Power Transfer Conditions:

- 50Ω RF Source with Transmission Line Terminating at a 50Ω Antenna
- Proper “Match” Enables RF Source Power to be Efficiently Emitted from the Antenna or Load



DAS RF Transmission Line Paths Through a Building

Interior Demolition

Alarming and Supervisory Signals

- Loss of Commercial AC Power
- Low Capacity of 12-Hour Backup Battery
- Failure of 12-Hour Battery Backup
- Active RF Emitting Device Failure
- Active System Component Failure
- Alarm System Malfunction Link Between the ERRCS Equipment and Fire Alarm Panel
- Donor Antenna and Transmission Line Malfunction

There is NO Monitoring Required for the Malfunction of DAS Cabling & Coverage Antennas

Example: Short or Open Circuits

Monitoring a Passive DAS RF Coaxial Cabling and Antennas

Backbone or Vertical Riser and Horizontal Distribution Cables to Antennas

Cables may be installed in Rigid Metallic Tubing, within an Enclosure Matched the Building's Fire Rating, 2 – 3 hours

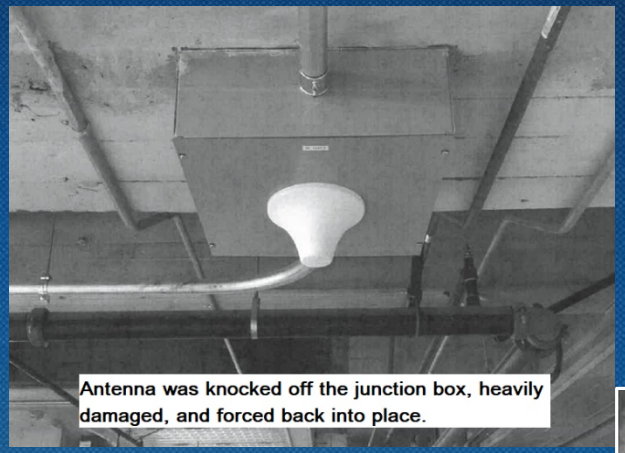
Effective Technology is Available

Why Passive DAS Monitoring ?

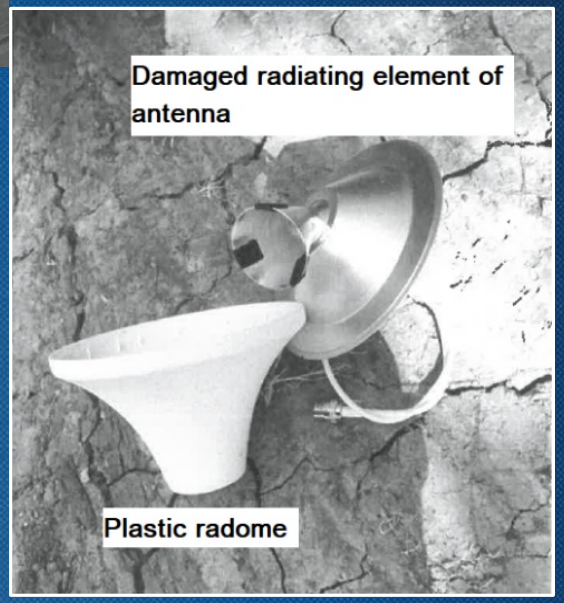
Cables Are Cut or Damaged

Antennas are Damaged

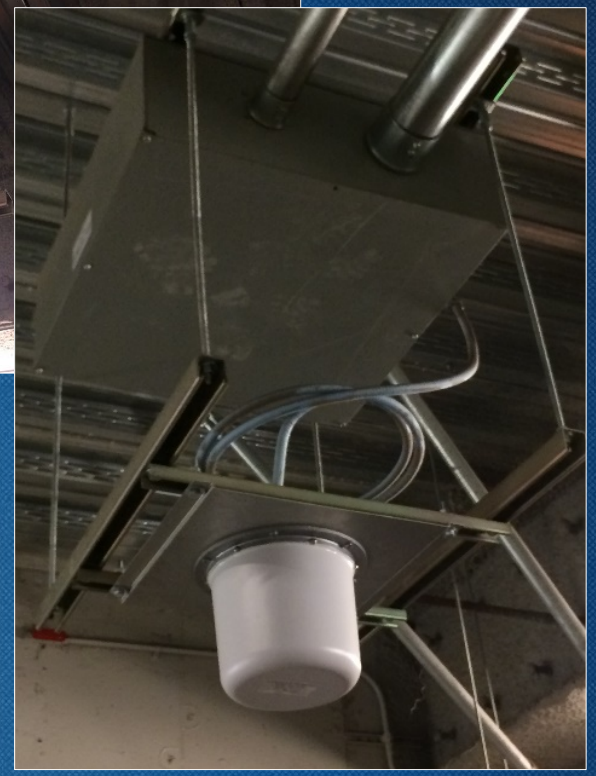
Antennas may be Disconnected During Building Maintenance or Renovation



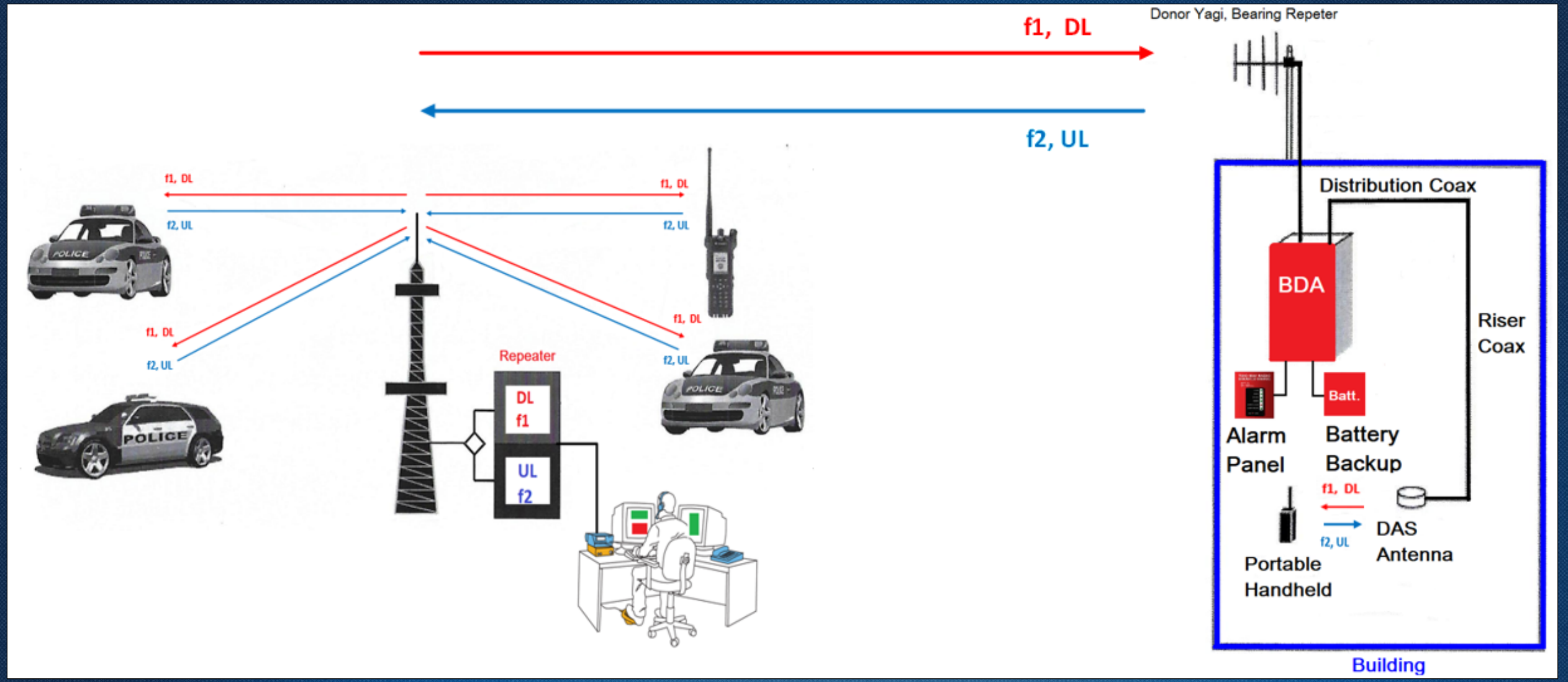
Photos Courtesy of: Brian Rhodë
DAS/ERRCS Division Manager
RedRock, Security & Cabling, Irvine, CA



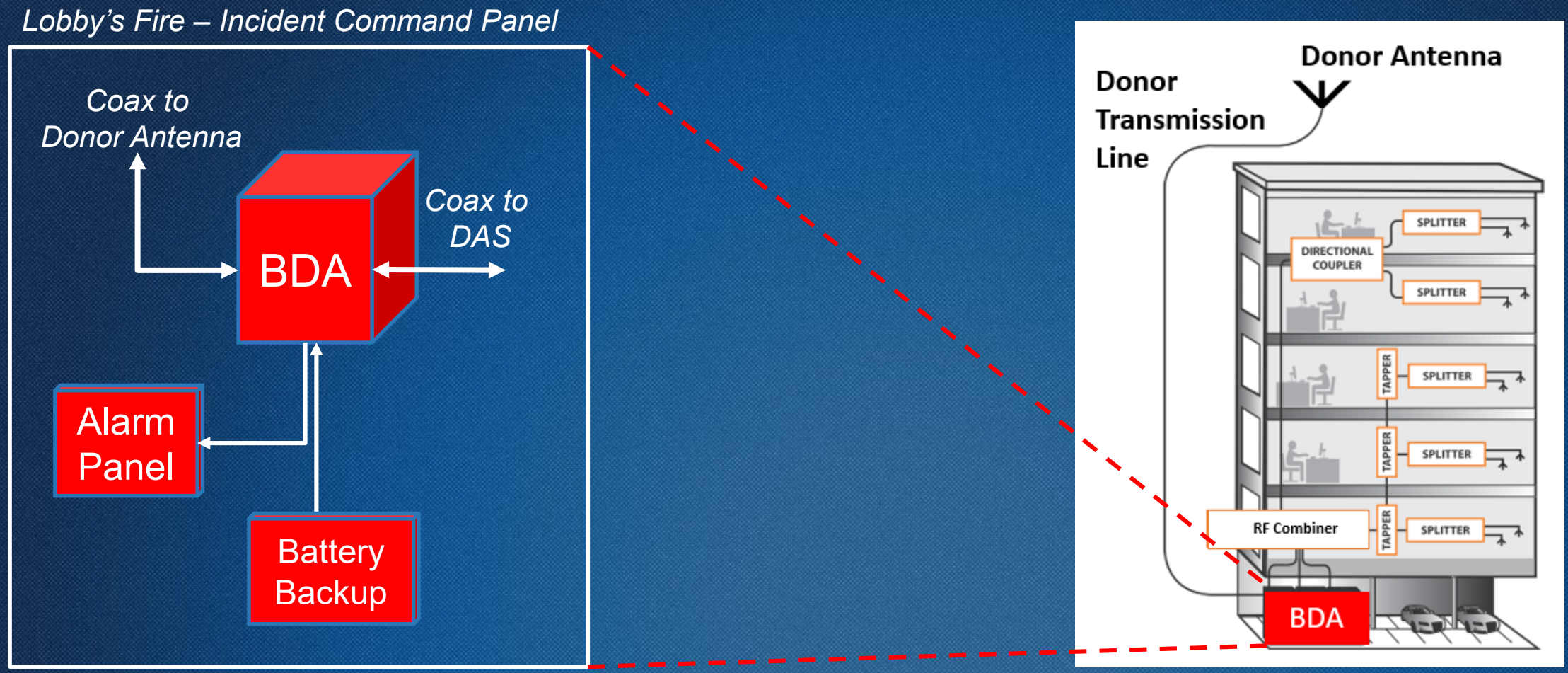
What's Going On Within Walls and Ceilings?



Wide Area Public Safety Network and ERRCS



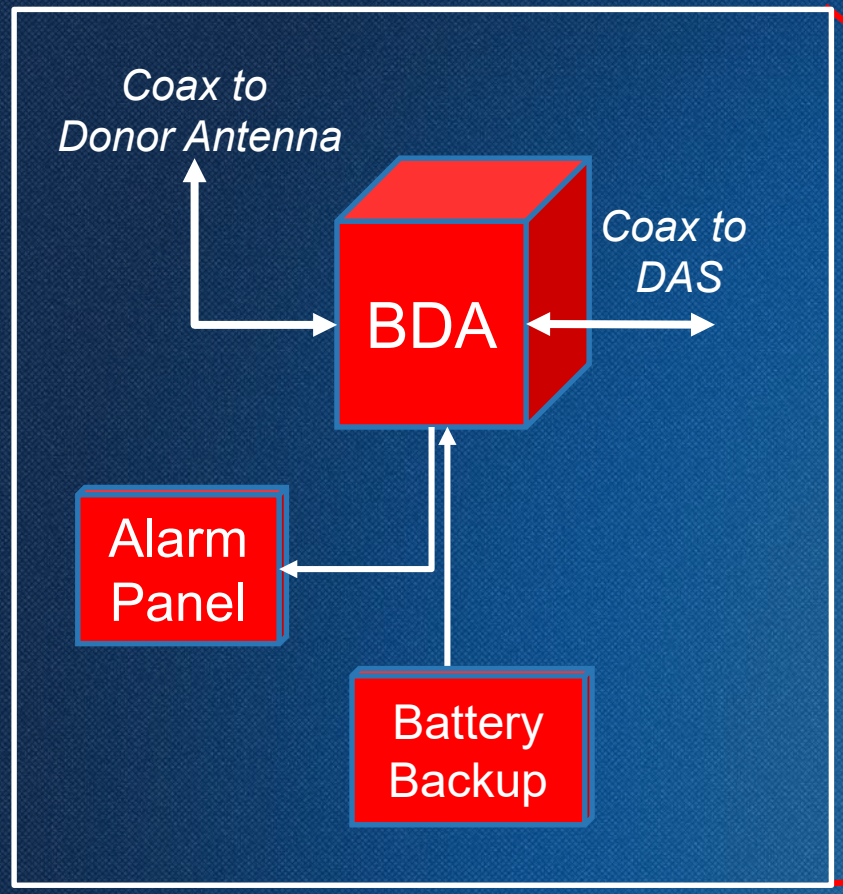
BDA Based ERRCS, Donor System, and DAS



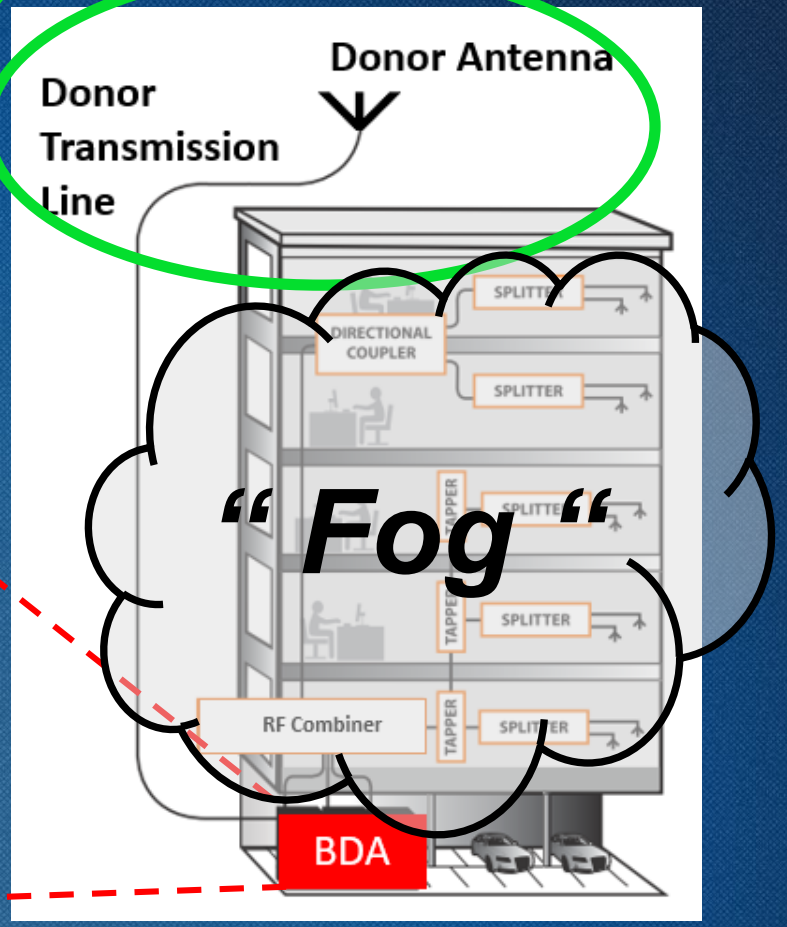
What about the Building's Passive DAS?

Donor Antenna & Donor Transmission Line must be Monitored per Today's ERRCS Codes

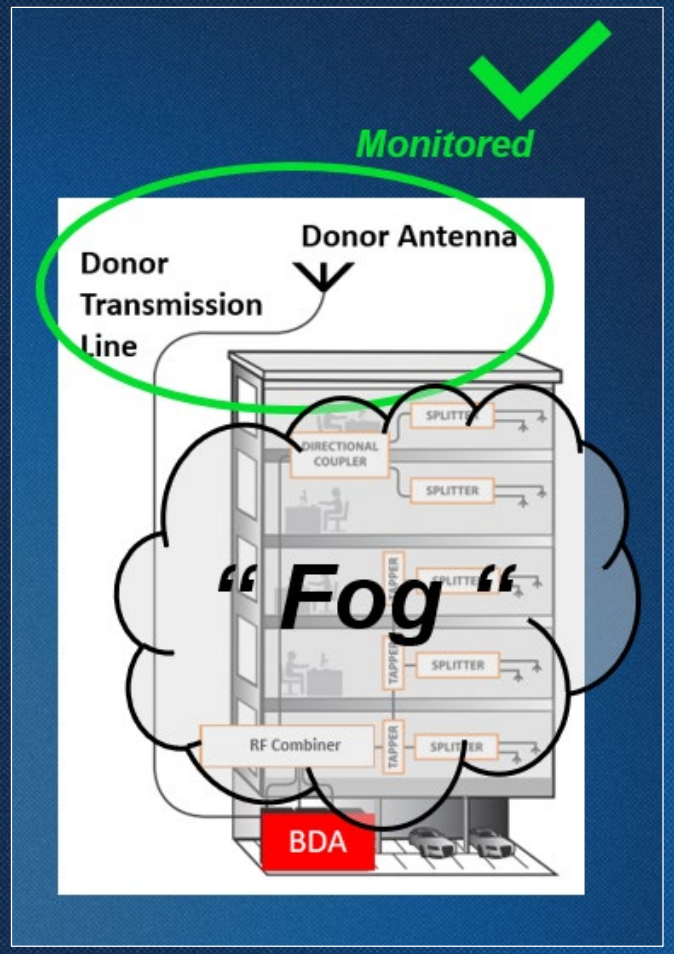
Lobby's Fire – Incident Command Panel



Monitored



What are you Missing, by NOT Monitoring your ERRCS Passive DAS?



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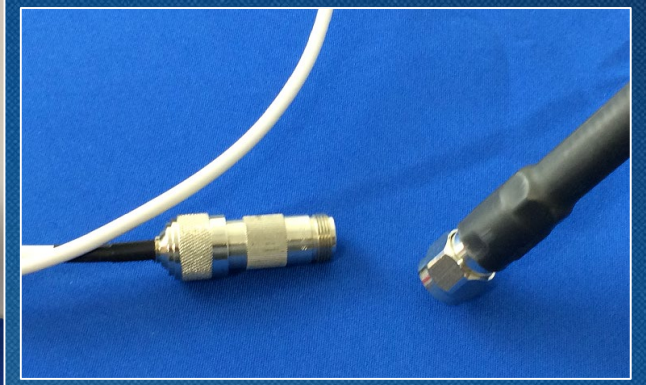
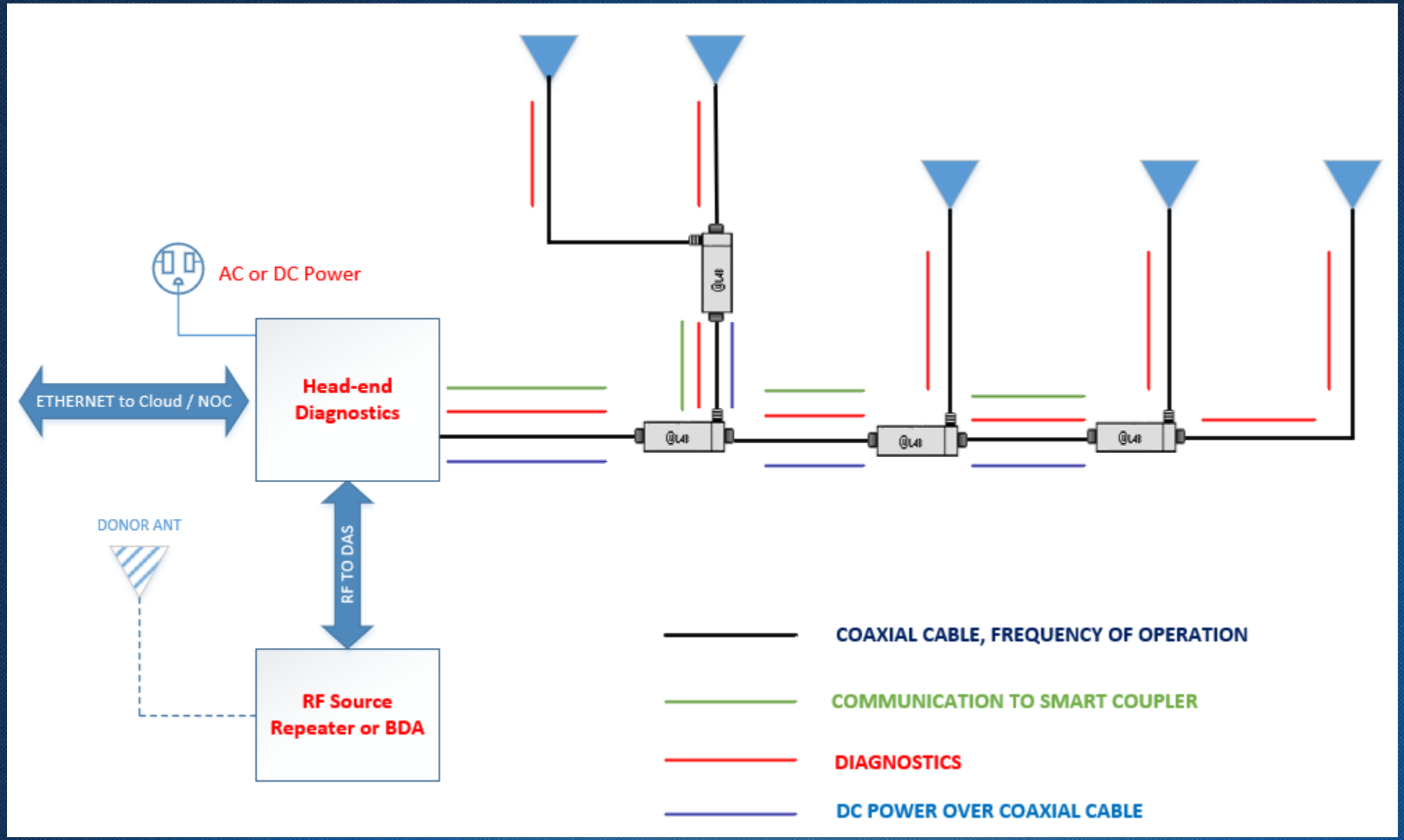


IoT Passive DAS Monitoring



Head-end Alarm Outputs

1. Terminal Block:
   - Connects to Fire Alarm Panel
   - No Failure, Remains in a Normally Closed State

2. RJ-45 Ethernet Port:
   - Network Interface Enabling TCP/IP Gateway Access
   - GUI Interface to View SMART Coupler Node Status
   - IoT Board's MAC Address Recorded to a Specific Location

3. TCP/IP with SNMP Traps Enables Communication:
   - System Integrator, Dispatch Center, NoC, AHJ, Building Owner

Make Passive Monitoring Smarter with IoT

Monitors DAS infrastructure health
antennas, coaxial cables, and passive components

Designed for Public Safety
VHF, UHF, TETRA, 700, 800, 900 MHz bands

FirstNet Band 14 Ready

Diagnostics, power, and communications provided over RF coaxial cable by the SMART Gateway

Alarms communicated via e-mail, SMS, and SNMP

SMART Gateway & SMART Coupler

Broadband 130-960 MHz passive coupler

Active, diagnostic smart technology

Provides remote real-time monitoring

Pinpoint failure location

Q and A

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