

# SmartFabric OS10 Specification Sheet

The Dell SmartFabric OS10 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 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.
- GRE Tunnel support
- 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
- Storm Control support for Broadcast and Multicast traffic in Full switch mode
- 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
- Dell Update Package(DUP) support for Hardware Platforms S, Z and E Series

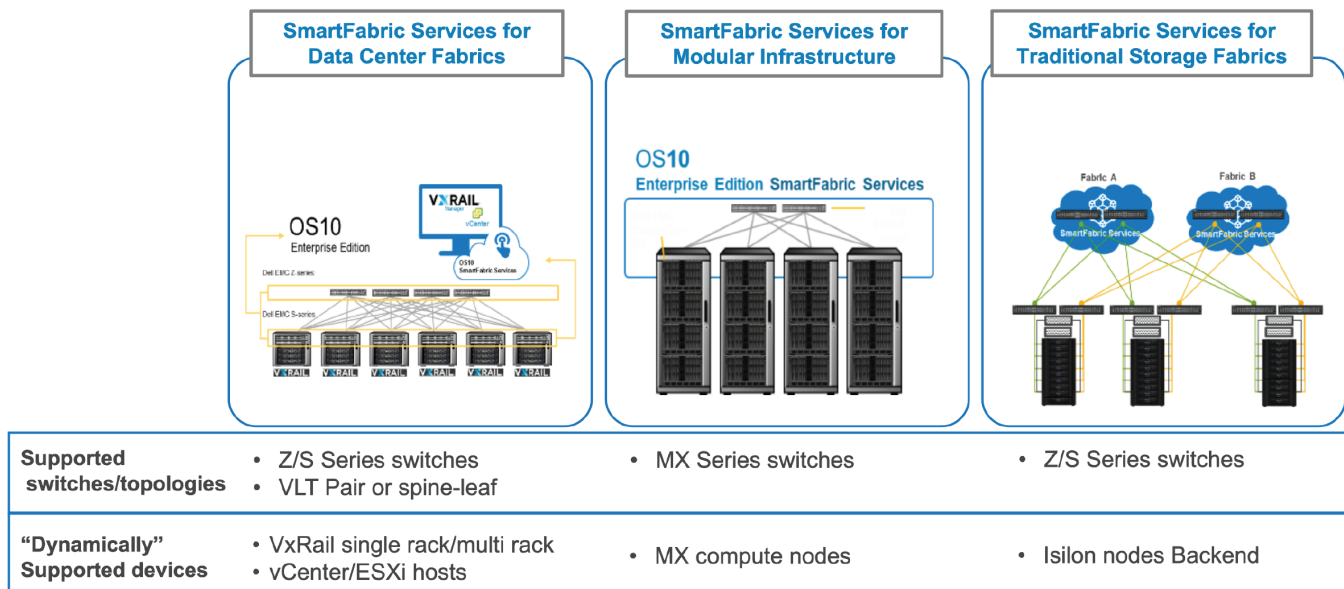
## SmartFabric Services

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

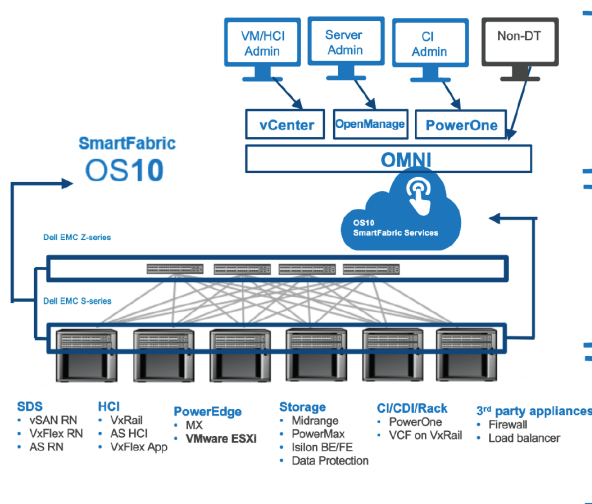
There are two types of SFS:

- 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                      |
| 802.1Qbb | PFC                               |
| 802.1Qaz | ETS                               |
| 802.1X   | Network Access Control            |
| 802.3ac  | Frame Extensions for VLAN Tagging |
| 802.3x   | Flow Control                      |
| 802.1ad  | QinQ/Provider Bridges             |

### 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 Expedited   |
| 3246                      | Forwarding PHB Group VRF                 |
| 2784                      | GRE Tunnel                               |
| 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 10 |
| Linux Kernel 4.19       |

### 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                                 |
| Dell Update Package (DUP)                                        |
| DUP image support with ability to check FW version compatibility |

## 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  
Secure Boot support with integrity checks for image and configuration files

### 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

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