



Designing life saving buildings starts with proper planning for a public safety DAS

Presenter: Daryl Boffman, M.C. Dean, Inc.



Radio challenges from 9/11

Communications lost between emergency services personnel and command and control due to:

- Lack of public safety RF penetration through building materials
- Police, fire ambulatory services on different networks and frequency bands
- Handheld radio devices with different protocols
- Out-of-state emergency services teams on different networks and frequencies
- Public safety phones located in the buildings were immobile
- Communication equipment was not protected from fire, water, and heat



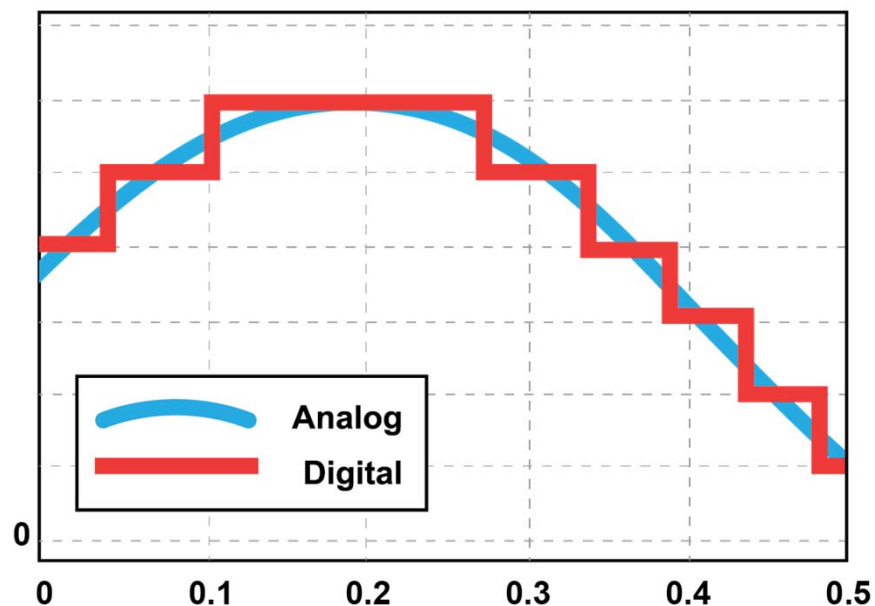
New public safety codes, regulations, & rules

- IFC 510
- National Electric Code Articles 770 and 800
- NFPA 72
- NFPA 1221
- Local State Uniform Fire Prevention and Building Codes
- Local AHJ
- Public Safety DAS Equipment OEMs



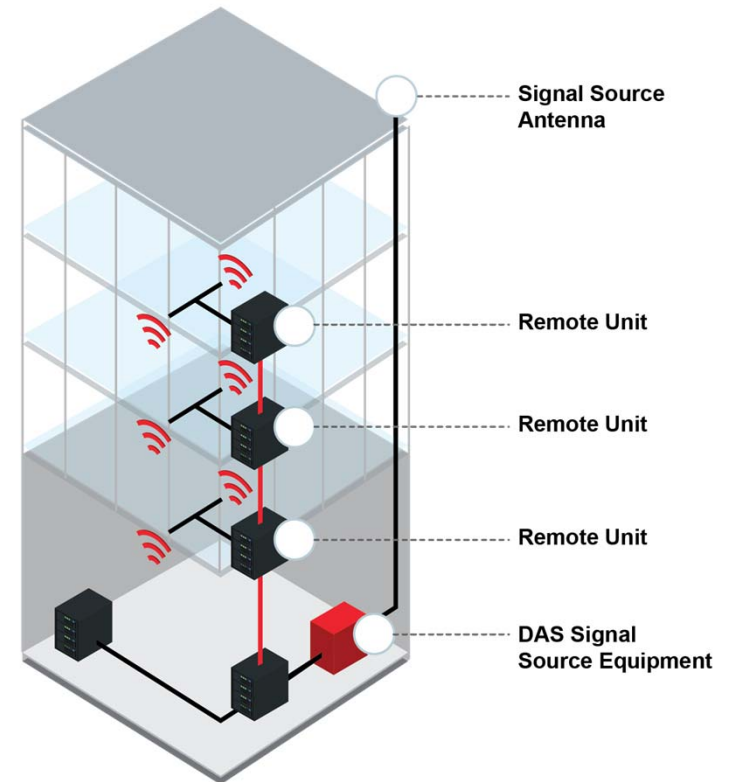
Types of public safety DAS infrastructures

- Analog
- Digital
- Passive DAS
- Active DAS
 - **Passive vs. Active**
 - ✓ *Passive DAS are less expensive*
 - ✓ *Passive DAS are easier to design and install*
 - ✓ *Passive DAS have fewer points of failure*
 - ✓ *Active DAS can provide better coverage for large deployments*
 - ✓ *Active DAS provide better management and monitoring capabilities and features*
 - ✓ *Active DAS are better if combining with cellular DAS solutions*

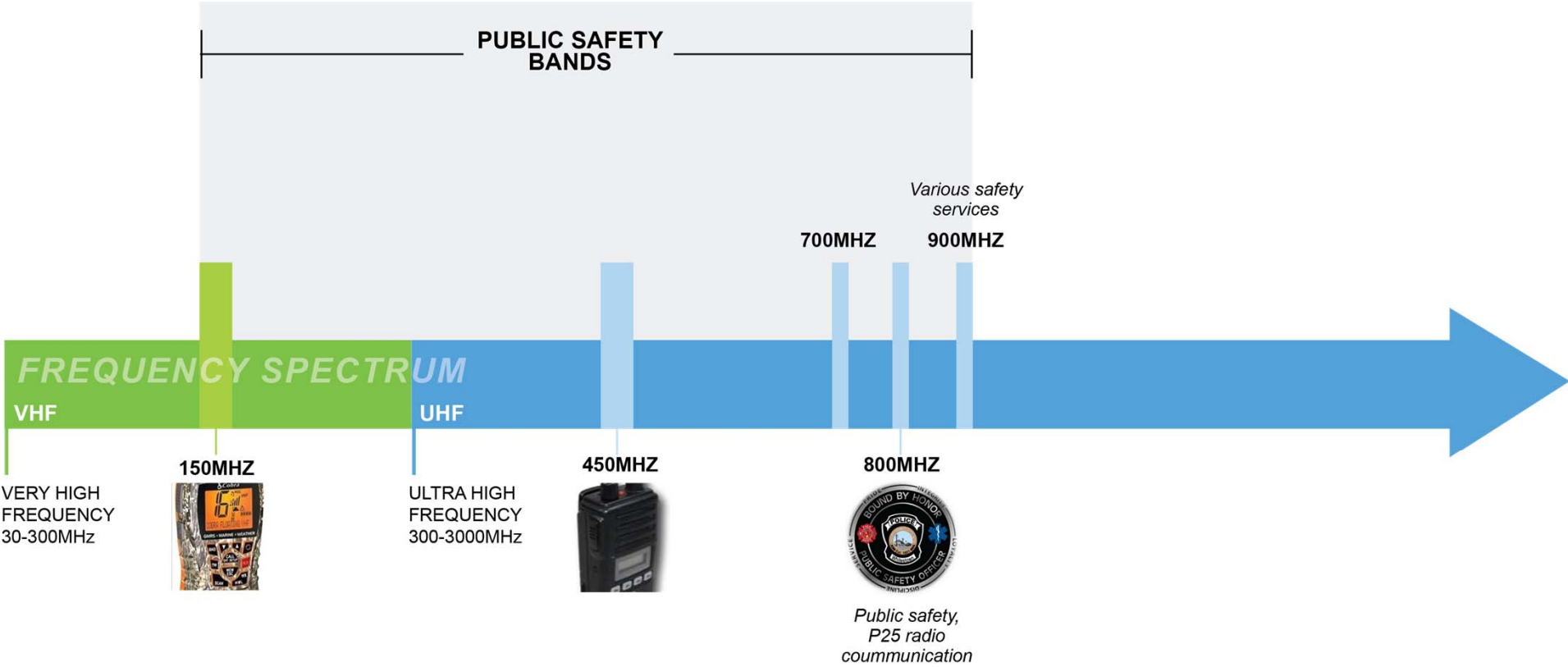


Major public safety DAS components

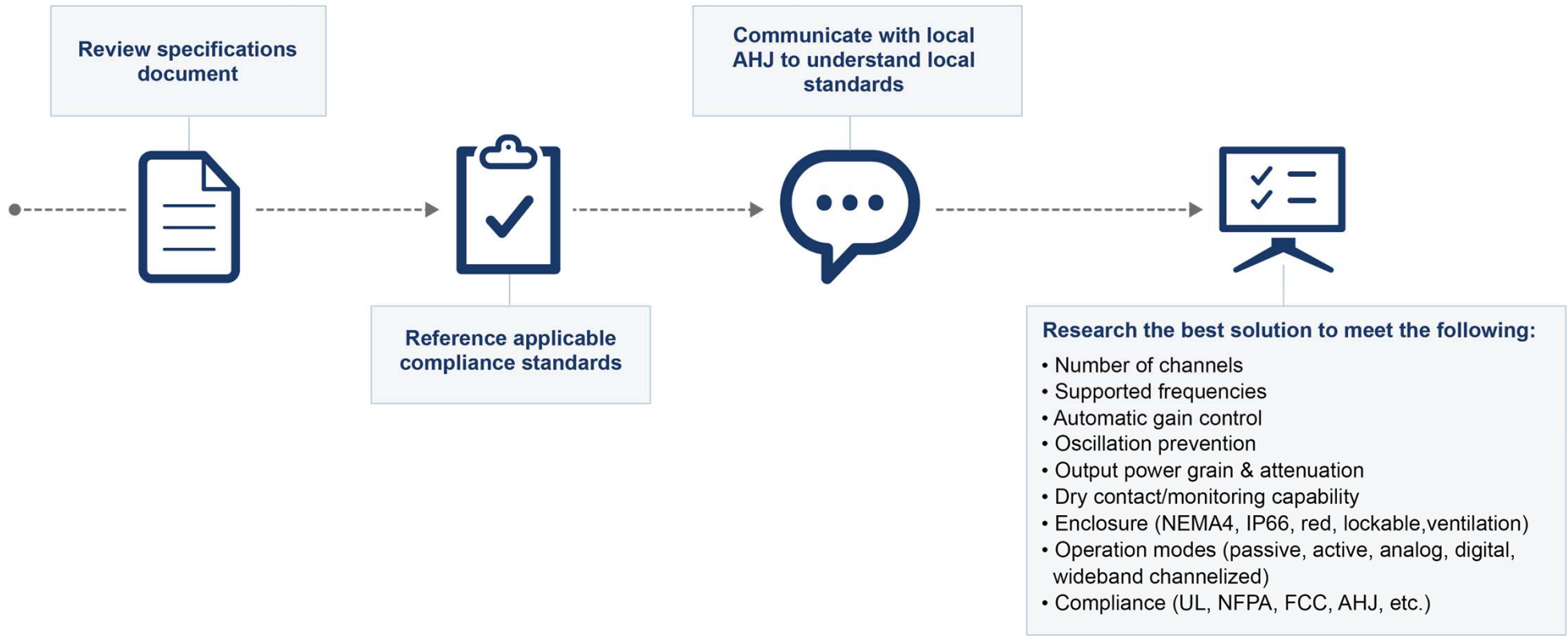
- Coaxial cabling infrastructure
- Fiber optic cabling infrastructure
- Bi-directional amplifier (BDA) class A or class B
- Signal source antennas
- Head-end base interface unit
- Remote amplification units
- Network management system
- Uninterrupted power supplies (UPS)/battery back-up units (BBU)
- Service antennas (omni/panel)
- Fire alarm monitoring panels
- Fire alarm annunciator panel



Commonly supported public safety frequencies

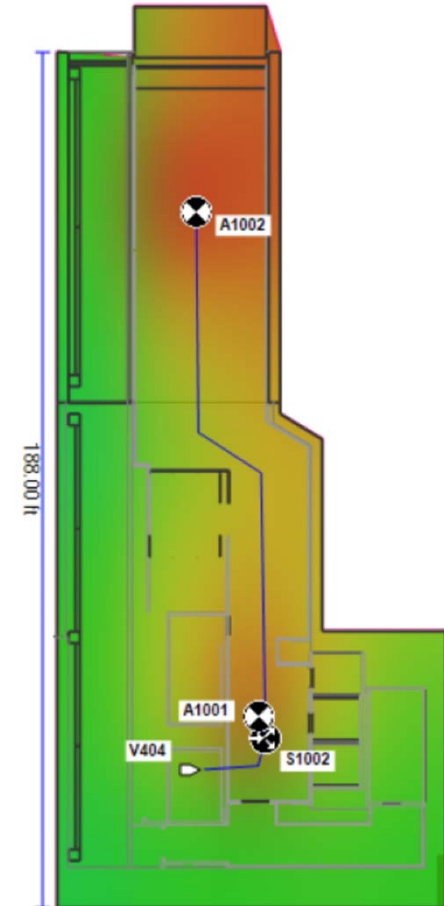


Important DAS pre-deployment processes



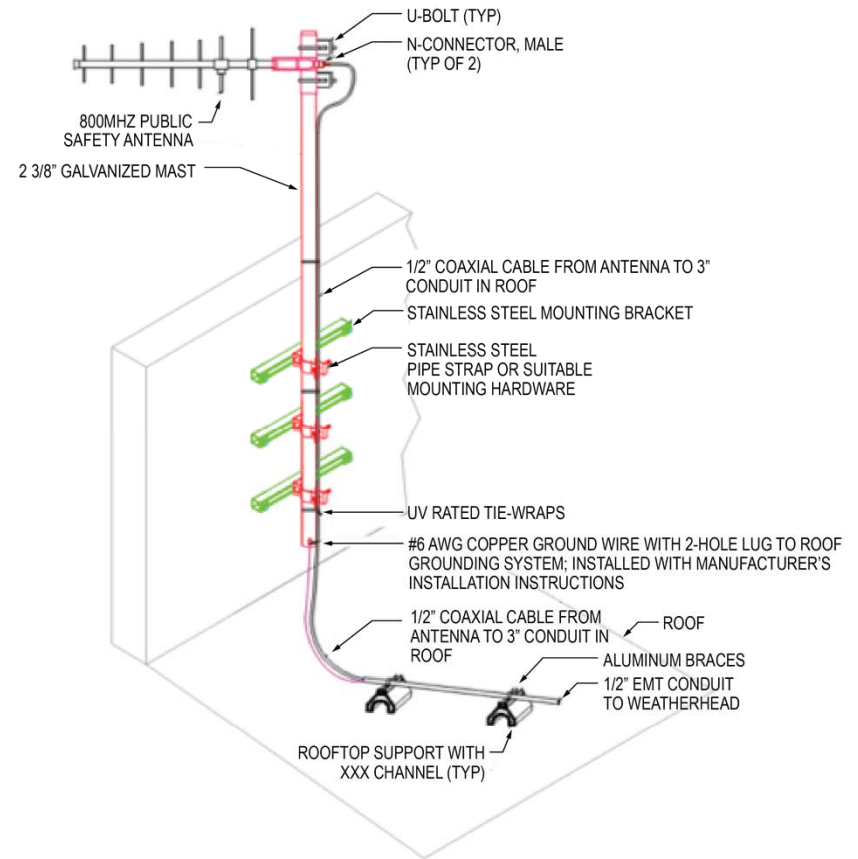
Proper public safety DAS design

- Certified DAS designer
- Trained/certified engineering team
- Review updated NFPA 72/1221 and local requirements
- Ensure converged DAS solution is acceptable by local AHJ
- Submit DAS design to the OEM for review and approval
- Submit converged solution design to WSPs for review and acceptance
- Submit design to local AHJ for review and approval
- Import RF based design into AutoCAD for proper floor plan development



Signal source antenna mounting requirements

- Non-penetrating roof mount with mats and weights
- Roof penetration
- Mounting to existing structure
- Wind load calculations
- Antenna separation
- Grounding
- Lightning protection
- Weather proofing
- Conduit support
- Weather head installation



Coaxial and fiber cabling and service antennas

- Conduit size and installation
- Pull box sizing and installation spacing
- Coaxial cables (plenum, foam; ½” or larger; black, white, blue, red)
- Cable connector (male, female, N-Type, 4.3-10, SMA, QMA, PIM)
- Coaxial cable testing (D-to-F, return loss, insertion loss, PIM)
- Fiber cable type (riser, armored, single-mode, multi-mode, single strand, multi-strand, ribbon, hybrid fiber)
- Fiber connectors (SC-APC, LC-APC, LC UPC)
- Fiber termination (fusion splice, UniCam, pre-terminated, housing)
- Fiber cable testing (OTDR loss testing, power meter)
- Antenna mounting options (drop ceiling tile, hard pan, wall, unistrut, enclosures, specialized mounting and housing)
- Labeling (wrap around, local fire department required labeling)



Preparation of head-end and remote closets

- Fire rating for closets (no rating, 2-hour, 4-hour)
- Ample rack and wall space
- Ample power, outlets (available circuits in the electrical panel)
- Availability of emergency back-up power
- Space for BBUs and UPS (NEMA2 or NEMA4 requirements)
- Grounding of equipment and racks (available busbars, wire gauge)
- HVAC requirements for DAS active components (Tonnage)
- Conduit size and pathway access (head-end to roof, head-end to IDF)
- Fire alarm system integration (remote monitoring panel, annunciator panel)



Equipment installation, testing, & commissioning

- Per manufacturers' specifications
- Rack sizing
- Equipment grounding
- Equipment labeling
- Benchmark testing
- Grid walk testing
- DAQ testing
- Constant wave testing
- Commissioning
- System optimization
- Dry contact alarming and testing
- As-build documentation



Questions?

Daryl Boffman

M.C. Dean

Director for Wireless Systems

Contact Phone: 301-639-7453

Contact e-mail: daryl.boffman@mcdean.com

