BROCADE

Brocade VDX 6940 Switches

- Transforms networks to deliver cloud scale, agility, and operational efficiency with Brocade data center fabrics
- Offers the market's highest 10, 40, and 100 GbE density in a fixed form factor
- 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 40 GbE/100 GbE uplinks and Ports on Demand (PoD)
- Maximizes network availability with efficiency and resiliency
- Supports storage environments with advanced flexibility

Advanced Features Enable Data Center Transformation

The data center is evolving, driving requirements for infrastructure that can support dynamic growth in Virtual Machines (VMs), distributed applications, and Big Data, as well as the transition to cloud-based computing—without compromising performance. The Brocade® VDX® 6940 and the Brocade VDX family of switches deliver the performance, flexibility, scale, and efficiency essential to modern data centers, including cloud and highly virtualized environments.

Optimizes Scale-Out Architecture

Brocade VDX switches are designed to help organizations stay ahead of application-driven network change by enabling agile growth through a scale-out architecture. This approach offers three key benefits. First, it enables network expansion as a business grows over time. Data center administrators can horizontally scale spine switches as the number of leaf switches increases. Second, scale-out architecture also enables the creation of resilient network fabrics, eliminating a single point of failure and potential downtime. Third, and most important, scale-out network architecture delivers a compelling economic benefit. Unlike scale-up, a scale-out model reduces upfront investment. And by using high-density fixed switches, it lowers the Total Cost of Ownership (TCO), reducing power, cooling, and data center space.

Brocade VDX 6940 Switches

The Brocade VDX 6940-36Q is a fixed 40 Gigabit Ethernet (GbE)-optimized switch in a 1U form factor. It offers 36 40 GbE QSFP+ ports and can be deployed as a spine or leaf switch (see Figure 1). Each 40 GbE port can be broken out into four independent 10 GbE SFP+ ports, providing a total of 144 10 GbE SFP+ ports. Deployed as a spine, it provides options to connect either 40 GbE or 10 GbE uplinks from leaf switches. By deploying this high-density, compact switch, data center administrators can reduce their TCO through savings on power, space, and cooling.

In a leaf deployment, 10 GbE and 40 GbE ports can be mixed, offering flexible design options to cost-effectively support demanding data center and service provider environments. As in other Brocade VDX platforms, the

Brocade VDX 6940-36Q offers a Ports on Demand (PoD) licensing model. Brocade VDX 6940-36Q is available with 24 ports or 36 ports. The 24-port model offers a lower entry point for organizations that want to start small and grow their networks over time. By installing a software license, organizations can upgrade their 24-port switch to the maximum 36-port switch.

Figure 1: The Brocade VDX 6940-36Q Switch provides 36 40 GbE ports.

The Brocade VDX 6940-144S is a 10 GbE-optimized switch with 40 GbE or 100 GbE uplinks in a 2U form factor. It offers 96 native 1/10 GbE SFP/SFP+ ports and 12 40 GbE QSFP+ ports, or 4 100 GbE QSFP28 ports. In addition, the Brocade VDX 6940-144S provides flexibility for uplinks, 40 GbE or 100 GbE from leaf switches, and delivers greater cross-sectional bandwidth for east-west traffic. Purpose-built for scale-out data centers and service providers, it enables aggregation of multiple server racks with a single switch.

With its high density, the Brocade VDX 6940-144S is an ideal fit for middle-of-row or end-of-row data center deployments (see Figure 2). By connecting multiple racks to a single cut-through switch, this architecture offers greater cross-sectional bandwidth for applications. Servers from multiple racks can be just one hop away from one another. The compact 2U form factor saves space, also reducing power and cooling, resulting in lower TCO.

Brocade VDX 6940 Switches provide the advanced feature set that data centers require while delivering the high performance and low latency virtualized environments demand. Together with

Brocade 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 2: The Brocade VDX 6940-144S Switch provides 96 1/10 GbE ports and 12 40 GbE or 4 100 GbE ports.

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

Brocade VDX switches enable organizations to evolve their data center networks at their own pace, with full investment protection. As the foundation for several data center architectures, Brocade VDX switches support Brocade IP fabrics, Brocade VCS® fabrics, as well as network virtualization, including controller-based network virtualization architectures, such as VMware NSX, and standards-based (BGP-EVPN) controller-less architectures with Brocade BGP-EVPN Network Virtualization for architectural flexibility (see Figure 3).

For organizations seeking automated provisioning capabilities to improve IT agility, Brocade VDX switches, together with Brocade 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.

Read more about Brocade data center fabrics.

Organizations that aim to automate the entire network lifecycle and integrate with cross-domain technologies to improve business agility—but lack sufficient engineering resources or training—can transform their networks with Brocade Workflow Composer™. Brocade Workflow Composer supports the Brocade VDX platform, enabling enterprise and cloud service provider IT organizations to bring network automation to IT operations (see Figure 4). Unlike other network automation solutions that require proprietary hardware platforms and focus solely on configuration management, Brocade Workflow Composer provides turnkey, customizable, or do-it-yourself network workflow automation for provisioning, validation, troubleshooting, and remediation of the entire Brocade VDX platform—while integrating with tool chains and processes from other IT domains. Brocade Workflow Composer is powered by StackStorm, an open, extensible, and microservices-based framework that leverages the power of proven DevOps methodologies; popular open source technologies such as Puppet, Python, and Mistral; and a thriving technical community for peer collaboration and innovation to provide event-driven, cross-domain workflow automation.

Additionally, Brocade VDX switches offer programmability and interoperability options through a PyNOS Library and YANG model-based REST and Netconf APIs. Cloud orchestration and control

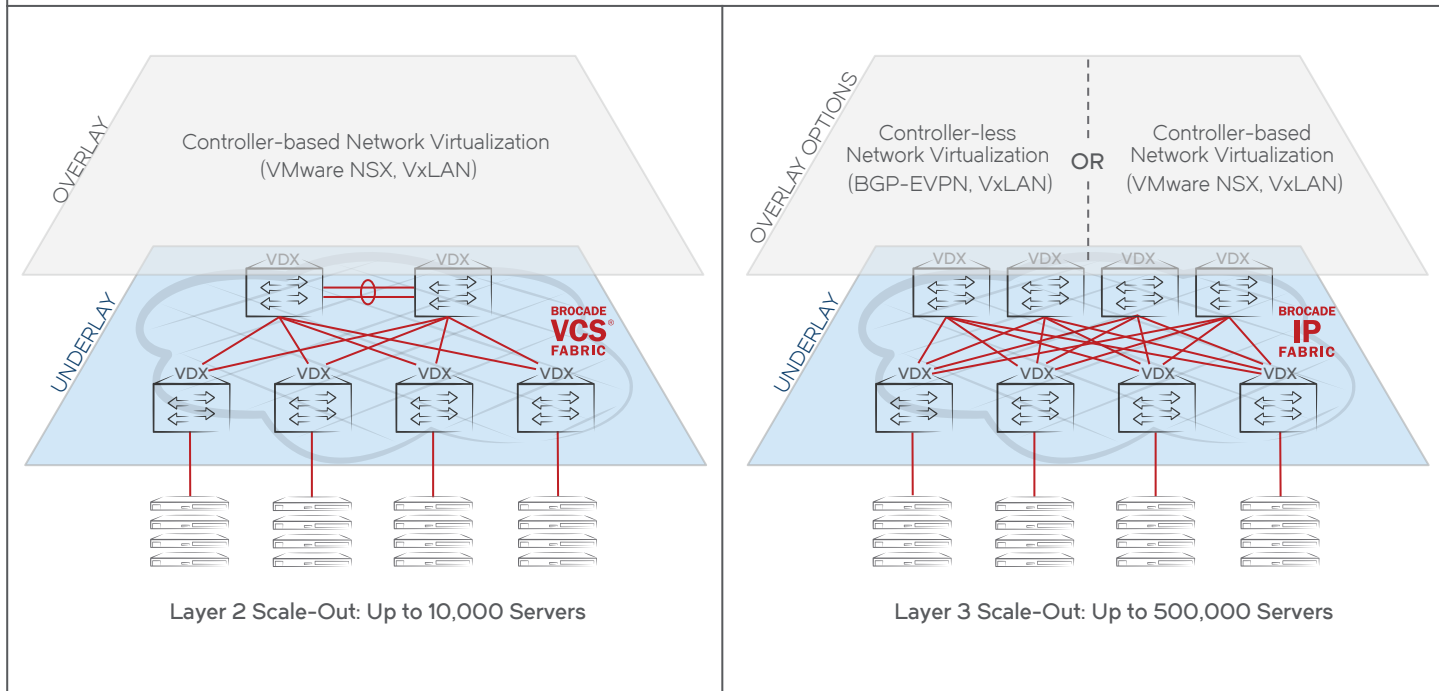## Brocade Data Center Fabrics and Network Virtualization Options

OVERLAY
Controller-based Network Virtualization
(VMware NSX, VxLAN)

UNDERLAY

VDX   VDX

VDX   VDX   VDX   VDX

**BROCADE
VCS®
FABRIC**

Layer 2 Scale-Out: Up to 10,000 Servers

OVERLAY OPTIONS
Controller-less
Network Virtualization
(BGP-EVPN, VxLAN)   **OR**   Controller-based
Network Virtualization
(VMware NSX, VxLAN)

UNDERLAY

VDX   VDX   VDX   VDX

VDX   VDX   VDX   VDX

**BROCADE
IP
FABRIC**

Layer 3 Scale-Out: Up to 500,000 Servers

Figure 3: Multiple network architectures offer the flexibility that can help organizations rapidly adapt to changing business conditions and traffic patterns.

through OpenStack and OpenDaylight-based SDN controller support enable full network integration with compute and storage resource provisioning and management.

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 and 40 GbE options, Brocade VDX 6940 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 10 GbE servers. The 40 GbE

and 100 GbE uplinks can easily aggregate high-bandwidth traffic and reduce bottlenecks that occur when aggregating multiple 10 GbE or 40 GbE connections, keeping data center networks working at peak performance.

In a Brocade VCS fabric, Brocade VDX 6940 Switches also help maximize network utilization with hardware-based Brocade ISL Trunking. Organizations can create a 120 GbE Brocade ISL trunk by utilizing three 40 GbE ports or 12 10 GbE ports between Brocade VDX 6940 Switches. The Brocade ISL trunk is automatically formed between two Brocade VDX 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 Brocade VDX

6940, 6740, and 8770 Switches. Refer to the *Brocade VDX 6940 Hardware Reference Manual* for details.

Brocade VDX 6940 Switches offer a unique balance between two conflicting attributes—buffer and latency. Niche products with very high buffer often suffer from high latency, and products with ultra-low latency are not a good fit for data centers with bursty traffic. Brocade VDX 6940 Switches, with a purpose-built data center chip, excel in optimizing buffer and latency to deliver better application performance. These switches deliver 800 ns any-port-to-any-port latency. In addition, they offer an industry-leading 24 MB deep buffer. 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. Brocade VDX 6940 Switches also feature a single ASIC
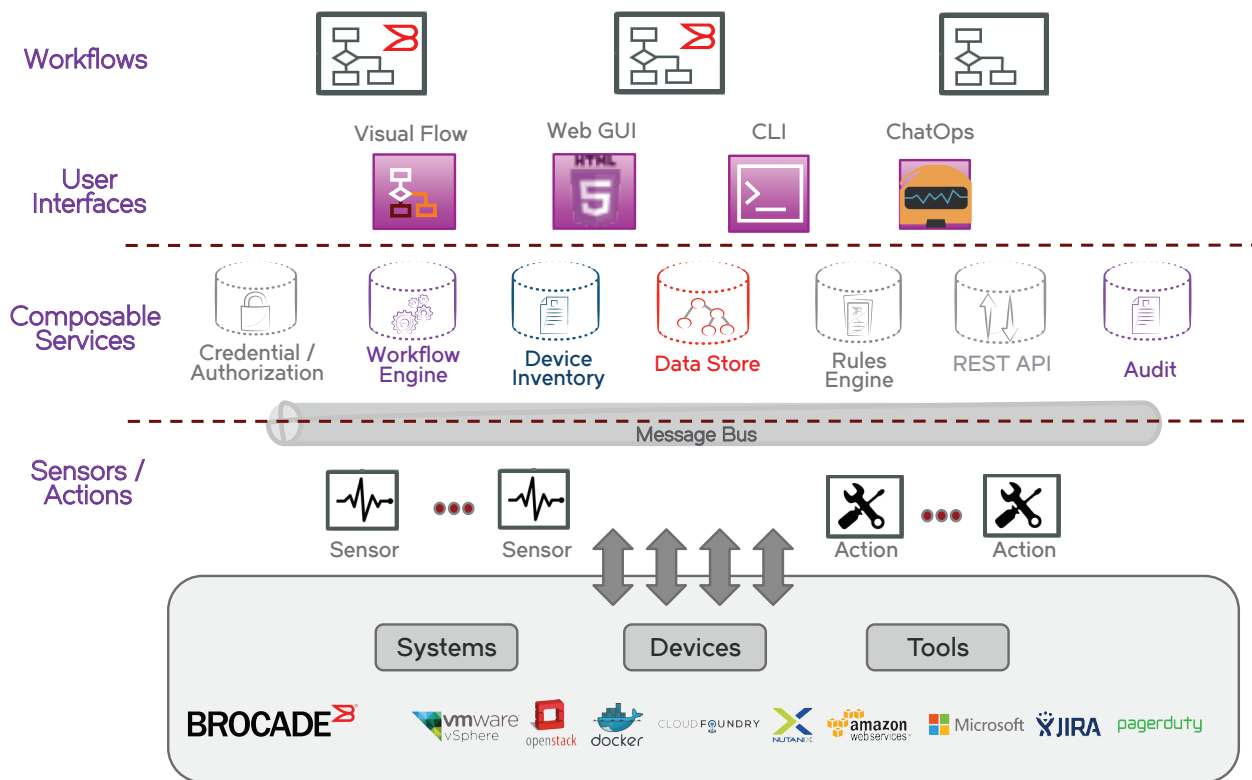
Figure 4: Brocade Workflow Composer brings workflow-centric, cross-domain network automation to IT operations.

design, instead of multiple ASIC designs commonly found in other switches. This improves performance since all ports communicate via the one ASIC.

Cloud and Big Data Environments

Brocade VDX 6940 Switches deliver optimized buffer and latency and high performance to enable greater cross-sectional bandwidth for east-west traffic—exactly what cloud workloads demand. These switches offer the flexibility needed to scale out networks, deliver intelligence to more effectively manage VM mobility, as well as provide an SDN-enabled and programmable infrastructure. In addition, Brocade VDX 6940 Switches offer an advanced feature set that non-virtual and Big Data environments require. With 10, 40, and 100 GbE options for designing oversubscribed or non-oversubscribed

networks, high throughput, and optimized buffer and latency, the Brocade VDX 6940 is an ideal switch for Big Data applications. Together with Brocade data center fabrics, Brocade VDX 6940 Switches can simplify network design and operations for both cloud and Big Data network fabrics.

Fits into Any Data Center Design

Brocade VDX 6940-36Q and 6940-144S front access ports are positioned to enable easy server or switch connectivity and to simplify cabling. With a choice of front-to-back or back-to-front airflow, these switches are ideal for deployments connecting servers, storage, and other switches, as well as for providing compatibility for either hot aisle or cold aisle data center designs. For the 40 GbE ports that also support

10 GbE connections with breakout cables, the switches offer the flexibility needed to support a mixed environment as data centers or service providers transition to higher bandwidth.

Brocade VDX 6940 Switches are designed to connect data centers in multiple ways 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:

• 10/40/100 GbE uplinks: The 40 GbE QSFP+ ports offer the flexibility to expand and interconnect the network infrastructure intelligently and efficiently while reducing bottlenecks. Brocade VDX 6940 Switches offer the option

to separate each 40 GbE uplink into four 10 GbE uplinks via breakout cables. As capacity and need increase, organizations can revert to 40 GbE when ready.

- Ports on Demand: Ports on Demand (PoD) enables organizations to activate additional 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.

Maximizes Network Availability with Efficiency and Resiliency

Brocade data center fabrics create a more efficient and resilient network, and deliver the high performance and high reliability required by modern data centers, including cloud and highly virtualized environments.

Optimizing East-West Traffic

Traditional data centers are architected with a rigid, three-tier 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. Brocade 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 Brocade VDX 6940 delivers a highly efficient 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 fixed switches during a software upgrade/downgrade process. This software change process is non-disruptive to Layer 2, Layer 3, Fibre Channel, and Fibre Channel over Ethernet (FCoE) traffic. Moreover, the ISSU implementation is hardware-optimized, thus reducing the time it takes to complete the upgrade/downgrade process.

Advanced Storage Support

Brocade VDX 6940 Switches provide advanced storage support with multiple storage connectivity options, including FCoE, iSCSI, and NAS. They also feature Data Center Bridging (DCB), which enables the reliable exchange of storage traffic over the LAN, eliminating packet loss when network congestion occurs and allocating bandwidth as needed to keep the network running efficiently. Moreover, Brocade VDX 6940 Switches offer NAS Auto QoS intelligence to prioritize delay-sensitive IP storage traffic within the fabric and to help ensure consistent performance while decreasing latency.

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, and education services, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Acquisition Options That Match Balance Sheet Objectives

Successful network deployments drive business forward, providing technical and financial agility. Brocade offers the broadest financing models, from traditional leasing to Brocade Network Subscription. Network-as-a-Service allows organizations to subscribe to network assets today then upgrade on demand, scale up or down, or return them with 60-day notification. Brocade Network Subscription plans can be structured to meet IASC guidelines for OpEx or CapEx treatment to align with financial goals. Learn more at www.nonetworkcapex.com.

Maximizing Investments

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

Brocade VDX 6940-36Q and 6940-144S Feature Overview

Overview	Brocade VDX 6940-36Q	Brocade VDX 6940-144S
Form factor	1U	2U
Switching bandwidth (data rate, full duplex)	2.88 Tbps	2.88 Tbps
Switch performance	2.16 Bpps	2.16 Bpps
Port-to-port latency	800 ns	800 ns
Dimensions and weight	Width: 44 cm (17.32 in.) Height: 4.4 cm (1.73 in.) Depth: 43.8 cm (17.22 in.) Weight: 8.9 kg (19.6 lb) without media; 10.1 kg (22.3 lb) with media	Width: 44 cm (17.32 in.) Height: 8.7 cm (3.41 in.) Depth: 48.5 cm (19.1 in.) Weight: 15.46 kg (34.1 lb) empty; 17.32 kg (38.2 lb) with media
10 GbE SFP+ ports	144 10 GbE ports using breakout cables	96 fixed 10 GbE ports and additional 48 10 GbE ports with breakout cables
1 GbE SFP	O	96
1/10 GBASE-T	O	O
40 GbE QSFP+	36	12
100 GbE QSFP28	O	4
40 GbE Ports on Demand (PoD)	24, 36	6, 12
10 GbE Ports on Demand (PoD)	N/A	64, 80, 96
Power supplies	Two internal, redundant, field-replaceable, load-sharing AC/DC power supplies	Two internal, redundant, field-replaceable, load-sharing AC/DC power supplies
Cooling fans	5 field-replaceable fans (FRUs); each fan FRU has 2 fans	4 field-replaceable fans (FRUs); each fan FRU has 1 fan
Airflow	Rear-to-front or front-to-rear airflow	Rear-to-front or front-to-rear airflow

Brocade VDX 6940-36Q and 6940-144S Specifications

Scalability Information*

Connector options	Out-of-band Ethernet management: RJ-45 (fixed) Console management: RJ45 to RS-232 (fixed) Firmware and diagnostic: USB
Maximum VLANs	4,096
Maximum MAC addresses	112,000 (L2 MACs); fabric-wide 256,000 (CML)
Maximum port profiles (AMPP)	512
Maximum members in a standard LAG	16
Maximum per-port priority pause level	8
Maximum switches that a vLAG can span	8
Maximum members in a vLAG	64
Maximum jumbo frame size	9,216 bytes

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

Brocade VDX 6940-36Q and 6940-144S Specifications *(continued)*

Scalability Information*

Queues per port	8
DCB Priority Flow Control (PFC) classes	8
Maximum ACLs	10,000
Maximum ARP entries	84,000
Maximum IPv4 unicast routes	12,000
Maximum IPv6 unicast routes	3,000
DCB Priority Flow Control (PFC) classes	8
HA/ISSU	ISSU fully supported

Mechanical

Enclosure	Front-to-rear, rear-to-front airflow; 1U (6940-36Q) and 2U (6940-144S), 19-inch EIA-compliant; power from non-port side

Environmental

Environmental	Brocade VDX 6940-36Q	Brocade VDX 6940-144S
Temperature	Operating: 0°C to 40°C (32°F to 104°F)	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)	Non-operating and storage: −25°C to 70°C (−13°F to 158°F)
Humidity	Operating: 5% to 93% at 50°C (122°F)	Operating: 5% to 93% at 50°C (122°F)
	Non-operating and storage: 10% to 95% at 60°C (140°F)	Non-operating and storage: 10% to 95% at 60°C (140°F)
Altitude	Operating: 0 to 3,000 m (9,842 ft.)	Operating: 0 to 3,000 m (9,842 ft.)
	Non-operating and storage: 0 to 12,000 m (39,370 ft.)	Non-operating and storage: 0 to 12,000 m (39,370 ft.)
Shock	Operating: 15 G, 11 ms, half-sine wave	Operating: 15 G, 11 ms, half-sine wave
	Non-operating and storage: 33 G, 11 ms, half-sine wave, 5/ea axis, and 33 G 6 ms, trapezoidal, 1/ea axis	Non-operating and storage: 33 G, 11 ms, half-sine wave, 5/ea axis, and 33 G 6 ms, trapezoidal, 1/ea axis
Vibration	Operating: 1 G sine, 0.5 gms random, 5 to 500 Hz	Operating: 1 G sine, 0.5 gms random, 5 to 500 Hz
	Non-operating and storage: 2.4 G sine, 1.1 gms random, 5 to 500 Hz	Non-operating and storage: 2.4 G sine, 1.1 gms random, 5 to 500 Hz
Airflow	Maximum: 159 CMH (94 CFM)	Maximum: 370 CMH (218 CFM)
	Minimum: 65 CMH (38 CFM)	Minimum: 95 CMH (56 CFM)

Power

Power		
Power supplies	Two internal, redundant, field-replaceable, load-sharing power supplies	Two internal, redundant, field-replaceable, load-sharing power supplies
Power inlet	C13	C13
Input voltage	100 to 240 V or 48 V DC	100 to 240 V or 48 V DC
Input line frequency	50 to 60 Hz	50 to 60 Hz
Inrush current	30 A peak at cold start and 50 A peak at warm start for <10 ms, 10 A peak for cycles 10 ms to 150 ms, <7 A peak for >150 ms	40 A peak at either cold or warm start <10 ms, 10 A peak for cycles 10 ms to 150 ms, <7 A peak for >150 ms

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

Brocade VDX 6940-36Q and 6940-144S Specifications *(continued)*

Power *(continued)*	Brocade VDX 6940-36Q	Brocade VDX 6940-144S
Maximum current	6 A at 100 VAC	6 A at 100 VAC
	7 A at 90 VAC	7 A at 85 VAC
Typical power consumption	At 100 VAC 2.18 A, 215 W, 733.81 BTU/hr	At 100 VAC 3.288 A, 327 W, 1,116 BTU/hr
	At 200 VAC 1.12 A, 212 W, 723.57 BTU/hr	At 200 VAC 1.639 A, 321 W, 1,095 BTU/hr
	Input current calculated with 1 PSU; watts and BTU/hour with 2 PSUs	Input current calculated with 1 PSU; watts and BTU/hour with 2 PSUs
Maximum power consumption	At 100 VAC 2.84 A, 282 W, 962.5 BTU/hr	At 100 VAC 2.706 A, 512 W, 1,747 BTU/hr
	At 200 VAC 1.44 A, 276 W, 942 BTU/hr	At 200 VAC 1.375 A, 500 W, 1,706 BTU/hr
	Input current calculated with 1 PSU; watts and BTU/hour with 2 PSUs	Input current calculated with 1 PSU; watts and BTU/hour with 2 PSUs

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
- IEC 60950-1 Second Edition +A1
- GB 4943.1-2011 and GB9254-2008
- CNS14336-1(99)
- CSA/NRTL Certification

EMC

- FCC Class A
- ICES-003 Class A
- VCCI-Class A
- CE
- C-Tick
- BSMI
- KCC Class A

Immunity

- EN55024

Environmental Regulatory Compliance

RoHS-6 (with lead exemption) Directive 2002/95/EC

NEBS-Compliant

Standards Compliance

Brocade VDX 6940 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 Brocade VDX 6940:

- 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)

Brocade VDX 6940-36Q and 6940-144S Specifications *(continued)*

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	IGMP v1
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	IGMP v2
RFC 2267	Network Ingress Filtering
RFC 2328	OSPF v2
RFC 2370	OSPF Opaque 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
RFC2460	Internet Protocol, Version 6 (v6) Specification (on management interface)
RFC 2462	IPv6 Stateless Address Auto-Configuration
RFC 2464	Transmission of IPv6 Packets over Ethernet Networks (on management interface)
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

Brocade VDX 6940-36Q and 6940-144S Specifications *(continued)*

RFC Support *(continued)*

RFC 2865	Remote Authentication Dial-In User Service (RADIUS)
RFC 3101	The OSPF Not-So-Stubby Area (NSSA) Option
RFC 3137	OSPF Stub Router Advertisement
RFC 3176	sFlow
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 (PIM-SM): Protocol Specification (Revised)
RFC 4724	Graceful Restart Mechanism for BGP
RFC 4861	IPv6 Neighbor Discovery
RFC 4893	BGP Support for Four-Octet AS Number Space
RFC 5082	Generalized TTL Security Mechanism (GTSM)
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
RFC 5942	IPv6 Neighbor Discovery
RFC 7432	BGP-EVPN—Network Virtualization Using VXLAN Data Plane
IPv6 Routing	
RFC 2545	Use of BGP-MP Extensions for IPv6
RFC 2740	OSPFv3 for IPv6
IPv6 Multicast	
RFC 2710	Multicast Listener Discovery (MLD) for IPv6

Brocade VDX 6940-36Q and 6940-144S Specifications *(continued)*

VRRP/VRRPe

RFC 5798	VRRP Version 3 for IPv4 and IPv6

Brocade Network OS Software Capabilities

		VCS Fabrics	IP Fabrics
Software scalability	Maximum switches in a fabric	48	Unlimited
	Maximum ECMP paths in a fabric	32	32
	Maximum LAGs in a fabric	2,000	144
Layer 2 switching	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
	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 Ports	X	
	IP Maps Support	X	
	L2 Loop prevention in an overlay environment		X
	High availability/In-Service Software Upgrade—hardware-enabled	X	X
	IGMP v1/v2 Snooping	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 Configuration	X	X
	Uni-Directional Link Detection (UDLD)	X	X
	Transparent LAN Services	X	

Brocade Network OS Software Capabilities *(continued)*

		VCS Fabrics	IP Fabrics
Layer 3 switching	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
	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
	IPv4/IPv6 dual stack	X	X
	IPv6 ACL packet filtering	X	X
	BGP Additional-Path	X	X
	BGP-Allow AS	X	X
	BGP Generalized TTL Security Mechanism (GTSM)	X	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	
	Static Anycast Gateway		X
	ARP Suppression		X

Brocade Network OS Software Capabilities *(continued)*

		VCS Fabrics	IP Fabrics
Automation and programmability	OpenFlow 1.3	X	X
	REST API with YANG data model	X	X
	Puppet	X	X
	Python	X	X
	PyNOS libraries	X	X
	Ansible	X	X
	VMware vRealize plugins	X	X
	DHCP automatic fabric provisioning	X	X
	Netconf API	X	X
Multitenancy and virtualization	TRILL FGL-based VCS Virtual Fabric feature	X	
	Virtual fabric extension	X	
	VM-Aware Network Automation	X	
	BFD for virtual fabric extension	X	
	Brocade VCS Gateway for NSX	X	
	Brocade IP Fabric Gateway for NSX		X
	VMware NSX-v Certification	X	X
	Automatic Migration of Port Profiles (AMPP)	X	X
DCB	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	
Fibre Channel/FCoE	Multi-hop Fibre Channel over Ethernet (FCoE); requires Brocade VCS Fabric technology	X	
	FC-BB5 compliant Fibre Channel Forwarder (FCF)	X	
	Native FCoE forwarding	X	
	FCoE to Fibre Channel Bridging	X	
	FCoE on Brocade VDX 6940	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	

Brocade Network OS Software Capabilities *(continued)*

		VCS Fabrics	IP Fabrics
Fibre Channel/FCoE *(continued)*	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
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
	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 Scheduling (Hybrid)	X	X
	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
	Brocade 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

Brocade Network OS Software Capabilities *(continued)*

		VCS Fabrics	IP Fabrics
Management and monitoring *(continued)*	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
	TACACS+	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

Brocade VDX 6940-36Q and 6940-144S Software License Ordering Information

Software SKU	Description
BR-VDX6940-FCOE	FCoE software license for Brocade VDX 6940
BR-VDX6940-144S-16-10GPOD	16×10 GbE Ports on Demand (PoD) license for Brocade VDX 6940-144S
BR-VDX6940-144S-6X40G-POD	6×40 GbE or 2×100 GbE Ports on Demand (PoD) license for Brocade VDX 6940-144S
BR-VDX6940-36Q-12X40G-POD	12×40 GbE Ports on Demand (PoD) license for Brocade VDX 6940-36Q

Brocade VDX 6940-36Q and 6940-144S Hardware Ordering Information

See the Brocade VDX Transceiver Support Matrix for optics and cable ordering details.

Harware SKU	Description
BR-VDX6940-36Q-AC-F	Brocade VDX 6940-36Q base system with 36 40 GbE QSFP+ ports, AC power supply, non-port-side exhaust airflow
BR-VDX6940-36Q-AC-R	Brocade VDX 6940-36Q base system with 36 40 GbE QSFP+ ports, AC power supply, port-side exhaust airflow
BR-VDX6940-24Q-DC-F	Brocade VDX 6940-36Q base system with 24 40 GbE QSFP+ ports, DC power supply, non-port-side exhaust airflow
BR-VDX6940-24Q-DC-R	Brocade VDX 6940-36Q base system with 24 40 GbE QSFP+ ports, DC power supply, port-side exhaust airflow
BR-VDX6940-24Q-AC-F	Brocade VDX 6940-36Q base system with 24 40 GbE QSFP+ ports, AC power supply, non-port-side exhaust airflow
BR-VDX6940-24Q-AC-R	Brocade VDX 6940-36Q base system with 24 40 GbE QSFP+ ports, AC power supply, port-side exhaust airflow
BR-VDX6940-64S-AC-R	Brocade VDX 6940-144S base system with 64 10 GbE SFP+ ports, AC power supply, port-side exhaust airflow
BR-VDX6940-64S-AC-F	Brocade VDX 6940-144S base system with 64 10 GbE SFP+ ports, AC power supply, non-port-side exhaust airflow
BR-VDX6940-96S-AC-R	Brocade VDX 6940-144S base system with 96 10 GbE SFP+ ports, AC power supply, port-side exhaust airflow
BR-VDX6940-96S-AC-F	Brocade VDX 6940-144S base system with 96 10 GbE SFP+ ports, AC power supply, non-port-side exhaust airflow
BR-VDX6940-144S-AC-R	Brocade VDX 6940-144S base system with 96 10 GbE SFP+ ports and up to 12 40 GbE QSFP+ ports or up to 4 100 GbE QSFP28 ports, AC power supply, port-side exhaust airflow
BR-VDX6940-144S-AC-F	Brocade VDX 6940-144S base system with 96 10 GbE SFP+ ports and up to 12 40 GbE QSFP+ ports or up to 4 100 GbE QSFP28 ports, AC power supply, non-port-side exhaust airflow
BR-VDX6940-64S-DC-F	Brocade VDX 6940-144S base system with 64 10 GbE SFP+ ports, DC power supply, non-port-side exhaust airflow
BR-VDX6940-64S-DC-R	Brocade VDX 6940-144S base system with 64 10 GbE SFP+ ports, DC power supply, port-side exhaust airflow

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