

Wi-Fi Solution for Small K-12 School (< 25 AP)

OVERVIEW

With the explosive innovations in technology, K-12 schools face a challenge of providing fast and reliable wireless access to meet the demands of the everyday activities of students, staff, and guests. Meru's Wireless LAN solution delivers uninterrupted learning to every user on campus, creating a more efficient and enjoyable education experience.

This deployment guide offers a quick way to deploy a full Wi-Fi network in a K-12 school environment requiring less than 25 APs.

DETERMINE THE NETWORK DESIGN

There are three common areas that require wireless access in K-12 environments: classrooms, high-density areas such as cafeterias, gyms, and theaters, and outdoor areas. Each of these has different user requirements, and thus requires a different design and solution.

CLASSROOMS

Due to 1-1 computing and BYOD, K-12 education environments are seeing a phenomenal number of wireless devices connecting to their networks. If BYOD is allowed, the wireless infrastructure must be able to support at least three devices per student. Average classroom size is approximately 30 students. The recommendation for AP placement is as follows:

- One AP per classroom where both 1-1 computing and BYOD are expected, usually in middle school and high school environments
- One AP for every two classrooms for 1-1 computing with no BYOD requirements, usually in elementary school environments

HIGH-DENSITY AREAS

Cafeterias, gymnasiums, and theaters are all areas in which large numbers of students congregate, along with their portable devices, all requiring Wi-Fi access at the same time. By using our Virtual Cell technology in our Channel Layering design, we are able to add capacity to the wireless network in such areas. Each deployed channel is a contiguous layer throughout the area, allowing the ability to create multiple virtual cells to handle the high density.

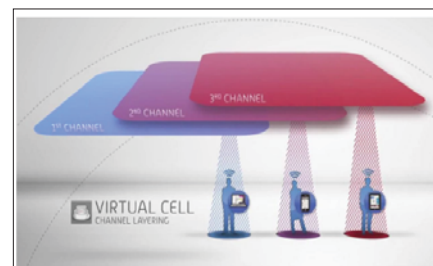
Based on internal testing and the assumption that K-12 schools will have a mix of single-, dual-, and three-stream clients, along with a wide variety of application use including streaming music, high-definition video, and other web traffic, we have designed the following chart to assist in choosing how many channels to deploy in a high-density area.

Required Number of 20 MHz Channel Layers										
Client Throughput	Number of Clients									
	100	200	300	400	500	600	700	800	900	1000
0 - .5 Mbps	1	2	3	4	5	6	7	8	9	10
.5 - 1 Mbps	2	4	6	8	10	11	12	13	14	15
1 - 2 Mbps	4	8	12	16	20	22	24			
2 - 4 Mbps	8	16	24							
4 - 8 Mbps	16	24								

PRE-REQUISITES

For a successful deployment, ensure that you have met the following prerequisites before you begin the deployment process.

1. Determine wireless requirements
 - a. Device count
 - b. Traffic type
 - c. BYOD allowed
 - d. Authentication
 - e. Any high-density areas such as a gym, theater, library
2. Define IP scheme for:
 - a. Controller
 - b. APs
 - c. Wireless guest network
 - d. Wireless student network
 - e. Wireless staff network
3. Rack controller and connect to trunked Ethernet switchport
4. Configure initial setup of controller with the network information
5. Obtain AP licenses for controller
6. Set up DNS entry for "wlan-controller" for AP discovery of controller



- When configuring channel layers, co-locate APs in a “pod” approximately 7–10 feet apart.
- Turn on load balancing to evenly distribute usage across all access points.

OUTSIDE AREAS

With mobility being a key functionality in K-12 environments, many schools require coverage outside the classroom in hallways, quad areas, and outdoor sports areas.

- If the outside requirement is for coverage only, a site survey is recommended to determine the placement of APs and the antenna types.
- If the outside requirement will include high density, determine how many APs are needed based on the estimated device count for the specified area.
- Determine which external antenna best fits the environment. Many schools install the APs inside a building, but mount external antennas on the outside of the building.

THE WIRELESS NETWORK INFRASTRUCTURE

The following equipment is recommended for a K-12 school with fewer than 25 APs

- MC1550 controller
- AP832 802.11ac access point
- Identity Manager

CONFIGURE YOUR WIRELESS NETWORKS

K-12 schools require a minimum of three wireless networks: for students, staff, and guests. The authentication for these three networks will vary based on the school’s security policy. It is recommended that staff and student networks utilize 802.1X authentication with Active Directory integration. Guest authentication can be given through a sponsor or a self-register captive portal process.

To access the controller, open up a web browser and enter the IP address or DNS name in the URL box. For the quickest configuration, navigate to the Wizards tab on the left menu bar.

- Validate the initial controller setup configuration, including IP address, subnet, gateway, country code, time zone, and system date/time
- Upload the license file to activate access points
- View and validate current APs connected to the controller
- Start scanning the environment to allow the controller to determine the best channel to use
- To create the three recommended wireless networks (Guest, Student, Staff), click the Add button and enter the SSID name, security mode, and VLAN IP information
- Review the controller configuration, then save it
- Be sure to install an SSL certificate on the controller
- Once the APs are connected to the controller, devices will be able to connect to Wi-Fi

INTEGRATE IDM WITH THE CONTROLLER

Meru Identity Manager (IDM) gives you the ability to easily manage guest users and allow quick BYOD onboarding. The Smart Connect feature dramatically reduces IT workload by enabling students and teachers to access the secure wireless network with just a few quick steps.

IDM also offers a RADIUS feature that allows 802.1x authentication for schools that may not have an external RADIUS server. The tracking and reporting capabilities in IDM are also extremely beneficial in ensuring appropriate use of your school’s wireless network.



Once the initial setup of IDM is complete:

- Add the controller as a RADIUS client. Meru IDM automatically configures the controller to begin communicating with IDM. (On the controller, be sure to add the firewall filter ID created during the automated configuration process for the “Guest” security profile.)
- Configure Guest Connect by customizing the sponsor portal settings for guest management access.
- Configure Smart Connect profiles and policies to allow automatic BYOD onboarding for students and staff.

BONJOUR SERVICE CONTROL

Many K-12 schools use Apple TV for classroom collaborative learning, and most students use Apple iPads as their primary educational tool. Bonjour is the protocol used by these Apple products to communicate with other devices limited to the same Layer 2 network. This can pose a problem because most schools have multiple VLANs distributed throughout their campus. Bonjour Service Control allows the communication of Bonjour services across multiple VLANs by controlling service discovery and advertisement and by using flexible policy management based on service type, location, and user groups.

For example, with Service Control enabled, a teacher's wireless iPad on VLAN 10 can communicate with a wired Apple TV connected to a projector on VLAN 50. At the same time, you can prohibit student iPads on VLAN 20 from connecting to the projector with Service Control policy management.

To configure this feature, enable Service Control in the Meru controller's global settings:

- Define how the services will be discovered using a wired gateway list
- Specify the types of services that may be discovered
- Define the locations based on APs
- Create Service Control policies based on user groups, services, and location

SUMMARY

With Meru, you have the tools you need to provide an uninterrupted learning experience with anywhere, anytime Wi-Fi access for students, teachers, and guests. A Meru network:

- Is simple to deploy and expand
- Speeds onboarding with automated provisioning and guest management
- Is easy to manage centrally, requiring a minimum of support
- Gives you visibility into what your students are doing on the network
- Provides smooth roaming, reliable connectivity, and predictable performance, even in high-density environments



For more information about Meru Networks, visit www.merunetworks.com or email your questions to: meruinfo@merunetworks.com

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