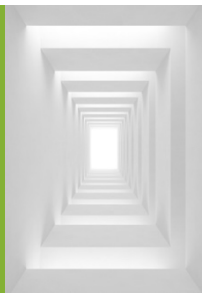
Juniper® Validated Design

JVD Test Report Brief: Enterprise WAN for Finance and Stock Exchange



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Introduction

Multicast traffic is fundamental to stock exchange networks, primarily used for the efficient and simultaneous distribution of real-time market data such as quotes, trades, and order book updates to a large number of trading participants. This ensures fairness, as all clients receive the same data at nearly the same time, supporting synchronized decision-making and competitive parity. Given the extremely high volume and velocity of market data, multicast provides a scalable solution by avoiding overhead of duplicating data streams for each recipient, unlike unicast. However, as multicast typically uses UDP, which lacks retransmission, packet loss must be minimized through a reliable and low loss network design.

The JVD is designed to support latency-sensitive, deterministic, and ultra-fast trade execution. In this architecture, EVPN with L3VPN-NGMVPN is implemented to handle multicast at scale and to meet the performance requirements of the finance and stock exchange WAN network. Low latency and jitter are critical, as even microsecond delays can affect the trade outcomes. Protocols like Internet Group Management Protocol (IGMP) and Protocol-Independent Multicast (PIM) are used to manage multicast group membership and route traffic efficiently. Strict quality of service (QoS) policies prioritize multicast traffic.

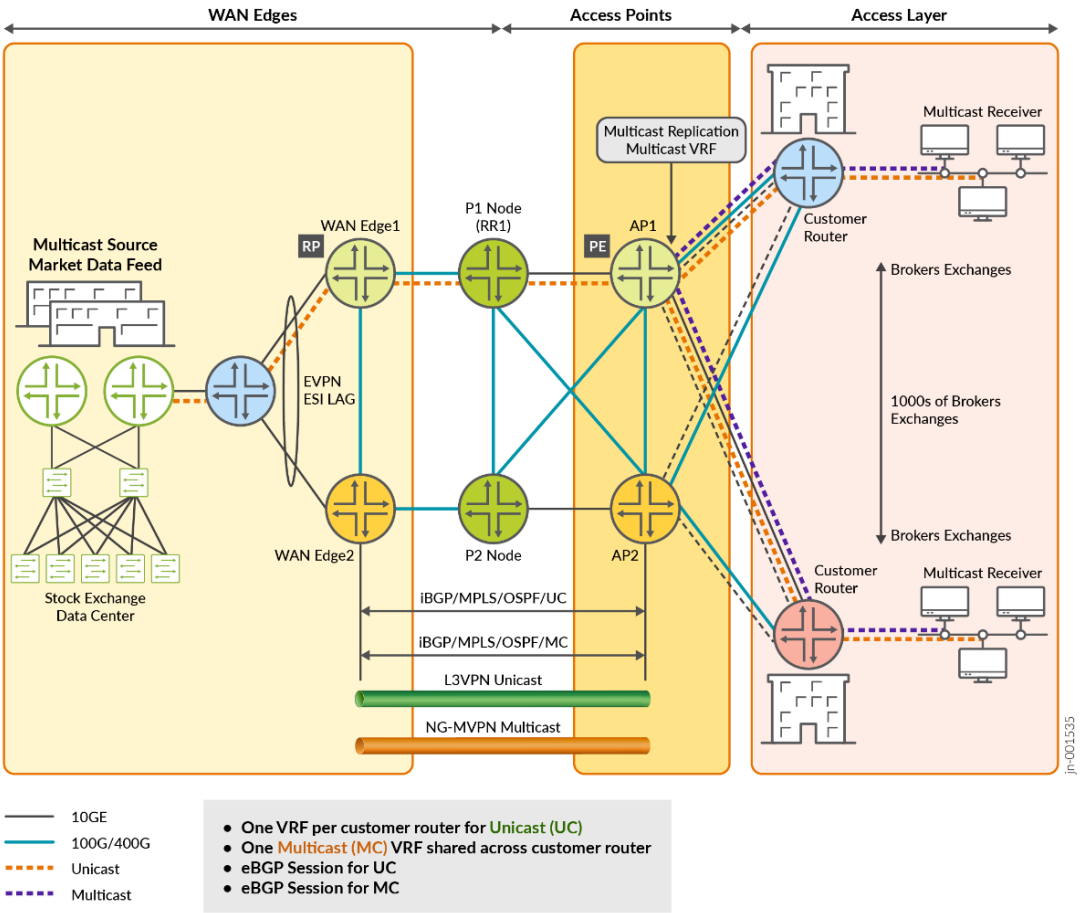
This JVD targets the following platforms for various roles of the Stock Exchange or Finance solution architecture:

- ACX7100-48L as L2/L3 Edge Node
- MX304, MX10008, and Wan Edge Nodes
- PTX10003 and PTX10001-36mr as Provider Nodes (P)
- MX304 and MX10004 as Access Provider Nodes (AP)
- ACX7100-48L and MX480 as Customer Routers

Test Topology

Figure 1 shows the configuration of static RP with WanEdge1 and WanEdge2 as RPs.

Figure 1: Network Architecture of Finance and Stock Exchange



The topology is defined as follows:

Table 1: Role and DUT Details

Role	Helper/DUT
L2/L3 Edge	Helper Router
WANEdge1	DUT (RP)
WanEdge2	Helper Router (RP)
P1	Provider Router : Helper Router
P2	Provider Router : Helper Router
AP1	Access Point : DUT
AP2	Access Point : Helper Device

Role	Helper/DUT
CR1	Customer Router : DUT
CR2	Customer Router : DUT

Platforms Tested

Table 2 lists the platforms tested for this JVD during initial qualification. For more details on all supported platforms and OS versions, see the Validated Platforms and Software section in the JVD document.

Table 2: Platforms, Controllers, and Roles

Tag	Role	Model	OS	Line Card	RE	Fabric	VC	Helper/DUT
R1	L2/L3 Edge	ACX7100-48L	Junos OS EVO 24.4R2	NA	RE-JNP-7100	JNP7100-48L-CHAS	NA	Helper
R2	WanEdge1	MX304	Junos OS 24.4R2	NA	RE 2700 8C 128G	JNP304-CHAS	NA	DUT
R3	P1	PTX10003	Junos OS EVO 24.4R2	NA	RE-JNP10003-80C	RE-JNP10003-80C	NA	Helper
R4	AP1	MX304	Junos OS 24.4R2	NA	RE 2700 8C 128G	JNP304-CHAS	NA	DUT
R5	WanEdge2	MX10004	Junos OS 24.4R2	LC480, LC9600	RE X10	JNP10004-SF2	NA	Helper
R6	P2	ptx10001-36mr	Junos OS EVO 24.4R2	NA	RE-JNP10001-36MR	RE-JNP10001-36MR	NA	Helper
R7	AP2	MX10004	Junos OS 24.4R2	LC9600	RE X10	RE-JNP10001-36MR	NA	Helper
R8	CR1	ACX7100-48L	Junos OS EVO 24.4R2	NA	RE-JNP-7100	JNP7100-48L-CHAS	NA	DUT
R9	CR2	MX480	Junos OS 24.4R2	MPC5E, MPC10E	RE-S-2X00x6	SCBE3-MX-S	NA	DUT
RT0	TGEN	IXIA	9.30.3001.12	NA	NA	NA	NA	Helper

High Level Features Tested

The high level features that are tested are as follows:

- Vlans
- EVPN
- ESI-LAG - Active-Standby
- OSPF
- iBGP

- eBGP
- MPLS
- RSVP-TE
- NG-MVPN - Inclusive Mode
- SPT-ONLY Config
- PIM

Event Testing

The events that are tested with validation of protocol and traffic convergence before and after the event are as follows:

- Restart of critical Junos and Junos Evo processes
- Device reboot
- Interface up or down
- Deleting configuration of various stanzas and evaluating its impact on node and network stability
- Clearing protocol sessions to simulate protocol session flap and impact evaluation on service and traffic

Traffic Profiles

The solution has been validated with the follwing traffic profile, where each multicast VLAN contains multiple traffic streams.

Table 3: Traffic Profiles Details

Stream Name	Load (Mbps)	Packet Size (Bytes)
MVPN_Multicast_Vlan_1	40.96	512
MVPN_Multicast_Vlan_2	40.96	512
MVPN_Multicast_Vlan_3	40.96	512
MVPN_Multicast_Vlan_4	40.96	512
MVPN_Multicast_Vlan_5	40.96	512
MVPN_Multicast_Vlan_6	40.96	512
MVPN_Multicast_Vlan_7	40.96	512
MVPN_Multicast_Vlan_8	40.96	512
MVPN_Multicast_Vlan_9	40.96	512
MVPN_Multicast_Vlan_10	40.96	512
LR_CR1_Ucast_21_AF	40.96	512
LR_CR1_Ucast_22_BE	40.96	512
LR_CR1_Ucast_23_CTRL	40.96	512
LR_CR2_Ucast_21_AF	40.96	512
LR_CR2_Ucast_22_BE	40.96	512
LR_CR2_Ucast_23_CTRL	40.96	512

Stream Name	Load (Mbps)	Packet Size (Bytes)
RL_CR1_Ucast_21_AF	40.96	512
RL_CR1_Ucast_22_BE	40.96	512
RL_CR1_Ucast_23_CTRL	40.96	512
RL_CR2_Ucast_21_AF	40.96	512
RL_CR2_Ucast_22_BE	40.96	512
RL_CR2_Ucast_23_CTRL	40.96	512

Known Limitations

This JVD initially qualified on Junos OS Release 24.4R2. For more details on all supported platforms and OS versions, see the **Validated Platforms and Software** section in the JVD document.

Scale and Performance Data

This document may contain key performance indexes (KPIs) used in solution validation. Validated KPIs are multi-dimensional and reflect our observations in customer networks or reasonably represent solution capabilities. These numbers do not indicate the maximum scale and performance of individual tested devices. For uni-dimensional data on individual SKUs, contact your Juniper Networks representatives.

The Juniper JVD team continuously strives to enhance solution capabilities. Consequently, solution KPIs may change without prior notice. Always refer to the latest JVD test report for up-to-date solution KPIs. For the latest comprehensive test report, contact your Juniper Networks representative.

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