Disaster Communications Assessment at New York-Presbyterian Healthcare

Presentation to Greater New York Hospital Association

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Why We Initiated the Project

- NYP survived 9/11 attacks but still suffered losses;
- Although communications generally worked well, we experienced problems;
- We want to be able to respond in *any* kind of emergency, including . . .

What Was the Formal Outcome?

- Initial Assessment Report
- Infrastructure Inventory and Summary of Gap Analysis
- Listing of Emergency Communications Preparedness Alternatives

Project Approach

- Define goals, scope, process, deliverables
- Interview subject matter experts
  - *Hospital Operations*
  - *Clinical Operations*
  - *Emergency Medical Services*
  - *Nursing*
  - *Facilities*
  - *Security*
  - *Academic Computing Relationships*
  - *Telecommunications*
  - *IT Infrastructure*
  - *IT Core Resources*
  - *NYP Healthcare System*

Project Objectives

- **Understand and document current communications operations, emergency operations, procedures and processes, including**
  - ***Voice / Data Communications***
  - ***Wireless Infrastructure***
  - ***Emergency Communications Technologies (wired and wireless)***

Project Focus

- **Identify risks and vulnerabilities, technology interdependencies**
  - ***Single points of failure***
  - ***Network diversity / resilience***
  - ***Network security***
  - ***Wireline vs. wireless technologies***
  - ***Voice vs. data communications technologies***
  - ***Cross-linkages across technologies***
  - ***Existing vs. next-generation technologies***
  - ***Staffing issues***
  - ***Procedure documentation***
  - ***Emergency plan documentation***
  - ***Emergency communications system testing***

Project Extensions

- Identify potential disaster scenarios that impact communications infrastructure
- Identify and quantify potential impacts to the institution
- Define desired method(s) of operation, as applicable to emergency communications

Identify Gaps and Solutions

- Identify gaps between current and desired methods of operation
- Identify gaps in current communications environment
- Identify potential solutions to achieve desired methods of operation

Focus on Primary Locations

- **Initial Assessment**
  - ***New York Weill Cornell Campus - 68th/York***
  - ***Columbia Presbyterian Campus - 168th/Ft. Washington***
  - ***The Allen Pavilion - 220th/Broadway***
  - ***Other Offices - 38th/First Avenue***
- **Subsequent Assessments**
  - ***Facilities in Westchester***
  - ***Facilities in Queens and Brooklyn***

Major Issues Addressed

- *Network diversity / resilience / security*
- *Wireline vs. wireless technologies*
- *Single points of failure*
- *Voice vs. data technologies*
- *Voice and data cross-linkages*
- *Emergency plan documentation*
- *System testing*

Systems and Services Reviewed

- *Local access (dial tone)*
- *SONET fiber ring technology*
- *Long distance service*
- *Digital PBX systems*
- *Radio paging*
- *Cellular service*
- *Two-way radios*
- *Campus intranet / WAN*
- *Red phones*
- *Microwave*

Risks We Face

- Loss of electrical power
- Loss of access to local central office
- Loss of radio base stations, transmitters, antennas
- Loss of radio paging terminals, antennas, connections to carriers
- Loss of cell sites/switches
- Loss of Internet service provider (ISP)
- Loss of PBX at any particular site
- Voice/data traffic congestion
- Security breaches; virus infestations

General Scenarios Projected for Review

- *Fires, floods, blackouts, vandalism*
- *Loss of access to local central office*
- *Loss of connectivity across carrier networks*
- *Loss of radio base stations, transmitters, antennas*
- *Loss of radio paging terminals, antennas, links to carriers*
- *Loss of cell sites/switches*

Specific Scenarios Considered

- *Loss of Internet service provider (ISP)*
- *Loss of data network infrastructure*
- *Loss of PBX at any particular site*
- *Loss of Red Phone service*
- *Loss of microwave service*
- *Voice/data traffic congestion*

Focused Scenarios

- *Security breaches; virus infestations*
- *Cable cuts, both internal and external*
- *Loss of call center and physicians answering service*
- *Denial of access to NYP buildings due to emergencies*
- *Inability of staff to reach NYP due to severe weather*

What We Assessed

- Identified over 50 Service Types/Locations
- Examples of Service Types
  - Local DT
  - Long distance service
  - Radio Paging
  - Cellular Service
  - Two-way Radios
  - Campus Intranet over Wide Area Network (WAN)
  - “Red Phones”
  - Microwave

Assessment Example

- **Location** - *NYWC*
- **Service Type** - *OC-3 SONET*
- **Department Owner** - *Telecommunications*
- **Service Description** - *Verizon Service; connects to 168th and 38th*
- **Quantity** - *155MB fiber ring*
- **Risks Identified** - *Catastrophic loss of Verizon office, multiple offices; major fiber optic cable damage; existing capacity insufficient for needs*
- **Desired Configuration** - *Multiple SONET rings with CO diversity, access to alternate sources of DT; wireless SONET access; sufficient bandwidth*
- **Results of Gap Analysis** - *Add'l SONET access desirable; non-wireline access desirable; upgrade to OC-12; connect to alternate DT sources*

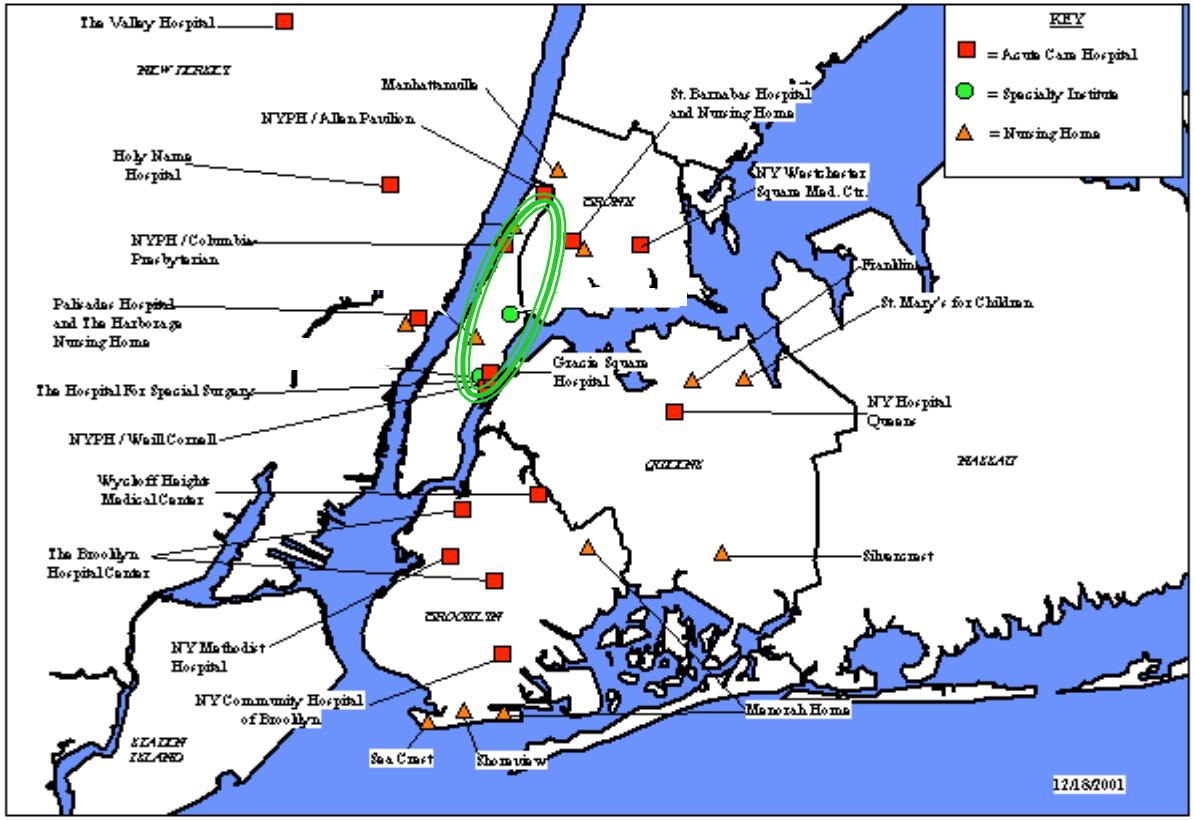
Another Assessment Example

- **Location** - *CPMC*
- **Service Type** – *Red Phones (Centrex)*
- **Department Owner** - *Telecommunications*
- **Service Description** – *Verizon-Provided Service from single Central Office*
- **Quantity** – *200 stations*
- **Risks Identified** - *Catastrophic loss of Verizon switching office; damage to MDF which is in same room as main PBX*
- **Desired Configuration** – *Service from different COs; MDF in location different from PBX; overlap critical extensions to WCMC campus; consider VoIP alternative*
- **Results of Gap Analysis** – *Re-terminate MDF in secure area; diversify to multiple CO's; begin pilot of VoIP alternative*

What Did We Learn?

- **Voice and Data Communications**
  - ***Two large SL-100 PBX systems need to be linked; both located in single rooms with power supplies, equipment***
  - ***Already have highly resilient local access network with linkages to multiple Verizon offices***
  - ***Already have high-bandwidth SONET fiber network linking major campuses, may need to be increased in capacity for added bandwidth, resilience***
  - ***Emergency Red Phones currently back up main phone service; but no diverse routing and service located in same area as main phone service***
  - ***Need to explore "dark fiber" alternatives***

Current SONET Network Infrastructure



Additional Lessons Learned

- ***Heavy dependence on radio paging (in-house and long-range); different technology platforms; need to be fully integrated; some paging antennas located in same room***
- ***Heavy use of two-way radios (approx. 400 in use); used by staff, also mounted in vehicles; need to review use of existing frequencies, need for common frequencies***

Additional Lessons Learned

- ***Cellular service by Verizon and AT&T mostly good, but has capacity constraints; limited service available from Nextel; in-house cellular antenna advisable***
- ***Overhead paging speakers located mostly in patient areas; not all buildings have speakers, limited coverage areas***

More Lessons Learned . . .

- **Voice and Data Communications**
  - ***Audio and video conference facilities available; not currently part of emergency procedures***
  - ***Heavy patient phone usage post-9/11 suggests need for revised PBX facilities***
  - ***Need capability to dynamically reconfigure processing of outgoing calls to alternate local access***
  - ***Need process for after-hours activation and operation of command center***
  - ***Need for access to additional cable TV channels in command center***

And More Lessons . . .

- **Voice and Data Communications**
  - ***Need for resources and action plan for communicating with other local and regional hospitals (especially NYP)***
  - ***Need process to back up and recover call center and physicians answering service; add interactive voice response (IVR) system to facilitate emergency communications***
  - ***Need process to re-route incoming calls to alternate sites***
  - ***Command center communications needs to be reviewed and updated***

And Still More Lessons . . .

- **Voice and Data Communications**
  - ***10MB Ethernet across campus; major program underway migrating to Gigabit Ethernet backbone, 100MB to the desktop will provide more capacity***
  - ***Current Internet Service Provider (Applied Theory) to be joined by second ISP (AT&T)***
  - ***Wiring infrastructure being upgraded; network has good diversity across nodes***
  - ***Need A/C in equipment areas to protect infrastructure***

And Finally . . .

- **Voice and Data Communications**
  - ***Access to Internet needs to be expanded for network resilience***
  - ***Microwave communications in use between major campuses for data communications should be expanded to augment wireline network resources***
  - ***Need to review current bandwidth assets to Disaster Recovery site in upstate NY***
  - ***Need improved emergency communications procedures between NYPH System hospitals***

What's Available in General?

- **Wireline solutions**
  - ***Local/long distance carrier resilience options***
  - ***Carrier emergency recovery (TSP)***
  - ***Long distance carrier resilience options***
  - ***Broadband network services (e.g., SONET, dark fiber)***
  - ***Digital PBX systems***
  - ***Centrex service***
  - ***Overhead paging***

What's Available Now / Future?

- **More Wireline solutions**
  - ***Call recording systems***
  - ***Dial dictation systems***
  - ***Automated notification systems***
  - ***Frame relay / ISDN / DSL***
  - ***Cable TV***
  - ***Building infrastructure diversity***
  - ***Data network diversity***
  - ***Voice over IP technology***

What's Available Now / Future?

- **Wireless solutions**
  - ***Radio paging (one-way, two-way)***
  - ***800 MHz radio (NYC)***
  - ***Cellular (traditional)***
  - ***Cellular (e.g., Nextel, GSM)***
  - ***Wireless extensions to PBX (e.g., SpectraLink)***

What's Available Now / Future?

- **More Wireless solutions**
  - ***Free-space transmission (e.g., microwave, infrared)***
  - ***Blackberry (e-mail)***
  - ***Satellite phones (Globalstar, Motient)***
  - ***OnStar (GPS)***
  - ***Amateur (ham) radio***

What Does It All Mean for NYPH?

- ***Voice and data network infrastructures are highly diverse, resilient***
- ***Wireless communications services work well, but need expansion and additional resilience***
- ***Administrative, clinical and technical staffs understand value of emergency communications***
- ***Emergency communications generally worked well following September 11, except for public carrier constraints; items for enhancement identified***

Accomplishments Identified

- *Emergency procedures reviewed and exercised regularly*
- *No serious or life-threatening infrastructure issues noted*
- *No adverse in-house technical issues that impacted Telecommunications operations*
- *Documentation of emergency plans and procedures varies across units*

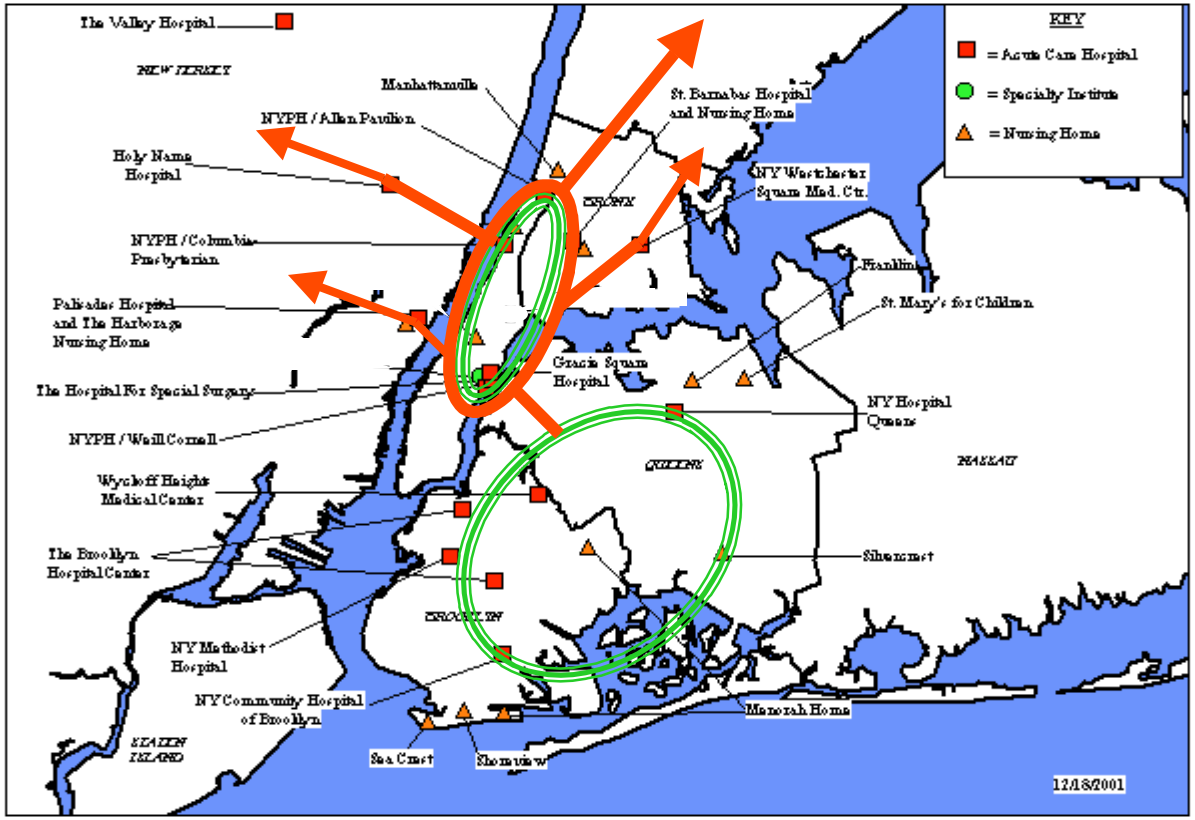
More Positive Conclusions . . .

- ***Plans already developed to address and remedy identified infrastructure issues; plans / funding needed for other issues***
- ***NYP staff committed to continuous improvement of service, survivability, and recoverability***
- ***NYP is well-positioned to take advantage of advanced technologies***

Issues Still to be Addressed

- *Additional SONET access, bandwidth*
- *New sources of dial tone, e.g., NJ, CT*
- *Major phone systems situated in single equipment room*
- *Integration of SL-100 PBXs, remove outdated PBXs no longer in primary use*
- *Integration of radio paging platforms across campuses; enhance system backups*
- *Enhance cellular service coverage, e.g., use of Nextel, other carriers*

Potential SONET Network Infrastructure



Possibilities for Consideration

- *Relocate facilities for Red Phone service; consider VoIP alternative*
- *Expand CPMC-NYWCMC linkages for two-way radios, paging, voice/data*
- *Second, diversely routed ISP needed*
- *Expand wireless access, e.g., wireless local access, SONET, microwave*
- *Update communications assets for Command Centers*
- *Separate trunk groups for emergency personnel, patient phones*

Other Possibilities

- *Increase overhead paging speakers*
- *Revise connectivity arrangements with disaster recovery center in NY*
- *Prevent automatic shutdown of SL-100 extensions following non-use*
- *Need emergency contact data, emergency support procedures for dealing with area hospitals, Healthcare System members online and in hard copy*
- *Need backup plans, alternate location for Doctors Answering Service*

Going-Forward Actions

- *Deploy alternate sources of dial tone to ensure recoverability of PSTN*
- *Deploy "dark fiber" as bypass method for local carrier networks*
- *Enhance and expand microwave services to bypass local carrier networks*
- *Eliminate or minimize single points of failure in network infrastructure*
- *Expand communications assessment program to Healthcare System hospitals*

More Going Forward Actions

- *Complete linkage of SL-100s*
- *Integration of radio paging systems*
- *Telecommunications Strategic Plan that maps to current strategic planning efforts and addresses emergency issues*
- *Wireless communications standards for the institution, e.g., paging, cellular service, wireless phones, two-way, satellite, amateur radio*

And Still More Challenges . . .

- ***Explore Use of Internet-based data access for reporting, emergency communications***
- ***Provide awareness training on emergency preparedness and communications assets, particularly what works and what does not in a disaster situation***

Concluding Observations

- Major communications vulnerability is the Public Switched Telecommunications Network (PSTN)
- Major Technical Challenge: Maintain communications between, among and within institutional boundaries
- The Balancing Challenge: What risks do we prepare for, and at what cost?