FUJITSU

Datasheet
ExtremeSwitching VDX 6740, 6740T, and 6740T-1G

HIGHLIGHTS

- Transforms networks to deliver cloud scale, agility, and operational efficiency with data center fabrics
- Supports 1, 10, and 40 GbE options for optimal flexibility and scale
- Meets today's application demands with high performance and low latency
- Delivers line-rate throughput for all ports and packet sizes
- Fits into any data center design by leveraging 10 GbE/40 GbE uplinks, Ports on Demand (PoD), and Capacity on Demand (CoD)
- Maximizes network availability with efficiency and resiliency
- Supports storage environments with advanced flexibility
- Automates infrastructure provisioning, validation, troubleshooting, and remediation workflows

Advanced Features to Transform Data Centers

Data centers continue to evolve, creating a need for an infrastructure that can support growth in Virtual Machines (VMs), distributed applications, and data, as well as the transition to cloud-based computing—without compromising performance. The ExtremeSwitching VDX® 6740 and the VDX family of switches deliver the performance, flexibility, and efficiency essential to modern data centers, including cloud and highly virtualized environments.

VDX 6740 Switch

The VDX 6740 (Figure 1) offers 48 10 Gigabit Ethernet (GbE) SFP+ ports and four 40 GbE QSFP+ ports. Each 40 GbE port can be broken out into four independent 10 GbE SFP+ ports, providing an additional 16 10 GbE SFP+ ports. In addition, the switch features low power consumption, consuming 1 watt per 10 GbE port.

VDX 6740T Switch

The VDX 6740T (Figure 2) offers 48 10GBASE-T ports and four 40 GbE QSFP+ ports. Each 40 GbE port can be broken out into four independent 10 GbE SFP+ ports, providing an additional 16 10 GbE SFP+ ports. The switch also features low power consumption, consuming less than 5 watts per 10 GbE port.

VDX 6740T-1G Switch

The VDX 6740T-1G (Figure 3) offers 48 1000BASE-T ports and two 40 GbE QSFP+ ports. Each 40 GbE port can be broken out into four independent 10 GbE SFP+ ports, providing an additional eight 10 GbE SFP+ ports for uplink. All 48 1000BASE-T ports can be upgraded to 48 10GBASE-T ports via the Capacity on Demand (CoD) software license. Two 40 GbE ports are enabled as part of the base license. The additional two 40 GbE ports can be upgraded via the Ports on Demand (PoD) software license.

Features and benefits

The VDX 6740, 6740T, and 6740T-1G are all Ethernet fabric Top-of-Rack (ToR) switches that support a demanding data center environment. The VDX 6740 series of switches provides the advanced feature set that data centers require while delivering the high performance and low latency virtualized environments demand. Together with data center fabrics, these switches transform data center networks to support the New IP by enabling cloud-based architectures that deliver new levels of scale, agility, and operational efficiency. These highly automated, software driven, and programmable data center fabric design solutions support a breadth of network virtualization options and scale for data center environments ranging from tens to thousands of servers. Moreover, they make it easy for organizations to architect, automate, and integrate current and future data center technologies while they transition to a cloud model that addresses their needs, on their own timetable and on their terms.

Figure 1:   The VDX 6740 Switch provides 48 10 GbE SFP+ ports and four 40 GbE QSFP+ ports.

Figure 2:   The VDX 6740T Switch provides 48 1000BASE-T/ 10GBASE-T ports and four 40 GbE QSFP+ ports

Figure 3:   The VDX 6740T-1G Switch provides 48 1000BASET/ 10GBASE-T ports and four 40 GbE QSFP+ ports.

Transform Networks to Deliver New Levels of Scale, Agility, and Operational Efficiency

VDX switches allow organizations to evolve their data center networks at their own pace, with full investment protection. As the foundation for several data center architectures, VDX switches support Extreme IP fabrics, Extreme VCS® fabrics, as well as network virtualization, including controller-based network virtualization architectures, such as VMware NSX-V-certified, and standards-based controller-less architectures with Extreme BGP-EVPN Network Virtualization for architectural flexibility (see Figure 4).

For organizations seeking automated provisioning capabilities to improve IT agility, VDX switches, together with Extreme VCS Fabric technology, accelerate time to value through automated provisioning of network devices and network virtualization. Automated service and resource upgrades further reduce ongoing maintenance time and costs. High availability is achieved through non-disruptive In-Service Software Upgrade (ISSU) and self-healing fabrics.

Optionally, for DevOps-centric organizations, VDX switches can be provisioned using Extreme Workflow Composer™ and Extreme Workflow Composer Automation Suites.

Turnkey and Customizable Lifecycle Automation

Organizations that aim to automate the entire network lifecycle but lack sufficient engineering resources can leverage Workflow Composer, a server-based, DevOpsinspired network automation platform powered by StackStorm. The Workflow Composer platform automates the entire infrastructure lifecycle—from provisioning and validation to troubleshooting and remediation. It also integrates across IT domains for end-to-end event-driven workflow automation.

Designed to run with the Workflow Composer platform, Workflow Composer Automation Suites are ideal for IT organizations that seek to embrace automation yet possess limited automation training or time. The suites provide out-of-the-box network lifecycle automation for commonly performed tasks, and are packaged to address major use cases.

The Automation Suites Include
•Network Essentials :
Basic building blocks to help organizations with limited resources get up and running quickly, including workflows that automate steps common to most networks.

•Data Center Fabrics :
A collection of workflows specific to provisioning, troubleshooting, and remediating data center fabrics, including Extreme IP fabric deployments

•Internet Exchange Points :
Workflows to automate steps specifically associated with Layer 2 Internet exchange connectivity, such as tenant provisioning and maintenance.

Each automation suite includes documentation and a collection of turnkey yet customizable workflows, services, sensors, actions, and rules. Organizations can use Automation Suites as-is or as starter kits for building or customizing workflows specific to their data center requirements to reduce time-to-value

Additionally, VDX switches offer programmability and interoperability options through a PyNOS Library and YANG model-based REST and Netconf APIs. Cloud orchestration and control through OpenStack and OpenDaylight-based SDN controller support enable full network integration with compute and storage resource provisioning and management.

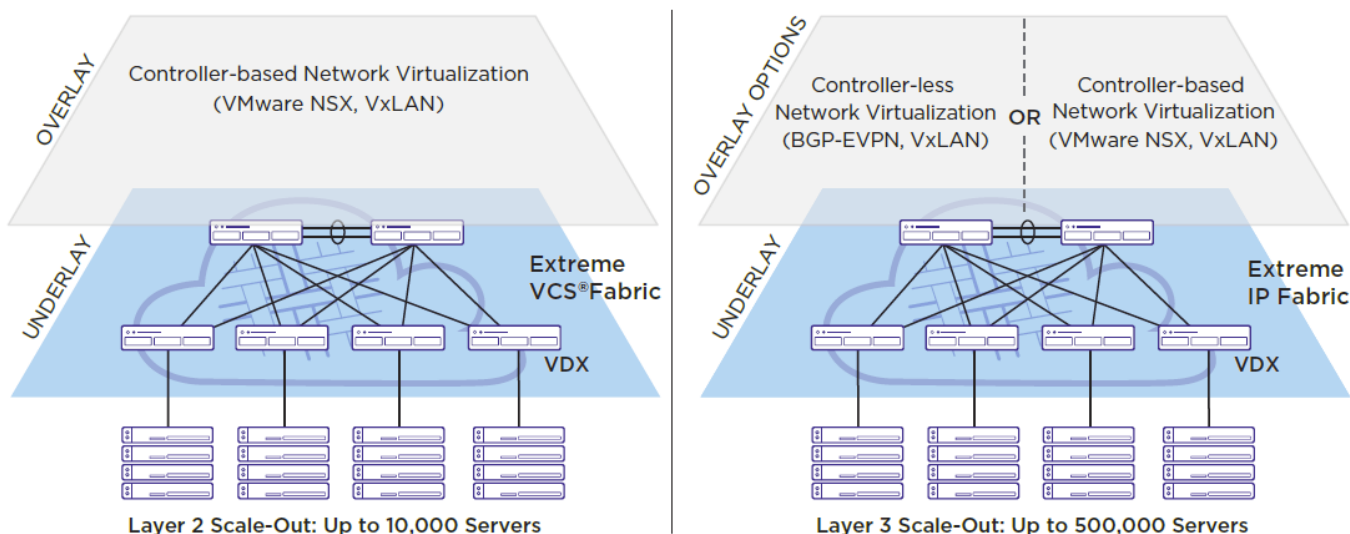## Extreme Data Center Fabrics and Network Virtualization Options

Figure 4: Multiple network architectures offer the flexibility that can help organizations rapidly adapt to changing business conditions and traffic patterns.

Meets Today's Application Demands with High Performance and Low Latency

As data centers virtualize more of their servers and VM density per server increases, organizations will require higher bandwidth connectivity to support the explosion of data and application processing. With 1/10 GbE connections, VDX 6740, 6740T, and 6740T-1G switches deliver the high-performance computing needed to keep up with the demands of a virtualized data center, allowing organizations to reduce network congestion, improve application performance, and meet the capacity required by 1 GbE and 10 GbE servers. The 40 GbE uplinks can easily aggregate high-bandwidth traffic and reduce bottlenecks that occur when aggregating multiple 10 GbE connections, keeping data center networks working at peak performance.

In a VCS fabric, VDX 6740 switches also help maximize network utilization with hardware-based Extreme Inter- Switch Link (ISL) Trunking. Organizations can create an 80 GbE trunk by utilizing two 40 GbE ports, or a 160 GbE trunk with 16 10 GbE ports. The ISL trunk is automatically formed between two VDX 6740, 6740T, and 6740T-1G switches when they are linked together, allowing traffic to be equally distributed among all ports. This increases link efficiency and limits traffic disruptions, especially during high traffic times. Also, 40 GbE and 10 GbE trunking is supported between VDX 6740, 6940, and 8770 switches. Refer to the Network OS Management Configuration Guide for more information.

Extreme Metro VCS technology provides an innovative solution to interconnect data centers and their traffic flows over distance, guaranteeing supported traffic characteristics. Metro VCS technology configured for regular Ethernet traffic supports 10 GbE ISLs up to 80 km, 40 GbE ISLs up to 40 km, and 100 GbE ISLs up to 40 km. To configure Metro VCS technology for lossless traffic applications (DCB/FCoE), refer to the Metro VCS Predeployment Guide for details.

While an increase in traffic can also create latency issues, VDX 6740 switches deliver very low latency through wire-speed ports with 850 ns (VDX 6740) and 3 μs (VDX 6740T/6740T-1G) any-port-to-any-port latency. In addition, the switches deliver an industry-leading 24 MB deep buffer per switch. This provides the buffering capacity to handle increases in traffic, especially during peak times when ports are congested, allowing traffic to be distributed across the ports. The VDX 6740, 6740T, and 6740T-1G feature a single ASIC design, instead of multiple ASIC designs commonly found on other switches, further improving performance and reducing latency since all ports can communicate via one ASIC.

### Fits into Any Data Center Design

Access ports are positioned to allow for easy server connectivity and to simplify cabling. With a choice of frontto- back or back-to-front airflow, these switches are ideal for ToR deployments connecting servers, storage, and other switches, as well as for providing compatibility for either hot aisle or cold aisle data center designs. With dual-speed functionality, each 1 GbE port also supports 10 GbE connections, providing the flexibility needed to support a mixed environment as data centers transition to higher bandwidth.

The switches are designed to connect data centers with multiple options to meet individual design requirements. This flexible design provides investment protection, giving organizations a single switch that can support varying data center requirements. The following features help organizations meet their evolving needs:

• 10 GbE or 40 GbE uplinks:
The 40 GbE SFP+ ports offer the flexibility to expand and interconnect the network infrastructure intelligently and efficiently while reducing bottlenecks. The switches offer the option to separate the 40 GbE uplinks into four 10 GbE uplinks via breakout cables. As capacity and need increase, organizations can revert to 40 GbE when ready.

Workflow Composer Automation Suites
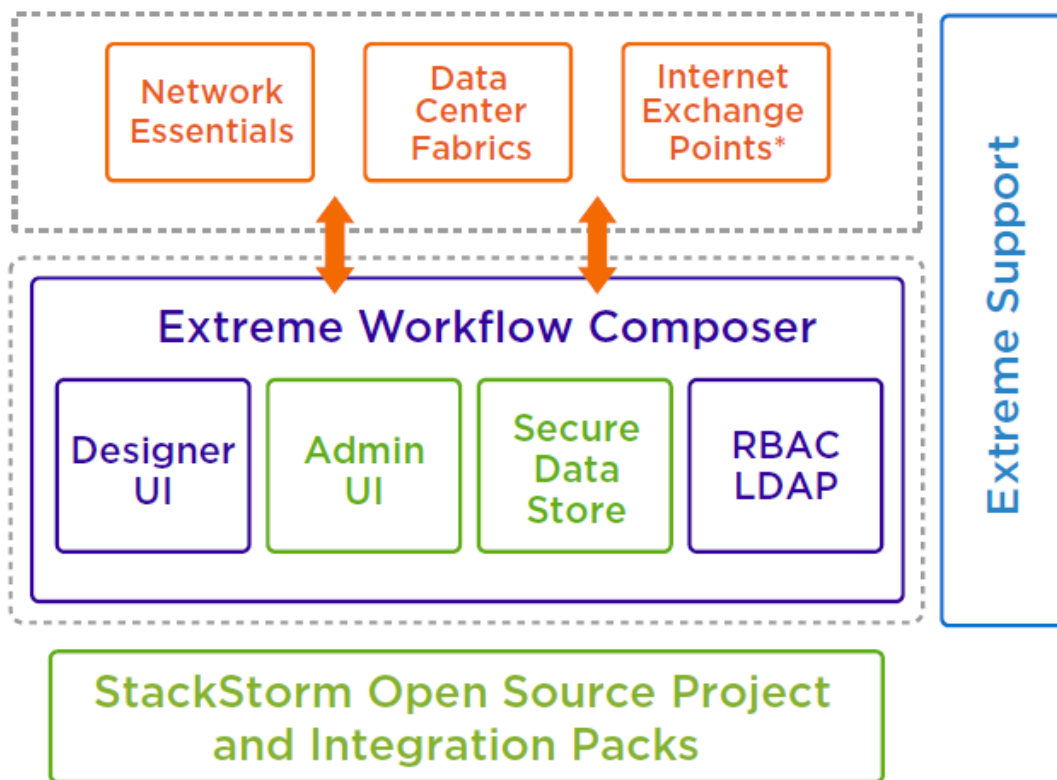
Figure 5: The Extreme Workflow Composer Automation Suite Architecture.

・Ports on Demand:
Ports on Demand (PoD) enables organizations to activate 24 to 64 ports. They can purchase the number of ports that they currently need and seamlessly scale up later by simply applying a software license. This flexible and cost-efficient "pay as you grow" licensing model solves scalability challenges by allocating IT resources as needed.

・Capacity on Demand:
The Capacity on Demand (CoD) license for the VDX 6740T-1G enables organizations to upgrade all 48 1000BASE-T ports to 48 10GBASE-T. This helps organizations migrate seamlessly from 1 GbE to 10 GbE via a software license without ripping and replacing the physical switch.

Maximizes Network Availability with Efficiency and Resiliency
Extreme data center fabrics create a more efficient and resilient network, and deliver the high performance and high reliability required by today's data centers.

- Optimizing East-West Traffic
Traditional data centers are architected with a rigid, threetier tree topology optimized for the north-south traffic flow of client-server computing environments, compromising performance, increasing latency, and creating bottlenecks. With the increased prevalence of virtualization and distributed applications, data center network traffic is now predominantly east-west, or server-server. Data center fabrics were designed and optimized to address these traffic patterns by moving traffic through any of the active paths and avoiding the multiple hops required in other tiered topologies.

- In-Service Software Upgrade
The VDX 6740 family of switches delivers a highly efficient ToR In-Service Software Upgrade (ISSU) by leveraging a software model that uses a dual-OS infrastructure on a multi-core CPU. This enables data center administrators to deliver enterprise-class business continuity on ToR switches during a software upgrade/downgrade process. This software change process is non-disruptive to Layer 2, Layer 3, Fibre Channel, and FCoE traffic. Moreover, the ISSU implementation is hardware-optimized, thus reducing the time it takes to complete the upgrade/downgrade process.

Supports Storage Environments with Advanced Flexibility
The VDX 6740, 6740T, and 6740T-1G offer advanced storage support with multiple storage connectivity options, including FCoE, Fibre Channel (VDX 6740 only), iSCSI, and NAS storage. They also feature Data Center Bridging (DCB), which enables the reliable exchange of storage traffic over the LAN network, eliminating packet loss when network congestion occurs and allocating bandwidth as needed to keep the network running efficiently. Moreover, the switches offer Network-Attached Storage (NAS) Auto QoS intelligence to prioritize delay-sensitive IP storage traffic within the fabric and to help ensure consistent performance while decreasing latency.
The VDX 6740 features 32 Flex Ports, which can take either a 10 GbE or 16 Gbps Fibre Channel personality. In Fibre Channel mode, these Flex Ports can be used to either directly connect Fibre Channel storage to VCS fabrics or bridge FCoE traffic to Fibre Channel SANs, thus protecting existing SAN investments. The Flex Ports and FCoE features on the VDX 6740 can be turned on with an addon software license.

VDX 6740, 6740T, and 6740T-1G Feature Overview

VDX 6740, 6740T, and 6740T-1G Specifications

Overview	VDX 6740	VDX 6740T	VDX 6740T-1G
Form Factor	1U	1U	1U
Switching bandwidth(data rate, full duplex)	1.28 Tbps	1.28 Tbps	1.28 Tbps
Switch Performance	960 Mpps	960 Mpps	960 Mpps
Port-to-port latency	850 ns	3 μs	3 μs
Dimensions and weight	Width: 43.99 cm (17.32 in.) Height: 4.32 cm (1.75 in.) Depth: 40.99 cm (16.14 in.) Weight: 8.66 kg (19.1 lb)	Width: 43.74 cm (17.22 in.) Height: 4.27 cm (1.68 in.) Depth: 53.65 cm (21.12 in.) Weight: 10.82 kg (23.85 lb)	Width: 43.74 cm (17.22 in.) Height: 4.27 cm (1.68 in.) Depth: 53.65 cm (21.12 in.) Weight: 10.82 kg (23.85 lb)
10 GbE SFP+ ports	Up to 64	Up to 16	Up to 16
2/4/8/16 Gbps Fibre Channel Flex Ports	Up to 32 (out of 64 10 GbE ports) Port types supported: E_Port (connecting to EX_Port only), F_Port, N_Port (Access Gateway mode)	0	0
1/10 GBASE-T	0	48	48
40 GbE QSFP+ (10 GbE breakout cable)	4	4	4
10 GbE Ports on Demand (PoD)	24, 32, 40, 48, 56, 64	24, 32, 40, 48, 56, 64	N/A
10 GbE Capacity on Demand (CoD)	N/A	N/A	16, 32, 48
Power supplies	Two hot-swappable, load-sharing	Two hot-swappable, load-sharing	Two hot-swappable, load-sharing
Cooling fans	N+1 redundant, integrated into power supplies	N+1 redundant, five hot-swappable fan units	N+1 redundant, five hot-swappable fan units
Airflow	Front to back Back to front	Front to back Back to front	Front to back Back to front

VDX 6740, 6740T, and 6740T-1G Specifications (Continued)

Scalability Information[*1]

Connector options	Out-of-band Ethernet management: RJ45 (fixed) Console management: RJ45 to RS-232 (fixed) Firmware and diagnostic: USB
Maximum VLANs	4,096
Maximum MAC addresses	160,000
Maximum port profiles (AMPP)	1,024
Maximum members in a standard LAG	64
Maximum per-port priority pause level	8
Maximum switches that a vLAG can span	8
Maximum members in a vLAG	64
Maximum ACLs	13,000
Maximum ARP entries	32,000
Maximum IPv4 unicast routes	12,000
Maximum IPv6 unicast routes	3,000
HA/ISSU	ISSU fully supported

Mechanical

Enclosure	Front-to-rear, rear-to-front airflow; 19-inch EIA-compliant; power from non-port side

Environmental

Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating and storage: -25°C to 70°C (-13°F to 158°F)
Humidity	Operating: 10% to 85% non-condensing Non-operating and storage: 10% to 90% non-condensing
Altitude	Operating: Up to 3,048 meters (10,000 feet) Non-operating and storage: Up to 12 kilometers (39,370 feet)
Shock	Operating: 20 G, 11 ms half-sine Non-operating and storage: Square wave, 44 G, 15 ms
Vibration	Operating: 0.5 G peak, 0.7 G ms random, 5 to 500 Hz Non-operating and storage: 2.0 g sine, 1.4 G rms random, 5 to 500 Hz
Airflow	VDX 6740T port-side-intake: Maximum: 49.3 CFM; Nominal: 26.3 CFM VDX 6740T port-side-exhaust: Maximum: 51.9 CFM; Nominal: 27.3 CFM VDX 6740 port-side-intake and port-side-exhaust: Maximum: 25.7 CFM; Nominal: 11.5 CFM
Heat Dissipation	1,672.41 BTU/hr

Environmental

Power Supplies	Two internal, redundant, field-replaceable, load-sharing AC power supplies
Power Inlet	C13
Input Voltage	85 to 264 VAC nominal
Input Line Frequency	50 to 60 Hz
Inrush Current	Limited to 30 A peak at 240 VAC during cold startup at 25°C ambien
Maximum Current	66 A max at 100 VAC/60 Hz
Maximum Power Consumption	VDX 6740: 110 W VDX 6740T: 460 W VDX 6740T-1G: 276 W (Base SKU)

*1. Please refer to the latest version of the release notes for the most up-to-date scalability numbers supported in software.

Safety Compliance
・CAN/CSA C22.2 No. 60950-1-07 including A1 / UL 60950-1-07, Ed. 2 including A1
・CAN/CSA-C22.2 No. 60950-1 Second Edition EN 60950-1
Second Edition +A1/A12
・EN 60950-1 Second Edition +A1/A12
・IEC 60950-1 Second Edition +A1
・GB 4943.1-2011 and GB9254-2008
・CNS14336-1(99)

EMC
・FCC Class A
・ICES-003 Class A
・VCCI-Class A
・CE
・C-Tick
・BSMI
・GOST
・KCC Class A
・CCC

Immunity
・ANSI C63.4
・ICES-003 Class A
・CISPR22 and JEIDA (Harmonics)
・EN55022 Class A and EN55024
・CISPR22
・AS/NZS CISPR22
・CNS 13438(95)
・51318.22-99 and 51318.24-99
・KN22 and KN24
・GB17625.1-2003

Environmental Regulatory Compliance
・RoHS-6 (with lead exemption) Directive 2002/95/EC

Standards Compliance
VDX 6740 products conform to the following Ethernet standards:
· IEEE 802.1D Spanning Tree Protocol
· IEEE 802.1s Multiple Spanning Tree
· IEEE 802.1w Rapid Reconfiguration of Spanning Tree Protocol
· IEEE 802.3 Ethernet
· IEEE 802.3ad Link Aggregation with LACP
· IEEE 802.3ae 10G Ethernet
· IEEE 802.1Q VLAN Tagging
· IEEE 802.1p Class of Service Prioritization and Tagging
· IEEE 802.1v VLAN Classification by Protocol and Port
· IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
· IEEE 802.3x Flow Control (Pause Frames)
· IEEE 802.3ab 1000BASE-T
· IEEE 802.3z 1000BASE-X
The following draft versions of the Data Center Bridging (DCB) and Fibre Channel over Ethernet (FCoE) standards are also supported on the VDX 6740:
· IEEE 802.1Qbb Priority-based Flow Control
· IEEE 802.1Qaz Enhanced Transmission Selection
· IEEE 802.1 DCB Capability Exchange Protocol (Proposed under the DCB
Task Group of IEEE 802.1 Working Group)
· FC-BB-5 FCoE (Rev 2.0)

The VDX 6740 products conform to the following Fibre Channel standards:
· FC-GS-5 ANSI INCITS 427:2007 (includes the following)
· FC-GS-4 ANSI INCITS 387: 2004
· FC-SP-2 INCITS 496-2012 (AUTH-A, AUTH-B1 only)
· FC-DA INCITS TR-36: 2004 (includes the following)
· FC-FLA INCITS TR-20: 1998
· FC-PLDA INCIT S TR-19: 1998
· FC-MI-2 ANSI/INCITS TR-39-2005
· FC-PI INCITS 352: 2002
· FC-PI-2 INCITS 404: 2005
· FC-PI-4 INCITS 1647-D, revision 7.1 (under development)
· FC-FS-2 ANSI/INCITS 424:2006 (includes the following)
· FC-FS INCITS 373: 2003
· FC-LS INCITS 433: 2007
· MIB-FA INCITS TR-32: 2003

RFC Support
RFC 768 User Datagram Protocol (UDP)
RFC 783 TFTP Protocol (revision 2)
RFC 791 Internet Protocol (IP)
RFC 792 Internet Control Message Protocol (ICMP)
RFC 793 Transmission Control Protocol (TCP)
RFC 826 ARP
RFC 854 Telnet Protocol Specification
RFC 894 A Standard for the Transmission of IP Datagram over
        Ethernet Networks
RFC 959 FTP
RFC 1027 Using ARP to Implement Transparent Subnet Gateways
        (Proxy ARP)
RFC 1112 IGMPv1
RFC 1157 Simple Network Management Protocol (SNMP)
v1 and v2
RFC 1305 Network Time Protocol (NTP) Version 3
RFC 1492 TACACS+
RFC 1519 Classless Inter-Domain Routing (CIDR)
RFC 1584 Multicast Extensions to OSPF
RFC 1765 OSPF Database Overflow
RFC 1812 Requirements for IP Version 4 Routers
RFC 1997 BGP Communities Attribute
RFC 2068 HTTP Server
RFC 2131 Dynamic Host Configuration Protocol (DHCP)
RFC 2154 OSPF with Digital Signatures (Password, MD-5)
RFC 2236 IGMPv2
RFC 2267 Network Ingress Filtering
RFC 2328 OSPF v2
RFC 2370 OSPF Opaqie Link-State Advertisement
        (LSA) Option Partial Support
RFC 2375 IPv6 Multicast Address Assignments
RFC 2385 Protection of BGP Sessions with the TCP MD5 Signature
        Option
RFC 2439 BGP Route Flap Damping
RFC 2460 Internet Protocol, Version 6 (v6) Specification
        (on management interface)
RFC 2462 IPv6 Stateless Address Auto-Configuration
RFC 2464 Transmission of IPv6 Packets over Ethernet Network
RFC 2474 Definition of the Differentiated Services Field in the IPv4
        and IPv6 Headers
RFC 2571 An Architecture for Describing SNMP Management
        Frameworks
RFC 2711 IPv6 Router Alert Option
RFC 2865 Remote Authentication Dial-In User Service (RADIUS)
RFC 3101 The OSPF Not-So-Stubby Area (NSSA) Option

RFC Support (cont.)
RFC 3176 sFlow
RFC 3137 OSPF Stub Router Advertisement
RFC 3392 Capabilities Advertisement with BGPv4
RFC 3411 An Architecture for Describing SNMP Frameworks
RFC 3412 Message Processing and Dispatching for the SNMP
RFC 3413 Simple Network Management Protocol (SNMP)
            Applications
RFC 3587 IPv6 Global Unicast Address Format
RFC 3623 Graceful OSPF Restart - IETF Tools
RFC 3768 VRRP
RFC 4271 BGPv4
RFC 4291 IPv6 Addressing Architecture
RFC 4292 IP Forwarding MIB
RFC 4293 Management Information Base for the Internet Protocol
            (IP)
RFC 4443 ICMPv6 (replaces 2463)
RFC 4456 BGP Route Reflection
RFC 4510 Lightweight Directory Access Protocol (LDAP): Technical
            Specification Road Map
RFC 4601 Protocol Independent Multicast—Sparse Mode (PIMSM):
            Protocol Specification (Revised)
RFC 4724 Graceful Restart Mechanism for BGP
RFC 4861/5942 IPv6 Neighbor Discovery
RFC 4893 BGP Support for Four-Octet AS Number Space
RFC 5880 Bidirectional Forwarding Detection (BFD)
RFC 5881 Bidirectional Forwarding Detection (BFD) for IPv4 and
            IPv6 (Single Hop)
RFC 5882 Generic Application of Bidirectional Forwarding Detection
            (BFD)
RFC 5883 Bidirectional Forwarding Detection (BFD) for
            Multihop Paths

IPv6 Routing
RFC 2740 OSPFv3 for IPv6
RFC 2545 Use of BGP-MP extensions for IPv6

IPv6 Multicast
RFC 2710 Multicast Listener Discovery (MLD) for IPv6

VRRP / VRRPe
RFC 5798 VRRP Version 3 for IPv4 and IPv6

Network OS Software Capabilities

Software Scalability	VSC Fabrics	IP Fabrics
Maximum switches in a fabric	48	Unlimited
Maximum ECMP paths in a fabric	32	32
Maximum LAGs in a fabric	2,000	Unlimited

Layer 2 Switching	VSC Fabrics	IP Fabrics
Service Node Load Balancing BFD/ARP Optimizations	x	x
Conversational MAC Learning	x	x
Virtual Link Aggregation Group (vLAG) spanning	x	x
Layer 2 Access Control Lists (ACLs)	x	x
Supports 2K ingress and egress ACLs	x	x
Edge Loop Detection (ELD)	x	x
Address Resolution Protocol (ARP) RFC 826	x	x
Private VLANs	x	
Maintenance Mode/Graceful Traffic Diversion	x	
Distributed VXLAN Gateway	x	
Diagnostic Port	x	
IP Maps Support	x	
L2 Loop prevention in an overlay environment		x
High availability/In-Service Software Upgrade - hardware-enabled	x	x
IGMP snooping support for multicast flooding	x	x
IGMPv1/v2 Snooping	x	x
IGMPv3	x	x
MAC Learning and Aging	x	x
Link Aggregation Control Protocol (LACP) IEEE 802.3ad/802.1AX	x	x
Virtual Local Area Networks (VLANs)	x	x
VLAN Encapsulation 802.1Q	x	x
Per-VLAN Spanning Tree(PVST+/PVRST+)	x	x
Rapid Spanning Tree Protocol (RSTP) 802.1w	x	x
Multiple Spanning Tree Protocol (MSTP) 802.1s	x	x
STP PortFast, BPDU Guard, BPDU Filter	x	x
STP Root Guard	x	x
Pause Frames 802.3x	x	x
Static MAC Configuratio	x	x
Uni-Directional Link Detection (UDLD)	x	x
Uplink switch for VDX switches, VCS fabrics, and the VCS Virtual Fabric feature	x	
Transparent LAN Services	x	
L2 Traceroute for VXLAN	x	x
BUM Storm Control	x	x

Layer 3 Switching	VSC Fabrics	IP Fabrics
Border Gateway Protocol (BGP4+)	x	x
DHCP Helper	x	x
Layer 3 ACLs	x	x
Multicast: PIM-SM, IGMPv2	x	x
OSPF v2/v3	x	x
Static routes	x	x
IPv4/v6 ACL	x	x

Layer 3 Switching	VSC Fabrics	IP Fabrics
Policy-Based Routing (PBR)	x	x
Bidirectional Forwarding Detection (BFD)	x	x
32-Way ECMP	x	x
VRF Lite	x	x
VRF-aware OSPF, BGP, VRRP, static routes	x	x
VRRP v2 and v3	x	x
uRPF for IPv4 and IPv6	x	
IPv4/IPv6 dual stack	x	x
IPv6 ACL packet filtering	x	x
BGP automatic neighbor discovery for IP fabri		x
BGP Additional-Path	x	x
BGP-Allow AS	x	x
BGP Generalized TTL Security Mechanism (GTSM)	x	x
BGP graceful shutdown for maintenance mode		x
BGP Peer Auto Shutdown	x	x
Multicast Refactoring	x	x
IPv6 routing	x	x
OSPF Type-3 LSA Filter	x	x
Wire-speed routing for IPv4 and IPv6 using any routing protocol	x	x
BGP-EVPN Control Plane Signaling RFC 7432		x
BGP-EVPN VXLAN Standard-based Overlay		x
Multi-VRF	x	x
IP Unnumbered Interface		x
Intersubnet Routing (Symmetric and Asymmetric)		x
IP over Port Channel		x
VRRP-E	x	x
Fabric Virtual Gateway	x	x
Static Anycast Gateway		x
ARP Suppression		x

Automation and Programmability	VSC Fabrics	IP Fabrics
OpenFlow 1.3	x	x
REST API with YANG data model	x	x
Puppet	x	x
Python	x	x
PyNOS libraries	x	x
VMware vRealize plugins	x	x
DHCP automatic fabric provisioning	x	x
Netconf API	x	x

Multitenancy and Vrtualization	VSC Fabrics	IP Fabrics
TRILL FGL-based VCS Virtual Fabric feature	x	
Virtual fabric extension	x	
VM-Aware Network Automation	x	
BFD for virtual fabric extension	x	
Automatic Migration of Port Profiles (AMPP)	x	x

Network OS Software Capabilities (cont.)

DCB	VSC Fabrics	IP Fabrics
Priority-based Flow Control (PFC) 802.1Qbb	x	
Enhanced Transmission Selection (ETS) 802.1Qaz	x	
Manual configuration of lossless queues for protocols other than FCoE and iSCSI	x	
Data Center Bridging Exchange (DCBX)	x	
DCBX Application Type-Length-Value (TLV) for FCoE and iSCSI	x	
IP Storage		
Inter-Switch Link (ISL)	x	
Deep on-chip packet buffer	x	x
Auto QoS for NAS	x	x
VCS fabric auto forming/auto healing	x	x
Fibre Channel/FCoE		
Multi-hop Fibre Channel over Ethernet (FCoE); requires Extreme Networks VCS Fabric technology	x	
FC-BB5 compliant Fibre Channel Forwarder (FCF)	x	
Native FCoE forwarding	x	
FCoE to Fibre Channel Bridging	x	
FCoE on VDX 8770	x	
FCoE on QSFP+ port	x	
Multi-hop Access Gateway Support	x	
End-to-end FCoE (initiator to target)	x	
FCoE Initialization Protocol (FIP) v1 support for FCoE device login and initialization	x	
Name Server-based zoning	x	
Supports connectivity to FIP Snooping Bridge (FSB) device	x	
FCoE traffic over standard LAG	x	
Interface Binding	x	
Dual Personality Ports	x	
Logical SANs	x	
High Availability		
ISSU L2 and L3	x	x
BFD	x	x
OSPF3-NSR	x	x
BGP4-GR	x	x
Management Module Failover	x	x
Quality of Service (QoS)		
ACL-based QoS	x	x
Eight priority levels for QoS	x	x
Class of Service (CoS) IEEE 802.1p	x	x
DSCP Trust	x	x
DSCP to Traffic Class Mutation	x	x
DSCP to CoS Mutation	x	x
DSCP to DSCP Mutation	x	x
Random Early Discard	x	x
Per-port QoS configuration	x	x

Quality of Service (QoS) cont.	VSC Fabrics	IP Fabrics
ACL-based Rate Limit	x	x
Dual-rate, three-color token bucket	x	x
ACL-based remarking of CoS/DSCP/Precedence	x	x
ACL-based sFlow	x	x
Scheduling: Strict Priority (SP), Deficit Weighted Round-Robin (DWRR), Hybrid	x	x
Scheduling (Hybrid)		
Queue-based Shaping	x	x
Flow-based QoS	x	x
Management and Monitoring		
Logical chassis management	x	
IPv4/IPv6 management	x	x
Industry-standard Command Line Interface (CLI)	x	x
Netconf API	x	x
REST API with YANG data model	x	x
VDX Plugin for OpenStack	x	x
Link layer discovery protocol (LLDP) IEEE 802.1AB	x	x
MIB II RFC 1213 MIB	x	x
Switch Beaconing	x	x
Management VRF	x	x
Switched Port Analyzer (SPAN)	x	x
Telnet	x	x
SNMP v1, v2C, v3	x	x
sFlow RFC 3176	x	x
Out-of-band management	x	x
Remote SPAN (RSPAN)	x	x
RMON-1, RMON-2	x	x
NTP	x	x
Management Access Control Lists (ACLs)	x	x
Role-Based Access Control (RBAC)	x	x
Range CLI support	x	x
UDLD	x	x
OpenStack Neutron ML2 plugin	x	x
Python	x	x
Puppet	x	x
Distributed Configuration Management	x	
Maps switch health monitoring	x	
Security		
Port-based Network Access Control 802.1X	x	x
RADIUS (AAA)	x	x
Secure Shell (SSHv2)	x	x
BPDU Drop	x	x
Lightweight Directory Access Protocol (LDAP)	x	x
Secure Copy Protocol	x	x
Port Security	x	x

More information

Fujitsu platform solutions

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