TEST REPORT

Tolly.

#223127

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Commissioned by Extreme Networks

Extreme Networks:

Interoperability Evaluation for Cisco Catalyst & WLAN with Extreme Switches

EXECUTIVE SUMMARY

Wireless LANs are an essential part of enterprises of all sizes and Wi-Fi 6 is the latest generation bringing enhanced performance and implementing 2.5GbE uplinks from AP to switch. To further enhance performance, Cisco Systems implements multiple 10GbE ports on its Catalyst WLAN controller. Extreme Networks provides high-performance switching ideal for serving as a network fabric for high-performance Wi-Fi 6 wireless networks.

Extreme Networks commissioned Tolly to evaluate the interoperability of its Extreme 5520-24X 10GbE and 5720-48MW series of LAN switches with the Cisco Systems WLAN and wired solutions as implemented in the Cisco Systems Catalyst 9800 WLAN Controller, Catalyst 9115 Series Wi-Fi 6 Access Point, and Catalyst 9200 48-port PoE switch.

The Extreme Networks LAN switches and the Cisco Systems Catalyst wireless WLAN solutions demonstrated interoperability across all functionality tests and illustrated interoperability with the 2.5GbE AP uplink, 10GbE WLAN controller, and the Cisco Systems Catalyst switch. See Table 1 for WLAN results.

THE BOTTOM LINE

The Extreme switches & Cisco WLAN Controller and AP illustrated:

1. Power over Ethernet (PoE) & LLDP power negotiation interoperability
2. VLAN tagging interoperability
3. sFlow & LLDP system interoperability & visibility
4. Interoperability with 2.5GbE uplink of the AP
5. Link Aggregation interoperability with the WLAN controller (10GbE)

Extreme Networks 5520-24X & 5720-48MW LAN Switch Interoperability with Cisco Systems Catalyst 9800 WLAN Controller & Cisco Catalyst 9115 Series Wi-Fi 6 Access Point

Feature/Function	Extreme Networks 5520-24X (10GbE Switch with 40GbE Uplinks)	Extreme Networks 5720-48MW PoE (GbE switch with 10GbE Uplinks)
Power over Ethernet (PoE)	N/A. See note.	✔
Link Layer Discovery Protocol (LLDP)	✔	✔
PoE Power Negotiation via LLDP	N/A. See note.	✔
VLANs (Tagged traffic)	✔	✔
sFlow Support	✔	✔
2.5GbE Uplink Support	N/A. See note.	✔
Link Aggregation (Multiple controller 10GbE ports to switch)	✔	✔

Note: The 5520-24X is a 10GbE switch and is not used for access point connectivity. The 5520 product family has models that do include PoE and PoE power negotiation.

Source: Tolly, July 2023

Table 1

Extreme Networks

5520-24X 10GbE and 5720-48MW GbE PoE Switches

LAN Switch & Cisco WLAN & Wired Interoperability Evaluation

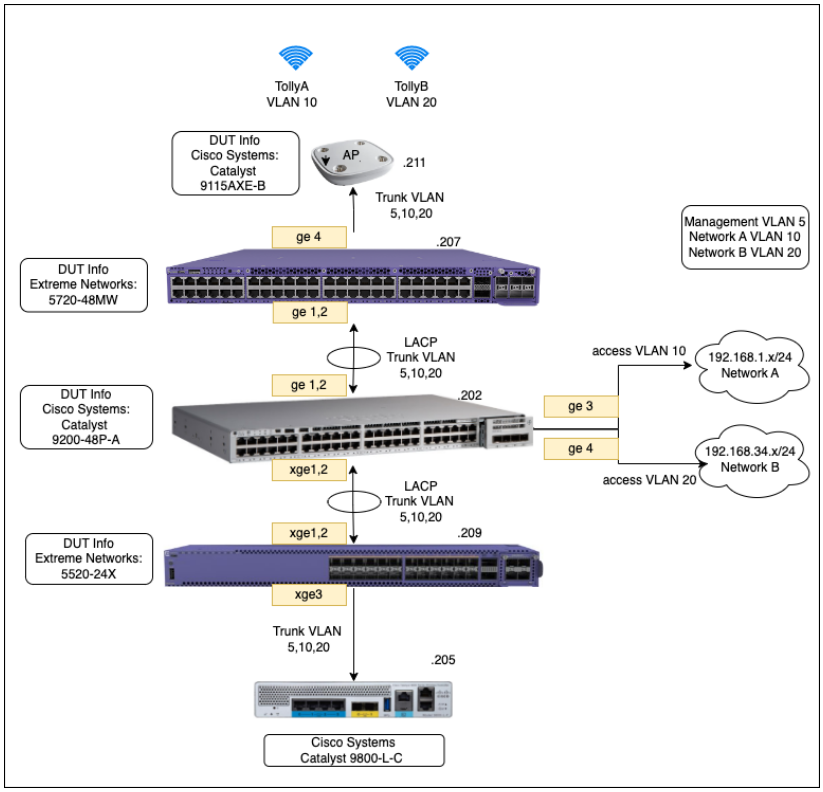
Tested July 2023

Background

Extreme Networks 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 features such as Power over Ethernet, LLDP, and VLANs, function effectively between the wired LAN and WLAN infrastructure components. Illustrating that functionality and interoperability was the driver for this test. Additionally, it is imperative to prove support for 10GbE and 2.5GbE uplinks as WLAN capacities continue to increase. As noted, all WLAN results are summarized in Table 1.

Tests were conducted in a microcosm of an Enterprise environment. This consisted of Extreme LAN switches providing wired Ethernet switching, including Power over Ethernet and Multigigabit Ethernet and 10GbE ports, communicating across the Cisco Catalyst 9200 switch. The Cisco WLAN AP was connected to the Extreme PoE switch and the Cisco WLAN controller was connected to the Extreme 10GbE switch. Various test clients on multiple network segments provided session traffic needed to evaluate the interoperability. All components were tested as a complete system. For an illustration of the test environment, see Figure 1.

Extreme Networks LAN Switch Interoperability with Cisco WLAN & Wired Infrastructure Test Environment



Source: Tolly, July 2023

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 Extreme Networks switch provided the required power to the AP via the wired 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 Extreme Networks switches discovered key system information and details about the AP under test. The details included system name, description, 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 Extreme Networks 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 Extreme Networks switches 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.

Tests showed that the Extreme Networks switches interoperated with the WLAN under test to create a two-port, link aggregation group (LACP) using two 10Gigabit Ethernet ports implemented in the WLAN controller under test. Two additional LACP-based LAGs were created between the Cisco Catalyst 9200 switch and both Extreme switches, which passed data to/from the WLAN clients.

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 Extreme Networks switches collected network traffic data from the AP under test. Tolly engineers displayed the AP-to-WLAN controller network traffic data using a network protocol analyzer.

2.5GbE Multigigabit Access Port

Interoperability was confirmed for the Extreme 5720 switch to the AP. This test was ot applicable to the other Extreme switch tested.

Switch Capabilities

In addition to the interoperability testing, Tolly engineers also validated more than a dozen important LAN switch capabilities.

These additional capabilities are listed in Table 2. Each Extreme switch passed all applicable test. (PoE/PoE+, for example, did not apply to the Extreme 5520-24X 10GbE switch.)

Each capability was configured as appropriate via the Extreme CLI and observed operating in the multi-switch environment. Because of the basic nature of those functions methodologies are not listed.

Test Setup & Methodology

Systems Under Test

LAN Switch

Tolly Group engineers tested WLAN interoperability using the Extreme Networks switches as the wired Ethernet LAN Switches. For switch infrastructure details, see Table 2.

WLAN Access Point & Controller

The Cisco Systems WLAN solution consisted of the Cisco Catalyst 9800 Series WLAN controller and a Cisco Catalyst 9115 Series Wi-Fi 6 Access Point. The AP was configured with a static IP address. The Cisco WLAN controller was configured to have the AP traffic tunneled to the controller, and tests were also conducted with local bridging mode For WLAN infrastructure details, see Table 3.

Clients & Session Traffic

Various common clients (Windows, MacOS, iOS wired and wireless) were used as required to provide the session traffic over the WLAN/wired environment. As the use of these clients was to provide generic traffic to illustrate that the environment was operational and that traffic could flow across the heterogenous switch-AP-controller environment client details are not relevant and, thus, not documented herein.

Extreme Networks Switch Capabilities Evaluation Results

Function	Description	Result
Static IP address support	Support for configuring ports with static IP addresses	✔
Hot-swappable power supplies	Support for multiple power supplies with hot-swap capability	✔
Remote configuration load	Support for loading configuration remotely via TFTP or FTP	✔
In-band configuration via SSH/ Telnet	Support for configuration via SSH and Telnet protocols	✔
Remote SNMP management	Support for remote management via SNMP	✔
VLAN trunks and 802.1Q tags	Support for IEEE 802.1Q virtual LAN tags and trunks	✔
RMON Group 1 and 2 Statistics	Support for remote network monitoring Group 1 & 2	✔
802.1s MSTP	Support for the IEEE 802.1s multiple spanning tree protocol	✔
Network Time Protocol (NTP)	Support for client and server NTP (client tested)	✔
Logging	Support for logging/reporting user access, configuration changes, and system events	✔
IGMP v2	Support for Internet Group Management Protocol v2	✔
802.1p QoS	Support for IEEE 802.1p priority bits	✔
802.3ad link aggregation	Support for IEEE 802.3ad link aggregation	✔
802.3at PoE+	Support for IEEE 802.3at Power over Ethernet+	✔

Source: Tolly, July 2023 Table 2

Test Methodology

Power Over Ethernet

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

Tolly engineers used the Extreme switch show command to validate that the switch was delivering power to the AP under test. Tolly engineers reviewed the power setting on the port before and after the AP was connected.

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 Extreme switch show command to verify that the Extreme switch could identify the system name of the AP under test.

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 Extreme switches.

Tolly engineers verified that the sessions were established and,

Solutions Under Test

Role	Vendor	Device Type	Multigigabit Copper (2.5/5GbE) Ports	Device	Version
Switch Infrastructure	Extreme Networks	LAN Switch	Yes	5520-24X	32.4.1.10
	Extreme Networks	LAN Switch	Yes	5720-48MW	32.4.1.10
	Cisco Systems	LAN Switch	Yes	C9200-48P-A	16.12.4
WLAN Infrastructure	Cisco Systems	WLAN Controller with fiber uplink	N/A	Cisco Catalyst C9800-L-F-K9	16.12.4a
	Cisco Systems	WLAN Wi-Fi 6 Access Point	Yes	Cisco Catalyst 9115 Series Wi-Fi 6 Access Point	Loaded from WLAN controller

Source: Tolly, July 2023

Table 3

additionally, used Extreme 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 via LACP to provide higher bandwidth between the WLAN controller and the LAN switch.

Tolly engineers configured a port channel using LACP on the Extreme switch using two 10GbE ports between the switch and the Cisco WLAN controller. Engineers confirmed that the WLAN controller recognized and used the link aggregation group.

2.5GbE Multigigabit Access Port

This test verified that the switch could communicate with the AP at 2.5GbE over the AP's multigigabit link to the switch. This test was run only on the Extreme Networks 5720-48MW switch.

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 the designated capture port.

Tolly engineers used a Wireshark network protocol analyzer to capture the traffic to confirm that sFlow was being sent to the designated capture port. Wireshark was used to display the data to confirm its contents as sFlow.

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