

ALAXALA Switch Interoperability Evaluation with Cisco Catalyst

ALAXALA AX6600S, AX3640S and AX1240S with Cisco Catalyst 3750-X and 6509-E

EXECUTIVE SUMMARY

IT managers who deploy a variety of switching devices in their networks need assurances of interoperability of these switches in order to maintain a functional network. In a world of ever-evolving standards and tight budgets, network managers evaluating new equipment need to know that the switches they purchase are interoperable with their current infrastructure. It is important to know which devices can interoperate with an existing Cisco LAN switch infrastructure.

ALAXALA commissioned Tolly to evaluate three of its enterprise-class LAN switches for Layer 2 / Layer 3 interoperability with the Cisco Catalyst 3750-X and 6509-E switches. The evaluation found that the ALAXALA AX6604S, AX3640S-24T2XW and AX1240S-24T2C (Layer 2 only) switches all achieve a broad spectrum of L2/L3 interoperability including support for 10GbE LAN PHY interfaces, 802.1p/Q VLAN tags, link aggregation, Multiple Spanning Tree, PIM-Sparse/Dense Mode Multicast, OSPF, BGP4 protocols and more.

THE BOTTOM LINE

The ALAXALA AX6604S, AX3640S-24T2XW and AX1240S-24T2C switches:

- 1 Earned 15 certifications for Layer 2 and Layer 3 advanced LAN functions
- 2 Demonstrated consistent stability in mixed environments
- 3 Achieved broad Layer 2 and Layer 3 interoperability with the Cisco Catalyst 3750-X and 6509-E
- 4 Interoperated with other devices tested when supporting 10GbE LAN PHY interface, 802.1p/Q VLAN tags, link aggregation, Multiple Spanning Tree, PIM-Sparse/Dense Mode Multicast, OSPF, BGP4 protocols and more

ALAXALA AX6604S Layer 2/ Layer 3 Interoperability Features/ Functions with Cisco Catalyst 3750-X and 6509-E

| Feature/Function | ALAXALA AX6604S Interoperability With | |
|----------------------------|---------------------------------------|---|
| | Cisco Catalyst 3750-X | Cisco Catalyst 6509-E |
| Auto-negotiation | ✓ | ✓ |
| VLAN Tag Propagation | ✓ | ✓ |
| Link Aggregation (802.3ad) | ✓ | ✓ |
| RSTP | ✓ | ✓ |
| MSTP | ✓ | ✓ |
| 10 GbE PHY | ✓ | ✓ |
| Jumbo Frame Support | ✓ | Cisco line card does not support this feature |
| RIPv2 | ✓ | ✓ |
| RIPng | ✓ | ✓ |
| OSPFv2 | ✓ | ✓ |
| OSPFv3 | ✓ | ✓ |
| BGP4 | ✓ | ✓ |
| PIM-DM | ✓ | ✓ |
| PIM-SM | ✓ | ✓ |
| PIM-SSM | ✓ | ✓ |

Source: Tolly, February 2012

Table 1



Background

Tolly engineers subjected the ALAXALA AX6604S, AX3640S-24T2XW and AX1240S-24T2C to over a dozen tests in several functional areas in conjunction with the Cisco Catalyst 3750-X and 6509-E switches, including support for auto-negotiation, 802.1p/Q, VLAN tag propagation, 10GbE LAN PHY support, 802.3ad LACP support, Rapid Spanning Tree Protocol support, RIPv2, RIPng, OSPFv2, OSPFv3, BGP4, PIM-DM, PIM-SM and PIM-SSM.

The ALAXALA AX3640S and AX6604S, being access and carrier-class switches, respectively, interoperated with both Cisco switches in all Layer 2 and Layer 3 tests, while the AX1240S, being a Layer 2 switch, interoperated with both Cisco switches in the Layer 2 scenarios. See Tables 1, 2 and 3 for details.

Test Results

Layer 2 Functions

10/100/1000 Auto-Negotiation

Engineers tested the interoperability of the ALAXALA switches with the Cisco Catalyst 3750-X and 6509-E switches. The ALAXALA switches demonstrated full interoperability with the Cisco switches in this category. Devices earning this certification have demonstrated the ability to establish the highest available speed and duplex settings.

802.1p/Q VLAN Tag Propagation

The ALAXALA switches interoperated with both Cisco Catalyst switches tested. Devices earning this certification have demonstrated the ability to maintain and recognize 802.1p/Q tags.

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AX6604S, AX3640S-24T2XW, AX1240S-24T2C



Layer 2/3 Switch Interoperability Evaluation

Tested February 2012

Link Aggregation Control Protocol (802.3ad)

This test verifies a devices' ability to trunk ports across multiple switches using LACP. For this test, all ALAXALA switches achieved interoperability with both Cisco Catalyst switches under test.

ALAXALA AX3640S-24T2XW Layer 2/Layer 3 Interoperability Features/Functions with Cisco Catalyst 3750-X and 6509-E

| Feature/Function | ALAXALA AX3640S-24T2XW Interoperability With | |
|----------------------------|--|---|
| | Cisco Catalyst 3750-X | Cisco Catalyst 6509-E |
| Auto-negotiation | ✓ | ✓ |
| VLAN Tag Propagation | ✓ | ✓ |
| Link Aggregation (802.3ad) | ✓ | ✓ |
| RSTP | ✓ | ✓ |
| MSTP | ✓ | ✓ |
| 10 GbE PHY | ✓ | ✓ |
| Jumbo Frame Support | ✓ | Cisco line card does not support this feature |
| RIPv2 | ✓ | ✓ |
| RIPng | ✓ | ✓ |
| OSPFv2 | ✓ | ✓ |
| OSPFv3 | ✓ | ✓ |
| BGP4 | ✓ | ✓ |
| PIM-SM | ✓ | ✓ |
| PIM-SSM | ✓ | ✓ |

Source: Tolly, February 2012

Table 2



Rapid Spanning Tree Protocol (RSTP)(802.1w)

Devices earning this certification demonstrated the ability to detect a failure of the Layer 2 Spanning Tree via the Rapid Spanning Tree protocol and attempted to establish a new Layer 2 “tree”.

In networks where multiple data paths exist, this approach provides a quicker re-establishment of traffic paths and dramatically reduces user downtime when compared with the recovery mechanism of traditional 802.1D Spanning Tree bridges/ switches.

For this test, the ALAXALA switches demonstrated interoperability with both Cisco Catalyst switches under test.

Multiple Spanning Tree Protocol (MSTP) (802.1s)

This test verifies that the ALAXALA switches under test implement multiple Spanning Tree instances on a switch port to selectively allow or block multiple VLANs,

without blocking the entire traffic traversing the port.

10GbE LAN PHY

This test verifies that the ALAXALA switches under test have the ability to transmit data between 10-Gigabit Ethernet interfaces. In this test, the two supporting ALAXALA switches successfully interoperated with both Cisco Catalyst switches under test.

Jumbo Frames Support

This test could not be attempted with the Cisco Catalyst 6509-E because the supplied Cisco 6509-E line card does not support jumbo frames. All ALAXALA switches interoperated with the Cisco Catalyst 3750-X.

Devices earning this certification have demonstrated the ability to transmit jumbo frames (9K bytes) across all possible vendor combinations under test.

Layer 3 Functions

The following interoperability tests apply only to the Layer 3 switches under test, the

ALAXALA AX6604S and AX3640S-24T2XW with the Cisco Catalyst 3750-X and 6509-E.

RIPv2

This test verifies that the switches exchange IPv4 routing table information via RIPv2 protocols all ALAXALA switches with L3 capabilities interoperated with both Cisco Catalyst switches under test.

RIPng

This test verifies that the ALAXALA switches under test exchanged IPv6 routing table information via RIPng protocol. All of the ALAXALA switches under test interoperated with both Cisco Catalyst switches under test.

OSPFv2

Tolly engineers verified that the all ALAXALA switches under test exchanged routing table information via OSPFv2 with the Cisco Catalyst switches under test.

OSPFv3

This certification verifies that the switches under test can exchange IPV6 routing table

ALAXALA AX1240S-24T2C Layer 2 Interoperability Features/Functions with Cisco Catalyst 3750-X and 6509-E

| Feature/Function | ALAXALA AX1240S-24T2C Interoperability With | |
|----------------------------|---|---|
| | Cisco Catalyst 3750-X | Cisco Catalyst 6509-E |
| Auto-negotiation | ✓ | ✓ |
| VLAN Tag Propagation | ✓ | ✓ |
| Link Aggregation (802.3ad) | ✓ | ✓ |
| RSTP | ✓ | ✓ |
| MSTP | ✓ | ✓ |
| Jumbo Frame Support | ✓ | Cisco line card does not support this feature |

Source: Tolly, February 2012

Table 3



ALAXALA Product Specifications (Vendor-provided specifications. Not verified by Tolly)

| ALAXALA AX6600S Series: AX6604S | |
|---------------------------------|--|
| Port Count | 32 Ports 10GBASE-R (XFP) 96 Ports 1000BASE-X (SFP) 96 Ports 1000BASE-T |
| Full line rate performance | 192Gbps (2 Control and Switching Units (CSU)) |

| ALAXALA AX3600S Series: AX3640S-24T2XW | |
|--|---|
| Port Count | 2 Ports 10GBASE-R(XFP)+ 4 Ports 1000BASE-X(SFP)/1000BASE-T ¹ + 20 Ports 1000BASE-T |
| Full line rate performance | 88Gbps |

| ALAXALA AX1200S Series: AX1240S-24T2C | |
|---------------------------------------|---|
| Port Count | 2 Ports 1000BASE-X(SFP)/1000BASE-T ¹ + 24 Ports 10/100BASE-T |
| Full line rate performance | 8.8Gbps |

| Software Features | |
|--------------------------------------|---|
| Layer 2 Functions | Port VLAN/Tag-VLAN, STP/RSTP/PVST+/MSTP, Ring, BPDU filter, root guard, loop guard IGMPv2/v3 snooping, MLDv1/v2 snooping |
| Layer 3 Functions ² | IPv4/IPv6 Unicast (Static, RIPv2, RIPng, OSPF, OSPFv3, BGP4, BGP4+) IPv4/IPv6 Multicast (PIM-SM, PIM-SSM, IGMPv2/v3, MLDv1/v2) |
| Security | IEEE802.1X/MAC/WEB authentication, filtering |
| Reliability/ Operability Improvement | Link aggregation, Jumbo frame, Storm control, UDLD, L2 loop detection, GSRP ² , VRRP ² |
| QoS | Flow detection, Marking, Mapping, Shaping, Priority control, Discarding control |
| Management | SNMP, MIB-II, RMON, syslog, lldp, telnet, ftp, Port mirroring |
| Power Savings | Static/Dynamic power saving |
| Redundancy ³ | Control and Switching Unit (CSU), Power Supply |

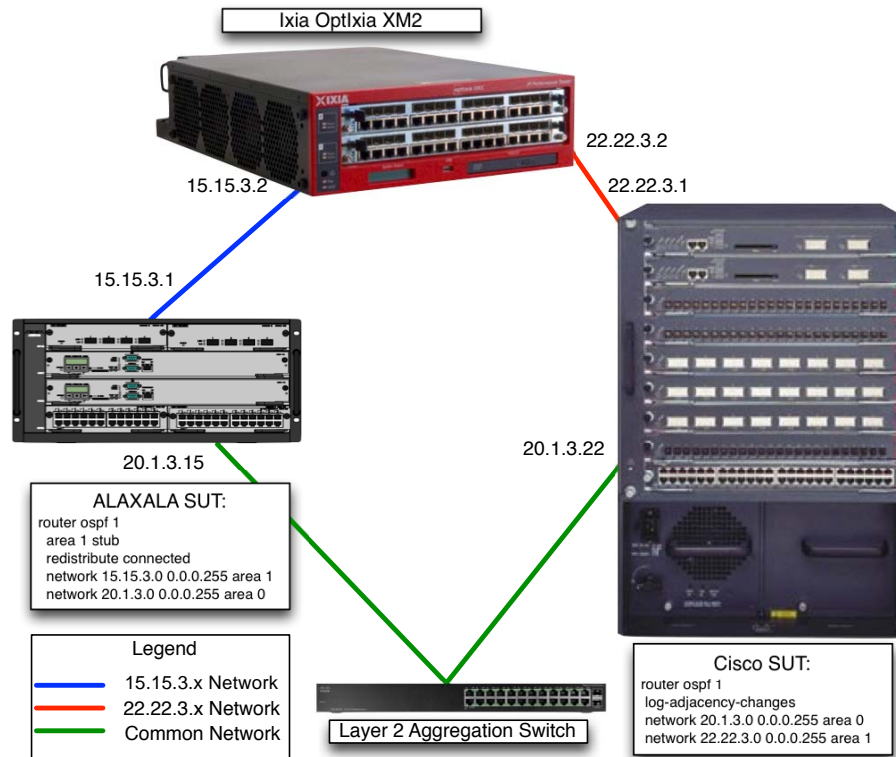
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- 1. Mutually Exclusive
- 2. Not Supported on AX1240S
- 3. Supported on AX6604S

Source: ALAXALA Networks Corp., February 2012

Table 4

OSPFv2 Test Bed Topology



Source: Tolly, February 2012

Figure 1

information via the OSPFv3 protocol. All ALAXALA switches were able to exchange this information with both Cisco Catalyst switches under test.

BGP4

Devices earning this certification demonstrated the ability to share routing information via the BGP4 with another switch. All ALAXALA switches under test were able to share this information with both Cisco Catalyst switches under test.

IP Multicasting- PIM Dense Mode (PIM-DM)

Devices earning this certification demonstrated the ability to provide IP

Multicasting services using the PIM-DM protocol.

This verifies a devices' ability to host and join IP multicast groups via PIM-DM in a multivendor network.

For this test, the AX6604S demonstrated interoperability using PIM-DM with both Cisco Catalyst switches under test.

IP Multicasting-PIM Sparse Mode (PIM-SM)

Devices earning this certification demonstrated the ability to provide IP Multicasting services using the PIM-SM protocol. This verifies a devices ability to update the multicast routing table and to



The test methodology used for this report relies upon test procedures, metrics and documentation practices as defined in Common Test Plan #1088: LAN Switch Interoperability.

To learn more about Tolly Common Test Plans, please visit: www.commonestplan.org



the deliver multicast packets to the appropriate multiple destinations via PIM-SM in a multivendor network. For this test all ALAXALA switches under test were able to demonstrate interoperability using PIM-SM with both Cisco Catalyst switches under test.

IP Multicasting- PIM Source Specific Multicast (PIM-SSM)

This certification verifies that the devices under test can support IP Multicast using PIM Source Specific Multicast (PIM-SSM). For this test all ALAXALA switches demonstrated interoperability using PIM-SSM with both Cisco Catalyst switches under test.

Test Setup & Methodology

Tolly Group engineers tested three ALAXALA switch models: the AX6604S, AX3640S-24T2XW and AX1240S-24T2C. Additional details on the ALAXALA switches tested can be found in Table 4. Full details on the methodology used can be located in the Tolly Common Test Plan #1088: LAN Switch Interoperability v1.01 on The Tolly Group's Web site at www.tolly.com.

The test bed utilized an Ixia Optixia XM2 traffic generator running IxOS 6.10 GA Patch1, using IxNetwork 6.0 as the source application.

For interoperability tests, Tolly engineers connected the ALAXALA AX6604S, AX3640S-24T2XW and AX1240S-24T2C switches in turn to both the Cisco Systems Catalyst 3750-X and Cisco Systems Catalyst 6509-E, respectively.

The Cisco Catalyst 3750-X was configured with 24x GbE ports, with an additional four 10GbE ports. The Cisco Catalyst 6509-E was configured with one 48-port GbE line card, and one 4-port 10GbE line card, in addition to two route processing modules. Both switches were running IOS Software version 12.2.

The ALAXALA AX1240S, running version 2.3.B, was configured with 24 Fast Ethernet ports and two SFP/RJ45 GbE ports. The AX3640S was configured with 24 GbE ports and two 10GbE ports, running OS-L3A-A version 11.6. The AX6604S Chassis was equipped with two, 24-port GbE modules and two, 4-port 10GbE modules, in addition to two Control and Switching Units, running OS-S version 11.5.

Each switch was configured in port-pairs for a given feature to ease testing efforts. For example, gigabit ports 3 and 4 on each switch were configured with two MSTP instances, allowing VLANs 10 & 20, with individual port-priorities and cost assigned for both vendors. When connected, engineers were able to verify that MSTP was negotiating properly from each console. Engineers then generated two streams of 10,000 pps on each VLAN, failed one of the links, and verified that the VLAN failed over to the active link, using the frame loss to calculate failover time.

For the Layer 3 portion of the testing, one port on each switch was connected to the XM2 traffic generator, configured with an IP address, and a second port was connected to a common network with all other switches. With each routing protocol, engineers verified that traffic could be passed from one Ixia port to another and proper routing tables existed on all switches. See Figure 1 for details on the OSPFv2 Interoperability test environment.



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Test Equipment Summary

The Tolly Group gratefully acknowledges the providers of test equipment/software used in this project.

| Vendor | Product | Web |
|--------------------|---|--|
| Ixia | Optixia XM2, IxOS 6.10 GA Patch 1 Interfaces: 32x 1Gbps Card Type: 2 x LSM1000 XMV16-01 |  http://www.ixiacom.com |
| The Siemon Company | Cat 6A Patch Cables LC - Multi-mode Fiber Optic Patch Cables |  http://siemon.com |

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