AFAA-NE and SFPE-NE are professional associations and societies formed to specifically represent the fire alarm industry and fire protection engineering.

Two-Way Radio Communications Enhancement Systems

Emergency Responder Radio Coverage
Meeting Overview

- John Houlihan
  - Member AFAA-NE Board of Directors
  - Brief Code History
  - Current Code Requirements
- Chief Gary McCarraher
- Joe Brooks Radio Supervisor BFD
- Admir Surkovic, Radio Engineer, CEO RSI
- Question & Answer
- Depart Enlightened and Informed!
1997

780 CMR
- 780 CMR 6th Edition
- Introduced February 1997
  - Based on BOCA 1993
- Section 403.6 Fire department communication system
  - Hardwired Telephone handset two-way system
  - Exception: Fire Department Radio Systems

NFPA 72
- NFPA-72 1996 with Base Code
- Updated to NFPA-72 2002 in July 2003
- Neither Edition of the NFAC addressed Fire Department Radios
780 CMR

- 780 CMR 7th Edition
- Introduced January 2007
- Based on the 2003 IBC
- Section 907.2.12.3 addressed Fire Department Communication System
  - Hardwired Telephone handset two-way system
  - Exception: Fire Department Radio Systems

NFPA 72

- NFPA-72 2007 was adopted by Reference
- Section 6.10.2 is NEW section for Two-Way In-Building Radio Communications Enhancement Systems
- Provided guidance to radio systems installed under 907.2.12.3 Exception
780 CMR
- 780 CMR 8th Edition
- Introduced August 2010
- Based on the 2009 IBC
- New Section 915
- Emergency Responder Radio Coverage
  - Now Required to improve radio signal strength into and out of building if necessary

NFPA 72
- NFPA-72 2010 was adopted by Reference
- Two-Way In-building Communications relocated to ECS Chpt 24
- Further defined technical coverage and signal strength levels
- Added requirements for pathway survivability
780 CMR

• Updated in April 2014
• Emergency Responder Radio Coverage section
  – Removed technical benchmarks from text of code, points to NFPA-72 2010 edition for technical design and compliance

NFPA 72

• Moved Fire Alarm system supervision from Annex to body of code
• Included list of critical areas for signal strength that mimicked the previous Building Code
• Added plans and permits to text of code
915 Emergency Responder Radio Coverage

- 915.1
  - Coverage SHALL be provided in all new buildings

- 915.2
  - All buildings shall have approved coverage, based on the existing levels of coverage at the exterior of the building
  - Does not apply to existing buildings
  - EX1 – wired communication system if approved
  - EX2 – if determined by AHJ coverage is not needed

- 915.3
  - Designed and installed per NFPA-72

- **24.5.2.1 General.**
  - Two-Way Radios have become prevalent communication system in the fire service

- **24.5.2.1.1 Non-Interference.**
  - Amplification equipment can not interfere with the Public Safety radio system – must be approved by AHJ

- **24.5.2.1.2 Approval and Permit.**
  - Plans must be submitted before approval is given

- **24.5.2.2 Radio Coverage.**
- **24.5.2.2.1 Critical Areas.**
  - Command Center, Fire Pump Rm, Exit Stairs, Exit passageway, Elevator Lobbies, standpipe cabinets, sprinkler sectional valves, other areas req. by AHJ **99% coverage**
- **24.5.2.2.2 General Building Areas.**
  - All areas shall have **90% coverage**

- 24.5.2.2.3 Amplification Components.
  - If 90% general area & 99% Critical areas can not be met,
    - certified signal booster &
    - distributed antenna system (DAS) must be installed
  - to achieve required adequate radio coverage
24.5.2.3 Signal Strength

- **24.5.2.3.1 Inbound.**
  - Min of -95dBm

- **24.5.2.3.2 Outbound.**
  - Min of -95dBm

- **24.5.2.3.3 Isolation.**
  - Minimum of 15dB isolation between the donor antenna and signal booster gain
24.5.2.4* System Radio Frequencies

- **24.5.2.4.1 List of Assigned Frequencies.**
  - System must be capable of all frequencies assigned by AHJ
  - AHJ must maintain list of all inbound/outbound frequencies required for signal booster in jurisdiction

- **24.5.2.4.2* Frequency Changes.**
  - Allow for upgrades to allow for changes and additions to system
24.5.2.5 System Components.

- **24.5.2.5.1 Component Approval.**
  - Signal Boosters, Cables, antennas, shall be approved and compatible with public safety radio system

- **24.5.2.5.2 Component Enclosures.**
  - Signal Booster shall be in NEMA 4 or NEMA 4X cabinet

- **24.5.2.5.3 External Filters.**
  - External filters are not permitted

- **24.5.2.5.4 Signal Booster Components**
  - MUST be FCC certified, and capable of simultaneous Digital & Analog communication
24.5.2.6 System Monitoring.

- 24.5.2.6.1 Fire Alarm System.
  - Antenna Malfunction
  - Signal booster failure
  - Power supply signals
    - Loss of AC power
    - Failure of battery charger
    - Low battery capacity @ 70%
24.5.2.6 System Monitoring.

- 24.5.2.6.2* Dedicated Panel.
  - Located in the Command Center
  - Normal AC power
  - Signal Booster Trouble
  - Loss normal AC power
  - Failure for battery charger
  - Low battery capacity
24.5.2.7 Technical Criteria.
- AHJ will maintain and provide
  - Required Frequencies
  - Location of Radio Sites
  - Maximum Propagation delays
  - Specifically approved components
  - Supporting technical information to design system

24.5.2.8 Inspection and Testing.
- Test and inspection in accordance with Chapter 14
  - Section 14.4.12
  - All testing shall be done Annually
  - Record of Completion Form Section 11
  - ITM Form Section 3 & 7.6
24.3.5 Pathway Survivability.

24.3.5.1 Pathway survivability levels shall be as described in Section 12.4.

24.3.5.8.1

- When TWRCES are used in lieu of a two-way in-building wired emergency communications system, it shall have a pathway survivability of Level 2 or Level 3.

24.3.5.8.2

- When TWRCES are used in lieu of a two-way in-building wired emergency communications system, the design of the system shall be approved by the AHJ.
NFPA-70 2014 Article 820

Article 820 Community Antenna Television and Radio Distribution Systems

- Similar to other cable Articles
  - Remove abandoned cables
  - Installed in neat and workman like manner
  - Accumulation of cable shall not prevent opening of panels of suspended ceiling

- Cables need Grounding and Bonding
  - Manufactures/Designers will recommend proper methods
  - No Smaller than 14AWG or Larger than 6AWG

- Cables permitted in Conduit
  - If recommended by design
  - Conduit fill tables do not apply
Article 820 Community Antenna Television and Radio Distribution Systems

- Cables support
  - Cables shall not be supported by raceways

- Cable – plenum is typically used
  - Plenum Cable
  - Riser Cable
  - General Cable
  - Limited use
Technical Resources

- www.mass.gov/bbrs
  - Unofficial copy of the building code amendments to IBC 2009, updates on the 9th Edition 780 CMR

- www.sec.state.ma.us
  - Massachusetts Secretary of State Book Store

- www.nfpa.org/72
  - Fire Alarm Code

- www.iccsafe.org
  - International Code Council IBC, IFC
Closing

Thank You

Presented by:

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