

Agilent N2X

Packets and Protocols Application

E7881B
Technical Data Sheet



Highly scalable and flexible traffic generation, protocol emulation, and service and subscriber emulation enable simultaneous stress testing of application services plus the data and control planes of converging multiservice networks and devices.

Key Features

- **Reduce the size and cost of your test bed by replacing it with a highly scalable simulated multi-protocol environment**
- **Improve test coverage through simultaneous simulation of both the data and control plane technologies**
- **Automate your testing with the powerful and flexible scripting environment**
- **Easy to use graphical user interface**

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.

It delivers unparalleled test realism to verify the ultimate performance, scalability and resilience of carrier grade services and infrastructure.

The E7881B N2X Packets and Protocols application software license enables the integrated multi-protocol emulation and traffic generation environment of the N2X required to simulate the scale, complexity and volatility of converging multiservice networks.

The E7881B N2X Packets and Protocols application software supports a wide range of protocols and interfaces to simulate and test cutting-edge services on network devices. It can emulate multiple protocols simultaneously, creating sophisticated network topologies around the device under test and verify that the device can concurrently manage numerous protocol engines and routing tables while continuously forwarding traffic.

The E7881B N2X Packets and Protocols application software enables users to quickly and easily configure large and complex test scenarios, for technologies such as MPLS VPNs, with ease. The high level abstractions in the application, such as Route Pools and Traffic Meshes, allow the test tool to reduce configuration complexity for test engineers.

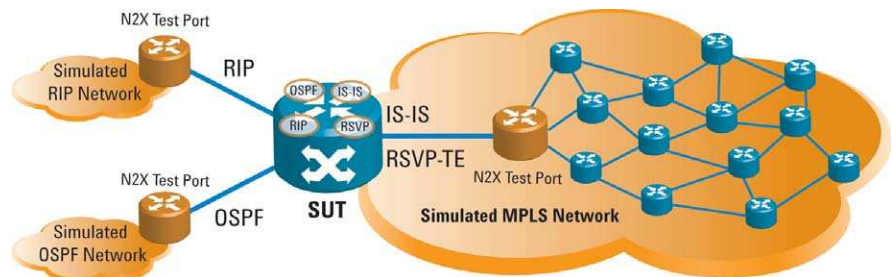


Figure 1: Simulate real world networks for measuring protocol scalability and verifying multi-protocol management

Product Features

Simulate real-world, multi-protocol environments

Powerful protocol emulation software stresses protocol engines beyond their limits and simulates multi-protocol network topologies. Through realistic simulation of real-world conditions, users are able to identify limitations and defects in a lab environment prior to deployment.

The following plug-in emulation software licenses are required to create a multi-protocol environment.

- **E7882A IPv4 Routing Emulation** software provides a comprehensive coverage of the routing protocols used to build and manage evolving network topologies, with protocols such as BGP-4, OSPF, IS-IS and RIP.
 - **E7883A MPLS Signalling Emulation** software enables the simulation of edge and intermediate/core label switch routers (LSRs). Addition of this license will support both the RSVP and CR/LDP protocols, allowing for comprehensive testing of real world multi-protocol routing and switching applications.
 - **E7884A L2 MPLS VPN Application** requires E7883A MPLS Signalling Emulation software for Layer 2 MPLS VPN plus RFC2547 L3 VPN, Martini L2 VPN, VPLS VPN's. It also provides the support to measure the scalability and performance of Virtual Private Wire Services (VPWS), VPLS and pseudo wire implementations.
 - **E7885A IPv6 Routing Emulation** software provides a comprehensive coverage of IPv6 routing protocols used to build and manage converging IPv4/v6 network topologies, with protocols such as BGP-4+, OSPFv3, IS-ISv6 and RIPng.
 - **E7886A Multicast Routing Emulation** software incorporates emulation capabilities of PIM-SM/SSM including IPv6 support, MSDP and host side emulation with IGMPv2/v3.
 - **E7887A DHCP Protocol Emulation** software to emulate servers, clients and relay agents. It allocates IP addresses to clients for scalability and functionality testing.
 - **E7888A Access Protocol Emulation** software incorporates emulation capabilities of PPPoX and L2TP.
- For more information on the protocol emulation software licenses, please refer to their individual technical datasheets.
- **E7889A Optical Signaling Emulation** software to test optical switches/routers and adds channelized TDM label support & LMP enhancement.
 - **E7896A DHCPv6 Protocol Emulation** software Facilitates emulation of thousands of DHCPv6 clients per port to measure maximum session setup times and subscriber scalability of today's B-RAS's. Emulation of MLDv1/v2 clients.
 - **E7828A IGMP Protocol Emulation** software (Internet Group Management Protocol) enables the testing of devices participating in IPv4 multicast replication. The software can simulate thousands of IGMPv2 or IGMPv3 hosts. An IGMP querier emulation is also included.
 - **E7897A MLD Protocol Emulation** software (Multicast Listener Discovery) enables the testing of IPv6 multicast routers and allows a complete and integrated tests of devices such as B-RASs, BNGs, BSAs, BSRs, IP DSLAMs, and Ethernet switches.
 - **E7898A IPv6 Access Protocol** bundle (DHCPv6 + MLD). Both packages are bundled together for additional value.
 - **E7829A DHCP, IGMP, PPPoX and L2TP** bundle. Offers many of the key access protocols at an attractive price.
 - **N5582A Link Aggregation Control Protocol Emulation (LACP)** software enables emulation of link bundles for rapid verification of layer-2 and Carrier Ethernet devices, characterization of bandwidth allocation schemes, and measurement of link failover performance.
 - **N5580A Spanning Tree Protocol (STP, RSTP & MSTP) Emulation** Software is the most comprehensive and scalable tool to verify spanning tree implementations and measure the impact of topology changes in switched networks.
 - **N5583A Bidirectional Forwarding Detection Protocol Emulation (BFD)** software verifies BFD implementations and benchmarks failure detection times. Together with N2X routing and MPLS software, users can quantify IP reconvergence and MPLS reroute times during failures and measure the impact on traffic QoS.

Generate wire speed traffic

With Agilent N2X's wire speed traffic capability you can generate a complex, real-world mix of traffic whilst simultaneously testing the routing and signalling functionality.

For example, the data forwarding performance of a router can be measured while simultaneously flooding OSPF Link States to it. The ability of a router to withstand Link State flooding as well as the time it takes for a router to converge on new routes can be precisely measured. Similarly, LSP tunnels can be created and the data forwarding performance of the labelled packets traversing those tunnels can be verified.

Some other examples of where simultaneous data and control plane verification are crucial include the testing of Graceful Restart, Performance impact during Route Flapping, MPLS Fast Reroute, and Resiliency.

Flexible, powerful scripting

The N2X Packets and Protocol application provides a comprehensive and flexible application programming interface (API), enabling users to control the tester programmatically.

The easy-to-learn Tcl/Tk scripting environment helps automate test scenarios that are tedious or imprecise to set up manually.

The N2X QuickTest library includes a range of predefined scripts that automates functional and performance testing of routing and switching devices. These scripts can also be used as springboards to create your own custom test scripts.

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.

The visual representation of the impact of topology changes on router stability and forwarding performance is useful to identify the performance thresholds of networking devices.

Test Scenarios

The E7881B N2X Packets and Protocols application software was specifically designed for simultaneous verification of data and control plane scalability and stability. Some common and useful test scenarios are:

- Protocol Scalability and Stability Verification
- Multi-Protocol Layer 2 VPN
- Multi-Protocol Layer 3 VPN
- Multicast Network Simulation Including Multicast VPN
- High Availability Scalability and Performance
- Network Subscriber Simulation for Edge Aggregation Device Verification
- Carrier Ethernet Functional, Performance and Scalability Testing

Protocol Scalability & Stability Verification

Simultaneously generate thousands of wire-speed traffic streams and thousands of protocol updates into each port and verify the baseline protocol scalability and forwarding performance. Simulate route flaps to measure how dynamic routing events affect forwarding performance and stability.

Multi-Protocol Layer 2 VPN

Testing the performance of Virtual Private LAN Services (VPLS) or pseudo-wires requires the emulation of multiple protocols as well as the configuration and analysis of complex traffic topologies. The E7884A Layer 2 MPLS VPN Emulation software provides the support to measure the scalability and performance of Virtual Private Wire Services (VPWS), VPLS and pseudo wire implementations on a router or entire collection of networking devices. It provides an easy mechanism for simulating an attached core network to the Device under Test (DUT) and rapid configuration of multiple VPNs and pseudo wires.

Multi-Protocol Layer 3 VPN and VPNv6

In real networks, setting up BGP/ MPLS VPNs across IPv4 and IPv6 networks requires multiple protocols. To achieve this environment for a test scenario, the OSPF or RIP component of the IPv4 Routing Emulation (E7882A) or IPv6 Routing Emulation (E7885A) software can be used to construct virtual topologies. The LDP or RSVP-TE component of the MPLS Signalling Emulation (E7883A) software can then be used to create LSPs. The LSP and VPN set up can be combined with unlabeled and labelled data packet generation and used to confirm the device's capability to set up VPNs.

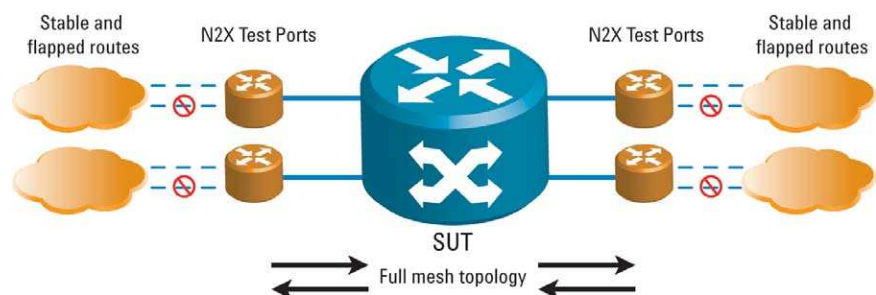


Figure 2: Performance Impact During Route Flapping

Multicast Network Simulation Including Multicast VPN

Complete verification of a system delivering multicast services requires a test environment that accurately reflects the potential scale and dynamic nature of multicast-enabled networks.

- The Multicast Routing Emulation Software (E7886A) includes PIM-SM/SSM and MSDP, enabling N2X to manipulate multicast group memberships, distribution trees, and traffic configurations while the test is running, and achieve complex multicast performance measurements.
- The IGMP Emulation Software (E7828A) and the MLD Emulation Software (E7897A) add the ability to simulate dynamic IPv4 and IPv6 multicast subscribers.
- The mVPN QuickTool Wizard automates the configuration and testing of Multicast VPNs.

Capable of interworking with the IPv4 Routing Emulation Software (E7882A), N2X offers the industry’s most powerful multicast test solution.

High Availability Scalability and Performance Testing

High Availability technologies are being deployed to help IP networks survive network outages and enable in-service upgrade of core network components, eliminating planned network maintenance downtime. The IPv4 Routing Emulation (E7882A) software and MPLS Signaling Emulation (E7883A) software packages support Graceful Restart and MPLS Fast Reroute protocol additions making it possible to efficiently and accurately generate test scenarios that target router resiliency verification.

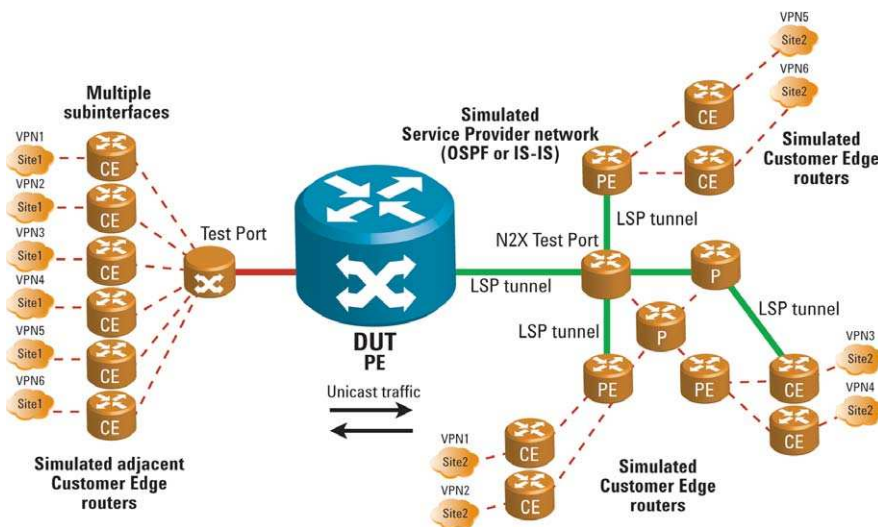


Figure 3: BGP/MPLS VPN Scalability Testing

Network Subscriber Simulation for Edge Aggregation Device Verification

N2X provides the most scalable and easy-to-use solution for assessing the performance of broadband access devices such as B-RASs, DSLAMs, LACs/LNSs and edge routers. With the E7888A Access Emulation Software these devices can be tested for session scalability, session set-up rate, and traffic forwarding/QoS performance. By emulating PPPoX & L2TP client sessions and running traffic over those sessions, the testing of these edge aggregation devices is substantially simplified by eliminating the need to configure thousands of individual clients.

Carrier Ethernet Functional, Performance and Scalability Testing

Service Providers are deploying Ethernet to reduce costs and offer end-to-end Carrier Ethernet services. N2X offers protocol test software to verify the functionality, scalability and performance of Carrier Ethernet technologies including LACP, BFD, CFM, VPLS, the Spanning Tree protocols (STP, RSTP and MSTP), and applications to characterize the performance of services (such as IPTV and VPNs) over Ethernet. The LACP emulation, for example, allows measurement of failover time following the failure of one link in a link bundle. The BFD emulation works in harmony with MPLS and routing protocol emulations, enabling users to quantify recovery times of Carrier Ethernet devices used within IP/MPLS networks. Together with the set of N2X layer-2 conformance test suites, N2X offers the industry's most comprehensive Carrier Ethernet test solution available on a single platform.

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 performance testing.

N2X Card Support

The E7881B Packets and Protocols Application software is supported by all the Agilent N2X cards except the XP, Packets only cards.

Configuration and Ordering Details

To use the E7881B Packets and Protocols Application Software, an N2X system is required with the following hardware:

- System controller
- Chassis
- Interface cards

Your local Agilent field engineer can provide more details on how to order and configure a test system.

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.

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.

Software Updates

With the purchase of any new system controller, Agilent will provide 1 year of complimentary software updates. At the end of the first year, you can enroll into the Software and Support Agreement (SSA) contract for continuing software product enhancements.

Support

Technical support is available throughout the support life of the product. Support is available to verify that the equipment works properly, to help with product operation, and to provide basic measurement assistance for the use of the specified capabilities, at no extra cost, upon request.

Ordering Information

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

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Printed in USA August 1, 2007
5988-9949EN

