

Brocade VDX 6740, 6740T, and 6740T-1G Switches



HIGHLIGHTS

- Offers flexibility to deploy 1000BASE-T and upgrade to 10GBASE-T for higher bandwidth
- Delivers high performance and reduces network congestion with 10 Gigabit Ethernet (GbE) ports, low latency, and 24 MB deep buffers
- Improves capacity with the ability to create up to a 160 GbE uplink with Brocade ISL Trunking
- Manages an entire multitenant Brocade VCS fabric as a single switch through Brocade VCS Logical Chassis, with REST APIs to allow higher-level management and orchestration frameworks
- Enables IP storage networking for improved performance, management, security, and span of control
- Provides efficiently load-balanced multipathing at Layers 1, 2, and 3, including multiple Layer 3 gateways
- Simplifies Virtual Machine (VM) mobility and management with automated, dynamic port profile configuration and migration
- Supports Software-Defined Networking (SDN) technologies within data, control, and management planes

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. However, traditional data centers typically use inflexible, three-tier network designs that cannot efficiently manage east-west traffic or deliver the bandwidth needed to support virtualization and new service delivery. In addition, with the movement toward cloud computing, the importance of deploying a flexible and responsive network infrastructure only grows.

To support the new direction of IT service delivery, data center operators need networks that are high performance, operationally efficient, automated, and elastic. The ideal network will be easy to manage and scale to meet demand as well as adapt to future requirements.

Brocade VDX 6740 Switch

The Brocade® 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 2 watts per 10 GbE port.

Brocade VDX 6740T Switch

The Brocade 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.

Brocade VDX 6740T-1G Switch

The Brocade 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 a 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.

The Brocade VDX 6740, 6740T, and 6740T-1G are all Ethernet fabric Top-of-Rack (ToR) switches that support a demanding data center environment. Access ports are positioned to allow for easy server connectivity and to simplify cabling. With a choice of front-to-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.

Brocade VDX 6740, 6740T, and 6740T-1G Switches provide the advanced feature set that data centers require while delivering the high performance and low latency virtualized environments demand. Together with Brocade VCS® Fabric technology, these switches can simplify network design and operations for a more automated and efficient network, offer the flexibility needed to scale networks, and deliver the intelligence to more effectively manage VM mobility and rack density, as well as provide a cloud-ready infrastructure that helps transform legacy data centers.

High Performance for Data Centers

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, Brocade 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.

The switches also help maximize network utilization with hardware-based Brocade 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 Brocade trunk is automatically formed between two Brocade 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.

Dedicated Networks for IP Storage

Building a dedicated network for IP storage is considered a best practice among today's enterprises. This approach to IP storage networks helps ensure independent administrative control and

operation, as well as a tight coupling of the application, compute, storage, and network. It allows enterprises to effectively and reliably support ever-growing applications and workloads while improving service-level guarantees, containing failure domains, and reducing security risks.

Whether building a next-generation storage network for server virtualization, business applications, replication, or backup and recovery, organizations need a solution that not only performs, but also provides high availability, fault tolerance, and the ability to expand over time. Brocade VDX switches deliver that performance, resiliency, and scale via patented load balancing and multipathing—cutting-edge technologies leveraged from a long heritage of Brocade Fibre Channel solutions. Self-provisioning and self-healing, Brocade VDX switches offer unmatched simplicity and automation, minimizing the learning curve and ongoing operational costs for storage administrators. Brocade VDX 6740 Switches can facilitate an optimal IP



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



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



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

storage network by delivering a fabric-based network architecture to manage the network and storage holistically. At the same time, Brocade Network Advisor provides organizations with unified management, network visibility, and insight across all of their storage networks, including dedicated IP storage networks.

Advanced Design Delivers Low Latency and Deep Buffer

The movement toward server virtualization has increased the quantity of VMs, data, and applications that require processing. This increase in traffic can create performance and latency issues. The Brocade VDX 6740, 6740T, and 6740T-1G deliver very low latency through wire-speed ports with 850 ns and 3 μ s (respectively) 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 Brocade 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.

Brocade VCS Fabric Technology

Brocade VCS fabrics running on the Brocade VDX family of switches allow organizations to create data center networks that just work. Together, these technologies provide unmatched automation, efficiency, and elasticity in support of the most demanding workloads, such as rich media and mission-critical applications, particularly in highly dynamic cloud environments. To learn more about Brocade VCS Fabric technology, visit www.brocade.com/vcs.

Unmatched Simplicity and Automation

Brocade VDX 6740, 6740T, 6740T-1G Switches, in conjunction with Brocade VCS Fabric technology, streamline configuration and management, maximize efficiency, and create a more automated and reliable network, especially in highly virtualized data centers. Brocade VCS Fabric technology delivers unmatched automation, efficiency, and resilience compared to traditional architectures and competitive fabric offerings. It delivers higher throughput and lower latency for the server-to-server (east-west) traffic patterns that are now dominating virtualized data centers. In changing how networks are architected, VCS fabrics deliver many benefits that fit the needs of evolving data centers.

Fast, Easy Deployment and Configuration

Brocade VCS fabric helps streamline network operations and speed deployment with embedded features that enable automatic configuration and management. These features include:

- **Brocade VCS Logical Chassis:** Brocade VCS Logical Chassis enables organizations to manage an entire VCS fabric as a single switch, upgrade software across the fabric with one command, and centralize monitoring and troubleshooting to enhance the overall availability and reliability of the network. Fabric-level REST APIs allow higher-level management frameworks to provide efficient orchestration of VCS fabrics within a cloud context. The single point of management eliminates the need to manually configure and manage each switch, simplifying management, lowering operational costs, and reducing configuration errors with the ability to push software upgrades across the fabric with a single command,

accelerating deployment. VCS Logical Chassis also provides a single view of the fabric for easy monitoring and troubleshooting, minimizing the time to repair network issues. For more information about VCS Logical Chassis, read the white paper *An Overview of Brocade VCS Logical Chassis*.

- **Self-forming and self-healing fabric:** Configuration is simplified with self-forming fabrics. As additional switches are added, they inherit the configuration of the fabric, allowing the network to scale out with ease. Configuration and device information is always shared among all switches, allowing fabric nodes to be added or removed, and physical or virtual servers to be relocated—without the fabric requiring manual reconfiguration. In addition, fabrics are self-healing, increasing network resiliency. The fabric redirects traffic in case a link fails, helping to ensure uninterrupted traffic flow and prevent data loss.
- **Zero-touch provisioning and zero-touch scale-out:** Zero-touch provisioning enables simple, rapid deployment. Provided natively in Brocade VDX switches through VCS Fabric technology, this feature enables installation, automatic software download, and configuration without user intervention. Brocade VDX switches are preconfigured so that newly deployed switches require only power and a network connection to become part of the fabric. RBridge-ID, VCS-ID, and other VCS parameters are automatically assigned. In addition, Inter-Switch Links (ISLs) automatically form between all new and existing switches in the fabric. By eliminating manual processes, this installation method greatly simplifies scale-out architecture. Zero-touch provisioning facilitates zero-touch scale-out. With automatic configuration of VCS parameters,

self-forming trunks, and logical chassis, network engineers can add, move, and remove network Brocade VDX switches without having to add or delete network configurations. This helps organizations contain costs while increasing reliability and speed when deploying clouds and data centers.

- **A reliable foundation for software-defined networks:** The Brocade VDX 6740, 6740T, and 6740T-1G are hardware-enabled with the flexibility to support emerging SDN protocols, including VXLAN/NVGRE. Logical Chassis technology and northbound APIs with fabric- and node-level orchestration capabilities provide operationally scalable management and integration with data center orchestration frameworks such as OpenStack. For more information, read the white paper [Brocade VCS Fabrics: The Foundation for Software-Defined Networks](#).

In-Service Software Upgrades

The Brocade 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.

Maximum Efficiency and Resiliency

Brocade VCS Fabric technology creates a more efficient and resilient network with a flat-meshed Layer 2 topology that delivers the high performance and high reliability required by data centers. Organizations gain a more flexible network that helps them rapidly adapt to changing business conditions and traffic patterns (see Figure 4).

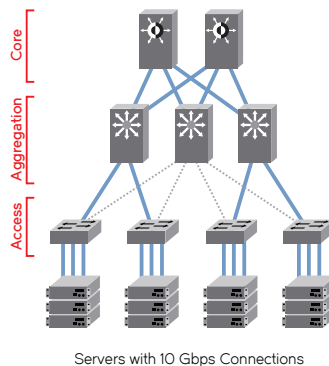
Optimized East-West Traffic

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. The VCS fabric was specifically 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.

Deliver Multitenant Cloud Data Centers

In addition, public and private cloud providers need to deploy and support distributed virtualized workloads quickly, securely, and in a scalable manner on a per-tenant basis. Traditional VLANs can be used for this purpose up to a point, but limitations on VLAN ID scale and the complexity of configuring large numbers of VLANs restrict their usefulness in larger data centers. The VCS Virtual Fabric feature of Brocade VCS Fabric technology is designed to address the scalability restrictions of traditional VLANs used for multitenant segmentation. It provides native secure multitenant support for both physical and virtual application deployments within and across VCS fabrics. Managed centrally through Brocade VCS Logical Chassis, the VCS Virtual Fabric feature simplifies and accelerates application deployment, and ensures policy consistency for each tenant regardless of how application components are distributed across the data center. VXLAN and VRF Lite are other options for network segmentation. To learn more, read [Multi-Tenancy Options in Brocade VCS Fabrics](#).

Classic Hierarchical Ethernet Architecture



Ethernet Fabric Architecture

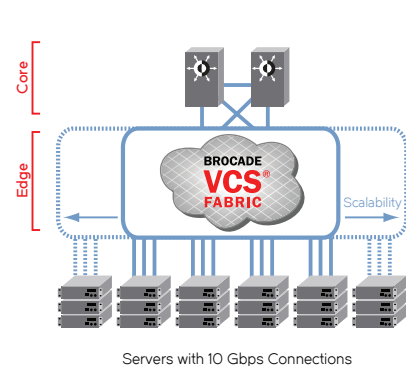


Figure 4: Compared to classic Ethernet architectures, Ethernet fabrics allow all paths to be active and provide greater scalability—while reducing management complexity.

Virtual Fabric Extension

Virtual fabric extension permits a Layer 2 connection between multiple VCS fabrics interconnected over a Layer 3 cloud. This allows VLANs, service VLANs, and transport VLANs to span across multiple VCS fabrics.

Virtual fabric extension is achieved through VXLAN encapsulation of Layer 2 frames, which are tunneled across VCS fabrics over a Layer 3 cloud. This feature does not require NSX or multicast to be running in Layer 3 clouds interconnecting VCS fabrics and any other controller. With virtual fabric extension, service providers and enterprises can extend Layer 2 traffic across multiple virtual fabrics within a single data center, or across multiple data centers, while still maintaining multitenant segmentation. Moreover, they can avoid installing costly dedicated WAN links or MPLS/GRE underlay, as virtual fabric extension requires only simple Layer 3 IP connectivity across sites.

Multiple Load-Balanced Paths at Layers 1-3

Brocade VCS Fabric technology enables highly elastic domains with extremely efficient load balancing in Layers 1-3. Innovative Brocade ISL Trunking load balances traffic across all the links in a trunk for improved performance at Layer 1. In Layer 2, Equal Cost Multi-Path (ECMP) uses all available network bandwidth, allowing all links to be fully active and utilized. In the event of a failure, traffic is automatically routed to the closest path, providing higher resilience and greater application uptime. In Layer 3, the fabric automatically load balances all flows among a number of Layer 3 instances that collectively act as a single Layer 3 gateway. Multilayer multipathing helps improve network utilization, reduce latency, and increase overall network

performance. Read the white paper *Setting a New Standard for Network Efficiency with VCS Fabric Multilayer Multipathing Capabilities* to learn more.

Optimized for Virtualization

Brocade VCS Fabric technology offers unique features to support virtualized server and storage environments and enable the transition to cloud computing (see Figure 5):

- **Brocade VCS Gateway for NSX:** Brocade VCS Gateway for NSX is a solution that unifies both virtual and physical infrastructure for a seamless transition to cloud environments. By unifying the best of both worlds—physical and virtual—Brocade VCS Gateway for NSX allows physical devices to connect to virtual devices.

Brocade VCS Gateway is integrated with VMware NSX, enabling the entire VCS fabric to function as a VXLAN gateway and eliminating the need for specific network placement. As such, the NSX Controller sees the

VCS fabric as a single logical gateway, thereby simplifying management and providing resiliency. Administrators can leverage existing infrastructure while gaining the benefits of VXLAN to support multitenancy and large-scale deployments of distributed applications.

In addition, Brocade VCS Gateway for NSX is integrated with the VMware NSX Controller. It offers the benefits of agility with self-service provisioning, flexible network architecture, scale-out modularity with VCS fabric, multitenancy, and an easily managed unified solution for physical and virtual assets.

- **Zero-touch VM discovery:** Brocade VM-Aware Network Automation eliminates the manual configuration of port profiles when a VM is added to the fabric or moved, providing an additional level of automation. The VCS fabric directly communicates with VMware vCenter, automatically downloading all port profile information

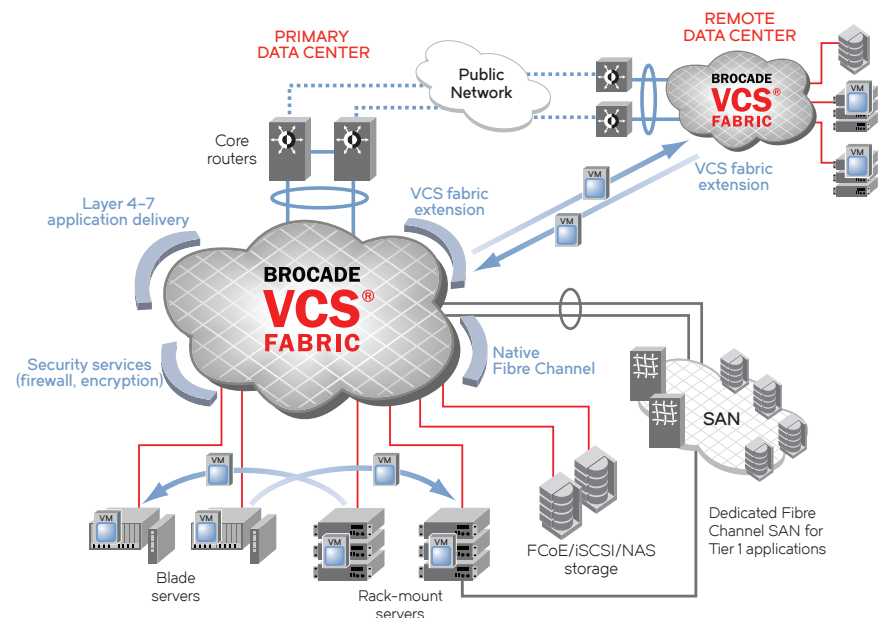


Figure 5: Brocade VCS Fabric technology simplifies the network architecture, enables unified storage connectivity, improves VM mobility, and allows the seamless insertion of services.

and the associated MAC address, and distributes the VM-specific information to all switches within the fabric. When the VM moves, no additional configuration is required.

- **Automatic Migration of Port**

Profiles: During a VM migration, the destination network switch ports must be configured to ensure that the VM traffic experiences consistent policies and configurations. With the Brocade Automatic Migration of Port Profiles (AMPP) feature, the VM policies and networking policies follow the VM within the VCS fabric. As a VM migrates, the destination port in the fabric learns of the MAC address move and automatically activates the port profile configuration within a single fabric or across separate fabrics. AMPP is hypervisor-agnostic and can be used with various hypervisors.

Flexible Design Meets Data Center Needs

Brocade VDX 6740, 6740T, and 6740T-1G 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 simply revert to 40 GbE when ready.

- **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:** Capacity on Demand (CoD) license for the Brocade VDX 6740T-1G enables organizations to upgrade all 48 100BASE-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.

Advanced Storage Support

The Brocade VDX 6740, 6740T, and 6740T-1G offer advanced storage support with multiple storage connectivity options, including FCoE, Fibre Channel (Brocade 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. The switches offer Network-Attached Storage (NAS) Auto QoS intelligence to prioritize delay-sensitive IP storage traffic within the fabric and help ensure consistent performance while decreasing latency.

The Brocade VDX 6740 features 32 Flex Ports, which can take either a 10 GbE or 16 Gb Fibre Channel personality. In Fibre Channel mode, these Flex Ports can be used either to directly connect Fibre Channel storage to VCS fabrics, or

to bridge FCoE traffic to Fibre Channel SANs, thus protecting existing SAN investments. The Flex Ports and FCoE features on the Brocade VDX 6740 can be turned on with an add-on software license.

Ease of Use Augmented by Brocade Network Advisor

Brocade Network Advisor is an easy-to-use network management platform for advanced management of Brocade VCS fabrics and Brocade VDX switches across the entire network lifecycle. Organizations can use Brocade Network Advisor to manage a VCS fabric as a single entity or to drill down to individual Brocade VDX switches for fault, inventory, or performance management—and to manage multiple VCS fabrics in parallel.

Brocade Network Advisor also provides simplified management of AMPP configurations, and integrity checks can be performed across physical Brocade VDX configurations—either in the same fabric or across different VCS fabrics. In addition, Brocade Network Advisor enables VM-level monitoring and can help identify top-talker applications leveraging sFlow across the fabric. Finally, Brocade Network Advisor provides VCS fabric diagnostics, including visualization of VCS fabric traffic paths and network latency monitoring that enables fault isolation via hop-by-hop inspection. For details, visit www.brocade.com/management.

Programming The On-Demand Data Center™

Organizations eager to capitalize on the benefits of virtual environments, namely increased automation, need networks that can be easily and quickly deployed. This requires network tools and infrastructure that are open and able to change rapidly

with their businesses. Brocade supports programmatic solutions and DevOps tools that allow a customized approach to deploying, operating, and interacting with the network. These solutions offer a new level of simplicity, agility, and rapid, automatic deployment, enabling data centers to evolve to meet new technology requirements.

Brocade VDX switches provide OpenStack Neutron ML2 support and fabric-level, programmable REST APIs with a YANG data model to enable integration with third-party and in-house network automation and cloud management tools. Support for Puppet and Python scripting offers choice and more effective configuration management. These programmability options help automate, simplify, reduce human error, and streamline the process while reducing costs. The tools also help drive productivity by enabling rapid application deployment for enterprises, and increase profitability by streamlining the tenant provisioning process and making networks more intelligent and flexible for cloud providers.

VCS fabrics provide support for OpenFlow 1.3, an industry-standard SDN communications protocol, allowing operators to address complex network behavior, optimize performance, and leverage a richer set of capabilities. OpenFlow 1.3 integrated with Brocade VDX switches provides the features, performance, and operational efficiency needed today and tomorrow.

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, and efficient cloud infrastructures. Leveraging 15 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.

Affordable Acquisition Options

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.Brocade.com/CapitalSolutions.

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

Overview	Brocade VDX 6740	Brocade VDX 6740T	Brocade 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)
1/10 GbE SFP+ ports	Up to 64	Up to 16	Up to 16
2/4/8/16 Gb 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

Brocade VDX 6740, 6740T, and 6740T-1G 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	160,000
Maximum port profiles (AMPP)	1,024
Maximum members in a standard LAG	64
Maximum per-port priority pause level	8
Maximum switches in a VCS fabric	48
Maximum ECMP paths in a VCS fabric	16
Maximum trunk members for VCS fabric ports	16
Maximum LAG groups in a VCS fabric	512
Maximum switches across which 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.

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

Scalability Information* *continued*

Queues per port	8
DCB Priority Flow Control (PFC) classes	8
Maximum ACLs	13,000
Maximum ARP entries	32,000
Maximum IPv4 unicast routes	12,000
Maximum IPv6 unicast routes	3,000**

General

Operating system	Brocade Network OS, a modular operating system	
Layer 2 switching features	<ul style="list-style-type: none"> • Address Resolution Protocol (ARP) RFC 826 • High availability/In-Service Software Upgrade—hardware-enabled • IGMP v1/v2 Snooping • MAC Learning and Aging • Link Aggregation Control Protocol (LACP) IEEE 802.3ad/802.1AX • Virtual Local Area Networks (VLANs) • VLAN Encapsulation 802.1Q • Private VLANs • Edge Loop Detection (ELD) 	<ul style="list-style-type: none"> • Per-VLAN Spanning Tree (PVST+/PVRST+) • Rapid Spanning Tree Protocol (RSTP) 802.1w • Multiple Spanning Tree Protocol (MSTP) 802.1s • STP PortFast, BPDU Guard, BPDU Filter • STP Root Guard • Layer 2 Access Control Lists (ACLs) • Pause Frames 802.3x • Uni-Directional Link Detection (UDLD)
Layer 3 switching features	<ul style="list-style-type: none"> • Border Gateway Protocol (BGP4+) • DHCP Helper • Layer 3 ACLs • Multicast: PIM-SM, IGMPv2 • OSPF • Static routes • IPv4/v6 ACL • Policy-Based Routing (PBR) • Bidirectional Forwarding Detection (BFD) 	<ul style="list-style-type: none"> • 16-way ECMP • VRF Lite • VRF-aware OSPF, BGP, VRRP, static routes • VRRP v2 and v3 • IPv4/IPv6 dual stack • IPv6 ACL packet filtering • IPv6 routing • Wire-speed routing for IPv4 and IPv6 using any routing protocol
Brocade VCS Fabric technology	<ul style="list-style-type: none"> • Automatic Fabric Formation • DHCP Option 66/67 (Auto Fabric Provisioning) • Distributed Configuration Management • Distributed Fabric Services • 16-way ECMP • Zero-touch provisioning • Switch Beacons 	<ul style="list-style-type: none"> • Transparent Interconnection of Lots of Links (TRILL) • Transparent LAN Services • Virtual Link Aggregation Group (vLAG) spanning • VRRP-E • Fabric virtual gateway
Multitenancy and virtualization features	<ul style="list-style-type: none"> • TRILL FGL-based VCS Virtual Fabric feature • Brocade VCS Gateway for NSX with VMware NSX Orchestration • Virtual fabric extension 	<ul style="list-style-type: none"> • Automatic Migration of Port Profiles (AMPP) • VM-Aware Network Automation • BFD for virtual fabric extension
DCB features	<ul style="list-style-type: none"> • Priority-based Flow Control (PFC) 802.1Qbb • Enhanced Transmission Selection (ETS) 802.1Qaz • Manual configuration of lossless queues for protocols other than FCoE and iSCSI 	<ul style="list-style-type: none"> • Data Center Bridging eXchange (DCBX) • DCBX Application Type-Length-Value (TLV) for FCoE and iSCSI

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

** Hardware supported.

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

General *continued*

Fibre Channel/FCoE features (Requires FCoE license)	<ul style="list-style-type: none"> • Multihop Fibre Channel over Ethernet (FCoE); requires Brocade VCS Fabric technology • FC-BB5 compliant Fibre Channel Forwarder (FCF) • Native FCoE forwarding • FCoE to Fibre Channel Bridging • FCoE on Brocade VDX 6740 and Brocade VDX 6740T • FCoE on QSFP+ port • Flex Ports, allowing direct and SAN connectivity of Fibre Channel targets • Multi-hop Access Gateway Support 	<ul style="list-style-type: none"> • End-to-end FCoE (initiator to target) • FCoE Initialization Protocol (FIP) v1 support for FCoE device login and initialization • Name Server-based zoning • Supports connectivity to FIP Snooping Bridge (FSB) device • FCoE traffic over standard LAG • Interface Binding • 10 GbE CoD license needs to be activated in order to support FCoE on the Brocade VDX 6740T-1G • Logical SANs
IP storage	<ul style="list-style-type: none"> • Auto QoS (automatic prioritization of IP storage traffic) 	
High availability	<ul style="list-style-type: none"> • ISSU L2 and L3 • BFD • OSPF v2/v3 	<ul style="list-style-type: none"> • OSPF3-NSR • BGP4 • BGP4-GR
Quality of Service (QoS)	<ul style="list-style-type: none"> • ACL-based QoS • Eight priority levels for QoS • Class of Service (CoS) IEEE 802.1p • DSCP Trust • DSCP to Traffic Class Mutation • DSCP to CoS Mutation • DSCP to DSCP Mutation • Random Early Discard • Per-port QoS configuration 	<ul style="list-style-type: none"> • ACL-based Rate Limit • Dual-rate three color token bucket • ACL-based remarking of CoS/DSCP/Precedence • ACL-based sFlow • Scheduling: Strict Priority (SP), Deficit Weighted Round-Robin (DWRR), Hybrid Scheduling (Hybrid) • Queue-based Shaping • Flow-based QoS
Switch health monitoring	<ul style="list-style-type: none"> • Brocade Fabric Watch monitoring and notification 	
Management		
Management and monitoring	<ul style="list-style-type: none"> • IPv4/IPv6 management • Industry-standard Command Line Interface (CLI) • Netconf API • REST API with YANG data model • Brocade VCS Plugin for OpenStack • Link Layer Discovery Protocol (LLDP) IEEE 802.1AB • Logical chassis management • MIB II RFC 1213 MIB • Switch Beaconsing • Management VRF • Switched Port Analyzer (SPAN) • Telnet • SNMP v1, v2C, v3 	<ul style="list-style-type: none"> • sFlow RFC 3176 • Out-of-band management • Remote SPAN (RSPAN) • RMON-1, RMON-2 • NTP • Management Access Control Lists (ACLs) • Role-Based Access Control (RBAC) • Range CLI support • UDLD • OpenStack Neutron ML2 plugin • Python • Puppet
Security	<ul style="list-style-type: none"> • Port-based Network Access Control 802.1X • RADIUS (AAA) • TACACS+ • Secure Shell (SSHv2) 	<ul style="list-style-type: none"> • BPDU Drop • Lightweight Directory Access Protocol (LDAP) • Secure Copy Protocol
Software-Defined Networking (SDN) and programmability	<ul style="list-style-type: none"> • OpenFlow 1.3 • VXLAN Gateway • REST API with YANG data model 	<ul style="list-style-type: none"> • Puppet • Python

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

Mechanical

Enclosure	Front-to-rear, rear-to-front airflow; 1U, 19-inch EIA-compliant; power from non-port side
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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	Brocade VDX 6740T port-side-intake: Maximum: 49.3 CFM; Nominal: 26.3 CFM Brocade VDX 6740T port-side-exhaust: Maximum: 51.9 CFM; Nominal: 27.3 CFM Brocade VDX 6740 port-side-intake and port-side-exhaust: Maximum: 25.7 CFM; Nominal: 11.5 CFM
Heat dissipation	1,672.41 BTU/hr

Power

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 ambient
Maximum current	6 A max at 100 VAC/60 Hz
Maximum power consumption	Brocade VDX 6740: 110 W Brocade VDX 6740T: 460 W Brocade VDX 6740T-1G: 276 W (Base SKU)

Safety Compliance

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

EMC

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

Immunity

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

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

Environmental Regulatory Compliance

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

Standards Compliance

Brocade 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
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The following draft versions of the Data Center Bridging (DCB) and Fibre Channel over Ethernet (FCoE) standards are also supported on the Brocade 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)
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The Brocade 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 INCITS 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
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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 1027	Using ARP to Implement Transparent Subnet Gateways (Proxy ARP)
RFC 959	FTP
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 Interdomain Routing (CIDR)
RFC 1584	Multicast Extensions to OSPF
RFC 1765	OSPF Database Overflow

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

RFC Support continued

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 (edge mode)
RFC 2460	Internet Protocol, Version 6 (v6) Specification (on management interface)
RFC 2370	OSPF Opaque Link-State Advertisement (LSA) Option—Partial Support
RFC 2385	Protection of BGP Sessions with the TCP MD5 Signature Option
RFC 2439	BGP Route Flap Damping
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 2865	Remote Authentication Dial-In User Service (RADIUS)
RFC 3101	The OSPF Not-So-Stubby Area (NSSA) Option
RFC 3176	sFlow
RFC 3137	OSPF Stub Router Advertisement
RFC 3392	Capabilities Advertisement with BGPv4
RFC 3768	VRRP
RFC 4510	Lightweight Directory Access Protocol (LDAP): Technical Specification Road Map
RFC 4271	BGPv4
RFC 4292	IP Forwarding MIB
RFC 4293	Management Information Base for the Internet Protocol (IP)
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 4456	BGP Route Reflection
RFC 4601	Protocol Independent Multicast—Sparse Mode (PIM-SM): Protocol Specification (Revised)
RFC 4893	BGP Support for Four-Octet AS Number Space
RFC 4861/5942	IPv6 Neighbor Discovery
RFC 2462	IPv6 Stateless Address Auto-Configuration
RFC 4443	ICMPv6 (replaces 2463)
RFC 4291	IPv6 Addressing Architecture
RFC 3587	IPv6 Global Unicast Address Format
RFC 2375	IPv6 Multicast Address Assignments
RFC 2711	IPv6 Router Alert Option
RFC 4724	Graceful Restart Mechanism for BGP

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

RFC Support *continued*

RFC 3623	Graceful OSPF Restart - IETF Tools
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
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VRRP/VRRPe

RFC 5798	VRRP Version 3 for IPv4 and IPv6
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Brocade VDX 6740, 6740T, and 6740T-1G Hardware Ordering Information

Hardware SKU	Description
BR-VDX6740-24-F	Brocade VDX 6740, 24P SFP+ ports only—no optics, AC, non-port-side exhaust airflow
BR-VDX6740-24-R	Brocade VDX 6740, 24P SFP+ ports only—no optics, AC, port-side exhaust airflow
BR-VDX6740-48-F	Brocade VDX 6740, 48P SFP+ ports only—no optics, AC, non-port-side exhaust airflow
BR-VDX6740-48-R	Brocade VDX 6740, 48P SFP+ ports only—no optics, AC, port-side exhaust airflow
BR-VDX6740-64-F	Brocade VDX 6740, 64P SFP+ ports only—no optics, AC, non-port-side exhaust airflow
BR-VDX6740-64-R	Brocade VDX 6740, 64P SFP+ ports only—no optics, AC, port-side exhaust airflow
BR-VDX6740-64-ALLSW-F	Brocade VDX 6740, 64P SFP+ ports only—no optics, AC, FCoE, VCS fabric, non-port-side exhaust airflow
BR-VDX6740-64-ALLSW-R	Brocade VDX 6740, 64P SFP+ ports only—no optics, AC, FCoE, VCS fabric, port-side exhaust airflow
BR-VDX6740T-24-F	Brocade VDX 6740T, 24P 10GBASE-T ports only—no optics, AC, non-port-side exhaust airflow
BR-VDX6740T-24-R	Brocade VDX 6740T, 24P 10GBASE-T ports only—no optics, AC, port-side exhaust airflow
BR-VDX6740T-48-F	Brocade VDX 6740T, 48P 10GBASE-T ports only—no optics, AC, non-port-side exhaust airflow
BR-VDX6740T-48-R	Brocade VDX 6740T, 48P 10GBASE-T ports only—no optics, AC, port-side exhaust airflow
BR-VDX6740T-64-F	Brocade VDX 6740T, 48P 10GBASE-T and 4 SFP+ ports only—no optics, AC, non-port-side exhaust airflow
BR-VDX6740T-64-R	Brocade VDX 6740T, 48P 10GBASE-T and 4 SFP+ ports only—no optics, AC, port-side exhaust airflow
BR-VDX6740T-64-ALLSW-F	Brocade VDX 6740T, 48P 10GBASE-T and 4 SFP+ ports only—no optics, AC, FCoE, VCS fabric, non-port-side exhaust airflow
BR-VDX6740T-64-ALLSW-R	Brocade VDX 6740T, 48P 10GBASE-T and 4 SFP+ ports only—no optics, AC, FCoE, VCS fabric, port-side exhaust airflow
BR-VDX6740T-56-1G-F	Brocade VDX 6740T-1G, 48P 1000BASE-T and 2 40 GbE QSFP+ ports, upgradable to 10GBASE-T via license only—no optics, AC, non-port-side exhaust airflow
BR-VDX6740T-56-1G-R	Brocade VDX 6740T-1G, 48P 1000BASE-T and 2 40 GbE QSFP+ ports, upgradable to 10GBASE-T via license only—no optics, AC, port-side exhaust airflow
BR-VDX6740-8x10G-POD	8-port PoD license for Brocade VDX 6740 and 6740T
BR-VDX6740-2x40G-POD	2-port 40 GbE PoD license for Brocade VDX 6740 and 6740T
BR-VDX6740T-1G-16X10G-COD	16-port 1 GbE to 10 GbE Capacity on Demand (CoD) upgrade license for Brocade VDX 6740T-1G

Brocade VDX 6740, 6740T, and 6740T-1G Software License Ordering Information

Software SKU	Description
BR-VDX6740-FCoE	Software, FCoE license for Brocade VDX 6740 and 6740T
BR-VDX6740-VCS	Software, VCS license for Brocade VDX 6740 and 6740T ¹
BR-VDX6740-ALLSW	Software, VCS and FCoE license for Brocade VDX 6740 and 6740T ¹

Brocade VDX 6740, 6740T, and 6740T-1G FRU and Optics Ordering Information

FRU and Optics SKU	Description
XBR-250WPSAC-F	FRU 250 W AC power supply/fan, non-port-side exhaust airflow, Brocade VDX 6740
XBR-250WPSAC-R	FRU 250 W AC power supply/fan, port-side exhaust airflow, Brocade VDX 6740
XBR-500WPSAC-01-F	FRU 500 W AC power supply/fan, non-port-side exhaust airflow, Brocade VDX 6740T, 6740T-1G
XBR-500WPSAC-01-R	FRU 500 W AC power supply/fan, port-side exhaust airflow, Brocade VDX 6740T, 6740T-1G
XBR-AC-FAN-F	AC fan, non-port-side exhaust airflow, Brocade VDX 6740T, 6740T-1G
XBR-AC-FAN-R	AC fan, port-side exhaust airflow, Brocade VDX 6740T, 6740T-1G
XBR-000190 (1-pack)	1 GbE copper
E1MG-SX-OM (1-pack) E1MG-SX-OM-8 (8-pack)	1000Base-SX
E1MG-LX-OM (1-pack) E1MG-LX-OM-8 (8-pack)	1000Base-LX
10G-SFPP-SR (1-pack) 10G-SFPP-SR-8 (8-pack)	10 Gbps SR
10G-SFPP-LR (1-pack) 10G-SFPP-LR-8 (8-pack)	10 Gbps LR
10G-SFPP-ER (1-pack) 10G-SFPP-ER-8 (8-pack)	10 Gbps ER
10G-SFPP-TWX-0101 (1-pack) 10G-SFPP-TWX-0108 (8-pack)	1 m Twinax copper cable
10G-SFPP-TWX-0301 (1-pack) 10G-SFPP-TWX-0308 (8-pack)	3 m Twinax copper cable
10G-SFPP-TWX-0501 (1-pack) 10G-SFPP-TWX-0508 (8-pack)	5 m Twinax copper cable
10Ge-SFPP-AOC-0701	10 GbE SFP+ direct-attached active optical cable, 7 m, 1-pack
10Ge-SFPP-AOC-1001	10 GbE SFP+ direct-attached active optical cable, 10 m, 1-pack
40G-QSFP-QSFP-C-0101	40 GbE direct-attached QSFP+ to QSFP+ active copper cable, 1 m, 1-pack
40G-QSFP-QSFP-C-0301	40 GbE direct-attached QSFP+ to QSFP+ active copper cable, 3 m, 1-pack
40G-QSFP-QSFP-C-0501	40 GbE direct-attached QSFP+ to QSFP+ active copper cable, 5 m, 1-pack
40G-QSFP-4SFP-C-0101	4x10 GbE direct-attached QSFP+ to 4 SFP+ copper breakout cable, 1 m, 1-pack
40G-QSFP-4SFP-C-0301	4x10 GbE direct-attached QSFP+ to 4 SFP+ copper breakout cable, 3 m, 1-pack
40G-QSFP-4SFP-C-0501	4x10 GbE direct-attached QSFP+ to 4 SFP+ copper breakout cable, 5 m, 1-pack
40G-QSFP-SR4	40 Gbps SR4
40G-QSFP-SR4-INT	40 Gbps SR4 (4x10 Gbps SFPP breakout-capable)
40G-QSFP-LR4	40GBASE-LR4 QSFP+ optic (LC), for up to 10 km over SMF, 1-pack

¹ VCS license is not required when running Brocade NOS 4.1 or later releases.

Brocade VDX 6740, 6740T, and 6740T-1G FRU and Optics Ordering Information *(Continued)*

FRU and Optics SKU <i>continued</i>	Description <i>continued</i>
XBR-R000291	FRU, Brocade VDX 6740 fixed rack mount kit for 4-post racks
XBR-R000292	FRU, Brocade VDX 6740 mid-mount kit for 2-post racks
XBR-R000293	Flush mount kit for 2-post racks for Brocade VDX 6740
XBR-R000294	FRU, universal 2-post mid-mount kit/flush mount kit, Brocade VDX 6740T/6740T-1G
XBR-R000295	FRU, universal rack mount kit, 4-post, 24- to 32-inch depth rack, Brocade VDX 6740T/6740T-1G

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