Juniper® Validated Design

JVD Solution Overview: Metro as a Service MEF 3.0

Executive Summary

The Metro Ethernet Business Services solution validates a comprehensive multidimensional architecture with best practices for designing and implementing a dense services L2/L3 portfolio across intra-domain and inter-AS regions. Metro Ethernet follows the standards and framework defined by the Metro Ethernet Forum (MEF) for the delivery and characterization of services. The MEF 3.0 certification for Operators involves the end-to-end compliance of production network services. By deploying MEF-certified equipment and adhering to MEF standards, providers can ensure that service offerings meet rigorous performance criteria and customer expectations.

Solution Overview

Metro as a Service by Juniper Networks introduces the first supplier-approved comprehensive validation of MEF 3.0 compliance conducted over a production-emulated network. The **Metro as a Service** Juniper Validated Design enhances the solution established with **Metro Ethernet Business Services JVD** by qualifying over 12,000 MEF 3.0 test cases end-to-end across all featured E-Line, E-LAN, E-Tree, and Access E-Line (E-Access) services. The MaaS JVD provides Service Providers with the key benefits:

- **Seamless Interoperability:** Juniper Networks MEF 3.0 certified products ensure that devices work well with other MEF-compliant systems, reducing integration complexity and making it easier to deliver reliable, multi-vendor services.

- **Faster Time-to-Market:** Juniper Networks MEF-compliant solutions come pre-tested with industry standards, enabling service providers to deploy new services quickly, stay competitive, and meet customer demands efficiently.

- **Guaranteed Service Quality:** MEF 3.0 standards include stringent performance, security, and reliability benchmarks, allowing providers to deliver high-quality, dependable services and maintain customer trust.
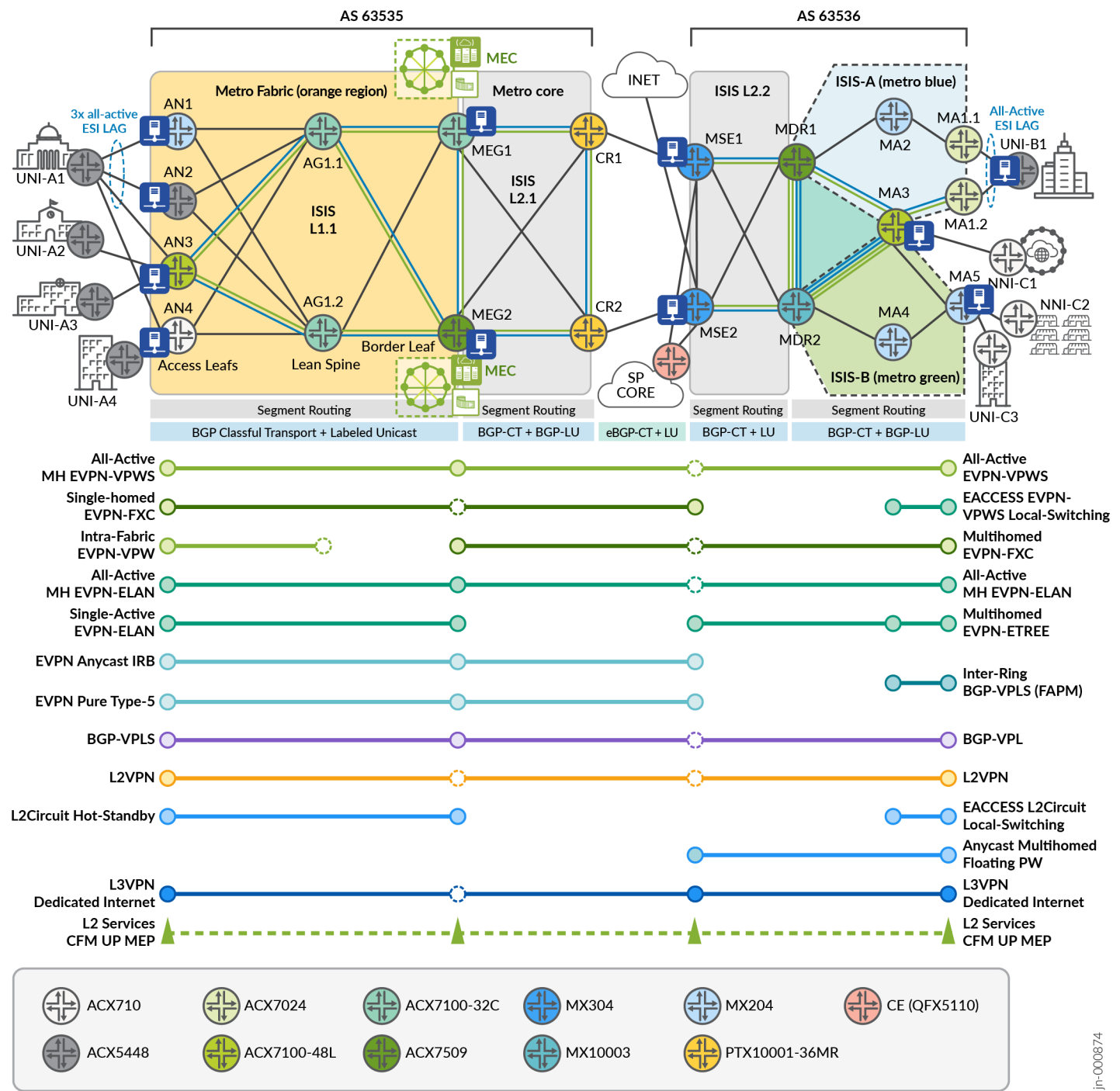
Juniper Networks is committed to delivering quality, interoperability, and compliance with industry standards for Carrier Ethernet services. With the **Metro Ethernet Business Services JVD** setting the foundation, this validation assures our customers can be confident that Juniper products and solutions are reliable, compatible, and capable of delivering high-performance Ethernet connectivity in diverse networking environments. The primary devices under test include MEF 3.0-certified products: ACX7024, ACX7100, ACX7509, and MX304.

The Metro Ethernet Business Services JVD addresses traditional L2 Business Access and Dedicated Internet Access services while incorporating modern service delivery protocols, including EVPN-VPWS, EVPN Flexible Cross Connect, EVPN-ETREE, and EVPN-ELAN. The topology, built upon the Juniper Cloud Metro portfolio, deploys an infrastructure designed to support metro access multi-ring topologies and metro fabric scale-out spine-and-leaf design. The reference architecture is based on modern Carrier Ethernet Metro Area Networks (MAN) and takes into consideration the transformation required to facilitate diverse new services, applications, and use cases.

The Cloud Metro concept carries several important characteristics in the amalgamation of service and content providers. These shifting industry trends demand massive bandwidth and service scale increases while supporting more complex metro workloads. The JVD establishes the bridge between retro-metro concepts and the modern adaptation of cloud principles into metro networks. This includes the array of EVPN technologies, SR-MPLS/SRv6, and machinery to support inter-domain traffic engineering or seamless architectures across disparate networks. This differentiating factor characterizes requirements for supporting X-to-Anything connectivity models or building infrastructures that become access agnostic while blending with virtualized network functions and devices.

The solution architectures and services proposed in the Metro Ethernet Business Services JVD are part of the network modernization journey and challenges faced by many Operators. Our modern converged network infrastructures and technologies stand ready to meet the demands of the new metro. JVD proposes solution blueprints to make every connection count!
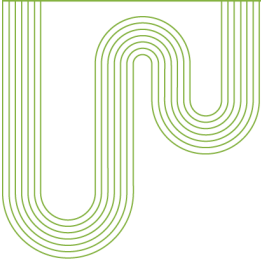
Figure 1: Metro as a Service Network Topology

The diagram illustrates the overall solution architecture and end-to-end service instantiation points, including the placement of Iometrix Lab in the Sky probes for the execution of MEF-related test cases.

The Metro as a Service JVD accomplishes the following crucial objectives:

- Service Performance: Validate bandwidth (using MEF bandwidth profile service attributes), latency, jitter (delay variation), frame loss, and QoS compliance with the capability to differentiate between traffic types. Ensures consistent and predictable network performance to meet SLAs.
- Service Activation: Ensure accurate service setup, provisioning, multiplexing, and bundling. Validation of service multiplexing and bundling capabilities that ensure EVCs and CE-VLANs can be managed over a single UNI, as required.
- Standards Conformance: Ensures Carrier Ethernet services deliver all defined EVC types, including E-Line, E-LAN, E-Tree, and Access E-Line, enabling compatibility and seamless operation in multi-vendor and multi-provider environments.
- Reliability and Resiliency: Test for service continuity, protection, and rapid failover. Ensuring services remain stable during network outages and able to meet uptime requirements. Protection mechanisms are built into both underlay and overlay network design.
- Service Assurance: Verify monitoring, fault detection, and Service OAM (Operations, Administration, and Maintenance) capabilities.

Metro EBS JVD includes over twenty use cases for delivering Carrier Ethernet services and solutions.

The Metro Ethernet Forum (MEF) is an industry consortium dedicated to accelerating the adoption of Carrier Ethernet services and technologies. Its primary purposes and goals revolve around standardization, interoperability, and innovation within the Ethernet ecosystem. MEF works to develop and promote standards for Carrier Ethernet services, ensure interoperability between Carrier Ethernet networks and equipment from different vendors, foster innovation by promoting the development of new technologies and services based on Carrier Ethernet, and educate the market about the benefits and capabilities of Carrier Ethernet services.