

Wireless Network for Mountain West Credit Union

Western Governors University

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Proposal Overview

Problem Summary

Mountain West Credit Union (MWCU) has seen an increase in member accounts being created. It has spurred the need to have more member-facing resources to help streamline document procurement and finalization. The IT Staff had just finished upgrading the switches to provide 10 Gb connections and installed Cat6 Ethernet cable throughout the locations to future proof the infrastructure. Unfortunately, this resulted in the funds not being available to upgrade the wireless network. Although the IT staff that the hardware they had wouldn't suffice for a wireless network, they saw a need and made a small wireless network of four outdated, consumer-grade Linksys WRT54GL Wireless-G capable routers were installed at two of the

branch locations and two in the operations center. When these devices were configured, the IT team informed the staff that only 3-5 wireless devices would be able to connect, and it was possible that connections would probably not be the best. Not only were these wireless routers slow, but they also were not secure as the IT staff connected them directly to the branch switches and did not section off the network traffic with a secure VLAN to block unwanted traffic.

More employees wanted to use mobile, wireless devices to help members sign documents, and some employees were starting to have members use their own wireless devices to connect to get documents downloaded and signed or to just have Wi-Fi while waiting to be helped by staff. This posed even more of a strain on the connection as the wireless routers were not made to have more than five connections and didn't have the bandwidth and speed capabilities to allow so many connections. After multiple complaints from employees, the IT staff decided it was necessary to upgrade the wireless network.

With the updated infrastructure already in place and more funds allotted to the IT department, they were able to look into upgrading the network. They wanted to have wireless access in all the branch locations and cover the 3-level operations center with sufficient wireless signal well. Also, having the need for more than four access points sparked the desire of having a centralized management point for each of the access points so that the IT team didn't have to log in to each individual site. They wanted to get this project proposed and completed as quickly as possible, so they reached out to TechRight Networking for a consultation.

IT Solution

MWCU contracted TechRight Networking to assess and upgrade the wireless network for the branches and operations center. The proposed solution will be to configure and install a Cisco Catalyst 9800-L Wireless Controller, which will allow for the IT staff to administer and maintain

the wireless network from a centralized location. TechRight will also configure and install 16 – Cisco Aironet 4800 Wireless access points at the branch locations and operation center, which will provide a wireless network capable of 400 clients running on 802.11ac wireless signal, a much-improved network than is currently being used. These new access points will give separate Service Set Identifiers (SSID's) for secure connections, one for employees to connect to and the other for visitors to provide. To provide security for the credit union information and data across the network, TechRight will also assist the IT staff in creating VLAN's to separate the employee wireless network traffic from the visitors. These VLANs will also aid in making sure that employee traffic is prioritized to be able to have a quick response for the internal intranet and external internet connection over the visitors' external internet only connection.

Implementation Plan

The wireless network upgrade for MWCU is a crucial element for the credit union to continue to meet customer and business needs. TechRight will begin the upgrade process by first meeting with the IT Manager, Operations Manager, and a couple of the branch managers to determine what the true need and wants of the wireless network will be to have a focused project scope. They will then visit the operations center and branch locations to gain an understanding and map out the current networking equipment and cabling. Also, this will be time for them to generate heatmaps to determine signal strengths and weaknesses to find the best locations to install the wireless access points.

Once TechRight has the scope, infrastructure, and heatmap information needed, they will proceed with ordering the hardware needed to complete the project. When TechRight has received the equipment, they will go onsite to MWCU and will configure, install and test the

equipment. After all the equipment is installed, they will train the IT staff on how to use the wireless controller to view and manage the wireless access points and provide some basic wireless network troubleshooting.

Review of Other Work

Configuring a wireless network can present challenges, primarily if the proper equipment and configurations are not used. In the case of Mountain West Credit Union, they will remove the wireless routers they have now and install access points. Alissa Irei, a senior writer for TechTarget, explains the difference between wireless routers and access points; "wireless routers server residential homes and small business, where a single device combines AP and routing functionality can readily meet the modest user demand" (Irei & Phifer, 2019), and "wireless APs are used in larger businesses and venues...to cover an extensive physical area or to support thousands of users" (Irei & Phifer, 2019). Following this reasoning is why TechRight will install access points at the branches and operations center for Mountain West Credit Union.

As part of MWCU's new wireless network, being able to more efficiently manage the access points was vital in creating a more effective and efficient environment. Wireless LAN controllers do just this by having all APs connected and controlled by the controller; it aids in administering configurations to all or one AP at a time. One of the critical components that MWCU will want from the wireless controller is to monitor and log AP's status. It is stated in Cisco's Wireless LAN Controller Configuration Best Practices document, "For performance, security, and ease of troubleshooting, it is recommended to set a unicast destination, and store the AP logs for later analysis in case of problems." (Cisco, 2018). It is a small and simple configuration, but it will significantly aid the IT Staff in being able to review logs during troubleshooting.

When it comes to networks, making sure the traffic goes in the right route is critical. Virtual Local Area Networks (VLANs) make it possible to separate network traffic received from devices connected to the same switch. TechRight was asked to provide a reason to use VLANs and so they found Alan Thomas' *Vlans and Trunks* (Thomas, 2015) document in which he states the following, "Virtual Local Area Networks (VLANs) provide several benefits to enterprise networks. VLANs provide a measure of flexibility, improve user mobility, ease the application of security measures, and increase the overall efficiency of the network." (Thomas, 2015)

In the case of Mountain West Credit Union, they are going to have an access point that allows for employees and guests to connect to the network. However, they need to make sure that the guest traffic stays separate. With the benefits of security and efficiency, the IT Staff are encouraged to learn how to implement VLANs to better secure their network and control traffic.

Mountain West Credit Union wants to create a wireless network that not only the employees can use but that visitors can connect to as well. As part of the planning and design, they want to create multiple Service Set Identifiers (SSID's) for individuals to distinguish network connections. One of the MWCU IT staff had heard that multiple SSID's with redundant types of access could cause issues with bandwidth and slow down the network. This is true, but it can be mitigated. A best practice document created by Meraki covers this known issue. In the document, it states, "Redundancy occurs when multiple SSIDs are deployed providing different types of access, but the configurations used could allow for them to be consolidated into a single SSID." (Meraki, 2018) As it is a best practice document, it continues with how a wireless network could be set up with a guest network with the bandwidth limited and the employee network using

encryption and other security methods. These steps are exactly what TechRight is going to do to help MWCU have a secure and efficient wireless network.

Project Rationale

MWCU has been expanding over the past few years, and with that expansion has come the need to be able to process more member accounts and more loans. At the time that the network was updated, it was not foreseen the benefit of being able to use wireless devices to procure documentation instead of having to print copies, Forcing the members to wait for the employee to gather documentation.

The trend in most companies now is to move to a more mobile environment, and this new wireless network project will help this company to move forward and to be more on par with the digital trend. Improving the wireless network will increase employee satisfaction while using the wireless network to streamline their work and will be a benefit to members as they are able to connect and use Wi-Fi while waiting in the lobby.

The current wireless network only having four wireless routers made it pretty simple for the IT staff to be able to update or manage. However, with adding upwards of 16 in the ability to add more as needed, it would be necessary to add a wireless LAN controller so that the management can be centralized. This will make it even easier and more efficient for the IT staff to administer and troubleshoot the wireless network.

Current Project Environment

MWCU currently is using out-of-date Linksys WRT54GL wireless routers as Wi-Fi access points. As a result of these devices being commercial greedy, they do not sufficiently

support the need that the credit union has with wanting to use a wireless network at their branches and operations center. Another downside to these wireless access points is that they are not currently managed by a central management console, and the IT staff have to spend time logging into each device separately to make changes or troubleshoot. A new Cisco Catalyst 9800-L wireless LAN controller will be installed to help with the initiation and management of all the wireless access points.

A benefit in the environment is that the credit union has finished an upgrade of the network infrastructure to include new Cisco 9248-48P switches, which are capable of providing power over ethernet connections. Power-over-ethernet technology will aid in powering the new Cisco Aironet 4800 wireless access points without needing a separate ac power adapter and utility power outlet at the installation point. When the new switches were installed, Cat6e ethernet cable was also run throughout the operation center and in the branches. This new cabling will be a great benefit to the wireless access point says it will help to help them to run at their most efficient speeds possible.

Methodology

The methodology model used for this project is the ADDIE model. The ADDIE model has five different phases, which are: Analysis, Design, Development, Implementation, and Evaluation. When properly applied, ADDIE is a function and fluid method that helps a project move through different life cycles in an efficient manner.

As part of the analysis phase, TechRight will meet with the MWCU IT manager, Operations manager, and a few of the branch managers to determine the number of wireless devices that may be connected at any given time and what the employee tasks will be while

connected to the network wirelessly. Also noted during this time would be the need for what traffic is needing to be secure versus what traffic can be allowed to freely traverse the network. TechRight will also make site visits to building and room dimensions and also heatmaps to determine what the strength of the wireless signal will need to be.

The scope formulated during the analysis phase will play a vital part in the design phase for TechRight. They will work with the IT Staff to determine the best locations within the branches and the operation center to install the wireless access points. Once the access point location is determined, TechRight will verify that the access point they have suggested will provide the right signal strength and allow for enough clients to connect. TechRight will also work with the IT staff to create employee and visitor SSID's for the access points and VLANs on the switches for the network to be properly secured.

After the design phase has been completed, TechRight will move to the development phase, where they will order the necessary hardware and wait for it to arrive at the credit union. While waiting for the hardware, TechRight will aid the IT staff in configuring VLANs on the switches to separate visitor traffic to be routed externally to the internet and will configure a VLAN to route the employee traffic to stay within the MWCU network. They will also create and document the new employee and visitor SSID's.

During the implementation phase, TechRight will arrive onsite at MWCU operations center and remove the old equipment. They will then install the wireless controller verify that it can be managed by the staff via the network. They will then configure the six access points and install them in the operations center. At the operations center, they will configure the other ten access points and then go out to the branches and install them and remove the two old routers.

Finally, the project will reach the evaluation phase, where TechRight will meet with the

IT staff to verify that the installations and configurations of the access point are correct. They will train the IT staff on how to test network connections, troubleshoot connection issues and use the wireless controller to manage the wireless network. They will provide the documentation for the employees and visitors to use to be able to connect to the wireless network and verify that the connections can be made easily and efficiently.

Project Goals, Objectives, and Deliverables

Goals, Objectives, and Deliverables Table

	Goal	Supporting objectives	Deliverables enabling the project objectives
1	Upgrade wireless network at MWCU	1.a. Obtain the requirements that the MWCU management and employees want the wireless network to be for	1.a.i. List of different job functions that the employees will use the wireless for
			1.a. ii. Obtain the approximate number of wireless devices that will connect to the network
		1.b. Gain an understanding of the operation center and branch buildings' physical layout	1.b.i. Have a blueprint of the operation center for building dimensions; all three floors, and blueprints of the branch locations for building dimensions
			1.b. ii. Generate heatmaps for each location where access points will be installed
			1.b.iii. Obtain a logical and physical map of the network infrastructure and cabling for access point connection
			1.c.i. Get Approved order for network hardware and order the hardware
		1.c. Procure and configure the network hardware	1.c. ii. Switches configured with VLAN's to separate network traffic
			1.c.iii. Configured access points with SSID's
			1.c. iv. Configured wireless controller used to manage all access points
		1.d. Remove old and install new network equipment	1.d.i. Old wireless routers removed
			1.d. ii. 10 -Wireless access points installed at branches; one at each
			1.d.iii. 6 -Wireless access points installed on the 3 floors of the operations center

			1.d.iv. 1-Wireless controller installed at the operations center to manage all access points
		1.e. IT staff that is trained to manage the wireless network	1.e.i. Documentation provided on how to use the wireless console
			1.e.ii IT Staff able to use the wireless controller successfully to manage the wireless network
			1.e.iii. Troubleshooting steps to determine network issues
			1.e.iv.. Documentation provided to help instruct employees and visitors on how to connect to the wireless network

Goals, Objectives, and Deliverables Descriptions

This project's main goal is to establish a secure and reliable wireless network for employees to connect to using mobile devices and for visitors to use when on site. This will help aid employees inefficiently create and finalize documentation for the credit union members. It will also help vendors and members to be able to use Wi-Fi when at the branches or visiting the operation center. This goal will be met by the successful completion of the following five objectives:

- Objective 1a: Understand the current need the credit union management and employees require from the wireless network. As part of this assessment, learning some of the key job functions that can be done from a wireless device will be critical. This objective will be considered successful when the assessment has been completed, and the client has provided a documented list of job requirements and an approximate number of devices that will be connecting to the wireless network.

- Deliverable 1.a.i: Meet with the credit union management to generate a list of requirements and obtain a document of the job functions that will be performed by employees while using the wireless network.
 - Deliverable 1.a.ii: As part of the requirements of the wireless network, an approximate number of wireless devices that will be connecting at each location (ops center and branches) needs to be given to know what model of the wireless access point will be best for the environment.
- Objective 1.b: Understand the physical layout of each floor of the operations center and branch location. Learn the logical and physical topology of the network infrastructure. This objective will be complete when the vendor has made an onsite visit and has obtained blueprints and heatmaps.
 - Deliverable 1.b.i: Obtaining copies of the blueprints for the ops center and branches are critical for TechRight to be able to know the physical layout of the buildings and where they can properly install the access points.
 - Deliverable 1.b.ii: During the site visits, TechRight will scan the locations to obtain heatmaps to determine where the Wi-Fi signal will be best and where it will be degraded.
 - Deliverable 1.b.iii: As part of the install, a logical and physical map of the network devices and cabling will need to be obtained by TechRight to aid in knowing where access points can be installed.

- Objective 1.c: A critical objective is to procure the necessary hardware, which will take the most time and help the project to become more "real" in that a physical aspect will be obtained. Creating the VLANs and SSID's before the hardware is received will help to configure hardware more quickly than the time it is needed. This objective will be successful when all hardware is received, and the VLANs have been configured on the current switches, and the SSID's have been configured on the access points.
 - Deliverable 1.c.i: An approved order from the MWCU management team for TechRight to order the new hardware.
 - Deliverable 1.c.ii: The current switches will be configured with VLANs to separate the employee and visitor network traffic for more security.
 - Deliverable 1.c.iii: The new access points will be configured to show an employee SSID and a visitor SSID for the wireless networks.
 - Deliverable 1.c.iv: The wireless controller will be configured to be able to manage all access points.
- Objective 1.d: The objective that really brings the project together is the installation of all the new hardware. This step is the one that all parties involved like to see moving along. This objective will be successful when all access points have been installed at the ops center, and branches and the wireless controller has been installed.
 - Deliverable 1.d.i: All old wireless routers will be removed to avoid any wireless signal confusion.

- Deliverable 1.d.ii: There will be ten wireless access points installed at each of the branch locations providing wireless access to employees and visitors.
- Deliverable 1.d.iii: The three floors at the ops center will have two access points each, a total of 6 installed to provide an adequate wireless signal for the employees to use on all floors.
- Deliverable 1.d.iv: The wireless controller will be installed at the ops center to aid in managing the wireless network.
- Objective 1.e: Wrapping up the project will be to train the IT staff and provide and documentation to help in troubleshooting and setting up the network connections. This objective will be successful when the IT staff has the necessary documentation in hand, and they have signed off on being able to effectively use the wireless controller to manage the wireless network.
 - Deliverable 1.e.i: Documentation will be provided to the client to be able as an aid using the wireless controller.
 - Deliverable 1.e.ii: The IT Staff will be trained to use the wireless controller to manage the wireless network. This will be a great benefit will save time for the staff when needing to make any configuration changes to any of the 16 access points.
 - Deliverable 1.e.iii: Troubleshooting documentation will be given to the client, as all functional systems have a well-thought-out troubleshooting process to help quickly find and resolve issues.

Deliverable 1.e.iv: Instructional documentation will be provided so that the IT Staff can give instructions to help the employees and visitors connect to the wireless network.

Project Timeline with Milestones

Milestone or Deliverable	Duration (Hours or Days)	Projected Start Date	Anticipated End Date
Project kick-off with MWCU management teams	4 Hours	10/19/2020	10/19/2020
Create a list of job functions done on the wireless network	2 Hours	10/19/2020	10/19/2020
Obtain an approximate number of wireless devices connecting to the network	1 hour	10/19/2020	10/19/2020
Obtain blueprints of the ops center and branch locations	3 hours	10/20/2020	10/20/2020
Obtain a logical and physical map of the network infrastructure and cabling	1 Hour	10/20/2020	10/20/2020
Generate Heatmaps for the three floors of the ops center and each branch location	1.5 Days	10/20/2020	10/21/2020
Get hardware order approved	2 Hours	10/22/2020	10/22/2020
Order hardware from vendors and wait for delivery	6 Days	10/22/2020	10/28/2020
Configure current switches with a VLAN for employee traffic and one for visitor traffic	1 Day	10/23/2020	10/23/2020

Create and document each SSID configuration	3 hours	10/23/2020	10/20/2020
Hardware delivered to MWCU	1 Day	10/28/2020	10/28/2020
Configure the access points with the SSID's	6 Hours	10/28/2020	10/28/2020

Configure the wireless controller to be managed by IT Staff and verify all access points listed in the console	3 hours	10/28/2020	10/28/2020
Install wireless controller at the operation center	1 hour	10/28/2020	10/28/2020
Install wireless access points at the operations center	1 Day	10/29/2020	10/28/2020
Remove old wireless routers from branches	2 Hours	10/29/2020	10/29/2020
Install wireless access points at the branches	2 Days	10/29/2020	10/31/2020
Provide documentation on how to use wireless controller	2 Hours	11/2/2020	11/2/2020
Train IT staff on how to use the wireless controller	2 Days	11/2/2020	11/3/2020
Provide documentation of troubleshooting steps to help with determining network issues	2 hours	11/2/2020	11/2/2020
Provide documentation to help instruct employees and visitors on how to connect to the wireless network	3 Hours	11/2/2020	11/2/2020
Follow up with MWCU management team and IT Staff to verify the wireless network is performing as requested	1 Day	11/10/2020	11/10/2020

Outcome

The wireless network upgrade for Mountain West Credit Union will improve the working environment for employees as well as add to the satisfaction of members and other

visitors. This new wireless network will allow employees to connect and maintain a connection without constant disconnecting because the circuits are overloaded. It will also help them to create and finalize documentation without having to print hard copies for the members to sign. It will also help the staff that has poor cell coverage to be connected via Wi-Fi to continue email and other messaging correspondence on their phones or other mobile devices. As for members and visitors, the wireless network will allow for them to connect while waiting in the lobbies, and it will help vendors to be able to connect their devices to access resources they may need from the internet. TechRight will continue to follow up once a week for a month to verify that the network is performing as expected. This project will be considered a success when the wireless network maintains has maintained 90% uptime a week for a month and when 75% of new member and loan documentation is processed over the credit union

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