



# Dell Force10 FTOS Command Line Interface (CLI)

Industry-standard CLI Syntax with Enhanced Manageability Features; Consistent Show, Configuration, Debugging and CLI Navigation Commands across Switch/Router Product Lines.

## The power of one: consistency

FTOS, the Dell Force10 Operating System, is a powerful and robust operating system that runs on all Dell Force10 switch/router product lines. Dell Force10's switch/router platforms derive from a single code base which follows a linear, sequential release path, which enables them to deliver uniform solution sets. Dell Force10 ensures that customers benefit from stable code, consistent configuration environment, and simpler software management.

## Streamlined management

- Common management functionality and common user interface across Dell 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 platforms
- Support for the same CLI, SNMP, and XML management models throughout the entire network greatly simplifies life-cycle management of the infrastructure

## Optimizing your operations

The Dell FTOS CLI combines the predominant, de-facto industry standard show, configuration and debugging syntax with enhanced usability and navigation features. As a result, the administration, configuration, and trouble-shooting operations are highly intuitive, enabling you to achieve leaner operations.

## Rich feature set

The Dell FTOS CLI is a primary method of administering, configuring, and monitoring FTOS applications and Dell Force10 switches/routers. The FTOS CLI is a significant asset in protecting training investments: It is fully compliant with the predominant, de-facto industry standard CLI. Certified engineers will be immediately familiar with the Dell Force10 CLI and productive from day one.

The CLI has many powerful features which make it very convenient for usage on a daily basis, which include:

- On-line help and auto-completion
- Interactive or automated modes
- Integration of Unix-like features such as grep and diff for configuration management
- Accessible over industry standard access protocols, such as Telnet, SSHv2, and serial console
- Configurations can be archived by the archive manager, and used for automated configuration rollback to restore a known working configuration

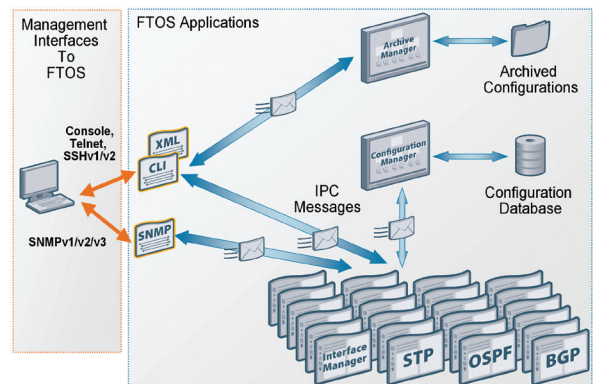


Figure 1. FTOS software architecture

```

#4810#show version
Force10 Networks Real Time Operating System Software
Force10 Operating System Version: 1.0
Force10 Application Software Version: 8.3.7.0
Copyright (c) 1999-2010 by Force10 Networks, Inc.
Build Time: Thu Dec 16 12:27:33 2010
Build Path: /sites/sjc/work/build/buildSpaces/build19/E8-3-7/SW/SRC
#4810 uptime is 1 week(s), 1 day(s), 21 hour(s), 1 minute(s)

System image file is "system://A"

System Type: S4810
Control Processor: Freescale QorIQ B2020 with 2147483648 bytes of memory.
128M bytes of boot flash memory.

  1 52-port GE/TE/FG (SE)
  48 Ten GigabitEthernet/IEEE 802.3 interface(s)
  4 Forty GigabitEthernet/IEEE 802.3 interface(s)
.....

z9000#show version
Force10 Networks Real Time Operating System Software
Force10 Operating System Version: 1.0
Force10 Application Software Version: 29000-8-3-11-283
Copyright (c) 1999-2011 by Force10 Networks, Inc.
Build Time: Tue Apr 26 11:30:05 PDT 2011
Build Path: /sites/sjc/work/build/buildSpaces/build02/Z9000-8-3-11/SW/SRC
z9000 uptime is 19 hour(s), 56 minute(s)

System image file is ""

System Type: Z9000
Control Processor: Intel Jasper Forest with 3474927616 bytes of memory.
32M bytes of boot flash memory.

  1 32-port TE/FG (SZ)
  4 Ten GigabitEthernet/IEEE 802.3 interface(s)
  31 Forty GigabitEthernet/IEEE 802.3 interface(s)
.....

s60#show version
Force10 Networks Real Time Operating System Software
Force10 Operating System Version: 1.0
Force10 Application Software Version: 8.3.3.4
Copyright (c) 1999-2010 by Force10 Networks, Inc.
Build Time: Sat Nov 20 02:31:14 2010
Build Path: /sites/sjc/work/build/buildSpaces/build01/E8-3-3/SW/SRC
s60 uptime is 1 week(s), 2 day(s), 0 hour(s), 2 minute(s)

System image file is "system://B"

System Type: S60
Control Processor: Freescale MPC8536E with 2147483648 bytes of memory.
128M bytes of boot flash memory.

  1 48-port E/FE/GE (SC)
  48 GigabitEthernet/IEEE 802.3 interface(s)

```

Figure 2. FTOS running on the E-Series, S-Series and Z-Series switch/router platforms

# FTOS Command Line Interface

## Simplified operations through the FTOS CLI

- Identical CLI on all platforms
- Ranges and aliases for bulk configuration
- Line card pre-configuration
- Configuration locking
- Configuration commit and rollback
- Online serviceability and diagnostics
- "monitor interface" command
- "show run <context>" command
- Configuration file "diff" command
- Command history shows timestamp, users and CLI commands
- Full-featured "grep" and "no-more" pipe for all commands with unlimited pipes
- ACLs and routing policies with sequence numbers, remarks and "resequence" command
- "do" command in configuration mode
- "send" command to write all users (Unix write/wall functionality)
- "show configuration" context while in configuration mode

## Specifications: FTOS

### IEEE Compliance

802.1AB	LLDP
802.1ad	Q-in-Q
802.1ag	Connectivity Fault Management
802.1D	Bridging, STP
802.1p	L2 Prioritization
802.1Q	VLAN Tagging, Double VLAN Tagging, GVRP
802.1s	MSTP
802.1w	RSTP
802.1X	Network Access Control
802.3ab	Gigabit Ethernet (100BASE-T)
802.3ac	Frame Extensions for VLAN Tagging
802.3ad	Link Aggregation with LACP
802.3ae	10 Gigabit Ethernet (10GBASE-X)
802.3af	Power over Ethernet
802.3ak	10 Gigabit Ethernet (10GBASE-CX4)
802.3ba	40 Gigabit Ethernet (40GBase-X) on optical ports
802.3ba	100 Gigabit Ethernet on optical ports 100 GBase-LR4/-SR4
802.3i	Ethernet (10BASE-T)
802.3u	Fast Ethernet (100BASE-TX)
802.3x	Flow Control
802.3z	Gigabit Ethernet (1000BASE-X)
ANSI/TIA-1057	LLDP-MED
Force10	FRRP (Force10 Redundant Ring Protocol)
Force10	PVST+

### RFC and I-D Compliance

#### General Internet Protocols

768	UDP	1990	PPP Multilink Protocol
793	TCP	1994	PPP CHAP
854	Telnet	2474	Differentiated Services
959	FTP	2615	PPP over SONET/SDH
1321	MD5	2698	Two Rate Three Color Marker
1350	TFTP		
1661	PPP	3164	Syslog
1989	PPP Link Quality Monitoring	4254	SSHv2
			draft-ietf-bfd-base-03 BFD

#### General IPv4 Protocols

791	IPv4	1812	Routers
792	ICMP	1858	IP Fragment Filtering
826	ARP	2131	DHCP (server and relay)
1027	Proxy ARP	2338	VRRP
1035	DNS (client)	3021	31-bit Prefixes
1042	Ethernet Transmission	3046	DHCP Option 82
1191	Path MTU Discovery	3069	Private VLAN
1305	NTPv3	3128	Tiny Fragment Attack Protection
1519	CIDR		
1542	BOOTP (relay)		

#### General IPv6 Protocols

1981	Path MTU Discovery (partial)	2675	Jumbograms
2460	IPv6	3587	Global Unicast Address
2461	Neighbor Discovery (partial)		Format
2462	Stateless Address Autoconfiguration (partial)	4291	Addressing
		4443	ICMPv6
2463	ICMPv6	5798	VRRPv3 for IPv6
2464	Ethernet Transmission		

#### IPv6 Routing Protocols

2080	RIPng	5340	OSPFv3
2545	BGP-4 extensions for IPv6	4601	PIM-SM for IPv4/IPv6
5308	IS-IS for IPv6		

#### RIP

1058	RIPv1	2453	RIPv2
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#### OSPF

1587	NSSA	3101	OSPF NSSA
1745	OSPF/BGP interaction	3623	Graceful Restart
1765	OSPF Database overflow	4222	Prioritization and Congestion Avoidance
2154	MD5		OSPF Link-State Advertisement (LSA)
2328	OSPFv2		
2370	Opaque LSA		

### IS-IS

1142	IS-IS	5301	Dynamic Hostname Exchange
1195	IPv4 Routing		
2763	Dynamic Hostname	5302	Dynamic Wide Prefixes
2966	Domain-wide Prefixes	5303	Three-way Handshake
3373	Three-way Handshake	5304	MD5
3567	MD5	5305	TE Extensions to IS-IS
3784	Wide Metrics	5306	Restart Signaling for IS-IS
5120	Multi-topology		
draft-ietf-isis-igp-p2p-over-lan-06			Point-to-Point Operation
draft-ietf-isis-ipv6-06			IPv6 Routing
draft-kaplan-isis-ext-eth-02			Extended Frame Size

### BGP

1997	Communities	4360	Extended Communities
2385	MD5	4893	4-byte ASN
2439	Route Flap Damping	4724	BGP Graceful Restart
2545	Multiprotocol Extensions for IPv6	4760	Multiprotocol Extensions
2796	Route Reflection	5396	4-byte ASN
2842	Capabilities		Representation
2858	Multiprotocol Extensions	5492	Capabilities
2918	Route Refresh		Advertisement
3065	Confederations		
4271	BGP-4		
draft-ietf-idr-bgp4-20			BGPv4
draft-ietf-idr-restart-06			Graceful Restart
draft-michaelson-4byte-as-representation-05			4-byte ASN Representation (partial)

### Multicast

1112	IGMPv1	3569	SSM for IPv4/IPv6
2236	IGMPv2	3618	MSDP
2710	MLDv1	3810	MLDv2
3376	IGMPv3	3973	PIM-DM
4541	IGMPv1/v2/v3, MLDv1 Snooping, MLDv2 Snooping		
draft-ietf-pim-sm-v2-new-05			PIM-SM for IPv4/IPv6

### MPLS

2702	Requirements for TE Over MPLS
3031	MPLS Architecture
3032	MPLS Label Stack Encoding
3209	RSVP-TE: Extensions to RSVP for LSP Tunnels
3630	TE Extensions to OSPF Version 2
3784	IS-IS Extensions for TE
3812	MPLS-TE MIB
3813	MPLS LSR MIB
4090	Fast Reroute Extensions to RSVP-TE for LSP Tunnels
4379	Detecting MPLS Data Plane Failures (TE/LDP) Ping & Traceroute
5036	LDP Specification
5063	Extensions to GMPLS RSVP Graceful Restart

### Network Management

1155	SMiv1	2578	SMiv2
1156	Internet MIB	2618	RADIUS Authentication MIB
1157	SNMPv1		
1212	Concise MIB Definitions	2665	Ethernet-like Interfaces MIB
1215	SNMP Traps		
1493	Bridges MIB	2674	Extended Bridge MIB
1657	BGP-4	2787	VRRP MIB
1724	RIPv2 MIB	2819	RMON MIB (groups 1, 2, 3, 9)
1850	OSPFv2 MIB		
1901	Community-based	2863	Interfaces MIB
		2865	RADIUS
1905	SNMPv2	2933	IGMP MIB
1907	SNMP MIB	3273	RMON High Capacity MIB
2011	IP MIB		
2012	TCP MIB	3416	SNMPv2
2013	UDP MIB	3418	SNMP MIB
2024	DLsw MIB	3434	RMON High Capacity Alarm MIB
2096	IP Forwarding Table MIB		
2233	Interfaces MIB		
2558	SONET/SDH MIB		

2570	SNMPv3	3580	802.1X with RADIUS
2571	Management Frameworks	3815	LDP MIB
2572	Message Processing and Dispatching	4292	IPv6 Forwarding Table MIB
2574	SNMPv3 USM	4293	IPv6 MIB
2575	SNMPv3 VACM	5060	PIM MIB
2576	Coexistence Between SNMPv1/v2/v3		

ANSI/TIA-1057			LLDP-MED MIB
draft-grant-tacacs-02			TACACS+
draft-ietf-idr-bgp4-mib-06			BGP MIBv1
draft-ietf-isis-wg-mib-16			IS-IS MIB
IEEE 802.1AB			LLDP MIB
IEEE 802.1AB			LLDP DOT1 MIB
IEEE 802.1AB			LLDP DOT3 MIB
IPv4	Multicast MIB		
ISIS	MIB		
ruzin-mstp-mib-02			MSTP MIB (traps)
sFlow.org			sFlowv5
sFlow.org			sFlowv5 MIB (version 1.3)

### MIBs

FORCE10-BGP4-V2-MIB		FORCE10-MON-MIB
FORCE10-CHASSIS-MIB		FORCE10-PRODUCTS-MIB
FORCE10-COPY-CONFIG-MIB		FORCE10-SMI
FORCE10-CS-CHASSIS-MIB		FORCE10-SS-CHASSIS-MIB
FORCE10-FIB-MIB		FORCE10-SYSTEM-COMPONENT-MIB
FORCE10-FORWARDING-PLANE-STATS-MIB		FORCE10-TC-MIB
FORCE10-IF-EXTENSION-MIB		FORCE10-TRAP-ALARM-MIB
FORCE10-LINKAGG-MIB		

### Management and security

HP OpenView support		RMON (groups 1, 2, 3, 9)
Industry-standard CLI		Secure copy (scp)
Interface access control		sFlow traffic accounting
Layer 2 and 3 ACLs		SNMPv1/v2/v3
NTPv3		XML configuration and command output
Port mirroring		
Port monitoring		
RADIUS/TACACS+ authentication		

### Automation

Virtual Server Networking		Smart Scripting
Bare Metal Provisioning		Programmatic Management

### Quality of Service and Rate Policing

Weighted Fair Queuing (WFQ)

### Virtualization

VRF-Lite

### Other

ACL-based accounting
Destination-based MAC accounting
DNS Client
Ping & Traceroute

Feature capabilities vary between the Z-series, 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.

Learn more at [Dell.com/Networking](http://Dell.com/Networking)

