FEATHER RIVER RAIL SOCIETY

Signal Department Technical Notes of July 2019 WiFi Upgrade
Kenneth Finnegan
Date: August 1, 2019

This WiFi deployment at the museum has been one of the most challenging network deployments I've worked on as a networking consultant. Not only are steel buildings and rail equipment very good at reducing WiFi coverage, the harsh weather in Portola made me hesitant to deploy any access points or cabling outdoors.

During this work on the museum network, the following ranked priorities were identified for the museum Internet:

1. Internet for the Museum Store for their point of sale and inventory systems
2. Internet for FRRS groups such as the Mechanical Department, Operating Department, Historical/Archives Department, etc. to enable and support their activities
3. Internet as a convenience for museum staff and volunteers to make their time spent on museum property more enjoyable

After a survey of the existing network, I proposed the best current option for the museum's network was to deploy three Ubiquiti UAP-AC-M mesh access points. These access points are special in that they don't all require being hard wired back to our Internet router with Ethernet cables, but can form a wireless mesh to extend coverage beyond the range of a single access point. As long as at least one of these access points are connected to the Internet, and all of the access points can see each other, they will function as expected.

The first access point is mounted to the north wall of the shop, with an Ethernet cable running down to the museum's router in the storage room and is the main uplink for the whole mesh. The second access point is mounted on the south-west corner of the shop, with an Ethernet cable run down to an outlet only for power. It can see the first access point from across the shop and relies on the first access point to be able to serve the Internet to users. The third access point is mounted on the interior wall of the member's lounge, again using an Ethernet cable only for power, and relies on being able to see the second access point across #3 and #4 rail for Internet. The system also includes a UniFi Cloud Key installed in the storage room; the UniFi Cloud Key is a small device which acts as a supervisor over all the Ubiquiti devices deployed across the museum to configure and monitor the access points.

This WiFi deployment should be an improvement on what the museum has had before, but does have some known deficiencies:

1. Users in the members' lounge rely on their traffic hopping from the third access point, to the second access point, to the first access point. This is generally not recommended to have

traffic take multiple wireless hops since it decreases network performance, but was deemed acceptable since the museum's Internet connection is currently 6Mbps down/0.75Mbps up, so this slower WiFi mesh topology is still faster than the museum's connection to the Internet at large. It would be possible to correct this by running a CAT5e cable from the storage room to the second access point, but this would require running a cable through the rafters of the shop, which would be a significant effort.

2. Since the network connection between the shop and member's lounge is wireless, a poorly positioned piece of rail equipment on #3 rail has been observed to degrade the network performance. This could be corrected by running an Ethernet cable between the shop and the lounge, but this would add a significant expense to the deployment since this would require fiber optic Ethernet equipment to go between the two buildings, and either an aerial cable strung or a significant amount of trenching effort to get between the two buildings.

3. WiFi coverage is still not satisfactory in the Edenwold sleeping area, due to it needing to penetrate both the metal walls of the member's lounge and the Edenwold itself. An additional access point installed in the Edenwold is a possible solution, but until the funding and labor to correct this is secured, it is recommended that members either book rooms on the north side of the Edenwold or stay in cabooses if they would like to have Internet access from their sleeping accommodations.

During this WiFi install, I also discovered that the current core Ethernet switch used by the museum has been the source of the radio interference likely experienced by any members who have tried to use the museum's radios around the shop. To correct this, I replaced the noisy 3Com switch with a new Netgear switch from my personal inventory, which has corrected the issue.

FEATHER RIVER RAIL SOCIETY

Signal Department
Kerry Cochran
Date: August 1, 2019

Current Audio Tour System:

Recently there have been some questions asked by the public and our FRRS President about the Audio Tour system.

The current Audio Tour system is currently an internet based audio tour system, that supplies information about our collection based upon either using a QR Code on a piece of equipment or looking at the web site and selecting the equipment you wish to hear about. There is no incremental cost to the society since this system has been created in-house and is part of our society's website.

From Steve Habeck Friday July 19th:

"We are getting several '***daily***' complaints from visitors that they cannot access the audio tour because their device tells them a password is required. Us computer-illiterate people here don't know enough about any of this crap to know what to do. Rather than give out our password to everyone, what do we need to do?"

The webmaster responed:

"Non-member users at the museum have to use the data plan for their cell phone. It is my understanding you decided a long time ago you do not want to provide the public with a public access to the museum Wi-Fi. We could setup a public Wi-Fi that would not require a password if instructed to do so.

You have to tell the users that we do not provide public Wi-Fi and that they have to use their cell-phone data plan."

eAudiotree:

An Audio Tour system based upon a docent or leader using a small transmitter and microphone, and several receivers. This type of system requires it to be purchased and maintained.

The largest problem with this type of system is the lost and damage to the equipment.

This was looked into several years ago and it was decided, not to invest into this type of system.

Public WiFi:

The question on having a Public or Guest WiFi at the museum has been asked about in the past years and at the time the current FRRS President did not want to have access to our internet.

With the advances in network systems, Public or Guest WiFi may be an option for us to consider.