FTOS

E-Series • C-Series • S-Series

Best-in-class Stability and Reliability
Unix-like NetBSD Modular OS
One FTOS Version for all Platforms

FTOS: Optimized for Portability, Resiliency and Scalability

FTOS, the Force10 Operating System, is the operating system that runs on Force10 switch/router product lines. FTOS is based on NetBSD, with application code developed and maintained by Force10 software engineers. A hardware abstraction layer (HAL) is used to make FTOS applications portable across product lines, without having to rewrite the application software for each platform.

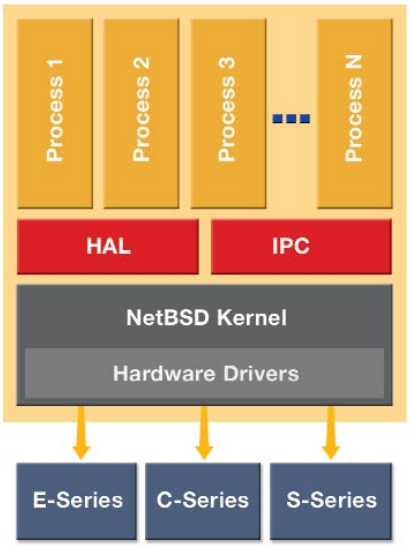
Key Features

- NetBSD is a modern and highly portable Unix-like OS built on over 20 years of innovative research and development
- Its architecture makes it an ideal OS for high performance and resilient networks
- Enables increased software portability and modularity to bring high performance FTOS software features and CLI to all switch/router product lines
- Basis for stability with many architecture, resiliency, performance and security advantages

The NetBSD kernel provides a stable operating system, handling memory allocation and process scheduling, while all other applications run as independent and modular processes in their own protected memory space.

- Separate OS and application functions limits application scope and provides inherent platform stability
- Memory protection prevents processes from corrupting each other
- Preemptive process scheduling prevents processes from monopolizing the CPU
- Application processes for each Layer 2 and 3 protocol, as well as management functions, security services and other FTOS features

FTOS also supports a distributed, multiprocessor architecture with separate CPUs running FTOS for Layer 2 switching, Layer 3 routing and management functions on the E-Series platform. On the C-Series and S-Series switch/router platforms, there is a single FTOS CPU that performs all control plane and management functions.



FTOS Software Architecture

The Power of One: Consistency

Force10 delivers a single version of FTOS for all platforms that follows a linear, sequential release path. By delivering the same OS across its entire switch/router line, including the E-Series, C-Series and S-Series platforms, Force10 ensures that customers benefit from stable code, a consistent configuration environment and simpler software management.

FTOS reliability and scalability characteristics provide the foundation for always-on networks and delivers many reliability and scalability benefits.

Stable Code

- Single code base and single release train enables Force10 to perform more rigorous prerelease testing
- Customers benefit from more stable, reliable software and consistent CLI
- Greatly simplifies software maintenance because only one software upgrade process is required across all Force10 platforms

Scalable Protocols

- FTOS control plane inherits a high degree of maturity and stability from its roots in NetBSD's high performance IPv4 and IPv6 stacks
- Advanced inter-process communication (IPC) mechanisms enable a scalable and distributed control plane
- Switching and routing protocols have been extensively tested and hardened through deployment in large global networks
- FTOS can accommodate the most demanding environments, reliably scaling to support very large, high performance networks

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FORCE10

FTOS: E-Series • C-Series • S-Series

Streamlined Management

- Common management functionality and a common user interface across Force10 product lines make operating the network easier
- Simpler product training and learning curve because system configuration, diagnostics, troubleshooting and software maintenance are identical across all platforms
- Support for the same CLI, SNMP and XML management models throughout the entire network greatly simplifies life-cycle management of the infrastructure

Consistent functionality, a stable code base and a common management interface and tool set all help reduce operational expenses, thus lowering total cost of ownership (TCO). By supporting FTOS across all its switch/router products, Force10 extends the reliability and scalability benefits to all tiers of the network for optimal uptime.

Specifications: FTOS

IEEE Compliance

802.1AB Link Layer Discovery Protocol
802.1D Bridging, STP
802.1p L2 Prioritization
802.1Q VLAN Tagging, Double VLAN Tagging, GVRP
802.1s Multiple Spanning Tree Protocol, PVST+
802.1w Rapid Spanning Tree Protocol
802.1X Network Access Control
802.3ad Link Aggregation with LACP

RFC and I-D Compliance

General Internet Protocols

RFC 768 UDP
RFC 793 TCP
RFC 854 Telnet
RFC 783 TFTP
RFC 959 FTP
RFC 1321 MD5
RFC 1591 DNS Client
RFC 1661 PPP
RFC 1989 PPP Link Quality Monitoring
RFC 1990 PPP Multilink Protocol
RFC 1994 PPP CHAP
RFC 2615 PPP over SONET/SDH
draft-ietf-bfd-base-03 BFD

General IPv4 Protocols

RFC 791 IPv4
RFC 792 ICMP
RFC 826 ARP
RFC 1027 Proxy ARP
RFC 1042 Transmission
RFC 1305 NTPv3
RFC 1519 CIDR
RFC 1532 BOOTP Relay
RFC 1812 Routers
RFC 2131 DHCP Relay
RFC 2338 VRRP

General IPv6 Protocols

RFC 1981 Path MTU Discovery
RFC 2460 IPv6
RFC 2461 Neighbor Discovery
RFC 2462 Stateless Address Autoconfiguration
RFC 2463 ICMPv6
RFC 2464 Transmission
RFC 2675 Jumbograms
RFC 3513 Addressing
RFC 3587 Global Unicast Address Format

RIP

RFC 1058 RIPv1
RFC 2453 RIPv2

OSPF

RFC 1587 NSSA
RFC 2154 MD5
RFC 2328 OSPFv2
RFC 2370 Opaque LSA
RFC 2740 OSPFv3
RFC 3623 Graceful Restart
RFC 4222 Prioritization and Congestion Avoidance

IS-IS

RFC 1142 IS-IS
RFC 1195 IPv4 Routing
RFC 2763 Dynamic Hostname
RFC 2966 Domain-Wide Prefixes
RFC 3373 Three-way Handshake
RFC 3567 MD5
RFC 3784 Wide Metrics
draft-ietf-isis-igp-p2p-over-lan-06 Point-to-point Operation
draft-ietf-isis-ipv6-07 IPv6 Routing
draft-kaplan-isis-ext-eth-02 Extended Frame Size

BGP

RFC 1997 Communities
RFC 2385 MD5
RFC 2439 Route Flap Damping
RFC 2545 Multiprotocol Extensions for IPv6
RFC 2796 Route Reflection
RFC 2842 Capabilities
RFC 2858 Multiprotocol Extensions
RFC 2918 Route Refresh
RFC 3065 Confederations
RFC 4360 Extended Communities
draft-ietf-idr-bgp4-20 BGPv4
draft-ietf-idr-restart-06 Graceful Restart

Multicast

RFC 1112 IGMPv1
RFC 2236 IGMPv2
RFC 2362 PIM-SM
RFC 2710 MLDv1
RFC 3376 IGMPv3
RFC 3569 SSM
RFC 3618 MSDP
RFC 3810 MLDv2
RFC 3973 PIM-DM
RFC 4541 IGMP/MLD Snooping

Network Management

RFC 1155 SMIv1
RFC 1156 Internet MIB
RFC 1157 SNMPv1
RFC 1212 Concise MIB Definitions
RFC 1215 SNMP Traps
RFC 1493 Bridges MIB
RFC 1724 RIPv2 MIB
RFC 1850 OSPFv2 MIB
RFC 2011 IP MIB
RFC 2012 TCP MIB
RFC 2013 UDP MIB
RFC 2024 DLSw MIB
RFC 2096 IP Forwarding Table MIB
RFC 2465 IPv6 MIB
RFC 2466 ICMPv6 MIB
RFC 2558 SONET/SDH MIB
RFC 2570 SNMPv3
RFC 2571 Mangement Frameworks
RFC 2572 Message Processing and Dispatching
RFC 2574 SNMPv3 USM
RFC 2575 SNMPv3 VACM
RFC 2576 Coexistence between SNMPv1/v2/v3
RFC 2578 SMIv2
RFC 2579 Textual Conventions for SMIv2
RFC 2580 Conformance Statements for SMIv2
RFC 2665 Ethernet-like Interfaces MIB
RFC 2674 Extended Bridge MIB
RFC 2787 VRRP MIB
RFC 2819 RMON MIB (Groups 1, 2, 3, 9)
RFC 2863 Interfaces MIB
RFC 2865 RADIUS
RFC 3176 sFlow
RFC 3273 RMON High Capacity MIB
RFC 3416 Protocol Operations
RFC 3418 SNMPv2
RFC 3434 RMON High Capacity Alarm MIB
draft-grant-tacacs-02 TACACS+
draft-ietf-idr-bgp4-mib-06 BGP MIBv1
draft-ietf-isis-wg-mib-16 IS-IS MIB
f10-bgp4-v2 Force10 BGP MIB (draft-ietf-idr-bgp4-mibv2-05)
f10-chassis Force10 E-Series Enterprise Chassis MIB
f10-copy-config Force10 File Copy MIB
f10-cs-chassis Force10 C-Series Enterprise Chassis MIB
f10-fib Force10 CIDR Multipath Routes MIB
f10-if-extension Force10 Enterprise Interface Extension MIB
f10-linkagg Force10 Enterprise Link Aggregation MIB
f10-mon Force10 Monitoring MIB
f10-products Force10 Product Object Identifier MIB
f10-smi Force10 Structure of Management Information
f10-ss-chassis Force10 S-Series Enterprise Chassis MIB
f10-system-component Force10 System Component MIB
f10-tc Force10 Textual Convention
f10-trap-alarm Force10 Trap Alarm MIB

Management Features

Industry-standard CLI
XML configuration and command output
Telnet, SSH v1/v2
TFTP, FTP, scp
NTPv3
SNMP v1/v2/v3
Syslog
sFlow traffic accounting
RADIUS/TACACS+ authentication
RMON (groups 1, 2, 3, 9)
Port mirroring
HP OpenView support

Feature capabilities vary between the E-Series, C-Series and S-Series due to hardware differences. Consult the data sheets and product manuals for specific details on supported software features for each platform.

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