Town of Lincoln
Fire and Police Departments

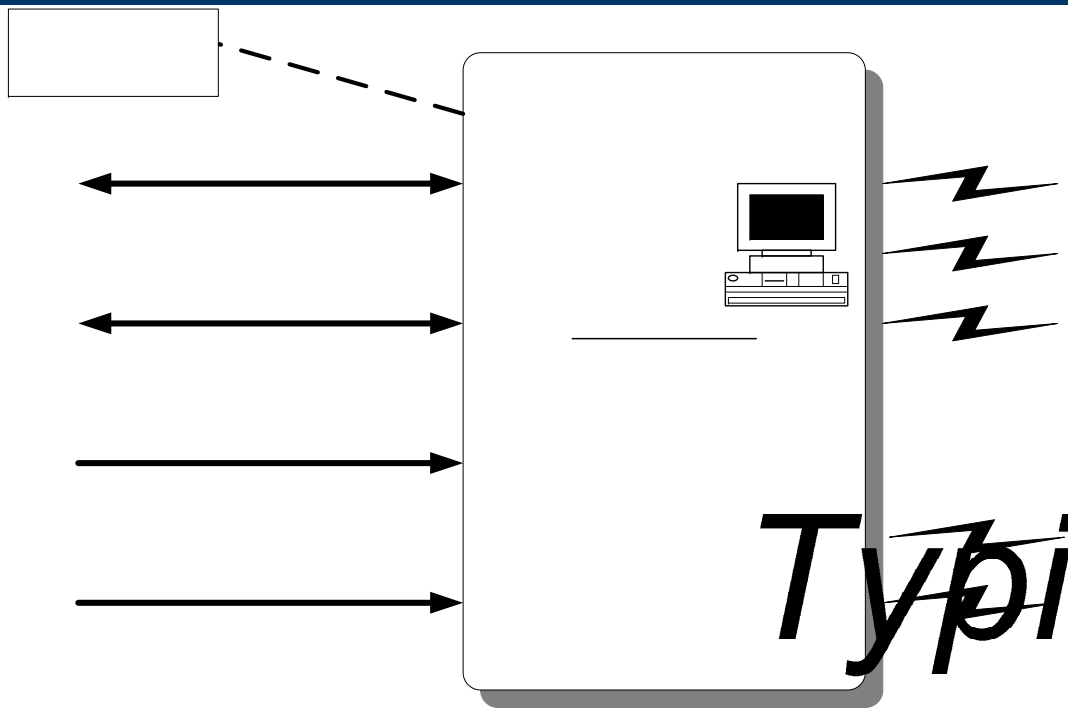
Radio System
Evaluation and
Recommendations

Langone & Associates' Tasks

- Review System Problems Regarding
  - Connectivity from the Reservoir radio site to the Communications Center
  - Radio coverage performance
- Investigate Feasibility of a New Main Radio Site in Waltham (Bear Hill Road & Main Street)

Public Safety Emergency Response Network
"An Overview"

- The Public Safety Emergency Response Network Requires the High Reliability of Many Components
- The Following Slide Illustrates the Many Components of the Network and the Importance that all Components Operate Properly
  - *Inputs >>> Facility >>> Outputs*
- This Study Focused on the FD & PD Radio System Component (Output)



Typical Pub

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Current System Configuration

- Main Communications Center at FD/PD Station
  - Two Position Radio Console (1999) – Motorola CommandPlus with control of frequencies for
    - Lincoln FD
    - Lincoln PD
    - Fire District 14 UHF & VHF-LB
    - Lincoln DPW
    - Four Surrounding PD
    - Regional Police - Bapern West District
    - Regional Police – Bapern 2, 3 & 4
  - Town owned copper cable to Reservoir radio site

Current System Configuration
(cont'd)

- Additional Equipment at FD/PD Station
  - FD Comparator (Spectra-TAC 1975)
  - PD Comparator (Spectra-Tac 1999)
  - FD Standby Repeater/Local Receiver (Quantar)
  - PD Standby Repeater/Local Receiver (MSR2000)
  - Control Stations for Regional Fire and Police (GM300 & Astro Consolette)

Current System Configuration
(cont'd)

- Reservoir Radio Site
  - FD Main Repeater (Quantar)
  - PD Main Repeater (Quantar)
  - DPW Main Repeater
  - Telephone Pole (40') as Antenna Structure
  - Equipment Shelter
  - Standby Generator
- Receive Only Site - 55 Old Bedford Road
  - FD Receiver (Astro-TAC)
  - PD Receiver (Astro-Tac)
  - Shared Antenna

Current System Configuration
(cont'd)

- FD Radio Units
  - Motorola XTS 2500 (2006) & HT 1000 Portables
  - Motorola XTL 5000 Mobiles (2006)
- PD Radio Units
  - Motorola XTS 2500 Portables (2006)
  - Motorola Astro Spectra Mobiles (2002)

Additional Tasks

- Reviewed feasibility of developing a new radio site adjacent to Bear Hill Road & Rt 117 in Waltham
  - Site is not optimum due to its location outside of Lincoln
  - Proposed site location would require access rights from abutters
  - Excessive cost to develop this site due to access and rock ledge
- Perform System Evaluation and Optimization
  - CyberComm (new service provider) just completed audit the system
  - Checked all fixed equipment
  - Checked all portables and mobiles

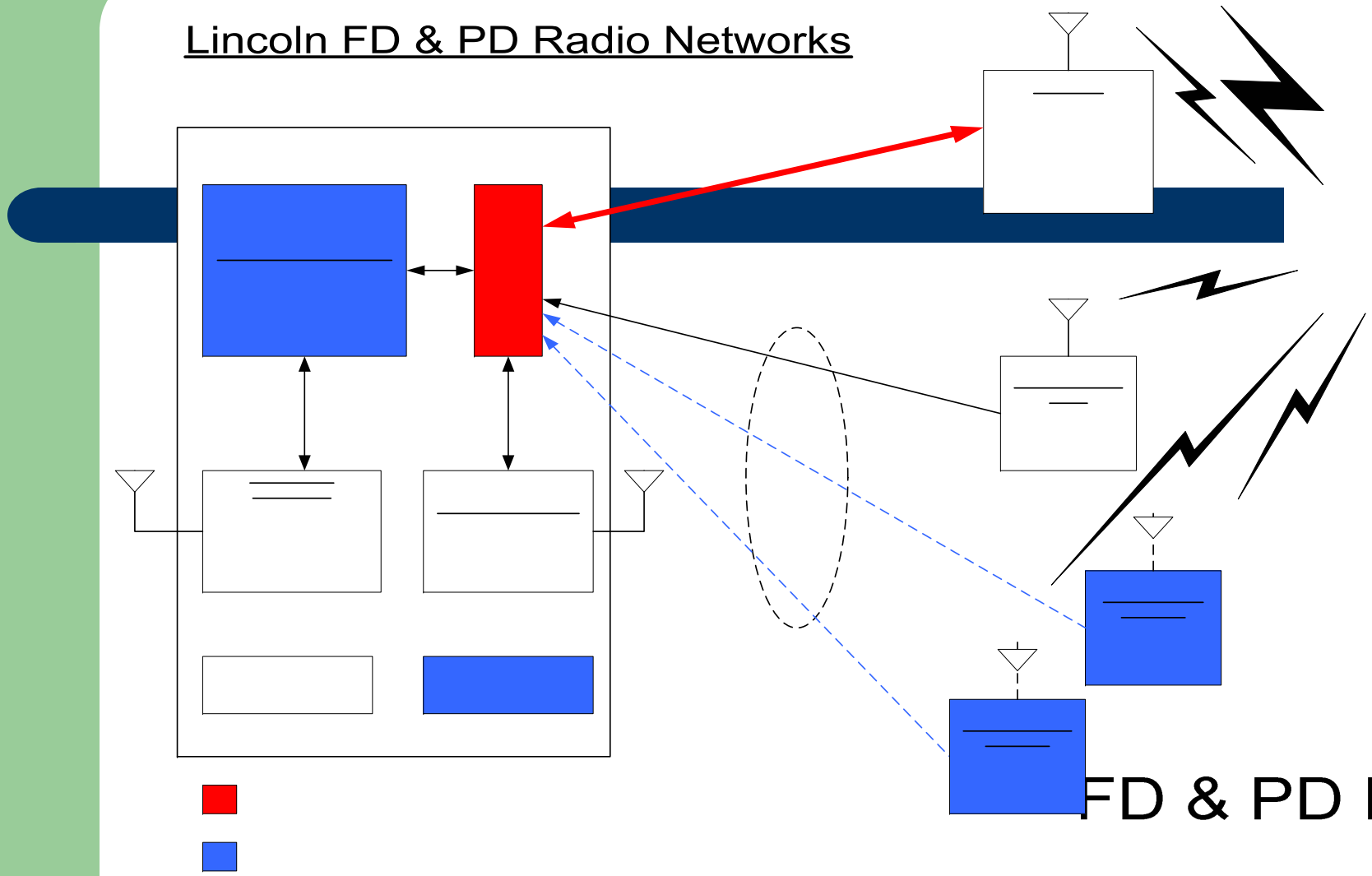
Findings

- Copper Cable from Communications Center to the Reservoir Radio Site is Unreliable Due to Water Contamination – should be replaced as soon as possible.
- Tower is not at optimum height for efficient propagation of radio signals
  - Tower should be replaced and raised as soon as possible so that antennas whips are above the trees
  - Investigate the use of downtilt antennas for improved coverage within the Town
  - Site ground and surge protection should be improved
  - Site has new standby generator and automatic transfer switch
  - No interference reported at the site
- FD & PD Voting Comparators have been very unreliable – should be replaced as soon as possible.

Findings
(Cont'd)

- Recent Increase in Service Calls Due to System Failures
  - Cable From the Communications Center to the Reservoir has intermittent failures due to water and corrosion
  - FD & PD Comparators have had an increase in failures
- Town recently changed radio system service providers for improved maintenance
- Following three slides illustrate
  - Existing FD and PD system with components identified by recommended time frame for replacement/upgrade
  - Existing Reservoir telephone pole antenna structure for FD & PD
  - Difference between antennas with and without downtilt

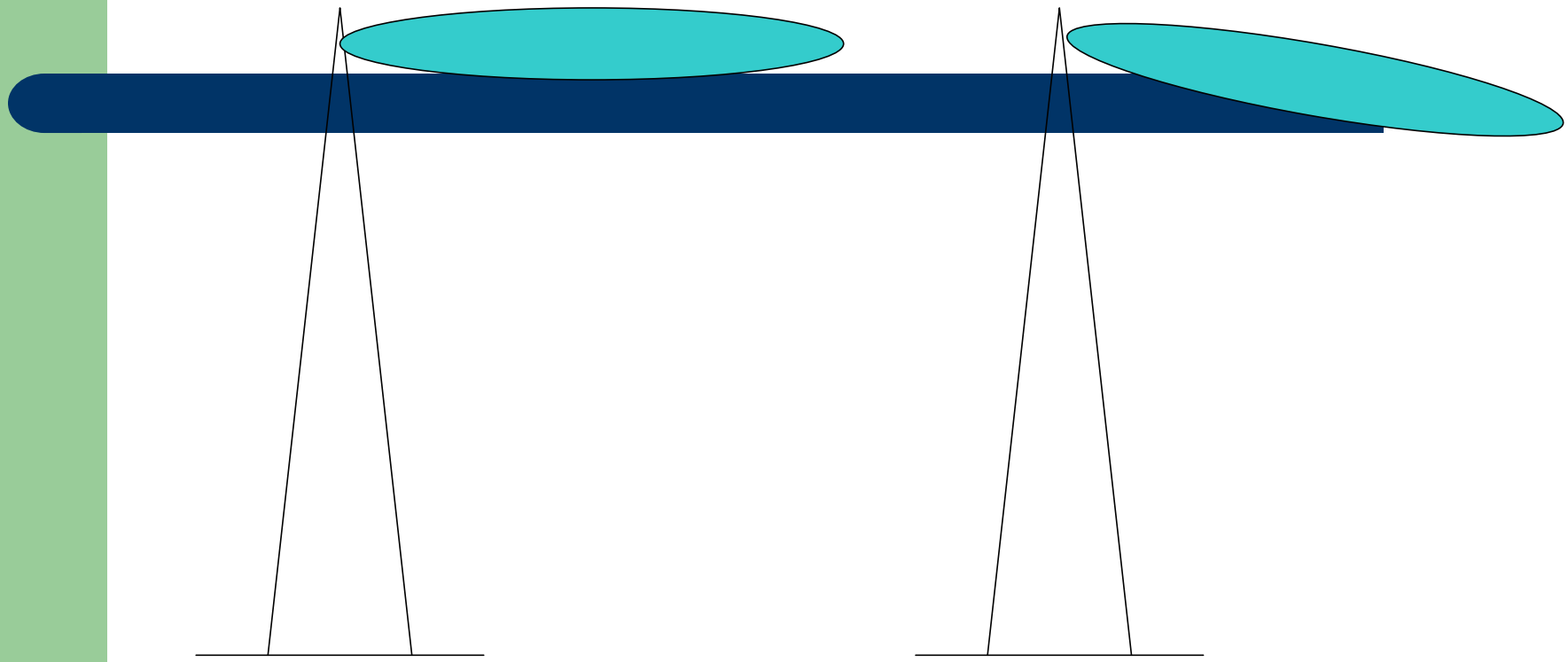
Lincoln FD & PD Radio Networks



FD & PD Building

Existing FD & PD Antenna Structure (Left)

Tower Mounted Antenna Radiation Pattern
No Downtilt vs. Downtilt



Recommendations Immediate
(See Separate Budget Estimate Spreadsheet)

- Replace Copper Cable From FD/PD to the Reservoir Radio Site
  - Fiber is more reliable and resistant to moisture
- Replace Tower at the Reservoir Radio Site and Increase Height
  - Requires prior FAA study to determine if there are any height restrictions or lighting restrictions due to close proximity to Hanscom Field
  - Requires submittal of FAA Form 7460
- Replace FD & PD Voting Comparators

Recommendations Future

(See Separate Budget Estimate Spreadsheet)

- Replace PD Standby Repeater
- Add UPS for Communications Center
  - Provides protection to computer equipment from loss of power and before the generator takes over
- Add Voting Receivers to improve portable talkback at:
  - Cell Tower at 37 Cambridge Turnpike
  - Cell Tower at 295 Cambridge Turnpike
- Replace Radio Control Console
- Replace Communications Center Furniture
  - To Accommodate the New E-911& Mapping Equipment to be Provided by the State 911 Board; Schedule is Unknown at this Time
- Replace Radio Equipment Unable to be Reprogrammed to Narrowband

Related Radio System Issues For Future Planning Purposes

- FCC Requires VHF & UHF Radio Systems to be Narrowband by 2013
  - Systems can operate as Analog or Digital
  - Lincoln FD & PD Analog UHF Dispatch Frequencies and FD and PD Radio Equipment Currently Meets This Requirement
  - Regional FD & PD equipment may have to be replaced
- Presently, there is no requirement for agencies to convert to digital
  - Conversion to digital is an individual agency decision taking into account the needs of the local public safety agency and its surrounding agencies

Next Steps

- Finalize Phased Implementation Plan for Future Years
- Verify Access to Verizon Conduit for New Fiber
- Obtain Certified Coordinates for New Tower Location
- File FAA Form 7460-1 to Study Impact of Raising the Tower
- Obtain Quote to Install and Test Fiber
- Prepare Specifications for all Items to be Procured Immediately
- Obtain quotes through a competitive process or the State Contract for the Immediate Needs
- Contact Cell Tower Owners Regarding Addition of FD & PD Receivers & Antennas
- Investigate Cost Sharing Arrangements with Verizon FIOS and Cell Tower Owners
- Prepare Plan for Future Upgrades