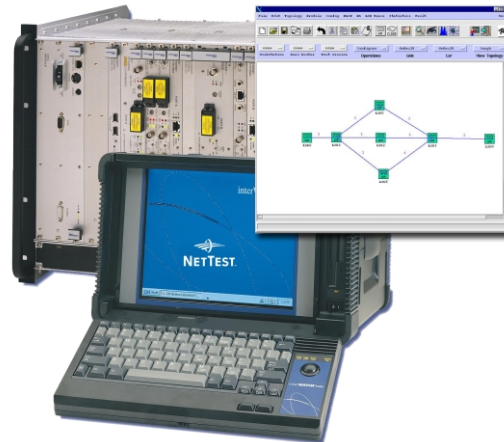


Network Emulator



KEY FEATURES:

- Signaling performance testing of IP routers, MPLS LERs/LSRs and GMPLS nodes
- Integration with multi-stream traffic generation and IP QoS test suites for performance measurement of data plane over established paths/routes
- Emulation of IP Routing, MPLS and GMPLS protocols
- Support of MPLS VPN technologies
- Cost effective solution for integrated testing of VoIP, ATM and IP/MPLS

The rapid growth and diversity in Internet service and the requirement to combine data, voice and other multimedia traffic have resulted in the need for faster, scalable converged services with guaranteed QoS. Multi protocol Label Switching (MPLS) provides a solution to meet these demanding service requirements for the next generation of IP networks.

MPLS allows greater efficiency in transport over new and existing IP, ATM and Frame Relay networks, while ensuring QoS levels through “label switched” or fixed paths. By separating the control and forwarding components, MPLS offers simpler mechanisms for packet-oriented routing, forwarding and switching of network traffic.

Generalized Multi Protocol Label Switching (GMPLS) extends this signaling and routing ability to incorporate the areas of wavelength, space and time division multiplexing (TDM), providing support for optical cross-connects (OXC) and DWDM. GMPLS will deliver a single control plane, providing a high-speed, reliable low-cost end-to-end data-centric network for the future.

Overtime MPLS and GMPLS will become an important underlying 'transport layer' for the deployment of Next Generation Networks where voice, data and other multimedia traffic converged on the same networks.

NetTest meets the challenge of testing and deployment of this new converged network with an integrated testing solution of VoIP, IP Routing, MPLS, GMPLS and ATM on the Performance and Verification Test platform, the InterWatch. The integrated testing solution simplifies test set-up and reduces significantly the cost of ownership in test equipment.

The Network Emulator utilizes complete IP and MPLS/GMPLS protocol stacks for each emulated node, ensuring realistic network emulation within the lab testing environment. By combining with multi-stream data traffic generation and IP Performance test suites, data plane performance measurement could be conducted over established paths/routes and under different emulated network conditions. Signaling protocol supported through emulation includes all major IP routing, MPLS and GMPLS protocols.

In addition, both MPLS/BGP VPN (RFC 2547bis) and Martini draft are supported as part of the Network Emulator's VPN support. Traditional IP routing tests such as route flooding and flapping and MPLS/GMPLS connection tests are also part of the integrated solution.

The Network Emulator provides research & development labs of network operators and equipment manufacturers with a comprehensive, scalable MPLS and GMPLS emulation solution to test and deploy MPLS and GMPLS switched networks.

Network Emulator Specifications

<p>Interfaces</p> <ul style="list-style-type: none"> POS OC-3c/STM-1 POS OC-12c/STM-4 POS OC-48c/STM-16 ATM OC-48c/ STM-16 ATM OC-12c /STM-4 ATM OC-3c / STM-1 DS3/E3 DS1/E1 Gigabit Ethernet 10/100BASE-T <p>Network Layer Protocols</p> <ul style="list-style-type: none"> ATM IP POS <p>Emulation</p> <ul style="list-style-type: none"> - Emulation of IP routing protocols: OSPF, OSPF-TE, IS-IS, IS-IS (TE), BG P-4, RIP, RIPng - Emulation of MPLS signaling protocols: RSVP-TE, CR-LDP - Emulation of GMPLS signaling protocols: RSVP-TE, OSPF-TE, IS-IS (TE), LMP, OUNI - Emulations of multiple iBGP peering relationships - Emulation of up to 30 IP routers, LERs (Ingress and egress)/LSRs or GMPLS Nodes - Emulation of Layer-3 MPLS/BG P VPN (RFC 2547bis) and Layer-2 VPN Martini draft - Generation of up to 500K route entries for BGP-4, 200K route entries for IS-IS and 200K route entries for OSPF per port (connection to real DUT) - Simulation of network changes through route updates, route withdraws, link and node shut-down at both physical and protocol level - Configuration and establishment of label-switched paths (LSPs) - LSP connection setup and tear-down test - Up to 50K of sustained Label Switch Paths (LSPs) - Multiple connections to real DUTs - LSP connectivity verification and error insertion (LSP and LSR failure) - Manual Label-Switched Path configuration supporting in/out segment tables and cross-connects - Real-time network status and LSP views. - Full capture and decode of signaling and data traffic - Simultaneously perform routing tests and traffic generation 	<p>Data Plane Integration</p> <ul style="list-style-type: none"> - Integration with multi-stream traffic generation application (InterWatch) to send wire-rate traffic to SUTs over established LSPs - Integration with IP Performance application (InterWatch) for measurement of QoS of multi-stream IP traffic over established LSPs <p>Routing Testing</p> <ul style="list-style-type: none"> - Flapping Time - Convergence Time (re-routing time) - Routing Table Size - Routing Flooding <p>Statistics</p> <p>Collection and view of:</p> <ul style="list-style-type: none"> LSP statistics Link / interface statistics Routing protocol statistics <p>Standard Compliance</p> <p>Internet Engineering Task Force (IETF)</p> <p>LDP/CR-LDP/RSVP-TE</p> <ul style="list-style-type: none"> - Multiprotocol Label Switching Architecture, RFC 3031 - MPLS Label Stack Encoding, RFC 3032 - MPLS using LDP and ATM VC Switching, RFC 3035 - LDP Specification, RFC 3036 - RSVP-TE: Extensions to RSVP for LSP Tunnels, draft-ietf-mpls-rsvp-lsp-tunnel-xx <p>Routing</p> <ul style="list-style-type: none"> - RFC 1256, ICMP Router Discovery Messages - MD-5 Message-Digest Algorithm, RFC 1321 - Classless Inter-Domain Routing: Address Assignment and Aggregation Strategy, RFC 1519 - Requirements for IP Version 4 Routers, RFC 1812 <p>BGP</p> <ul style="list-style-type: none"> - BGP4, draft-ietf-idr-bgp4-xx - Autonomous System Confederations for BGP, RFC 1965 - BGP4/IDR for IP: OSPF Interaction, RFC 1745 - Capabilities Negotiation, draft-ietf-idr-bgp4-cap-neg-xx - BGP Communities Attribute, RFC 1997 - MP Extensions , draft-ietf-idr-bgp4-multiprotocol-v2-xx - BGP Route Flap Damping , RFC 2439 - BGP Route Reflection: An Alternative to Full Mesh iBGP, RFC 2796 	<p>OSPF</p> <ul style="list-style-type: none"> - OSPF version 2, RFC 2328 - The OSPF NSSA Option , RFC 1587 - The OSPF Opaque LSA Option, RFC 2370 Draft-katz-yeung-ospf-traffic-xx <p>ISIS</p> <ul style="list-style-type: none"> - Level 1 and 2 Routing, RFC 1195 - Domain Wide Prefix Distribution, RFC 2966 - Maintaining more than 255 circuits in ISIS, draft-ietf-isis-wg-255adj-xx - ISIS Over IPV4, draft-ietf-isis-wg-over-ip-xx.txt <p>RIP</p> <ul style="list-style-type: none"> - RIP Version 2, RFC 2453 - RIP-2 MD5 Authentication, R FC 2082 <p>BGP-VPN Layer-3 VPNS:</p> <p>Multiprotocol BGP-VPN, RFC 25 47 bis</p> <p>Martini: Layer-2 VPNS:</p> <ul style="list-style-type: none"> - draft_martini_i2circuit_trans_mpls-xx.txt - draft-martini-i2circuit-encap-mpls-xx.txt <p>DiffServe: MPLS support of differentiated services</p> <ul style="list-style-type: none"> - draft_ietf_mpls_diff_ext-09.txt <p>GMPLS</p> <ul style="list-style-type: none"> draft-ietf-mpls-generalized-signaling-xx.txt draft-ietf-mpls-generalized-rsvp-te-xx.txt draft-ietf-ccamp-gmpls-sonet-sdh-xx.txt draft-ietf-mpls-bundle-xx.txt draft-ietf-mpls-rsvp-unnum-xx.txt draft-ietf-mpls-label-encaps-xx.txt draft-ietf-mpls-framework-xx.txt draft-ietf-mpls-arch-xx.txt draft-ietf-mpls-atm-xx.txt Draft-ietf-mpls-rsvp-lsp-tunnel-xx.txt <p>Part Numbers</p> <p>01C5716XXX Network Emulator for IP Routing</p> <p>01C5717XXX Network Emulator for MPLS</p> <p>01C5718XXX Network Emulator for MPLS + VPN Support</p> <p>01C5719XXX Network Emulator for G-MPLS</p> <p>01C5720XXX MPLS Upgrade for Network Emulator for IP Routing</p> <p>01C5722XXX VPN Support Upgrade from Network Emulator for MPLS</p> <p>01C5723XXX GMPLS Upgrade for Network Emulator from IP Routing</p>
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NetTest, the pioneer in multi-layer network testing, is a global provider of test and measurement systems, instruments and components for all types of networks and all stages of network development and operation. Our solutions offer leaders in optical, wireless and fixed networking vital insights into network performance, enabling informed business decisions that drive profitability.