Cisco IT Brief

# Migrating to a New Cisco Wireless Infrastructure

Wireless traffic on the Cisco network has grown in recent years as employees often do their work with multiple wireless devices and move among multiple work spaces within any given Cisco office. To meet this demand and continue serving our business functions, Cisco IT plans to implement a “wireless first” network design and migrate all company offices to a new wireless infrastructure based on the Cisco® Aironet™ 4800 Access Point.

We chose these access points because they offer:

- Dual 5 GHz-capable radios for higher speeds and less congestion
- Hyperlocation services that can provide location based use-cases involving wireless devices and users through Cisco Connected Mobile Experiences (Cisco CMX) and in the future
- The Intelligent Capture feature (driven by Cisco DNA Center) for advanced troubleshooting capabilities, even if remote

As part of this network refresh we will also implement new LAN switches in field offices, which will improve the performance of high-bandwidth applications end-to-end. We expect this new corporate standard for the wireless infrastructure will deliver improved connectivity for users—and improved capabilities for IT to optimize and troubleshoot wireless services—for years to come.

In late 2018, we conducted two pilot projects with the new wireless infrastructure, one in a campus building and one in a field office. In both projects, we conducted a new site survey to identify current demand levels and usage patterns in order to determine the number of access points to install and their optimal placement within the building. The site surveys also gave us information to help further define standardized topologies that we will apply in the future, and aid additional migration efforts of the wireless LAN in other Cisco offices.

“We’re not doing just a one-to-one replacement for the access points or even the wireless LAN controllers,” says Michael Combs, Member of Technical Staff – Lead Wireless Architect, Cisco IT. “Instead, we’re using this refresh as an opportunity to take a new approach to how we design our networks going forward so they are ready for Cisco DNA solutions. This design will also help us serve the ever-increasing demands of user and device density, as well as the next generation of applications.”

## New Wireless Design for a Campus Building

The campus pilot was conducted in a three-story building that provides office space for Cisco IT employees on the upper floors. The first floor is a multi-room conference center used for Cisco events and is often rented by local companies and organizations for their meetings. During the pilot, the site served a total of more than 830 unique devices on a daily basis, with a peak load of 750 devices connected simultaneously at one time.

This project focused on the new wireless LAN devices; no changes were planned for the LAN switches during the initial phase. In this building, we deployed Cisco 5520 Wireless LAN Controllers configured for High Availability-Stateful Switch Over (HA-SSO) as well as the Cisco Aironet 4800 Access Points. We managed these devices within the existing Cisco DNA Center and integrated them with the Cisco CMX instances.

## New Wireless Design for a Field Office

For the field office pilot project, we chose a site that often hosts customer demos, presentations, and training sessions. This office also presents several challenges for wireless deployment because it is housed in an historic textile mill.

"The space has high ceilings, exposed wood and steel beams, exposed HVAC ducts, and ceilings with different elevations and shapes. None of these architectural details, which can have a significant impact on access point placement and coverage, were captured in the two-dimensional floor plan drawings provided by our facilities team," says Marcelo Camandona, Member of Technical Staff, Cisco IT. "We performed an on-site wireless survey to identify the areas of concern, which emphasized the importance of doing a site visit for the different types of offices to properly plan our new wireless LAN design topologies." Based on the plan developed for this pilot site, we chose several Cisco products as the new wireless LAN solution for a Cisco field office.

**Cisco Catalyst® 9500 Series switch.** Installed as a new LAN backbone switch for the site, the Catalyst 9500 will eliminate the use of sub-interfaces in the WAN gateway to separate the L2 and L3 domains. The switch also adds 40 Gbps upstream/downstream performance for the backbone (distribution layer) to support the stable and reliable wireless environment that allows our employees to use desktop and collaboration services productively.

**Cisco Catalyst 9400 Series switch.** Installed as the new access switching platform, this switch also delivers 40 Gbps capacity toward the core layer and introduces Cisco Multigigabit Ethernet (mGig) technology to the access layers. The Cisco 4800 Access Point can obtain up to 5 Gbps performance over existing office cabling by using the mGig port for its connection to the switch.

**Cisco 3504 Wireless Controller.** A small form-factor wireless controller, the Cisco 3504 is designed for branch-office deployments. It supports HA-SSO for dynamic failover instead of solely relying on the traditional N+1 primary/backup controller design. In the new field-office design, the Cisco 3504 controllers act as a single pair with an active/standby controller, making the failover seamless to users and access points alike. Also, the Cisco 3504 makes the site ready for Cisco DNA solutions, including full insights from Cisco DNA Center Assurance.

**Cisco Aironet 4800 Access Points.** These devices are a standard in our new wireless infrastructure. The AP4800 is a best-in-class 802.11ac wave 2 access point, and brings advanced capabilities including Flexible Radio Architecture (FRA), as well as a dedicated internal third-radio for Hyperlocation and other cutting-edge use-cases.

**Cisco DNA Center Assurance.** After an office or campus building has been migrated to the new WLAN architecture, we use Cisco DNA Center to monitor and manage network and wireless conditions close to near real-time. We also use analytics provided by the Cisco DNA Assurance engine to help proactively identify and resolve wireless issues.

**CAT6A Cabling.** In some locations, we will upgrade the network cabling to the latest standards. The new cabling will allow us to use the Cisco 4800 Access Points at full capacity, including support for Multigigabit Ethernet from the access points and up to 10 GE from other capable devices to the Catalyst 9400 switches. The new cabling also prepares the wireless infrastructure to support other demanding devices for the foreseeable future.

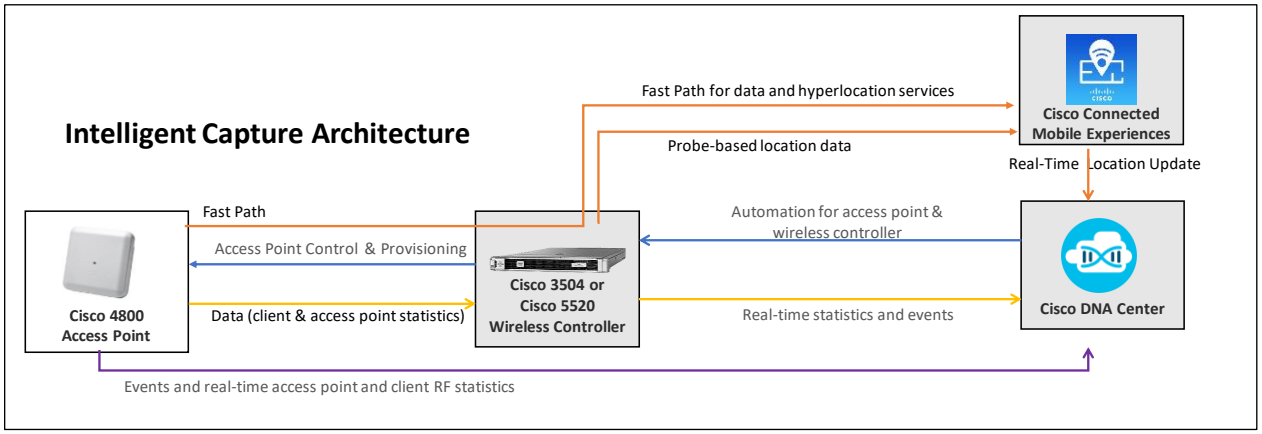
## Deep Analysis with Intelligent Capture

We expect to gain significant management benefits from the combination of Cisco DNA Center Assurance and the Intelligent Capture feature showcased by the Cisco 4800 Series access points. For example, Cisco DNA Center Assurance offers us more insights into the operational health of our network, both wired and wireless. We also have the ability to review events and trends of interest up to two weeks in the past, across multiple sites.

The Intelligent Capture feature expands upon this capability through an advanced integration with the access points, wireless LAN controller, Cisco CMX, and Cisco DNA Center. Specific capabilities that the Intelligent Capture feature brings include:

- Full packet capture for wireless clients (simultaneous wired and wireless), with the capture data collected remotely from the access points. This capability makes it easier to troubleshoot wireless issues end-to-end, because Intelligent Capture eliminates the need to guess which 802.3 wired packet correlates to which 802.11 wireless frame encrypted by 802.1X/EAP. Intelligent Capture will also automatically collect the full capture from any access point(s) needed while a client device roams throughout the floor.
- Onboarding capture for up to 16 clients (simultaneous wired and wireless for onboarding-related frames and packets). This capability allows us to select several devices, then quickly collect relevant statistics and a filtered packet capture for any issues related to device onboarding.
- Advanced statistics that provide more insights for troubleshooting the access points.
- Spectrum analysis from access points via Cisco DNA Center.

Additionally, on-site packet captures can involve a difficult and time-consuming process that often requires an advanced skillset. The Intelligent Capture capability will help eliminate the need for a technician or engineer to physically visit the site in order to collect over-the-air packet captures using a capable device, whether compatible USB wireless LAN adapters or sniffer-mode access points with a protocol analyzer.




The experience gained by Cisco IT in our initial campus and field office deployments has been useful for providing feedback to the wireless product development teams in our role as Cisco's Customer Zero. For example, the Intelligent Capture feature specifically encompasses the work of multiple development teams across different engineering functions, who benefit from the Cisco IT input drawn from our experience with real-world wired and wireless network environments.

The pilot projects were the first two sites in a broader wireless upgrade program for Cisco offices. As of early 2019, we have implemented the Cisco 4800 Access Points and other new wireless infrastructure in nearly 20 Cisco buildings worldwide.

## Benefits Expected for Users and IT

An updated network with a wireless-first approach will give our users more reliable connectivity and improved performance for high-demand applications such as video and collaboration. Designing the infrastructure from an up-to-date site survey also makes it easier for the network to support more users and growing device density over time.

Looking to the future, we expect similar deployments of Hyperlocation services by taking advantage of the multiple radios integrated within the Cisco 4800 Access Points. Flexible radio assignment (FRA) will also support more resilience, such as the ability to handle the higher traffic levels that occur during a big meeting or similar event by leveraging dual-5 GHz cells per access point (micro and macro). We will also benefit from a wireless and switching infrastructure that is ready for the high-bandwidth demands of new technologies such as 4K video or similar, and that will support an ever increasing shift to intent-based networking.

For More Information

Cisco AP 4800 Access Points
Cisco Catalyst switches
Cisco DNA Center