NETX Smart Router Series

Key features

High-performance open-source routing
Comprehensive BGP, OSPF and IPv6 support
Carrier Grade NAT
DDoS protection mechanisms
Rich set of QoS mechanisms
Clustering and High Availability
Advanced CLI configuration using netc

Product overview

The NETX Smart Router Series were jointly developed with Brno University of Technology to provide high-performance and open-source routing platform. Due to rich set of routing features and high-performance routing, these routers are ideal for deployment as an aggregation network device on the network edge.
NETX routers are designed to handle several full BGP feeds and provides CGN and traffic shaping capabilities in the same time. The operating system is based on GNU/Linux which allows easy extensibility and adaptation to various networking tasks.
In addition, the NETX Smart Router Series features robust configuration API that can be integrated to corporate automatisation NetOPS processes.

Features and benefits

Quality of Service (QoS)

- Committed Access Rate (CAR) and line rate traffic policing
- FIFO, PQ, CQ, WFQ, CBQ, and RTPQ congestion management
- Weighted random early detection (WRED) and Random early detection (RED) congestion avoidance
- API for easy integration with customer's information system

Layer 3 services

- Dynamic Host Configuration Protocol (DHCP) for IPv4 and IPv6 protocols
- DHCPv4 and DHCPv6 Relay agent with client link-layer identifier insertion
- Domain Name System (DNS) with DNSSEC support
- Router Advertisement daemon for IPv6 Stateless address configuration
- Captive portal for users redirection

Layer 3 routing

- Static IPv4 and IPv6 routing
- Distance vector routing protocols - RIP, RIPv2, RIPng and Babel
- OSPF, OSPFv3 link state routing protocols for IPv4 and IPv6 with ECMP, NSSA and MD5 authentication
- BGPv4 with support for Multiprotocol BGP, MD5 authentication, incremental updates and extensive policies to increase flexibility in large networks
- Policy based routing (PBR) for IPv4 and IPv6 to adapt routing policies to business needs; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies
- Virtual Routing and Forwarding (VRF) support provides separation of the routing table per customer

Management

- Industry-standard CLI reduces training needs and increases productivity in multivendor installations
- RESTful API for easy integration with automation processes
- SNMPv1, v2 and v3 provides complete support of SNMP protocol
- Network Time Protocol (NTP) for clock synchronisation
- Rich set of debug utilities - ping, traceroute, tracepath, mtr, possibility to sniff network traffic
- Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) protocols for maintaining IPv4 and IPv6 multicast groups
- Remote management using Secure shell security protocol

High Availability

- Virtual Router Redundancy Protocol (VRRP) with milliseconds timers for fast convergence when links fail, ensuring high network availability
- Redundant design of main processing unit and power supply
- Smart Clustering for easy configuration and management

Carrier Grade NAT

- Large scale network translation for preserving IPv4 address space
- Extensive logging support to keep information about user identity
- 5-tuple sessions help to accommodate larger number of customer per IPv4 address

Features and benefits

VxLAN

- MAC-in-UDP technology that provides Layer 2 connectivity between distant network sites across an IP network
- VXLAN L2 and L3 gateway support for up to 4k tunnels

DDoS Protection

- BGP Flowspec support to connect NETX router with DDoS detection devices
- Remote Trigger Blackhole community support for mitigation DDoS attack
- Unicast Reverse Path Forwarding (uRPF) to filter spoofed IP addresses according Best Current Practise Document BCP38
- Hardware DDoS Mitigation based on filtration rules in network interface card; support up to 10 000 prefixes (depends on platform)

Security

- Extended Access control lists (ACLs); Provide L3/L4 filtering based on source or destination IPv4/IPv6 address, IPv4/IPv6 subnet, source or destination TCP/UDP port number and other fields in IP or TCP/UDP header
- Secure Shell (SSH) for encryption remote connection of all transmitted data and secure remote CLI access over IP networks
- RADIUS - management security administration by using a password authentication server

Multicast

- Internet Group Management Protocol (IGMP) to maintain multicast groups; supports v1, v2, and v3 and Source-Specific Multicast (SSM)
- Multicast Listener Discovery (MLD) protocol for maintaining IPv6 multicast groups
- Easy manipulating with multicast routes in Linux kernel
- Support both IPv4 and IPv6 multicast routing
- IGMP and MLD snooping; optimises multicast traffic flow to necessary ports

API

- RESTful API for configuration and management; easy integration with custom NetOPS processes in your company
- Different frontends available (CLI, HTTP, custom)
- Industry Standard CLI syntax available; CLI benefits from standard GNU/Linux readline capabilities — powerful shortcuts and filtration provides faster configuration of networking tasks
- Allows directly and simply execute a command or configuration change
- Commit feature for safe configuration rollback

MPLS

- Multiprotocol Label Switching (MPLS) Layer 3 VPN; allows Layer 3 VPNs across a provider network
- MPLS and BGP integration; uses BGP to advertise routes across Label Switched Path (LSP)

NetX X13 series

	NETX X1310	NETX X1330	NETX X1350	NETX X1370
Performance				
Overall performance	10 Gbps	30 Gbps	50 Gbps	70 Gbps
Routing table size	3 mil.	5 mil.	5 mil.	5 mil.
ARP table size	128 000	512 000	512 000	512 000
ND cache size	128 000	512 000	512 000	512 000
Supported VLANs	4096	4096	4096	4096
Carrier Grade NAT sessions	up to 5 mil.	up to 10 mil.	up to 20 mil.	up to 20 mil.
Avg. power consumption	60W	100W	150W	200W
Ports				
Network interfaces	2x 10G Base-T			
Expansion slots	2x			
Dedicated management	yes			
Physical characteristics				
Dimension	1U - 43.68 x 42.9 x 4,3 cm			
Weight	13 kg			
Mounting and enclosure	EIA-standard 19-inch rack			
Electrical characteristics				
Frequency and voltage	2x 230V / 50Hz, hot-swap			
Power supplies / efficiency	2x 400W / 94%			
Environment				
Operating temperature	5° - 35°			
Operating humidity	10% - 90% noncondensing			
Dual flash memory	yes			
QoS				
supported algorithms	HTB (Hierarchy Token Bucket), HSFC (Hierarchical Fair Service Curve), CoDEL, FQ_CoDEL, SFQ			

Accessories

Expansion slot cards	NXB10 - 2x 10 Gb/s SFP+ ports NXB40 - 2x 40 Gb/s QSPF+ ports NXB100 - 2x 100 Gb/s QSPF28 ports	
Support	**NETX X1310 Series** NXS1310A - 1-year Extended Warranty NXS1310B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring NXS1310C - 1-year Integration support **NETX X1330 Series** NXS1330A - 1-year Extended Warranty NXS1330B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring NXS1330C - 1-year Integration support	**NETX X1350 Series** NXS1350A - 1-year Extended Warranty NXS1350B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring NXS1350C - 1-year Integration support **NETX X1370 Series** NXS1370A - 1-year Extended Warranty NXS1370B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring NXS1370C - 1-year Integration support

Standards and Protocols
applied to all products

BGP	RFC 4271 A Border Gateway Protocol 4 (BGP-4) RFC 1997 BGP Communities Attribute RFC 5492 Capabilities Advertisement with BGP-4 RFC 2385 BGP Session Protection via TCP MD5 RFC 4360 BGP Extended Communities Attribute RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP) RFC 4724 Graceful Restart Mechanism for BGP RFC 4760 Multiprotocol Extensions for BGP-4 RFC 4893 BGP Support for Four-octet AS Number Space	RFC 4272 BGP Security Vulnerabilities Analysis RFC 4274 BGP-4 Protocol Analysis RFC 4276 BGP-4 Implementation Report RFC 4277 Experience with the BGP-4 Protocol RFC 4451 BGP MULTI_EXIT_DISC (MED) Considerations RFC 5668 4-Octet AS Specific BGP Extended Community RFC 8092 BGP Large Communities Attribute RFC 7313 Enhanced Route Refresh Capability for BGP-4
OSPF	RFC 2328 OSPFv2 RFC 5340 OSPFv3 for IPv6 RFC 6987 OSPF Stub Router Advertisement RFC 6549 OSPFv2 Multi-Instance Extensions RFC 3101 OSPF NSSA	RFC 5187 OSPFv3 Graceful Restart RFC 3623 Graceful OSPF Restart RFC 4062 OSPF Benchmarking Terminology and Concepts RFC 4063 Considerations When Using Basic OSPF Convergence Benchmarks
RIP	RFC 1058 Routing Information Protocol RFC 2453 RIP Version 2	RFC 2080 RIPng for IPv6 RFC 4822 RIPv2 Cryptographic Authentication
Babel	RFC 6126 The Babel Routing Protocol	
DDoS Protection	RFC 5575 Dissemination of Flow Specification Rules RFC 7999 BLACKHOLE Community RFC 7674 Clarification of the Flowspec Redirect Extended Community	RFC 5635 Remote Triggered Black Hole Filtering with Unicast Reverse Path Forwarding (uRPF) RFC 6666 A Discard Prefix for IPv6
IPv6	RFC 2460 IPv6 Specification RFC 4443 ICMPv6 RFC 4861 IPv6 Neighbor Discovery RFC 4862 IPv6 Stateless Address Auto-configuration RFC 1981 Path MTU Discovery for IPv6 RFC 3315 Dynamic Host Configuration Protocol for IPv6 (DHCPv6) RFC 5722 Handling and Overlapping IPv6 Fragments RFC 5014 IPv6 Socket API for Source Address Selection	RFC 5095 Deprecation of Type 0 Routing Headers in IPv6 RFC 3736 Stateless DHCP Service for IPv6 RFC 4291 IP Version 6 Addressing Architecture RFC 3542 Advanced Sockets API for IPv6 RFC 6939 Client Link-Layer Address Option in DHCPv6 RFC 4251 SSHv6 Architecture RFC 4252 SSHv6 Authentication, Connection Transport Layer
Network management	IEEE 802.1AB Link Layer Discovery Protocol (LLDP) IEEE 802.1D (STP) RFC 1901 SNMPv2 Introduction RFC 1902 SNMPv2 Structure RFC 1903 SNMPv2 Textual Conventions RFC 1904 SNMPv2 Conformance RFC 1905 SNMPv2 Protocol Operations RFC 1906 SNMPv2 Transport Mappings RFC 3917 Requirements for IP Flow Information Export (IPFIX)	RFC 3176 sFlow® RFC 3954 Cisco Systems NetFlow Services Export Version 9 RFC 2272 SNMPv3 Management Protocol RFC 2570 SNMPv3 Overview RFC 2573 SNMPv3 Applications RFC 3411 SNMP Management Frameworks RFC 3412 SNMPv3 Message Processing RFC 3413 Simple Network Management Protocol (SNMP) Applications

Standards and Protocols
applied to all products

General protocols	RFC 2236 IGMP Snooping RFC 3768 VRRP RFC 2516 A Method for Transmitting PPP Over Ethernet (PPPoE) RFC 3046 DHCP Relay Agent Information Option RFC 5880 Bidirectional Forwarding Detection RFC 2765 Stateless IP/ICMP Translation Algorithm (SIIT) RFC 2993 Architectural Implications of NAT RFC 3022 Traditional IP Network Address Translator (Traditional NAT) IEEE 802.1Q VLANs IEEE 802.1Q GVRP IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3ae 10-Gigabit Ethernet IEEE 802.3i 10BASE-T IEEE 802.3u 100BASE-X IEEE 802.3x Flow Control IEEE 802.3z 1000BASE-X	RFC 2766 Network Address Translation - Protocol Translation (NAT-PT) RFC 2784 Generic Routing Encapsulation (GRE) RFC 2865 Remote Authentication Dial In User Service (RADIUS) RFC 2866 RADIUS Accounting RFC 2868 RADIUS Attributes for Tunnel Protocol Support RFC 2869 RADIUS Extensions RFC 2767 Dual Stacks IPv4 & IPv6 RFC 768 UDP RFC 791 IP RFC 792 ICMP RFC 793 TCP RFC 826 ARP RFC 856 TELNET RFC 894 IP over Ethernet RFC 2131 DHCP RFC 1631 NAT RFC 1305 NTPv3

BRNO UNIVERSITY OF TECHNOLOGY

Technologies integrated in NETX Smart routers are based on Brno University of Technology research results.