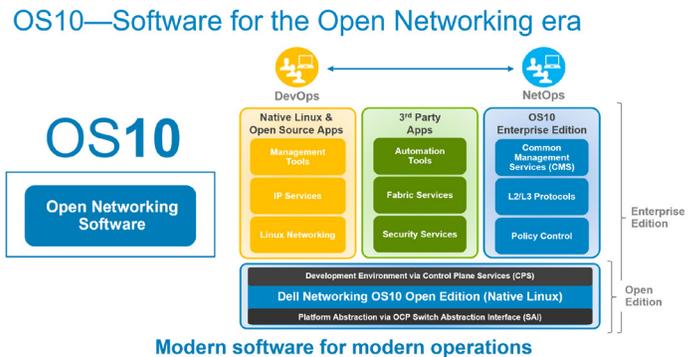


# SmartFabric OS10 Specification Sheet

The Dell SmartFabric OS10 Enterprise Edition is a Network Operating System supporting multiple architectures and environments. The networking world is moving from a monolithic stack to a pick-your-own-world. The OS10 solution is designed to allow multi-layered disaggregation of the network functionality. While OS10 contributions to Open Source provide users freedom and flexibility to pick their own 3rd party networking, monitoring, management and orchestration applications, OS10 Enterprise Edition bundles industry hardened networking stack featuring standard L2 and L3 protocols over a standard and well accepted CLI interface.



## Key Features of Dell SmartFabric OS10

- Standard networking features, interfaces and scripting functions for legacy network operations integration
- Standards-based switching hardware abstraction via Switch Abstraction Interface (SAI)
- Consistent DevOps framework across compute, storage and networking elements
- Pervasive, unrestricted developer environment via Control Plane Services (CPS)
- Layer 2 and 3 switching and routing protocols, along with Multicast and integrated IP services, quality of service, manageability and automation features
- Unmodified Linux kernel and unmodified Linux distribution
- Leverage common open source tools and best practices (YANG data models, commit scratchpad)
- Programmatic APIs, CLI automation using batch and aliases to simplify configuration management.
- Scalable L2 and L3 Ethernet Switching designed for Highly Scalable Data Center fabric with state-of-the-art implementation of Multi-Chassis LAG (VLT) QoS, ACL and standards based IPv4, IPv6, and Multicast features
- Multi-tenancy support using VRF LITE, VMWare NSX integrations, and standards based Overlays (BGP EVPN)
- Datacenter Interconnect & optimizations using BGP EVPN Symmetric IRB, unnumbered, ARP suppression, Type 5 routes. Dynamic route leaking across VRFs using route map based policies and RT mechanisms available in EVPN.
- Increase VM Mobility region by stretching L2 VLAN within or across two DCs with VxLAN & VLT capabilities.
- Converged network support for Data Center Bridging, with priority flow control (802.1Qbb), ETS (802.1Qaz), DCBx and iSCSI TLV
- Software Defined Networking using Openflow 1.0/1.3 standards with Multiple controllers support for HA
- Enhanced debugging & troubleshooting capabilities including local mirroring, Encapsulated Remote Port Mirroring (ERPM), Flows Sampling (sFLOW)
- Network Streaming Telemetry monitoring sensors, transmitting telemetry data using gPB and gRPC transport.
- OpenConfig gNMI interface for system Management, Symmetric Hashing support for LAG & ECMP
- Microsoft NLB cluster support, PTP G.8275.2 telecom profile support, SyncE and Hybrid PTP

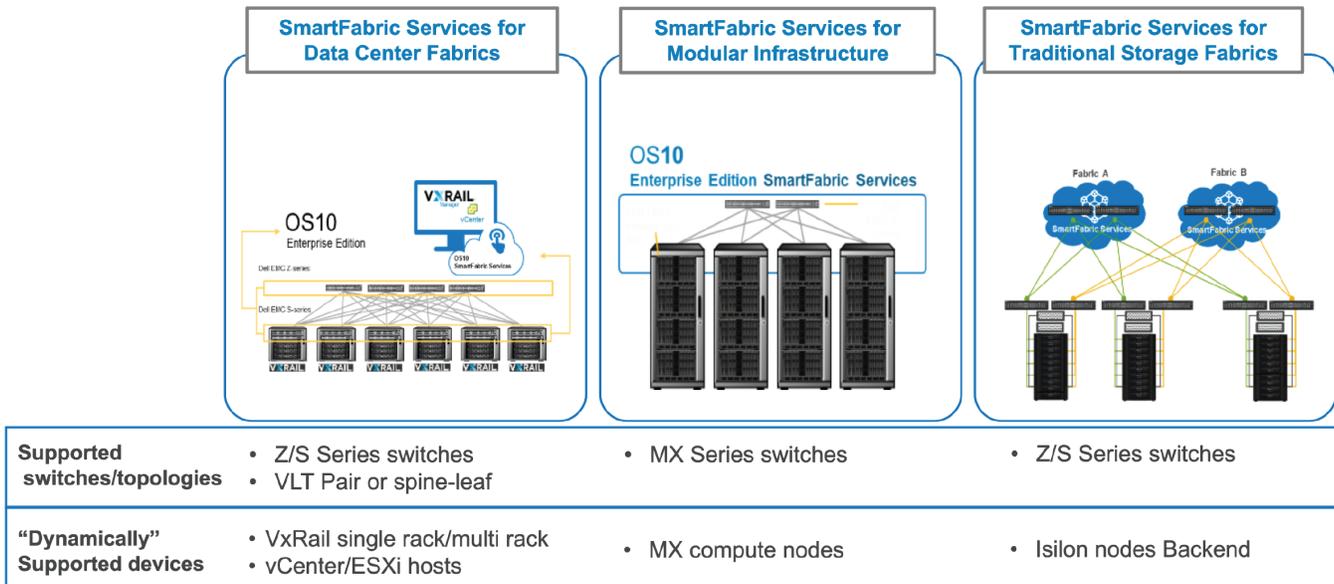
## SmartFabric Services

Dell SmartFabric OS10 includes SmartFabric Services (SFS). With SFS, customers can quickly and easily deploy and automate data center networking fabrics.

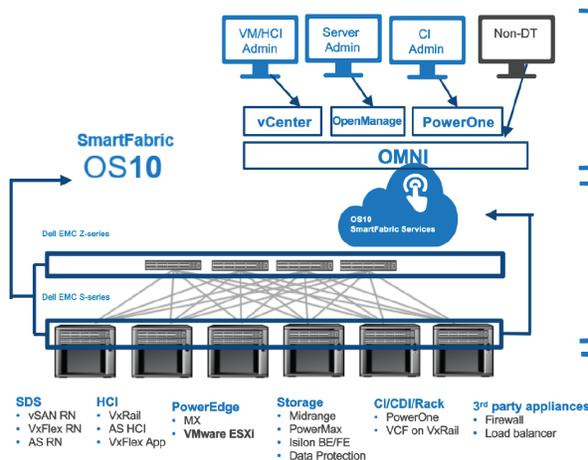
There are two types of SFS:

- SFS for Leaf and Spine – supported on selected PowerSwitch S and Z series switches
- SFS for PowerEdge MX – supported on selected modular switches

## SmartFabric Services supports three distinct environments



## How SmartFabric Services simplifies IT Transformation



### User experience

- Simple to orchestrate and manage
- Standalone App for other solutions e.g. KVM, storage only
- One application, same look and feel for Dell Technologies solutions

### Fabric Operations

- Self-forming fabric
- Deployment consistency and predictability – two switch to max scale
- Fabric level lifecycle management & operations
- Zero touch fabric expansion
- Dynamic switch replacement

### Solutions Operations

- Dynamic onboarding of select devices
- Static onboarding for non-integrated devices
- Dynamic underlay provisioning for virtual environments
- Qualified for typical use cases
- Faster time to productivity, better overall customer experience
- Natural fit for pay as you grow solutions

## Technical specifications

### IEEE Compliance

802.1AB	LLDP
TIA-1057	LLDP-MED
802.3ad	Link Aggregation
802.1D	Bridging, STP
802.1p	L2 Prioritization
802.1Q	VLAN Tagging , Q-in-Q
802.1Qbb	PFC
802.1Qaz	ETS
802.1X	Network Access Control
802.3ac	Frame Extensions for VLAN Tagging
802.3x	Flow Control

### Layer2 Protocols

802.1D	Compatible
802.1p	L2 Prioritization
802.1Q	VLAN Tagging
802.1s	MSTP
802.1w	RSTP
802.1t	RPVST+
7348	VxLAN
5517	PVLAN
VLT (Virtual Link Trunking)	
VRRP Active/Active	
RSTP, MSTP, RPVST+	
Port Mirroring on VLT ports	
DCB, iSCSI, FSB, FCoE on VLT	
RPM/ERPM over VLT	
VLT Minloss upgrade	
VxLAN with VLT	
VRF with VLT	
IGMP/MLD snooping over VLT	
PIM SM/SSM over VLT	
PVLAN with VLT	
Anycast Gateway with Virtual IP for VLT & eVLT	
Delay restore ports and Delay restore orphan ports	

### RFC Compliance

768	UDP
793	TCP
854	Telnet
959	FTP
1321	MD5
1350	TFTP
2474	Differentiated Services
2698	Two Rate Three Color Marker
3164	Syslog (with TLS support)
4254	SSHv2

### General IPv4 Protocols

791	IPv4
792	ICMP
826	ARP
1027	Proxy ARP
1035	DNS (client)
1042	Ethernet Transmission
1191	Path MTU Discovery
1305	NTPv4 (with DST support)
1519	CIDR
1812	Routers, Static Routes
1858	IP Fragment Filtering
2131	DHCPv4 (server and relay) DHCP Snooping (v4)
DHCP sub options:	
3527	Link-selection (5)
5107	Server Override (11)
6607	Virtual Subnet Selection (151/152)
5798	VRRPv3
3021	31-bit Prefixes
1812	Requirements for IPv4 Routers

1918	Address Allocation for Private Internets
2474	Diffserv Field in IPv4 and Ipv6 Headers
2597	Assured Forwarding PHB Group
3195	Reliable Delivery for Syslog
3246	Expedited Forwarding PHB Group
	VRF
	BGPv4 & v6
	OSPFv2 & v3
	Static Routes
	InterVRF Routing
	Route leaking across VRFs

### General IPv6 Protocols

1981	Path MTU for IPv6
2372	IPv6 Addressing
2460	IPv6 Protocol Specification
2461	Neighbor Discovery
2462	Stateless Address AutoConfig
2711	IPv6 Router alert
2463	ICMPv6
2464	Ethernet Transmission
2675	IPv6 Jumbograms
3484	Default Address Selection
3493	Basic Socket Interface
4291	Addressing Architecture
3542	Advanced Sockets API
3587	Global Unicast Address Format
4291	IPv6 Addressing
2464	Transmission of IPv6 Packets over Ethernet Networks
2711	IPv6 Router Alert Option
4007	IPv6 Scoped Address Architecture
4213	Transition Mechanisms for IPv6 Hosts and Routers
3633	DHCPv6 Relay
IPv6 Static Routes	
4861	Neighbor Discovery for IPv6
6105	IPv6 RA Guard
4191	Default router preferences and more specific routes
5175	IPv6 RA flag options
OSPF	
1745	OSPF/BGP interaction
1765	OSPF Database overflow
2154	OSPF with DigitalSignatures
2328	OSPFv2
5340	OSPF for IPv6 (OSPFv3)
2370	Opaque LSA
3101	OSPF NSSA
4552	OSPFv3 Authentication

### BGP

1997	Communities
2385	MD5
2439	Route Flap Damping
2796	Route Reflection
2918	Route Refresh
3065	Confederations
4271	BGP-4
2545	BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
2858	Multiprotocol Extensions
4360	Extended Communities
4893	4-byte ASN
5396	4-byte ASN Representation
5492	Capabilities Advertisement
5549	BGP Unnumbered
BGP ADD PATH	
BGP to OSPF route distribution	
BGP EVPN	

L2 & L3 Gateway with VxLAN Tunnels  
BGP EVPN Asymmetric IRB  
Symmetric IRB  
Type 5 Routes  
Centralized and Distributed Routing  
Anycast VTEP Gateway

### Linux Distribution

Debian Linux version 9  
Linux Kernel 4.9

### MIBS

BRIDGE-MIB  
ENTITY-MIB  
EtherLike-MIB  
HOST-RESOURCES-V2-MIB  
IEEE8021-PFC-MIB  
IEEE8023-LAG-MIB  
IF-MIB  
IP-FORWARD-MIB  
IP-MIB  
LLDP-EXT-DOT1-MIB  
LLDP-EXT-DOT3-MIB  
LLDP-MIB  
OSPF-MIB  
OSPFV3-MIB  
Q-BRIDGE-MIB (Get)  
RFC1213-MIB  
SFLOW-MIB  
SNMP-FRAMEWORK-MIB  
SNMP-MPD-MIB  
SNMPv2-MIB  
TCP-MIB  
UDP-MIB  
SNMP-USER-BASED-SM-MIB  
SNMP-VIEW-BASED-ACM-MIB  
SNMP-TARGET-MIB

### Network Management and Monitoring

SNMPv1/v2c/v3  
IPv4/IPv6 Management support (Telnet, FTP, TACACS, RADIUS, SSH, NTP)  
Port Mirroring  
Remote Port Monitoring  
(RPM)/Enhanced RPM (aka SPAN/RSPAN/ERSPAN by some vendors)  
3176 SFlow  
Support Assist (Phone Home)  
RestConf APIs, Auto-docs  
XML Schema  
CLI Commit (Scratchpad)  
Uplink Failure Detection  
Object Tracking  
FarEnd Failure Detection  
Bidirectional Forwarding Detection (BFD) – BGPv4/6, OSPFv2/3, Static Routes  
Streaming Telemetry  
System, Buffers, Data monitoring  
gRPC Transport with gPB encoding

### Automation

Control Plane Services APIs  
Linux Utilities and Scripting Tools  
CLI Automation (Multiline Alias)  
Zero Touch Deployment (ZTD)  
Ansible, Puppet, Chef, SaltStack  
3rd Party Packages support on Docker Container

## Technical specifications

### Quality of Service

Prefix List  
Route-Map  
Rate Shaping (Egress)  
Rate Policing (Ingress)  
Scheduling Algorithms  
    Round Robin  
    Weighted Round Robin  
    Deficit Round Robin  
    Strict Priority  
Weighted Random Early Detect

### Multicast

2236 IGMPv2 Snooping  
3810 MLDv2 Snooping  
4604 IGMPv3  
4601 PIM SM (IPv4 & IPv6), PIM ACLs  
4607 PIM SSM (IPv4 & IPv6)  
5059 BSR (IPv4 only)  
4610 Anycast RP using PIM-SM (IPv4 only)

### Security

2865 RADIUS  
3162 Radius and IPv6  
3579 Radius support for EAP  
3580 802.1X with RADIUS  
3826 AES Cipher in SNMP  
1492 TACACS (Authentication, Accounting, Authorization)  
6187 CAC/PIV – X.509v3 Certificates for SSH  
Control Plane, VTY & SNMP ACLs  
IP Access Control Lists  
Privilege Levels  
Port Security  
Digitally signed OS10 images  
AAA

### Data center bridging

802.1Qbb Priority-Based Flow Control  
802.1Qaz Enhanced Transmission Selection (ETS)  
Explicit Congestion Notification  
Data Center Bridging eXchange (DCBx)  
DCBx Application TLV (iSCSI, FCoE)  
RoCEv2

### FibreChannel

FCF F-Port  
FC Zoning  
FIP Snooping  
Multihop FSB, N Port, E Port  
Optimize FC rebalance (1 FCF per vFabric)

### Software Defined Networking

OpenFlow 1.3 (Native)  
Multiple Controllers HA

### PTP & SyncE profiles

G.8275.1, G.8271.1, G.8273.2, G.8275.2,  
G.8261, G.8262, G.8262.1, G.8264, Hybrid PTP  
& SyncE, ESMC

## IT Lifecycle Services for Networking

### Experts, insights and ease

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#### Optimize

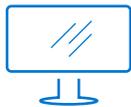
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