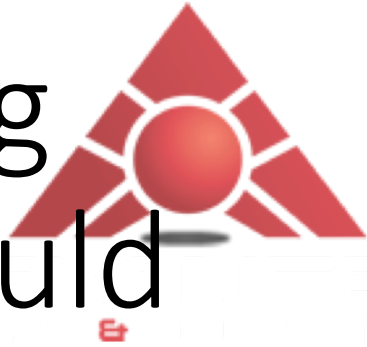


BDA and DAS: Life-Saving Systems Your Building Should Have



Clark A. Lazare
Vice President, BDA Division
Advanced Fire & Security, Inc.

Did you know?



- 150+ local municipalities now mandate public safety coverage
- ICC and NFPA codes mandate first responder coverage
- Indoor cellular/PCS service is required for E911 location
- 450, 700 and 800 MHz bands are allocated for fire and police
- According to CTIA, in 2012 400,000 E911 calls were made per day
- According to the FCC, 70 percent of E911 calls are made from wireless phones

Why Do I need a system?

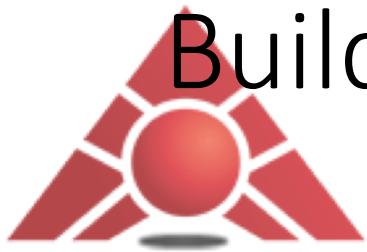


Providing reliable radio frequency signal in-building has become a building code requirement for most jurisdictions in Florida.

Emergency Responder and Public Safety DAS have grown in relevance since 9/11. The National Fire Association (NFPA) and the International Fire Code (IFC) have developed a standard for in-building systems that local Authority Having Jurisdictions (AHJ) are adopting and enforcing.

Many AHJs will not grant a Certificate of Occupancy without reliable and sufficient in-building radio signal.

General Guidelines for the Deployment of In-Building Radio Coverage Solutions



NFPA 1, National Fire Protection Association Fire Code

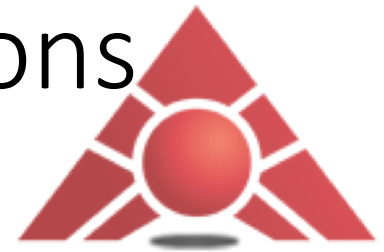


NFPA 70, National Fire Protection Code

NFPA 72, National Fire Alarm and Signaling Code (2010)

Motorola R-56, “Standards and Guidelines for Communication Sites”

TIA Bulletin TSB-88.1-C, Wireless Communications Systems Performance in Noise-Limited Situations, Part 1: Recommended Methods for Technology-Independent Performance Modeling



ANSI/TIA-222-G, Structural Standard for Antenna Supporting Structures and Antennas

IEEE STD 142 “Green Book”, “Recommended Practice for Grounding of Industrial and Commercial Power Systems”

ANSI/TIA/EIA-568-B, “Commercial Building Telecommunications Cabling Standard

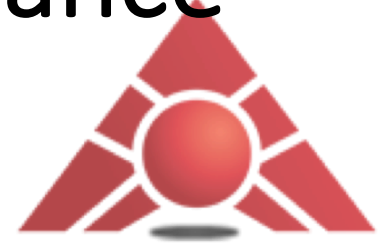
ANSI/TIA/EIA-569-B, “Commercial Building Standards for Telecommunications Pathways and Spaces”

What does Code require?



- 24.5.2.1.1 Non-Interference. No amplification system capable of operating on frequencies or causing interference on frequencies assigned to the jurisdiction by the FCC shall be installed without prior coordination and approval of the authority having jurisdiction. The building manager/owner shall suspend and correct other equipment installations that degrade the performance of the public safety radio system or public safety radio enhancement system.

Excerpts from Miami-Dade Ordinance



Signal levels shall be measured to ensure the system meets the criteria of NFPA 72: 24.5.2.3 according to parameters as follows:

- A minimum inbound of DAQ3 with signal strength of -95 dBm or greater shall be provided throughout the coverage area.
- A minimum outbound DAQ3 with signal strength of -95 dBm or greater shall be provided throughout the coverage area.
- Critical areas, such as the emergency command center(s), the fire pump room(s), exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by Miami Dade Fire Rescue, shall be provided with 99 percent floor area radio coverage.
- General building areas shall be provided with 90 percent floor area radio coverage.

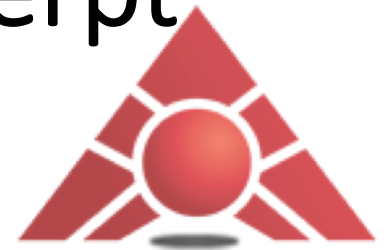
City of Miami Building Owner Responsibilities

Excerpt



- Keep record of the project documentation including but not limited to “As-built” documentation, 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
- • Have in place a service contract with a qualified Vendor for technical maintenance, repair (including all components of the system), operation and troubleshooting in the event of radio interference involving the in-building radio coverage solution
- • The Building Owner shall provide the contact information of the System Maintenance Vendor to the AHJ, so this entity can work directly with the Vendor in case of troubleshooting due to an interference event
- • Provide the AHJ with continuous access to the facility for purposes of testing of the Public Safety radio signal

Broward County Ordinance Excerpt



118.1.3

The AHJ shall determine if a new building or existing building shall require that a two-way radio communication enhanced public safety signal booster system be installed to comply with NFPA 1-11.10.1. The Building owner shall install a public safety signal booster to meet this requirement if so directed.

What is a BDA?

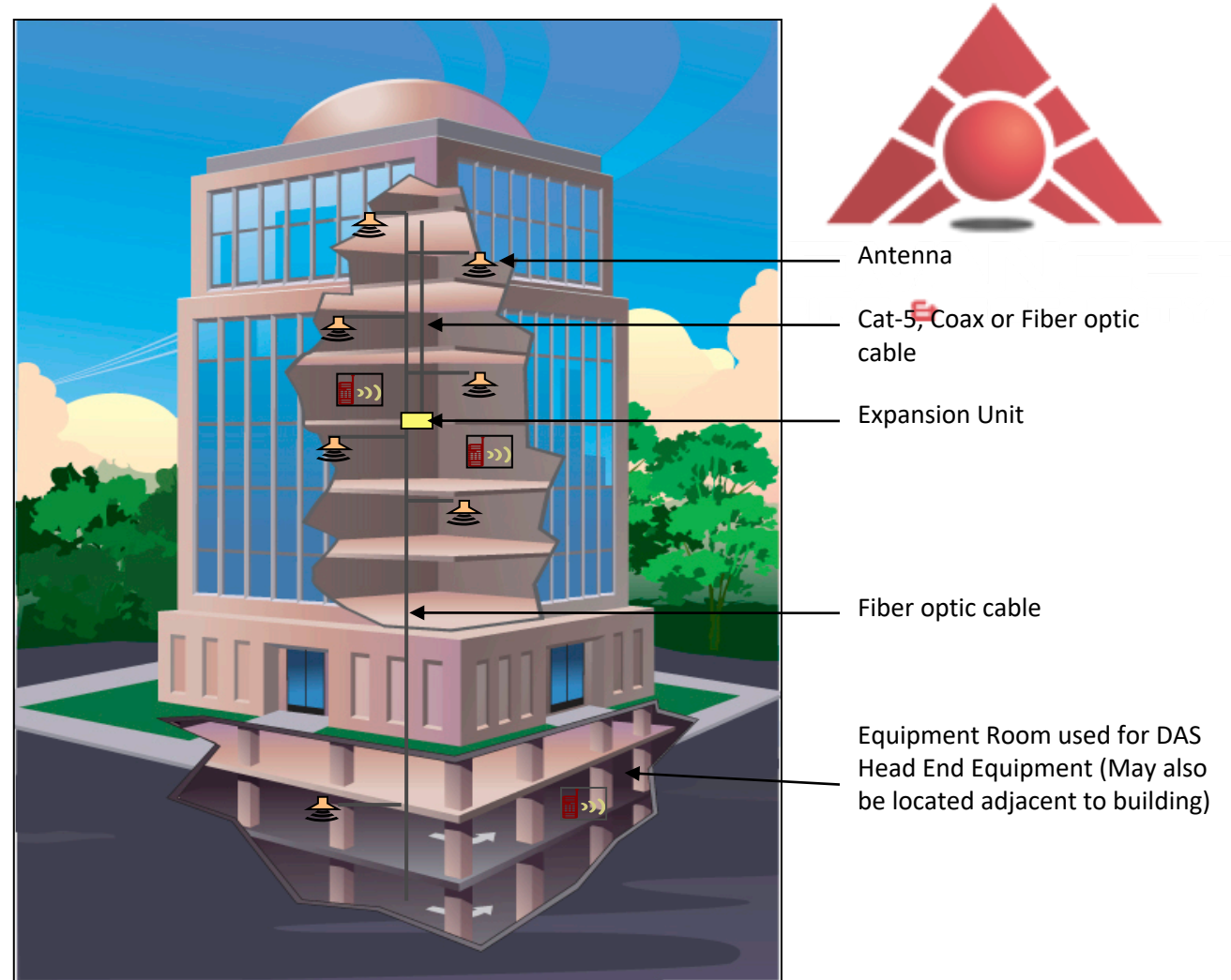


A BDA (Bi-Directional Amplifier) system is an in-building communication system that brings wireless signals into a structure from outside, amplifies those signals with a signal booster, and then evenly distributes the amplified signals throughout a structure via a Distributed Antenna System (DAS).



Public Safety Coverage Venue-wide

- A PS DAS is a network of antennas that are placed throughout the facility and are connected with cabling or fiber to a hub
- The hub allows for the outside PS RF donor signal to be distributed throughout the facility
- Remote units are placed on each floor and are connected to antennas which serve the floor
- AT&T will install the system and monitor it on a 24x7 basis



Advanced Fire's Venue-wide Public Safety Solution



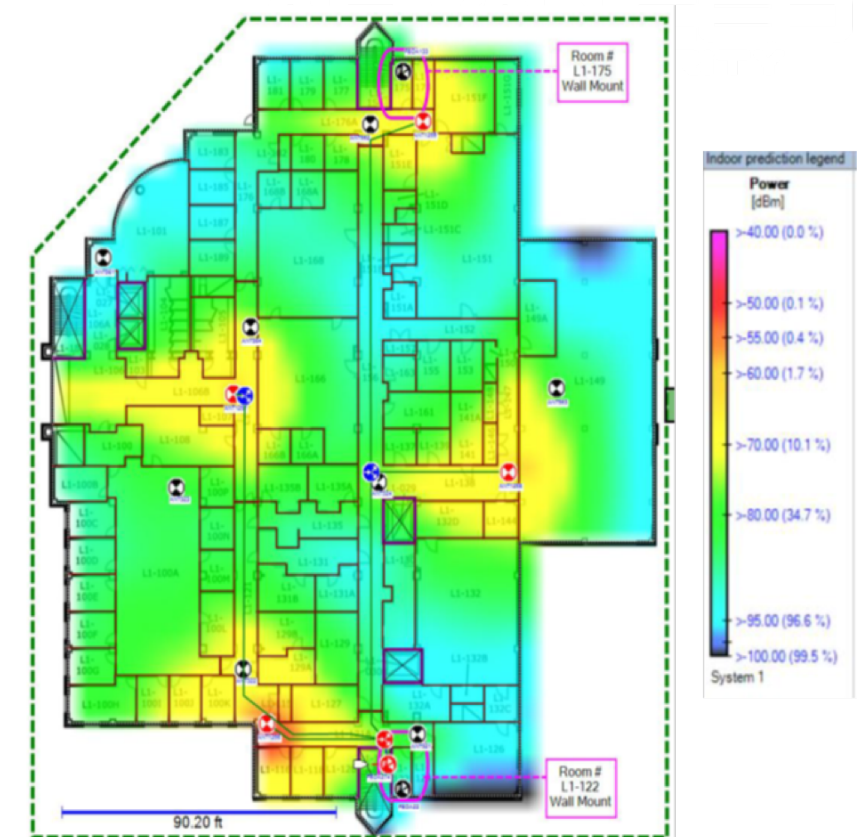
- Advanced Fire will use a Distributed Antenna System (DAS) that will enhance public safety coverage throughout the Venue even in hard to reach areas in stairwells, basements and underground parking garages
- The Public Safety DAS will provide increased coverage and reliability to meet local life safety (police and fire) needs



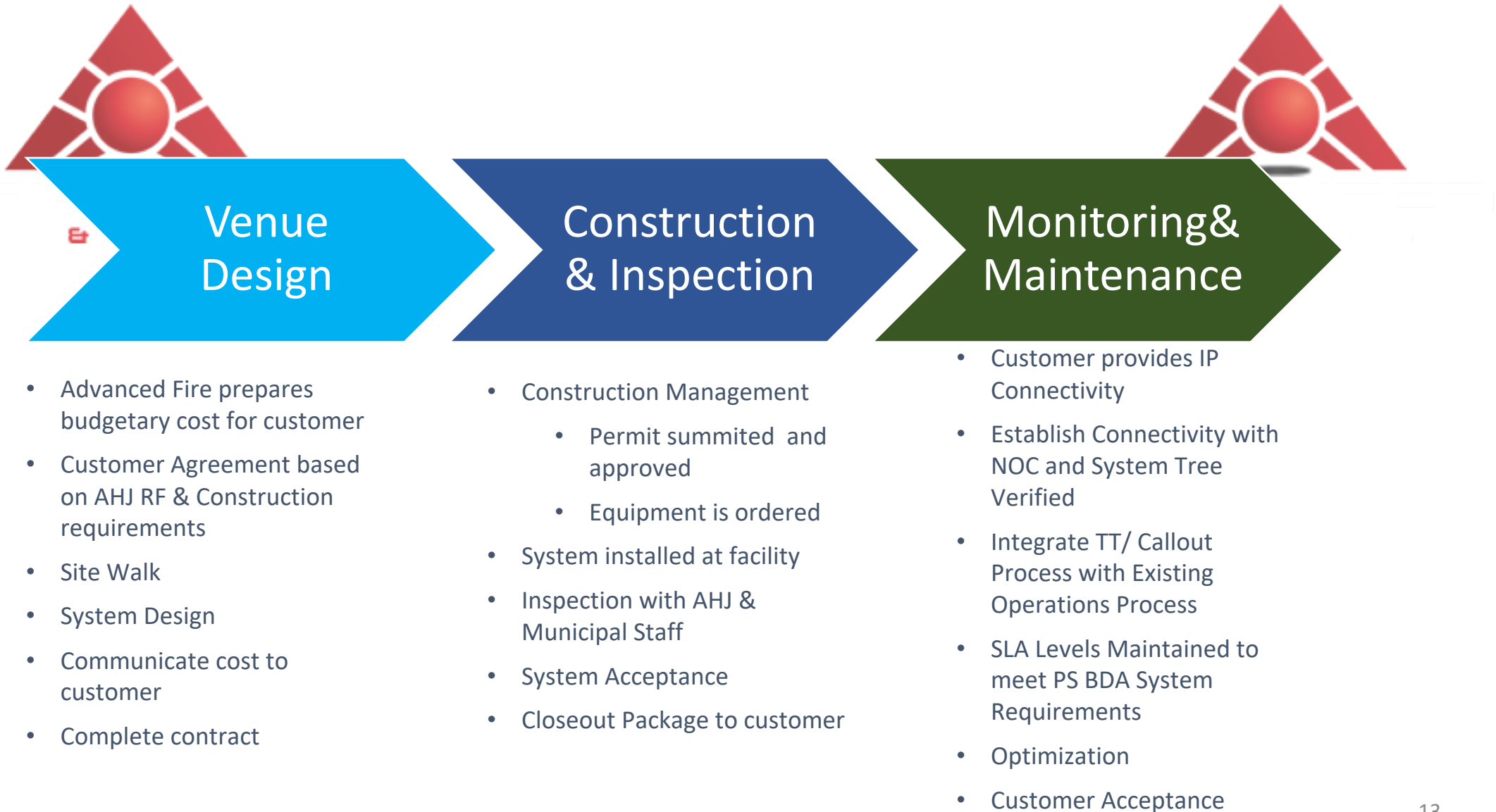
What is a Public Safety DAS?



- Distributed Antenna System is a network of amplifiers and antennas that provide public safety wireless service within a geographic area or structure
- Features
 - Dedicated and separate layer from commercial DAS
 - Custom designed to meet the needs and requirements of each customer
- Designed specifically for each facility
 - Coverage – To provide exceptional coverage, even in hard to reach areas in stairwells, basements and underground parking garages
 - Reliability – To ensure high quality and reliability, system offers wireless service that is dedicated to your visitors & staff
- Low profile, compact, scalable unobtrusive solution



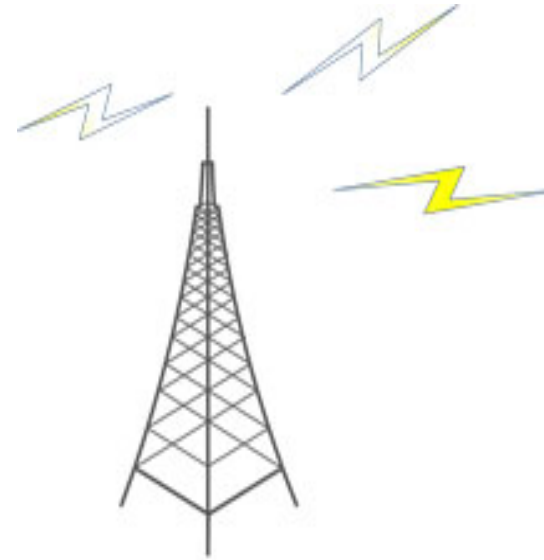
Process of Implementation



Distributed Antenna System types



- Cable-distributed
- Fiber-distributed
- Over-the-air Donors
- Microcell and On-Site Donors
- Community and Multi-Operator/Multi-Technology systems



Distributed
Antenna
System (DAS)



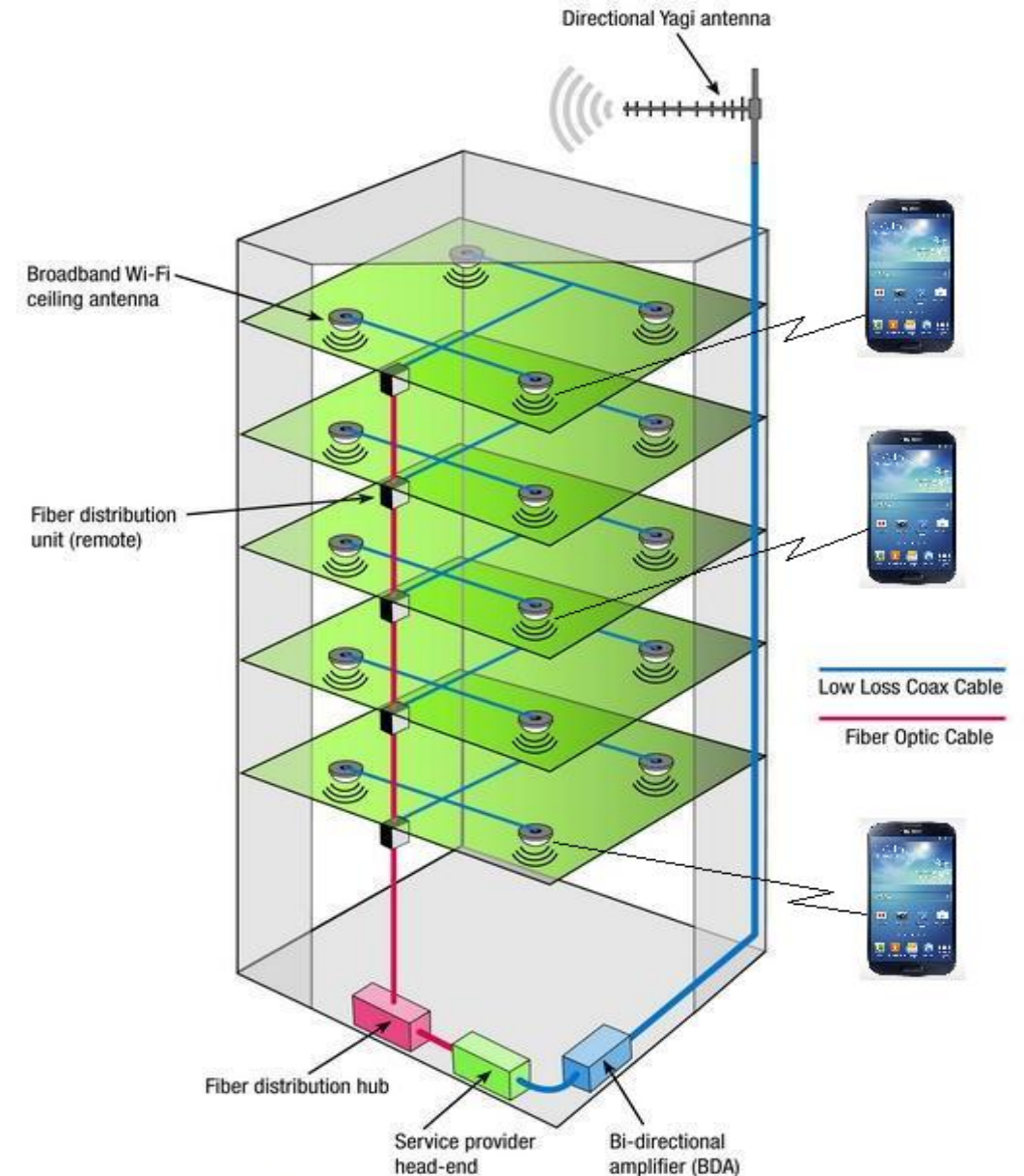
RF Propagation in DAS - Cellular



Donor antenna(s) aimed at towers
DAS Headend and Master Unit
Remote Radio Units, Coaxial
cables, Indoor antennas Optical
or Ethernet distribution

A hybrid DAS combines the ability of
an active DAS to cover very large
areas with some of the price
advantages of a passive system.

In-Building Distributed Antenna System



RF Propagation in Public Safety



- Extending in-building wireless (DAS) communications for public safety works substantially the same as a standard DAS for cellular service. The main difference is in how the donor signal is received from the public safety cell site.
- Rather than a base station transceiver (BTS) installed in the head-end equipment room, an antenna is installed at the building rooftop to receive the donor signal from the public safety cell site.
- The RF signal is sent to a bi-directional amplifier, and on to the head-end equipment which converts the RF signals to digital pulse signals. Digital signals are sent via fiber cabling to fiber remotes and antennas located through the building. Multiple cellular and public safety technologies can be supported on a single DAS.

Link Budgets



- A **link budget** is accounting of all of the gains and losses from the transmitter, through the medium (free space, cable, waveguide, fiber, etc.) to the receiver in a DAS system. It accounts for the attenuation of the transmitted signal due to propagation, as well as the antenna gains, cable lines and miscellaneous losses.
- A simple link budget equation looks like this:
$$\text{Received Power (dB)} = \text{Transmitted Power (dB)} + \text{Gains (dB)} - \text{Losses (dB)}$$



Q&A