



## Brocade Open Mobility Solutions: Interoperability Evaluation for Ruckus Wireless 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. Ruckus delivers high performance access points and scalable WLAN solutions. By working together with Ruckus, 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 the Ruckus Wireless, Inc. WLAN solution as implemented in its latest ZoneFlex R710 Access Point (AP) and SmartZone 100 WLAN Controller.

The Brocade LAN switch and Ruckus Wireless WLAN solutions demonstrated interoperability across all tests. While Tolly tested only the Ruckus SmartZone 100, the Ruckus virtual SmartZone controller and the Ruckus SCG 200 controller use common software and should also pass all tests. Similarly, all Ruckus ZoneFlex indoor and outdoor APs should pass all the interoperability tests except for the Link Aggregation test, which is only relevant to the R710 and any future 3 or 4 stream 802.11ac Wave 2 APs. See Table 1.

### THE BOTTOM LINE

The Brocade ICX switches & Ruckus Wireless AP illustrated:

- 1 Power over Ethernet (PoE) & LLDP Power Negotiation Interoperability
- 2 VLAN Tagging Interoperability
- 3 Link Aggregation Interoperability
- 4 sFlow & LLDP System Interoperability & Visibility

**Brocade ICX 7250/7450 LAN Switch Interoperability  
with Ruckus Wireless**

Feature/Function	Brocade ICX 7250/7450 Interoperability With	
	Ruckus Wireless ZoneFlex R710 AP	
Power over Ethernet (PoE)	✓	
Link Layer Discovery Protocol (LLDP)	✓	
PoE Power Negotiation via LLDP	✓	
VLANs (Tagged traffic)	✓	
Link Aggregation (Multiple AP ports to switch)	✓	
sFlow Support	✓	

Source: Tolly, August 2015

Table 1



# Background

Brocade and Ruckus Wireless both support and implement 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 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 Figure 1.

# 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 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.

Tests showed that the Brocade ICX switch discovered key system information and details about the AP under test. The details

**Brocade Communications Systems, Inc.**

**Brocade ICX 7250/7450 Switches**

**LAN Switch - WLAN Interoperability Evaluation**

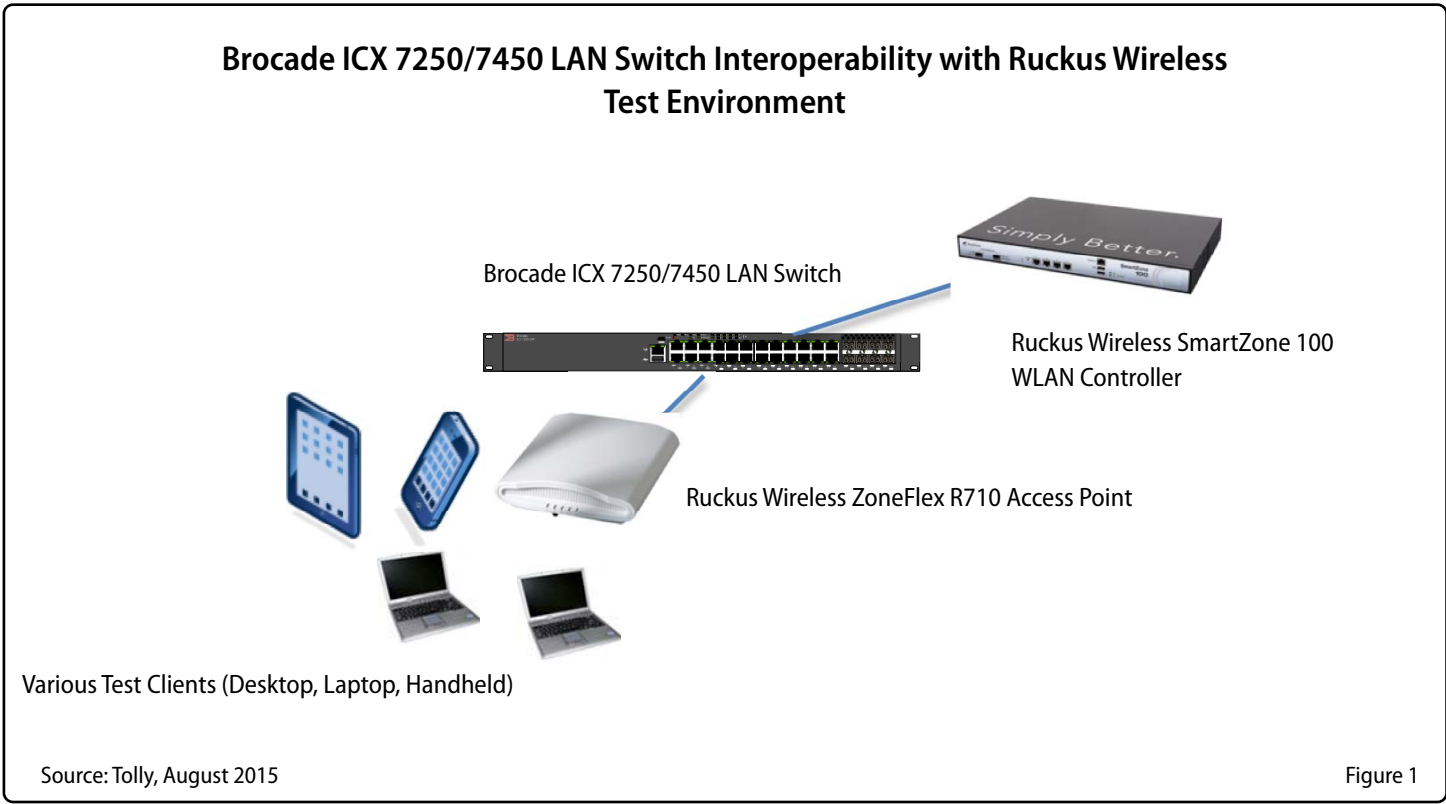


*Tested August 2015*

included system name, description, link aggregation status, and MAC/PHY details.

## Power Negotiation via LLDP

Different devices will require differing amounts of power from the LAN switch that is providing PoE. The LLDP 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.

## Link Aggregation

Link aggregation is a standards-based method of combining multiple physical ports of a switch to function as a single logical port. As WLANs migrate to the newer, faster 802.11ac Wave 2 standard, this will become increasingly important as the bandwidth of the AP exceeds 1 Gbps.

The Ruckus ZoneFlex R710 is one of the first APs to support the Wave 2 standard.

Tests showed that the Brocade ICX switch interoperated with the AP under test to create a two-port link aggregation group (LAG) using the two Gigabit Ethernet ports implemented in 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 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.*



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 Ruckus Wireless WLAN solution consisted of a single ZoneFlex R710 AP and the Ruckus Wireless SmartZone 100 WLAN controller. The software level for the Ruckus Wireless system was 3.1.1.0.x. The SmartZone 100 downloads the current software to the AP automatically.

#### 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 Figure 1 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.

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.

#### Link Aggregation

This test verified that the LAN switch could support the link aggregation function whereby two physical Gigabit Ethernet ports on the AP can be combined logically to provide higher bandwidth between the AP and the LAN switch.

Tolly engineers used the Brocade switch command, “show LAG”, to verify that the two Gigabit Ethernet ports of the AP under test were recognized as a link aggregation group.

#### 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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