Bethlehem Christian Academy Network Improvement

QuickLaunch Proposal

For

Teachers and Classroom Internet

(No Student Access)

by GOLDEN CONSTRUCTION AND REMODELING

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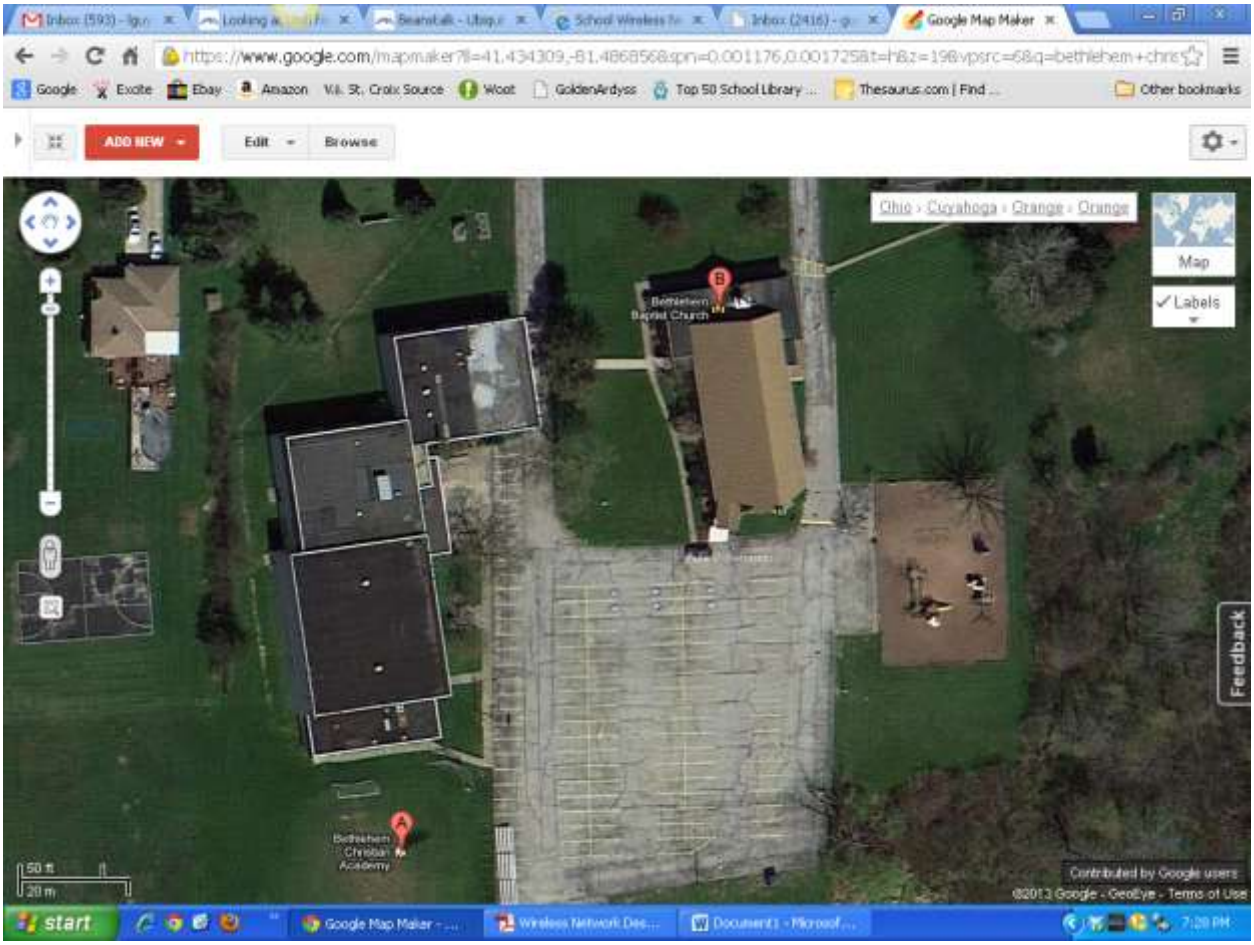
1. Overview:

This proposal intends to outline the QuickLaunch Wireless Network and Network security infrastructure option for Teachers and classroom consideration by Bethlehem Christian Academy hereinafter known as BCA. This wireless network described in this document is not intended for general student use.

Current Network Infrastructure:

The BCA campus consists of the Bethlehem Baptist Church building and a separate school building for BCA. Internet service is provided to the campus via the Bethlehem Baptist Church building. Wireless repeaters are currently utilized to propagate the wireless signal across the open green space to the school building providing spotty wireless service and non-existent service to the classrooms, computer and science labs, and the library.



Proposed Network:

Golden Construction and Remodeling proposes to update the current network infrastructure to provide a high quality and high reliability network consisting of Wireless Access Points (WAP's) installed at strategic locations throughout the BCA building.

2. Radio Frequency (RF) Planning

The BCA Wireless network will not just provide a strong wireless signal to the classrooms and lab areas at BCA. This system design will also take into consideration the different types of devices, users, and areas to cover.

The network will need to consider three key things:

Coverage, Capacity, and **Performance**

2.1. **Coverage:** The coverage map outlines the areas where teachers and devices will connect to the wireless network. This design intends to provide coverage to the classrooms and labs in the BCA building. It is not anticipated at this time to provide coverage into the Gymnasium or the Soccer fields, although this system is scalable, and additional areas can be added as the need arises. Reference the building map complete with WAP devices.

Throughput benchmark – The WAP devices that are proposed will have a 300 megabit throughput and a 600' range. Actual wireless performance is dependent on the location of the wireless devices and building obstructions to the wireless signal. For all practical purposes, a wireless device directly underneath a WAP should connect at the stated 300 megabit rate, or at the highest rate capable of the client device.

2.2. **Capacity:** Each wireless access point can accommodate 100+ wireless clients or devices connecting to the network. We have considered the areas that may present a high number of users, and propose to deploy additional WAP's in high concentration areas as deficiencies are realized. High user density areas are taken into consideration with this proposal.

2.3. **Performance**: The Golden Construction and Remodeling site survey revealed that the current area is not saturated with 2.4 Ghz devices, so there will not be a need to consider the 5 Ghz spectrum. The proposed wireless devices will provide High Speed 802.11N at 2.4 Ghz utilizing equipment at effective cost to performance ratios.

3. Applications and Devices

Video and web traffic are the anticipated applications on the BCA wireless network. The network should be capable of a "multi-media grade WLAN", which is to say that the system should perform quite well with Video and Web traffic data.

The selected equipment is capable of Per User rate limiting and Quality of Service performance features to prioritize and segment the wireless network traffic from other data on the network.

4. Security

Since this is a K-8 school setting, network security will be a major consideration. The proposed system will consist of a combination of client security controls to control any unauthorized use, and content filtering to protect the clients and ensure no compromising of the provided internet experience for the teachers.

4.1. **Wireless Security** – The Wireless Access points are capable of the following Wireless Security schemes – WEP, WPA-PSK, WPA-TKIP, WPA2-AES, and 802.11i. Users will have to comply with a password scheme to be allowed access to the network. The client wireless can save the password connection information until the password is changed. It is recommended that the wireless password be change periodically to ensure a high security network.

4.2. **Edge Router Security** – The proposed router will provide internet routing, firewall protection, and content filtering.

4.3. **Content Filtering and Content Blocking-** The router will scan all network traffic and block access to sites that are identified in the internal database of sites matching the filtering.

4.4. **Wireless Firewalls- SSID's** – Teachers will be connected with their own isolated network. Access to the internet gateway to surf the web and participate in learning exercises will be the only options available. The proposed system is capable of four different wireless networks (SSID's).

5. Scalability

The proposed system has unlimited scalability. The system can be started with a few Access Points and be expanded while maintaining a single unified management system.

6. Network Infrastructure

6.1. **Switching** – New 802.11N Access Points have potential for 300Mbps speeds. The switching hardware should be capable of at least a 100 MB switch rate. We intend to utilize the existing BCA switching hardware to network the Access Points.

6.2. **DHCP & DNS** – Static IP networks can present issues with AP and wireless client functionality. It is advised and preferred to have a dynamic IP network. Locally hosted DNS will be provided by the internet router for Internet Name resolution.

6.3. **POE & Power** – Access points can be powered by POE (power over Ethernet) which makes the installation of cabling to the AP's very clean and eliminates the need to have AC power locally at the AP location.

6.4 **Internet Access –** There is no internet access in the BCA building at this time. Golden Construction and Remodeling is recommends that BCA subscribe to a dedicated internet service rather than trying to

network across the green space to the existing internet service at Bethlehem Baptist Church. This scheme will reduce the startup costs, provide for a High Speed, High reliability network.

6.5 **WAP Building Esthetics –** The proposed devices feature easy mounting for either wall or ceiling mounting. They also feature aesthetic industrial design with a unique LED provisioning ring, which provides administrator location tracking and alerts for each device.

7. System Management

The biggest challenge with a large scale wireless implementation is trying to manage the users and devices after the system is installed. The RF environment and user patterns will need to be managed from one interface, to control operation costs and provide user satisfaction. Golden Construction and Remodeling will build the infrastructure with flexibility and the capability to expand. The selected system will be able to be managed from a central controller by support personnel.

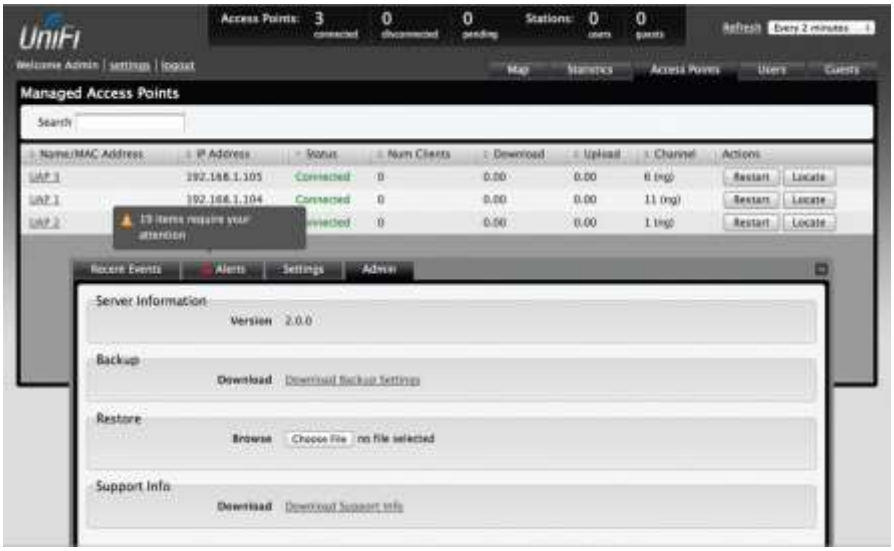
6.1. **User and Device Management**- “Bandwidth Contracts” to teachers or devices will be supported. A policy might be: each user is assigned 2mb of bandwidth.

6.2. **Adaptive Radio Management**- With the provided controller, coverage maps in real time can be perused to trouble shoot any issues. Access Points can be installed, configured, and managed with the intuitive and easy-to-learn Controller user interface.

6.3. **Change Management**- The management console provides total wireless change management. Passwords, configuration, and other changes can be entered and then pushed out to every endpoint WAP. The network can also be increased by simply deploying a new AP and associating it to the BCA network.

6.4. **Administrative Access**- Guest provisioning should be handled by BCA administrative staff using a local computer console. The major system configuration should come with high level privileges.

6.5. **Reporting and Monitoring**- Network monitoring is available from the control console. Statistics can be run to organize and visualize the BCA network traffic in clear and easy-to-read graphs.



8. Wireless Access Point Locations

The BCA building is a split level design. Golden Construction and Remodeling proposes to install a total of six WAP devices installed according to the glowing areas outlined in the building floor plan.

One access point will be installed on the first floor centered between rooms 13 and 14.

One access point will be installed on the first floor centered between the Art room and Room 16.

One access point will be installed in the second floor office area.

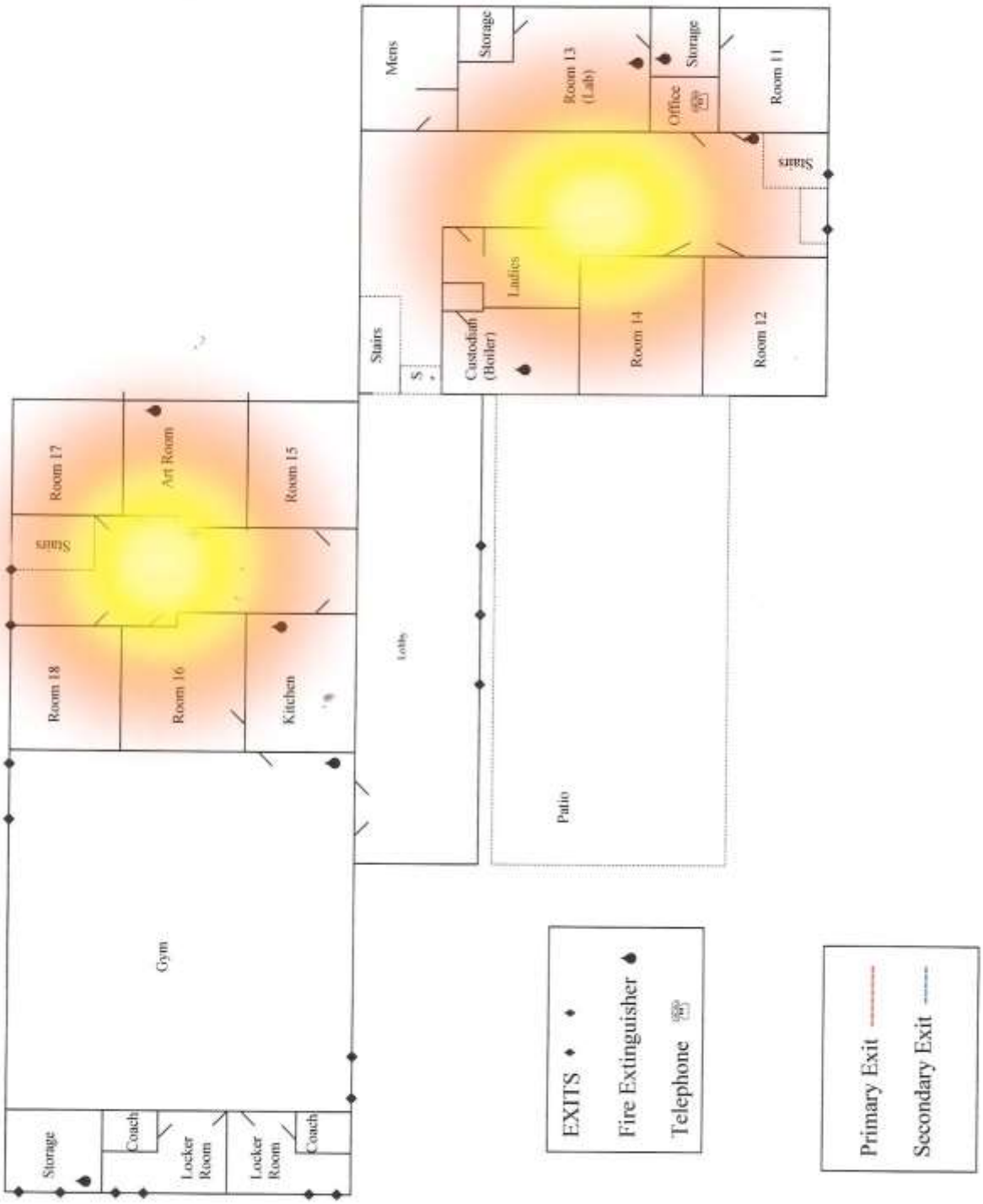
One access point will be installed on the second floor – Inside of the library.

One access point will be installed on the third floor – Centered in the hallway outside of room 25.

One access point will be installed on the third floor – Inside of the computer lab.

The above plan will provide for adequate signal strength and capacity in the classroom areas along with built-in redundancy.

SCHOOL BUILDING




3rd Floor
Stairs
Room 27
Mens
Room 25
Ladies
Room 24
Stairs
File
Office
Stai
Office
Library
2nd Floor
RR
RR
Faculty Lounge
Stairs
Room 21
Fire Extinguisher
Telephone

9. Wireless Costs

(6) Wireless Access Points & POE Injectors-	**$600.00**
(1) 1000' Cat 5 Spool Cable & Connectors	**$150.00**
(6) Wireless AP Installation- $150 X6	**$900.00**
Total Wireless Cost	**$1650.00**

Note: Wireless Adapters for the Desktop computers will have to be purchased at a cost of $20 per computer.

10. Internet Costs

(1) QoS Router w/Content Filtering -	**$100.00**
Router Installation and Setup-	**$100.00**
Total Router Cost	**$200.00**

Total QuickLaunchTeachers and Classroom Internet cost $1850.00

Monthly Internet Subscription Cost – Est. $60/month or $720 per year

11. Installation Plan

Phase 1 – Order DSL Service, Install Router and qualify Installation

Phase 2 – Install Wireless Access Points per Priority Schedule

Priority 1 – Office, Computer Lab, (2) 1st Floor

Priority 2 – Library, Rooms 23 &24 Hallway.

Note: For Student Access, the QoS router will be replaced with a Security Appliance with capabilities of content filtering and antivirus protection for large numbers of internet clients. Add $950 for the Security Appliance and $300 for installation and testing.