

## Brocade Open Mobility Solutions: Interoperability Evaluation for Cisco & Cisco Meraki WLAN with Brocade ICX Switches

### EXECUTIVE SUMMARY

Supporting wireless mobility means continually addressing new devices in a rapidly advancing industry. The Effortless Network™ enabled by the Brocade HyperEdge Architecture provides the ideal foundation for wireless network solutions. Cisco & Cisco Meraki deliver high performance access points and scalable WLAN solutions. By working together with Cisco & Cisco Meraki, Brocade aims to deliver the best-in-class, open wired network underlay infrastructure upon which to deploy wireless networks (WLAN). Brocade is committed to working with industry standard wireless networks to deliver open and secure multi-vendor wired/wireless network solutions.

Brocade commissioned Tolly to evaluate the interoperability of its Brocade ICX 7250/7450 switches with both the Cisco (Aironet) & Cisco Meraki WLAN solutions. The Cisco WLAN was implemented with the Cisco Aironet 2700/3700 Access Points (APs) and 2500 Series Wireless Controller. The Cisco Meraki WLAN was implemented with the Cisco Meraki MR34 AP configured with the Cisco Meraki System Manager Cloud based management software. No WLAN controller is required for the Cisco Meraki wireless network.

The Brocade LAN switch and Cisco & Cisco Meraki wireless WLAN solutions demonstrated interoperability across all tests. While Tolly tested only the Cisco Aironet 2700/3700 APs, with the Cisco 2500 WLAN Controller, and Cisco Meraki MR34 AP, all Cisco and Cisco Meraki APs should pass all the interoperability tests. See Table 1.

### THE BOTTOM LINE

The Brocade ICX switches with Cisco and Cisco Meraki APs illustrated:

- 1 Power over Ethernet (PoE) & LLDP and/or CDP Power Negotiation Interoperability
- 2 VLAN Tagging Interoperability
- 3 sFlow & LLDP and/or CDP System Interoperability & Visibility

### Brocade ICX 7250/7450 LAN Switch Interoperability with Cisco & Cisco Meraki

Feature/Function	Brocade ICX 7250/7450 Interoperability With	
	Cisco Aironet 2700/3700 APs	Cisco Meraki MR34
Power over Ethernet (PoE)	✓	✓
Link Layer Discovery Protocol (LLDP) or Cisco Discovery Protocol (CDP)	✓	✓
PoE Power Negotiation via LLDP or CDP	✓	✓
VLANs (Tagged traffic)	✓	✓
Link Aggregation (Multiple AP ports to switch)	N/A (see note)	N/A (see note)
sFlow Support	✓	✓

Note: Link Aggregation applicable only to APs implementing multiple Gigabit Ethernet data ports. The Cisco units tested did not have multiple interfaces.

Source: Tolly, August 2015

Table 1

## Background

Brocade supports and implements standards-based networking protocols to support open networking and provide support for third-party components in customer networks. For Enterprise WLAN environments, it is essential that functions such as Power over Ethernet, LLDP/CDP and VLANs and others function effectively between the wired LAN and WLAN infrastructure components and illustrating that functionality and interoperability was the driver for this test. All results are summarized in Table 1.

Tests were conducted in a microcosm of an Enterprise environment. This consisted of a Brocade ICX 7250 or ICX 7450 providing wired Ethernet switching, the WLAN solution under test (AP and controller) and various test clients to provide session traffic needed to evaluate the interoperability. See Figures 1 and 2.

## Test Results

### Power over Ethernet

Providing power to the AP via the wired Ethernet connection is certainly the most basic and arguably the most important element of interoperability.

Tests showed that the Brocade ICX switch provided the required power to the AP via the wired Gigabit Ethernet port.

### LLDP/CDP Discovery

The Link Layer Discovery Protocol provides a dynamic method for network devices to learn information about other network devices without requiring a management session between devices. The Cisco Discovery Protocol (CDP) is a proprietary protocol developed by Cisco Systems, Inc. that provides similar functionality. Brocade supports both protocols. CDP was used with the Cisco APs and LLDP with the Meraki AP.

Brocade Communications Systems, Inc.

Brocade ICX 7250/7450 Switches

LAN Switch - WLAN Interoperability Evaluation



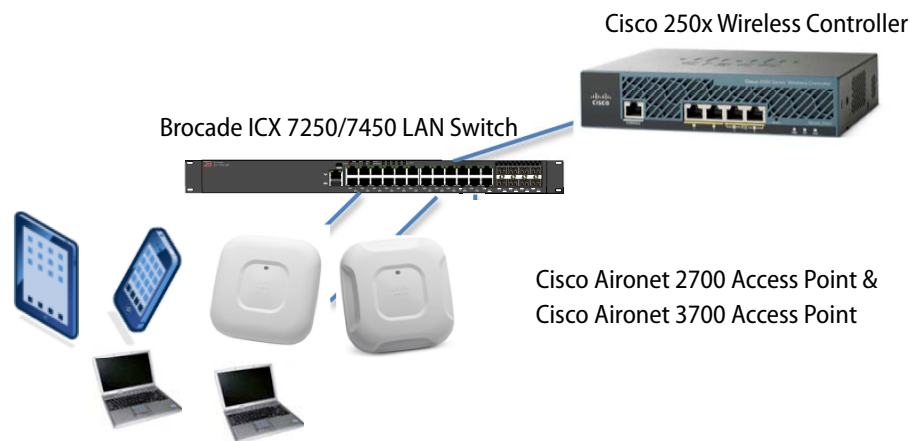
*Tested August 2015*

Tests showed that the Brocade ICX switch discovered key system information and details about the AP under test. The details included system name, description, link aggregation status, and MAC/PHY details.

### Power Negotiation via LLDP/CDP

Different devices will require differing amounts of power from the LAN switch

### Brocade ICX 7250/7450 LAN Switch Interoperability with Cisco WLAN Test Environment

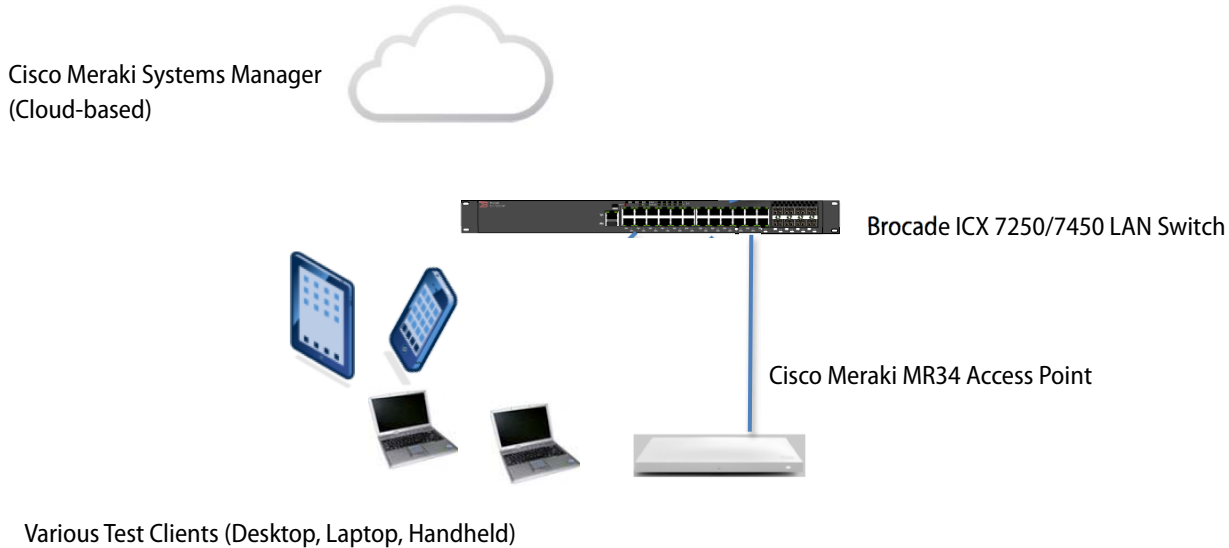


Various Test Clients (Desktop, Laptop, Handheld)

Source: Tolly, August 2015

Figure 1

## Brocade ICX 7250/7450 LAN Switch Interoperability with Cisco Meraki WLAN Test Environment



Source: Tolly, August 2015

Figure 2

that is providing PoE. The LLDP/CDP protocol provides for a communication path between the powered device and the power provider across which the AP can request specific power levels.

Tests showed that the Brocade ICX switch modified the power being delivered based on the requirements of the AP under test.

### VLAN Tagging

VLANs are an essential and commonly used method for differentiating traffic belonging to different groups of users. By tagging traffic into a particular VLAN, network traffic can be grouped for various reasons such as performance and/or security.

Tests showed that the Brocade ICX switch processed multiple client VLANs across a single switch port connected to the AP under test.

### sFlow

sFlow is an industry standard sampling technology used to monitor network traffic. sFlow gives visibility into network traffic for further analysis. Tests showed that the Brocade ICX switch collected network traffic data from the AP under test. Tolly engineers displayed the network traffic data, both wired and wireless using Brocade Network Advisor management software.

## Test Setup & Methodology

### Systems Under Test

#### LAN Switch

Tolly Group engineers tested WLAN interoperability using the Brocade ICX 7250

or ICX 7450 switch as the “wired” Ethernet LAN Switch. Both switches run the same software and were used interchangeably for various interoperability tests. For all tests, the Brocade ICX switches ran version FI 8.0.30b.

#### WLAN Access Point & Controller

The Cisco solution consisted of two APs, the Cisco Aironet 2700 (AIR-CAP2702I-A-K9) and 3700 (AIR-CAP3702I-A-K9) both running v15.2(4)JB6, along with the 2500 Wireless Controller running 7.6.130.0. The Cisco Meraki solution consisted of an MR34 AP controlled by the cloud-based Systems Manager running current level code as downloaded by the management server.

#### Clients & Session Traffic

Various common clients (desktops, laptops, handhelds) were used as available to provide the session traffic over the WLAN/ wired environment. As the use of these



clients was to provide generic traffic, the client details are not noted. See Figures 1 and 2 for the testbed diagram.

## Test Methodology

### Power Over Ethernet

This test verified that the LAN switch could deliver power to the AP from the LAN Switch wired Gigabit Ethernet port.

Tolly engineers used the Brocade switch command, “show inline power”, to validate that the switch was delivering power to the AP under test.

### Link Layer Discovery Protocol

This test verified that the LAN switch could identify key attributes of the AP under test via LLDP.

Tolly engineers used the Brocade switch command, “show lldp neighbors” to verify that the Brocade switch could identify the system name of the AP under test.

Further testing using “show lldp neighbors details” illustrated that the Brocade switch could retrieve very detailed information about the AP under test. The information returned included: system name, description, system capabilities, enabled capabilities, management address, port description, link aggregation status, 802.3 MAC/PHY information, and 802.3 PoE status.

The Brocade switch also supports the Cisco Discovery Protocol (CDP).

### Power Negotiation via LLDP

This test verified that the LAN switch could negotiate power to the level requested by the AP under test.

## Brocade ICX Switches

### INNOVATIVE SWITCHES FOR NEXT GENERATION IP NETWORKS

*Brocade ICX product family offers a complete set of products designed to work together to deliver a scalable, high-performance network solution critical to ensuring high user productivity with video, unified communications, VDI, and mobile applications. Brocade innovative HyperEdge Architecture provides simplified network deployment and management, scale-out networking and investment protection at the industry's lowest TCO.*

#### Open Standards

*Brocade believes that standards compliance is the best way to support wireless mobility and the new devices and technologies in the rapidly advancing industry. Compliance with open standards lets Brocade work with the best-of-breed vendors that are critical to a wireless network, such as the high-caliber companies you find in the Brocade partner ecosystem.*

#### Integration of Wired and Wireless Networks

*Partnering with wireless network vendors ensures compatibility and seamless integration of the combined network. With Brocade, customers can use common tools for both wired and wireless networks, to provide consistent security and policy management for all users—whether they connect via wire or wirelessly—thus avoiding potential single-vendor lock-in.*

#### Best-of-Breed

*No single best wireless network solution is right for every environment. Every business has unique requirements based on number of users and devices, network traffic load patterns, coverage, management, security, and cost, to name a few. Customers should choose the best wireless and wired network solutions to meet their requirements, rather than choosing the lowest common denominator offered with single-vendor solutions. A multivendor network strategy mitigates risk by reducing exposure to a single vendor's decisions.*

#### Open Mobility Solutions

*Brocade offers a robust, flexible network underlay that is scalable, open, and automated. The network is scalable to allow customers to grow and expand their networks for the future without having to use a “rip and replace” strategy. Brocade open standards-based solutions ensure multivendor interoperability and are automated to simplify management and reduce TCO. Brocade Open Mobility Solutions provide the best-of-breed network underlay for any wireless network.*

**Learn more at [www.brocade.com](http://www.brocade.com)**

*Source: Brocade Communications Systems, Inc.*



Tolly engineers used the aforementioned switch commands to verify that power was negotiated to the level required by the AP under test.

### **VLANs (Tagged Traffic)**

This test verified that the LAN switch could process traffic streams from the AP containing VLAN tags from two different VLANs.

Tolly engineers configured two clients communicating with the AP under test with each client on a different VLAN. The clients then communicated with systems that could be reached only by traversing the Brocade switch.

Tolly engineers verified that the sessions were established and, additionally, used Brocade switch commands to display the relevant VLANs on the switch and confirm the port mapping.

### **sFlow**

This test verified that the LAN switch could collect sFlow ("sampled flow") network traffic information relative to the AP under test and send it to Brocade Network Advisor (BNA) for further analysis.

Tolly engineers used the BNA monitoring dashboard to verify that network statistics were being collected for the AP under test.



### About Tolly...

The Tolly Group companies have been delivering world-class IT services for more than 25 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

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