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)

Small business routers

	NETX X1102	NETX X1205	NETX X1120
Physical characteristics			
Dimension	1U - 43.68 x 22.9 x 4,3 cm	1U - 43.68 x 22.9 x 4,3 cm	1U - 43.68 x 42.9 x 4,3 cm
Weight	7 kg	7 kg	13 kg
Mounting and enclosure	EIA-standard 19-inch rack	EIA-standard 19-inch rack	EIA-standard 19-inch rack
Electrical characteristics			
Frequency and voltage	1x 230V / 50Hz	1x 230V / 50Hz	2x 230V / 50Hz, hot-swap
Power supplies / efficiency	1x 200W / 90%	1x 200W / 90%	2x 400W / 94%
Avg. power consumption	40W	60W	80W
Environment			
Operating temperature	5° - 35°	5° - 35°	5° - 35°
Operating humidity	10% - 90% noncondensing	10% - 90% noncondensing	10% - 90% noncondensing
Ports			
Network interfaces	4x 1G Base-T	2x 10G Base-T	2x SFP+, 2x 1G Base-T
Expansion slots	1x (up to 4x 1G Base-T)	2x (up to 8x10G QSFP28)	1x (up to 4x10G SFP+)
Dedicated management	yes	yes	yes
Performance			
Routing performance	2 Gbps	5 Gbps	20 Gbps
Routing table size	2,5 mil., both for IPv4 and IPv6	2,5 mil., both for IPv4 and IPv6	5 mil., both for IPv4 and IPv6
ARP table size	64 000	64 000	256 000
ND cache size	64 000 (non shared)	64 000 (non shared)	256 000 (non shared)
Supported VLANs	4096	4096	4096
Carrier Grade NAT	up to 1 mil. sessions	up to 5 mil. sessions	up to 20 mil. sessions
Dual flash memory	no	yes	yes
QoS			
supported algorithms	FIFO, Token Bucket (TB), Hierarchical TB, Quick Fair Queuing, RED, WRED	FIFO, Token Bucket (TB), Hierarchical TB, Quick Fair Queuing, RED, WRED	FIFO, Token Bucket (TB), Hierarchical TB, Quick Fair Queuing, RED, WRED
performance	16 000 queues per interface	32 000 queues per interface	100 000 queues per interface

Cloud business routers

	NETX Blade	NETX Cloud
Performance		
Routing performance	20 Gbps	Dynamic; depends on a subscription
Routing table size	5 mil., both for IPv4 and IPv6	5 mil., both for IPv4 and IPv6
ARP table size	512 000	256 000
ND cache size	512 000 (non shared)	256 000 (non shared)
Supported VLANs	4096	4096
Carrier Grade NAT	up to 40 mil. concurrent session	up to 20 mil. concurrent session
QoS		
supported algorithms	FIFO, Token Bucket, Hierarchical Token Bucket , Quick Fair Queuing, Random Early	FIFO, Token Bucket, Hierarchical Token Bucket , Quick Fair Queuing, Random Early
performance	200 000 queues	100 000 queues

Medium and large business routers

	NETX X1140	NETX X1240	NETX X2460
Physical characteristics			
Dimension	1U - 43.68 x 42.9 x 4,3 cm	1U - 43.68 x 42.9 x 4,3 cm	2U - 43.68 x 70.9 x 8.9 cm
Weight	13 kg	13 kg	33 kg
Mounting and enclosure	EIA-standard 19-inch rack	EIA-standard 19-inch rack	EIA-standard 19-inch rack
Electrical characteristics			
Frequency and voltage	2x 230V / 50Hz, hot-swap	2x 230V / 50Hz, hot-swap	2x 230V / 50Hz, hot-swap
Power supplies / efficiency	2x 400W / 94%	2x 400W / 94%	2x 750W / 96%
Avg. power consumption	100W	100W	220W
Environment			
Operating temperature	5° - 35°	5° - 35°	10° - 35°
Operating humidity	10% - 90% noncondensing	10% - 90% noncondensing	10% - 80% noncondensing
Ports			
Network interfaces	2x SFP+, 2x 1G Base-T	2x 10G Base-T	4x 1G Base-T
Expansion slots	1x (up to 2x 100G QSFP28)	2x (up to 4x100G QSFP28)	4x (up to 8x 100G QSFP28)
Dedicated management	yes	yes	yes
Performance			
Routing performance	40 Gbps	40 Gbps	60 Gbps
Routing table size	10 mil., both for IPv4 and IPv6	10 mil., both for IPv4 and IPv6	10 mil., both for IPv4 and IPv6
ARP table size	512 000	512 000	512 000
ND cache size	512 000 (non shared)	512 000 (non shared)	512 000 (non shared)
Supported VLANs	4096	4096	4096
Carrier Grade NAT	up to 30 mil. sessions	up to 30 mil. sessions	up to 40 mil. session
Dual flash memory	yes	yes	yes
QoS			
supported algorithms	FIFO, Token Bucket (TB), Hierarchical TB, Quick Fair Queuing, RED, WRED	FIFO, Token Bucket (TB), Hierarchical TB, Quick Fair Queuing, RED, WRED	FIFO, Token Bucket (TB), Hierarchical TB, Quick Fair Queuing, RED, WRED
performance	300 000 queues per interface	300 000 queues per interface	400 000 queues per interface

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 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
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

Accessories

Expansion slot cards

NXC1 - 4x 1Gbps Base-T ports
NXC2 - 2x 1Gbps SFP ports
NXA10 - 1x 10 Gbps SFP+ port for NETX X1205, X1120, X1140, X1240, X2460
NXB10 - 2x 10 Gb/s SFP+ ports for NETX X1205, X1120, X1140, X1240, X2460
NXC10 - 4x 10 Gb/s ports SFP+ ports for NETX X1205, X1120, X1140, X1240, X2460
NXA40 - 1x 40 Gb/s port QSPF+ port for NETX X1120, X1140, X1240, X2460
NXB40 - 2x 40 Gb/s ports QSPF+ ports for NETX X1120, X1140, X1240, X2460
NXA40A - 2x 40 Gb/s ports QSPF+ with extended filtering capabilities for NETX X1240, X2460

Support

NETX X1102 Series
NXS1102A - 1-year Extended Warranty
NXS1102B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring
NXS1102C - 1-year Integration support

NETX X1205 Series
NXS1205A - 1-year Extended Warranty
NXS1205B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring
NXS1205C - 1-year Integration support

NETX X1120 Series
NXS1120A - 1-year Extended Warranty
NXS1120B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring
NXS1120C - 1-year Integration support

NETX X1140 Series
NXS1140A - 1-year Extended Warranty
NXS1140B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring
NXS1140C - 1-year Integration support

NETX X1240 Series
NXS1240A - 1-year Extended Warranty
NXS1240B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring
NXS1240C - 1-year Integration support

NETX X2460 Series
NXS2460A - 1-year Extended Warranty
NXS2460B - 1-year Next Business Day On-site Service, Proactive Care & Online Monitoring
NXS2460C - 1-year Integration support

BRNO UNIVERSITY OF TECHNOLOGY

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