

Agilent N2X
**Layer 2 MPLS VPN
Emulation Software**

E7884A
Technical Data Sheet



An easy-to-use solution specifically designed for measuring the scalability and performance of Layer 2 MPLS VPNs and pseudo wire services.

Key Features

- Tests scalability and performance of Virtual Private Wire Services (VPWS), Virtual Private LAN Services (VPLS) and Pseudo Wire Emulation Edge-to-Edge (PWE3) services.
- Integrated mesh traffic automates traffic creation with correct PDUs, labels and addresses.
- Extremely easy to set up and configure highly scalable tests.
- Emulates both customer edge (CE) switches/routers and provider (P) / provider edge (PE) routers.

Product Overview

Agilent N2X is the industry’s most comprehensive test solution for testing the development and deployment of network services for converging network infrastructures. Service providers, network equipment manufacturers (NEMs), and component manufacturers can verify service attributes of entire networks end-to-end, while also isolating problems down to individual networking devices and subsystems.

The E7884A Layer 2 MPLS VPN Emulation software is specifically designed to measure the scalability and performance of VPWS, VPLS and pseudo wire implementations on a router or collection of networking devices. It provides:

- An easy mechanism for simulating an attached core network to the Device under Test (DuT);
- Rapid configuration of many VPNs and pseudo wires across the DuT;
- A means to easily configure and build traffic streams across pseudo wires or across specific VPN segments.

Using the E7884A Layer 2 MPLS VPN Emulation software, the following performance and scalability measurements can be made:

- Discover the number of PE routers that a DuT can peer with;
- Reveal the maximum number of VPNs that can be supported by a DuT;
- Determine the maximum amount of pseudo wires or virtual circuits (VCs) that can be supported by a DuT;
- Measure traffic forwarding and flooding performance; and
- For VPLS, discover the greatest quantity of Ethernet MAC addresses that can be managed by a PE router.

The E7884A Layer 2 MPLS VPN Emulation software is the only solution available today that easily tests the scalability of Layer 2 MPLS VPNs and pseudo wires.

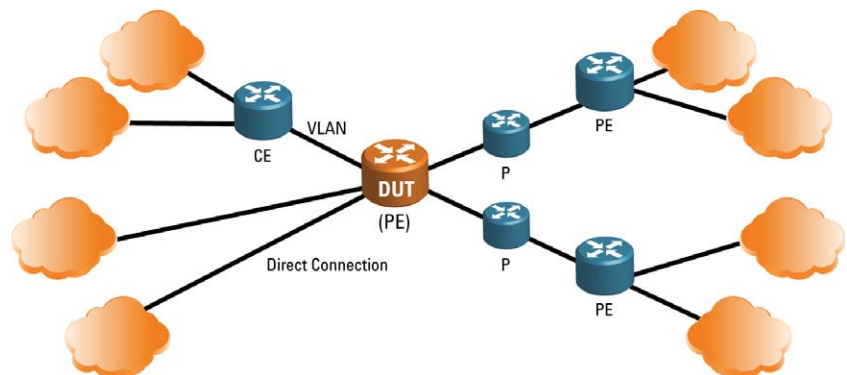


Figure1: A VPLS test topology

Layer 2 MPLS VPN Overview

The E7884A Layer 2 MPLS VPN Emulation software simulates an attached network topology to a router or other device under test. It simulates both attached CE devices and core network side P and PE routers. It then automatically builds MPLS tunnels or label switched paths (LSPs) across the topology, and sends traffic at up to wire speed to measure the VPN traffic performance of the router. The software is typically used as follows:

1. Agilent N2X interface cards are attached to the device under test (DuT). For example, 10/100, GbE or 10GbE Ethernet cards are attached to the customer-facing interfaces of the router, and OC-3c/12c/48c/192c POS or 10/100, GbE or 10GbE Ethernet interfaces are attached to the core-facing interfaces.
2. N2X emulates a simulated topology of core routers to the DuT using OSPF.
3. Routers within the simulated topology are selected as remote PE routers.
4. MPLS RSVP or LDP sessions are automatically opened between the simulated remote PE routers and the DuT.
5. If testing VPLS, local and remote Ethernet clients are defined and grouped into VPNs. The corresponding LSPs are opened. If testing pseudo wires, tunnel end-points are defined and the corresponding VC LSPs are opened. The number of PEs, tunnels, VCs, and VPNs are varied to discover the limits of the control plane.
6. Traffic meshes are defined between VPN endpoints and the traffic generator is started.
7. Throughput measurements on each VC are made, including the performance of different QoS classes.

The E7884A Layer 2 MPLS VPN Emulation software is the only solution available today with:

- Both CE-side and P/PE-side emulation
- Synchronized performance measurement of packets between CE and P/PE sides
- High level of scalability and;
- Ease of use.

The Agilent N2X with the E7884A Layer 2 MPLS VPN Emulation software is the only solution available to truly measure the performance of Layer 2 MPLS VPNs and pseudo wires.

Layer 2 MPLS VPN Features

Highly Scalable

The E7884A Layer 2 MPLS VPN Emulation software scales to test the VPN and pseudo wire scalability limits of routers.

Scale up the number of ports, PEs, VPNs, local sites, remote sites, pseudo wire VCs, MAC addresses, and/or VLANs to discover the limits of the DuT.

Set to Scale Even Further

The software will continue to scale up with the underlying capabilities of the Agilent N2X system. N2X XS and XS-2 cards will further increase the underlying protocol scalability.

Please ask your local Agilent sales representative for the latest scalability information for the N2X system.

Easy to Set Up and Use

The Layer 2 MPLS VPN Emulation is very easy to configure and use.

Rapidly Created Network Topologies

Network topologies can be quickly built and advertised into the DuT. Routers are easily designated as PE routers from a drop-down list.

Many simulated CEs or VPN sites local to the DuT can be added rapidly. Remote CEs or VPN sites that appear as connected behind the simulated PEs can also be quickly added.

Simulated PE routers and the VPN sites that they support can be configured in only a few steps. Multiple remote VPN sites can be added at the same time.

Transparently Established MPLS Tunnels

As routers are designated as PEs, LDP builds tunnels amongst the DuT and simulated PE routers. Alternatively, RSVP-TE tunnels can be used. VCs are automatically added as remote VPN sites are designated.

Control over RSVP and LDP tunnel/VC establishment is provided to any degree that is required.

Traffic Meshes Ease Traffic Configuration

Traffic meshes are a mechanism for selecting VPN endpoints and quickly building traffic streams amongst them. Traffic is automatically configured to emulate traffic from the local or remote Ethernet stations. Traffic sent into a DuT from the PE/P boundary is automatically configured with MPLS labels, MAC addresses and VLAN tags. labels, MAC addresses and VLAN tags.

The Right Measurements to the Right Level of Detail

The E7884A Layer 2 MPLS VPN Emulation software not only creates an environment for measuring the performance and scalability of L2 MPLS VPNs and pseudo wire services, it also provides the measurements that determine the performance of the VPNs.

Traffic Meshes for Measuring Forwarding/Flooding Performance

Traffic meshes can be quickly built between remote and local VPNs. Measurements can be made per VC.

Customized Traffic Streams for Verifying QoS Mechanisms

Full access to stream groups for modification allows the testing of different VLAN priorities, MPLS EXP settings, or any other PDU fields. Measurements can be viewed per QoS/CoS flow.

Layer 2 MPLS VPN Technical Specifications

The E7884A Layer 2 MPLS VPN Emulation software is designed according to the following specifications:

Standards

VPWS/PWE3

- IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3), RFC 4446
- Pseudowire Setup and Maintenance using Label Distribution Protocol (LDP), RFC 4447
- Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN, RFC 4385
- Encapsulation Methods for Transport of Ethernet Frames Over MPLS Networks, RFC 4448
- Encapsulation Methods for Transport of ATM Over MPLS Networks, RFC 4717
- Encapsulation Methods for Transport of Frame Relay Over MPLS Networks, RFC 4619

VPLS

- Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling, RFC 4762

Application Programming Interface

An Application Programming Interface (API) is provided through the Tool command Language (Tcl). The API is intended to automate configuration tasks, create repeatable test sequences, or to integrate the test system into a larger test system.

An API client may run directly on the N2X System Controller, or may run on any other PC or UNIX workstation connected to the System Controller via a TCP/IP connection. API clients communicate with the System Controller via an included package of Tcl commands.

All functions available through the GUI are available via the API. Any changes made through the API are automatically reflected on the GUI.

Additional N2X Features

Easy to use Graphical User Interface

The graphical user interface provides simple point and click features to dynamically define your sessions and generate routes and peers, quickly emulating a RSVP or LDP environment.

Flexible, powerful scripting

Automated scripts are quickly created using the Tcl/Tk scripting environment. With only a few lines of code, thousands of networks are easily advertised from simulated peers on any or all ports.

Online Help

An extensive online help system provides complete descriptions and detailed usage instructions. Dialog-level context-sensitive help provides rapid access to the relevant sections of the online help. A technology reference section provides a complete library of background information pertaining to router and switch performance testing.

Generate wire speed traffic

With N2X Packets and Protocols application's wire speed traffic capability you can generate a complex, real-world mix of traffic whilst simultaneously testing the routing and signaling functionality. For example, LSP tunnels can be created and the data forwarding performance of the labeled packets traversing those tunnels can be measured.

Configuration and Ordering Details

To use the E7884A Layer 2 MPLS VPN Emulation software, Agilent N2X hardware and software is required.

Hardware

A N2X system is required with:

- System controller
- Chassis
- Interface cards

The E7884A requires at least two interface ports - one port to emulate the CE side a second port to emulate the P/PE side.

For CE-side traffic generation, low-cost N2X Ethernet XP cards can be used.

For core-side (P/PE) traffic generation and protocol emulation, Packet over SONET/SDH or Ethernet XR/XR2 and/or XS/XS2 cards must be used.

Software

The E7884A Layer 2 MPLS VPN Application Software also requires each of the following software packages:

- E7881B Packets and Protocols Application Software
- E7882A IPv4 Routing Emulation Software
- E7883A MPLS Signaling Emulation Software

Please contact your local Agilent sales representative for pricing and availability.

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Agilent N2X

Agilent's N2X multi-service tester combines leading-edge services with carrier grade infrastructure testing and emulation. The N2X solution set allows network equipment manufacturers and service providers to more comprehensively test new services end-to-end, resulting in higher quality of service and lower network operating costs.

Software and Support Agreement

To protect your investment in the Agilent N2X, every new system includes an initial 12-month comprehensive system-based warranty and Software and Support Agreement (SSA).

Renewing Agilent support services ensures uninterrupted technical support and software upgrades, giving you confidence in N2X throughout the life of your system.

The N2X technical support portion of your SSA includes assistance with product operation and measurements, and verification that the N2X equipment is in correct working order.

Warranty and Support

Hardware Warranty

All N2X hardware is warranted against defects in materials and workmanship for a period of 1 year from the date of shipment.

Software Warranty

All N2X software is warranted for a period of 90 days. The applications are warranted to execute and install properly from the media provided.

This warranty only covers physical defects in the media, whereby the media is replaced at no charge during the warranty period.

Ordering Information

To order and configure the test system, consult your local Agilent field engineer.

Sales, Service and Support

N2X must be serviced by an approved Agilent Technologies service centre, please contact us for more information.

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