

Lincoln Sudbury Regional High School

NETWORK INFRASTRUCTURE REFRESH

MARCH 18TH, 2014

David Lane

Director of Networking Engineering – Interactive Data

- Market Data Vendor that specializes in the collection and dissemination of global market data
- Complex Global Network
- 30 Corporate Office supporting 2500 users
- 6 data centers with over 15,000 devices

Invited to participate in the LSRHS project by Joan Carlton of the Sudbury Finance Committee

25 years IT Experience

- Network Architecture and Operations
- Corporate Systems – Servers, Email Systems, Microsoft Active Directory, Virtualization
- Telecoms
- Help Desk

History of LSRHS Network

Network installed in 2004 during original building construction

Network Infrastructure

- Switches are HP Procurve switches – 2004 vintage
- Designed to support 10M, 100M, and 1Gb Ethernet
- Followed standard practices for a network of this size at the time built
 - Redundant 1Gb links from core to edge wiring closets
 - Servers are connected at 1Gb
 - Desktops are connected at 10/100M

Cable physical plant

- CAT 5e copper - designed to support 1Gbps up to 100M
- OM1 Fiber - designed to support 1Gbps up to 275M – limited 10G support
- Classrooms wired for one ceiling mounted access point
- Common areas not wired – auditorium, gymnasium, cafeteria, lecture hall
- Science labs not wired

History of LSRHS Network

Wireless Network

- Wireless appears to have grown slowly overtime
- Initial attempt to use Enterprise Class WLAN (wireless LAN) equipment
 - Bluesocket (bought by Adtran) – a lower tier vendor with limited adoption
 - Deployment was not expanded on when an incompatibility for Apple's auto configure/discovery protocols was found.
 - Limited to 15 Access Points
- Apple Airports
 - Standalone home / small business model access points
 - 30 Access Points

So what is the problem?

LSRHS Network Evaluation

The Lincoln Sudbury wired network is a functional and stable network that meets today's educational guidelines. However it has several short comings:

1. The network is now 10 years old. The network switches and its components will no longer be supported by Hewlett Packard after November 2014. While equipment has generally been reliable, the rate of failure will gradually increase over time.
2. While the network meets today's Mass STaR Chart guidelines for Internet and backbone bandwidth, it will not meet the requirements published for the 2017-2018 school year.
3. The network is missing the instrumentation and redundancy required to ensure it is already ready to support the demands of the school day. Once technology has been introduced back into the classroom for daily use, it must be treated as a mission critical network.

LSRHS Network Evaluation

The wireless network at Lincoln Sudbury is a collection of unmanaged retail market access points deployed on a large scale. These devices do not have the CPU power to support more than a handful of devices nor do they have the RF management capabilities of a modern system needed for such a deployment. This has led to a wireless end user experience that is frustrating at best.

To put it bluntly: The wireless network may not be depended on for it to be encompassed into the daily education plans of the faculty.

Upgrade Project

Guidelines used

Massachusetts STaR Chart Guidelines

- 2014-2015 school year: 100Mbps ISP & 1Gbps backbone per 1,000 students
- 2017-2018 school year: 1Gbps ISP & 10Gbps backbone per 1,000 students

PARCC testing 100kbps per test taker

CIPA Filtering – Child Internet Protection Act

Network Requirements

Redundant Layer3 Fiber Core – 10Gbps enabled

21 sets of Layer 2 access switches – 1Gb access / 10Gb uplink

Access switches must support POE (power of Ethernet)

Access switches must support voice QoS (quality of service) for future phone system replacement

Network design must include:

- Traffic separation by user class: Administration, Faculty, Student, Visitor
- QoS by user class
- Content Filtering by user class

Wireless Requirements

Centrally managed WLAN system

180 access points – wireless study will amend this number

Coverage – 385,000 sqft – All classroom, offices, atriums, auditorium, gyms, cafeteria, and outside courtyards

Coverage in auditorium and large gymnasium shall support low data rate usage at room capacity

Low voltage wiring of unwired space – auditorium, gymnasiums, cafeteria, atriums, and court yards

WLAN authentication system tied to schools existing LDAP system

WPA/WPA2 security

Installation of cabling as indicated in Wireless Survey Plan

Firewall Requirements

Support up to 2Gbps of full duplex traffic for all services

Provide Threat and Content Filtering (CIPA)

Load balance and network address translate multiple disparate ISP connections

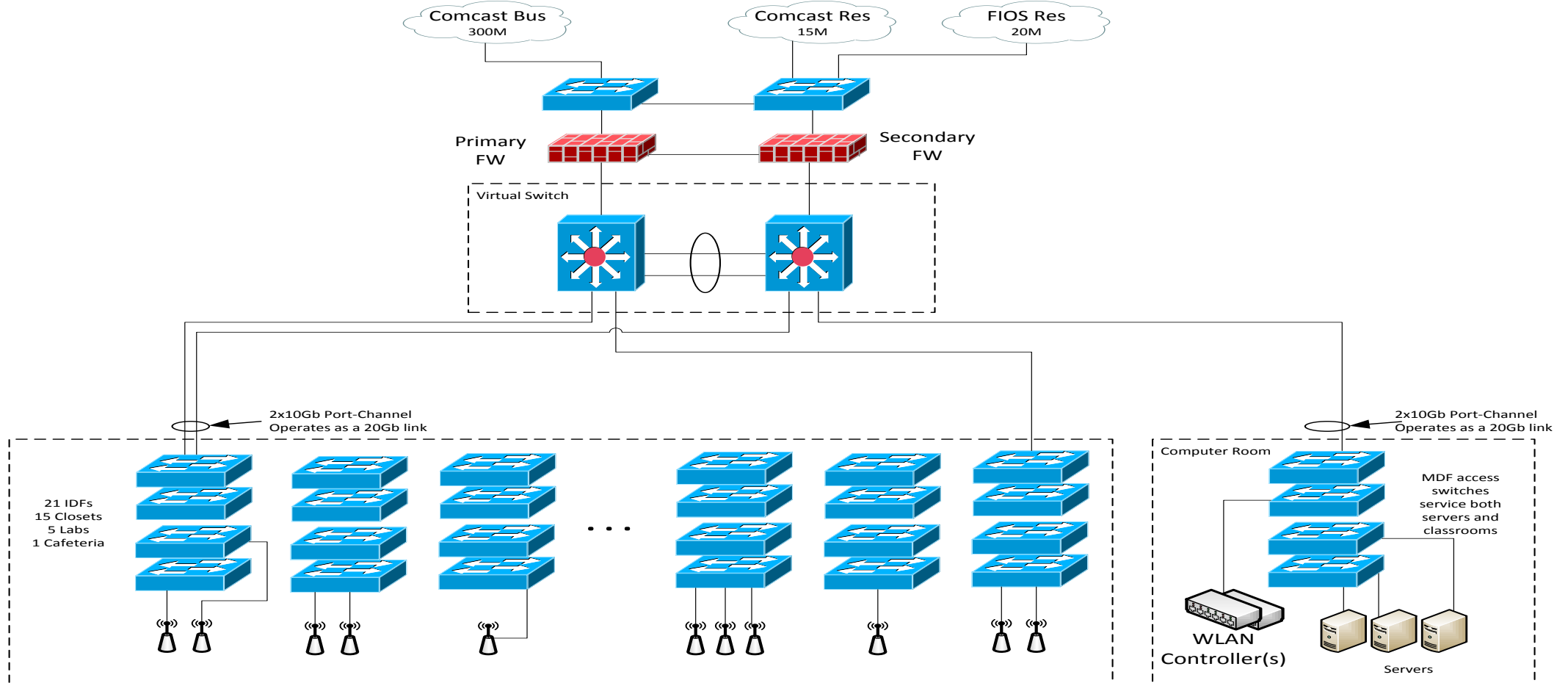
Redundant

Ability to enforce QoS policy based on VLAN.

Ability to enforce content filtering based on VLAN. YouTube for Schools compatible.

Software licenses and maintenance for content and malware filters

Network Design



Process

Currently working with 4 vendors from Massachusetts State Contract List – ITT50/ITC54

Sideband

- RF Engineering firm conducting a full wireless survey

Integration Partners – Lexington, MA

- Leading with a Juniper Networks/Aruba Wireless/Palo Alto Firewall solution

Presidio – Woburn, MA

- Leading with a Cisco Network/Wireless/Firewall solution

Unified IT Solutions – Taunton, MA

- Leading with a HP Networking/Wireless/Firewall solution

Project Status

Wireless Survey results

- Classroom and Office areas will require approximately 140 access points
- Project team has provided updated guidance to Sideband on usage requirement in common areas – auditorium, gyms, cafeteria, etc.
- We are expecting the survey to state an additional 40-60 access points will be required
- Final report will be available this week

Vendor Responses

- Vendors have all been given an identical requirements for wired and wireless networks
- All 3 Vendors have now presented their responses to the project team

Next Steps

- Review final wireless survey report, determine impact on original requirements
- Normalize responses for side by side comparison
- Project Team to meet to review and grade responses