Juniper® Validated Design

JVD Test Report Brief: Distributed Enterprise Branch EX Series

JVD-ENTWIRED-DISTENT-02-01

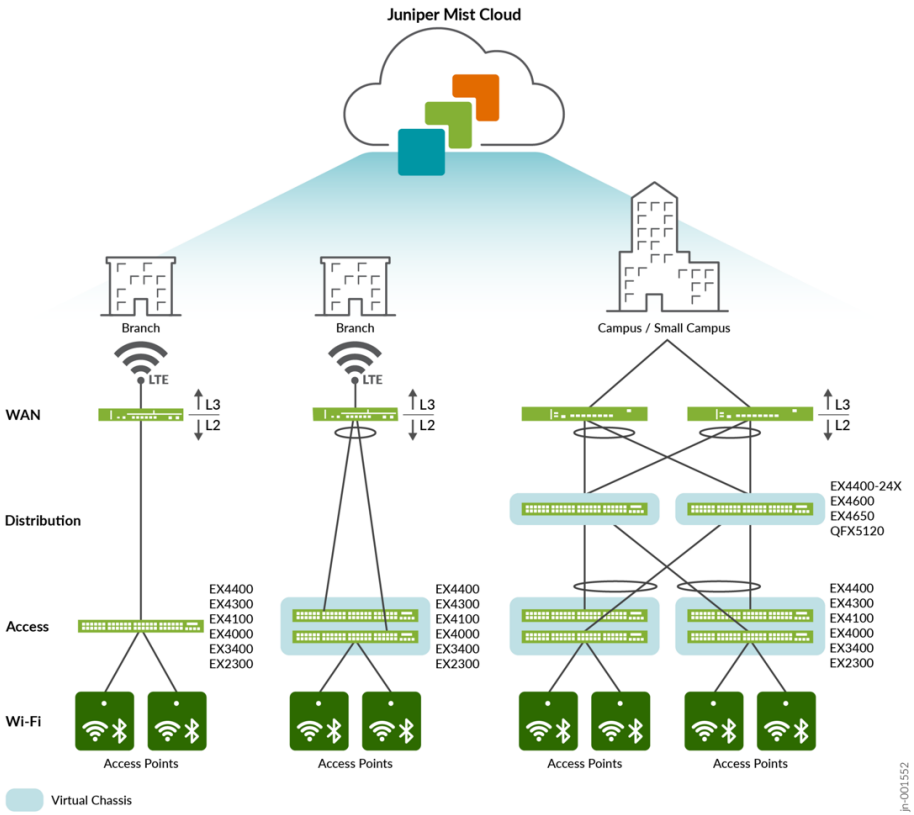
Introduction

This test plan aims to validate the Distributed EX Branch version 2 JVD.

Juniper® Wired Assurance is a cloud service that brings automated operations and service levels to enterprise campus switches, IoT devices, access points, servers, printers, and other equipment. It simplifies every aspect of wired switching, from Day-0 for seamless onboarding and auto-provisioning through Day-2 and beyond for operations and management. Juniper Networks® EX Series Switches and Juniper Networks® QFX Series Switches provide rich streaming telemetry through the Junos® operating system, which enables insights into what the switch is experiencing and how it is doing.

Marvis® AI Assistant complements Wired Assurance by using Mist AI™ to simplify and troubleshoot network operations with self-driving actions that automatically remediate issues. Marvis enables teams to shift from reactive troubleshooting to proactive remediation by turning insights into automated actions as part of the Self-Driving Network™.

Figure 1: Branch Architectures with Juniper EX Series Switches



Two major designs for branch testing with EX Series Switches are derived and tested:

- A design with a standalone switch and multiple Virtual Chassis in the access layer that are then directly connected to the WAN router. (Ruggedized EX and EX4000).
- A design in which the standalone switch and the Virtual Chassis in the access layer are connected to a Virtual Chassis in the distribution layer. That distribution layer then has the final connection to the WAN router. This is usually suggested when a customer wants to deploy five or more Virtual Chassis in the access layer.

Test Topology

Figure 2: Lab Without Distribution Switches Topology 1

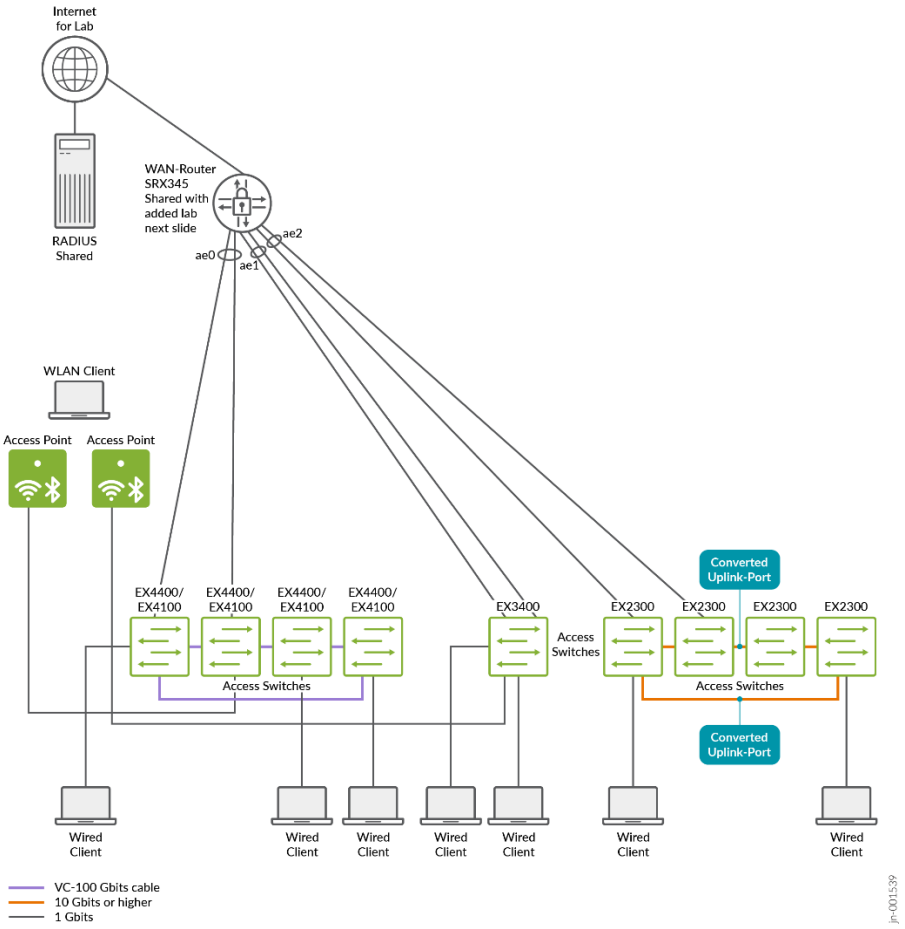


Figure 3: Lab Without Distribution Switches Topology 2

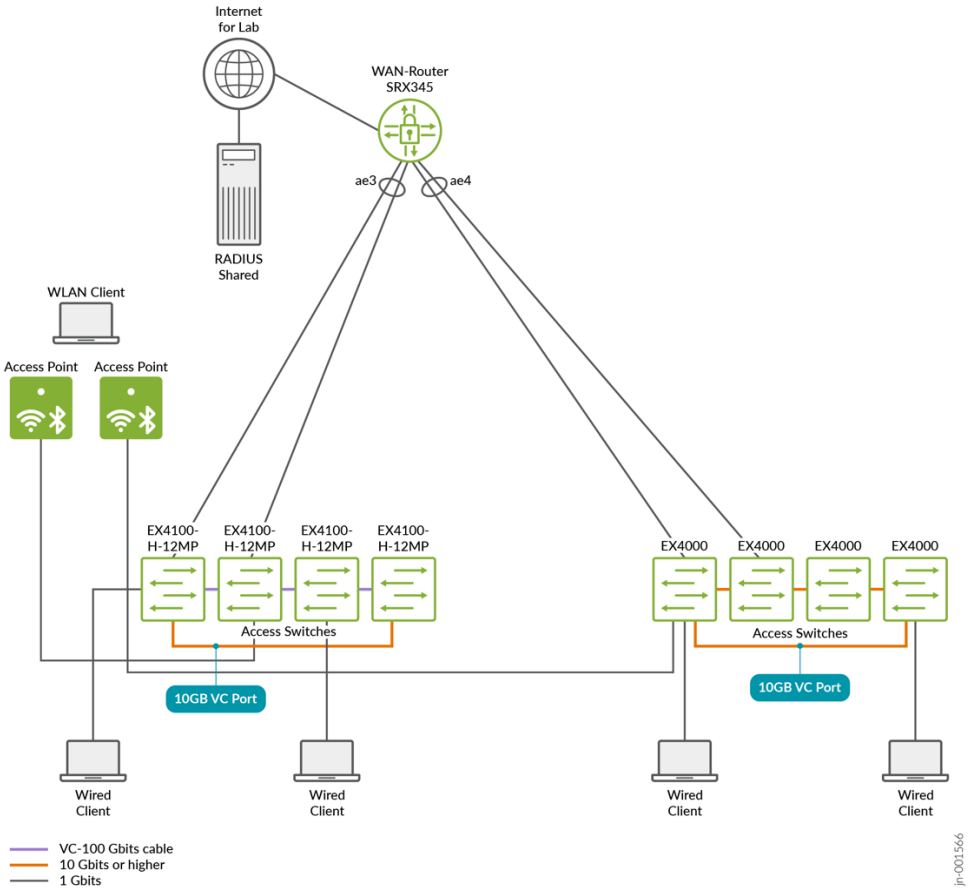


Figure 4: Lab with Distribution Switches Topology 2

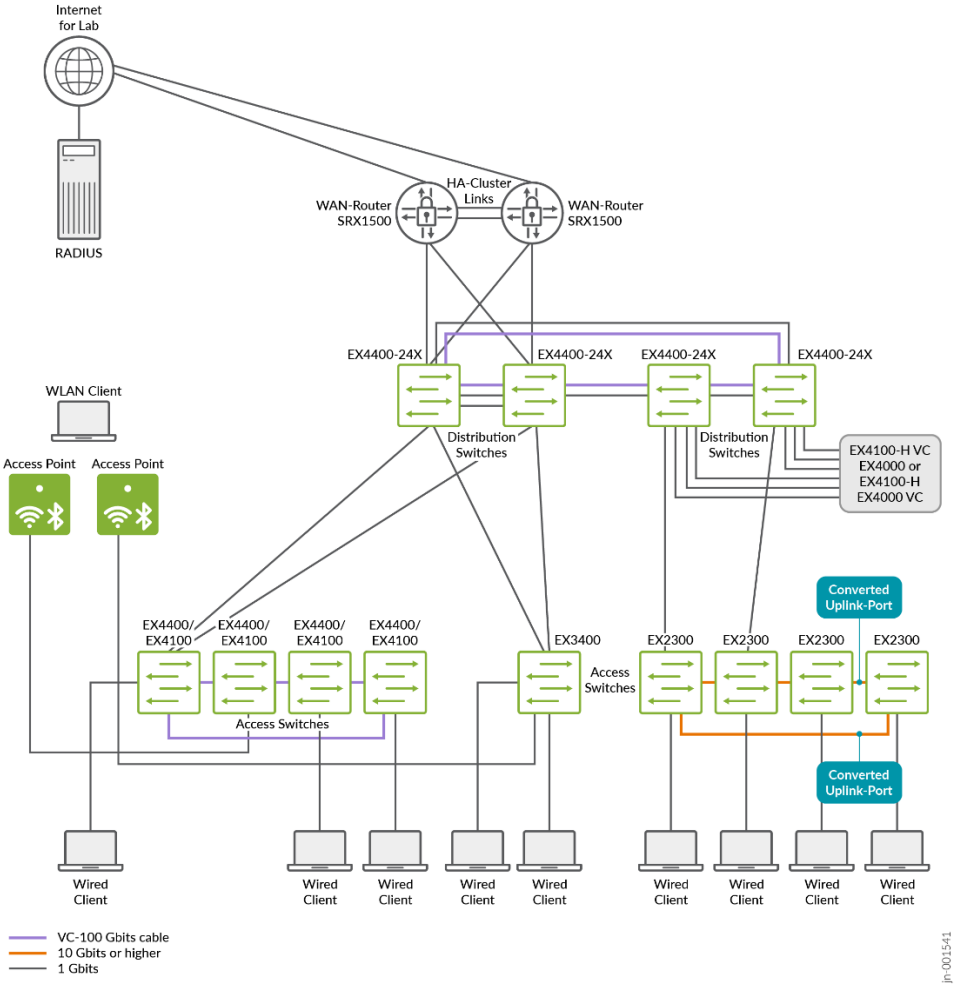
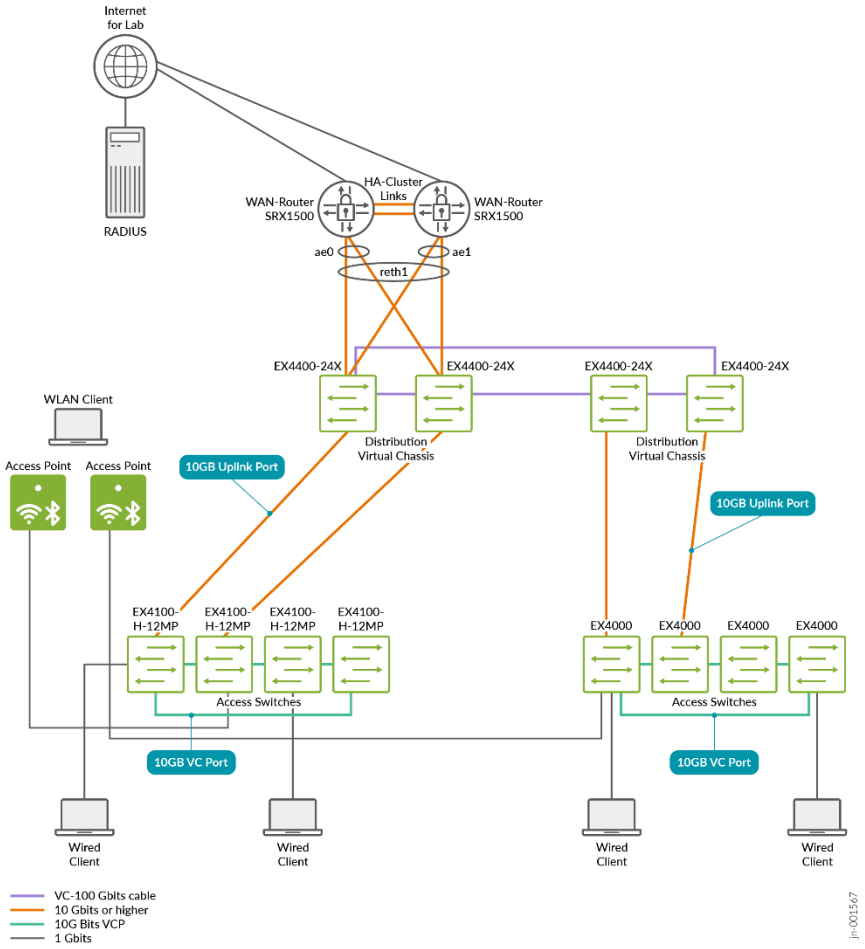


Figure 5: Lab with Distribution Switches Topology 2 (Continued)



Platforms Tested

Table 1: Platforms, Controllers, and Roles

Tag	Role	Model	OS	Linecard	RE	Fabric	VC	Helper/DUT	Additional Info
R0	ACCESS-Switch-1	EX4400	Junos OS 24.4R2	NA	NA	NA	YES	DUT	
R1	ACCESS-Switch-2	EX4100	Junos OS 24.4R2	NA	NA	NA	YES	DUT	
R2	ACCESS-Switch-3	EX2300	Junos OS 24.4R2	NA	NA	NA	YES	DUT	
R3	ACCESS-Switch-4	EX2300	Junos OS 24.4R2	NA	NA	NA	NO	DUT	

Tag	Role	Model	OS	Linecard	RE	Fabric	VC	Helper/DUT	Additional Info
R4	ACCESS-Switch-5	EX4100-H	Junos OS 24.4R2	NA	NA	NA	YES	DUT	
R5	ACCESS-Switch-6	EX4000	Junos OS 24.4R2	NA	NA	NA	YES	DUT	
R6	DISTRIBUTION-Switch	EX4400-24X	Junos OS 24.4R2	NA	NA	NA	YES	DUT	
R7	WAN-Router	SRX1500	Junos OS 21.2R3-S7.7	NA	NA	NA	NO	Helper	SRX Cluster , External Gateway/DHCP Server
R8	WAN-Router	SRX345	Junos OS 23.4R2-S4.9	NA	NA	NA	NO	Helper	External Gateway/DHCP Server
R9	RADIUS-Server	Linux	Ubuntu 16.04.3 LTS	NA	NA	NA	NO	Helper	Dot1X Server
AP	MIST AP	AP	Mist OS	NA	NA	NA	NO	Helper/DUT	Wi-Fi Access Point
RT0	Traffic Generator	Spirent	SpirentOS	NA	NA	NA	NO	Helper	Access hosts / DHCP Client

Scale and Performance Data

- Number of WAN routers: 1 (in HA mode with 2 nodes)
- Number of distribution switches tested: 1 (Virtual Chassis with 4 members)
- Number of access switches tested: 5 (4 Virtual Chassis (4 members each) + 1 standalone switch)
- Wired clients: 2000
- VLANs: 50

High Level Features Tested

- Day0: VC formation and on-boarding to Mist via ZTP
- Day1: Site-Variables (IPv4 and IPv6), Switch Template configuration
- Day2: Features, RMA, Replacing, Adding and deleting VC members
- Wired and Wireless Client Testing
- Monitoring: Switch Insights, Wired Assurance Alerts, Wired SLE monitoring, Marvis Virtual Network Assistant
- JMA testing (Dynamic Packet Capture).
- Wi-Fi Access Points

- Layer-3 Gateways on WAN-Router with Redundant WAN Router Design
- RADIUS-Server for Dot1x and DHCP
- Syslog (IPv4 and IPv6)
- DNS and NTP (IPv4 and IPv6)
- Access features testing
    - Protect RE-Filter (IPv4 and IPv6)
    - DHCP Lease
    - DHCP Snooping (IPv4 and IPv6)
    - IP Source Guard
    - Dynamic Arp Inspection
    - Dot1x Authentication
    - Storm-Control
    - MAC-Address limit with aging
    - Voice VLAN
    - QoS Profile
    - PoE
    - SNMP Monitoring (IPv4 and IPv6)
    - Dynamic-Port Configuration (IPv4 and IPv6)
    - Port Mirroring (IPv4 and IPv6)

Events and Triggers Testing

Link Failures:

- Interface flap for interfaces connected between Access and Distribution Switch
- Interface flap for interfaces connected between Distribution and WAN Router
- PoE Interface flap on Access Devices

Virtual-chassis events:

- Renumbering Distribution and Access Virtual-Chassis members
- Master Change for Distribution and Access Virtual-Chassis
- Existing virtual chassis member swap with a new switch
- Distribution and Access Virtual-chassis member Addition and Replacement
- Distribution and Access Virtual-chassis Routing Engine Reboot

Reboot across roles:

- Node Reboot across Distribution and Access layer Devices
- VC member Reboot on Access Layer Devices

Traffic recovery, control and forwarding plane restoration before and post all the events are monitored.

Traffic Profiles

- Ipv4 and Ipv6 traffic test between all clients of the same VLAN on same switch
- Ipv4 and Ipv6 traffic test between all clients of the same VLAN on different switch
- Ipv4 and Ipv6 traffic test between all clients of the different VLAN on same switch
- Ipv4 and Ipv6 traffic test between all clients of the different VLAN on different switch

Known Limitations

Currently ZTP does not support DHCPv6 onboarding. DHCPv6 configuration for obtaining DHCPv6 address on the vme and irb interfaces will have to be re-configured using additional CLI commands after onboarding the device.

Ipv6 support is not available for Ipv6 SNMP trap servers, Ipv6 source guard, neighbor discovery inspection and Ipv6 Protect RE. These features can be configured using additional CLI commands.

There might be challenges in replacing new Juniper Networks® EX4000 Switches using the Mist UI due to a known bug. This is targeted to be addressed in the next Mist™ platform's cloud product update.

The Juniper Networks® SRX1500 Firewall does not support the LACP "force-up" configuration in newer Junos OS releases.

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