Cisco MDS 9396S 16G Multilayer Fabric Switch for IBM System Storage

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System Networking

Product Guide

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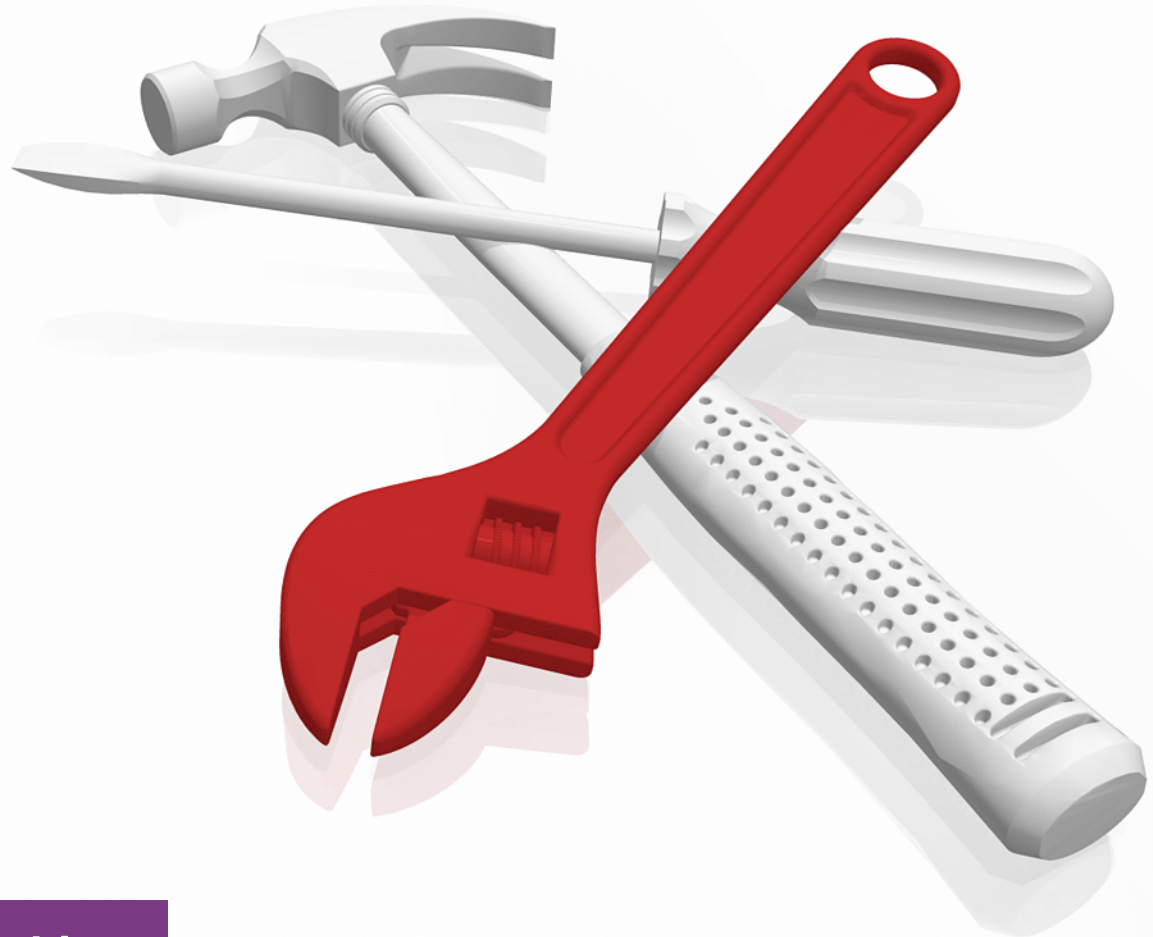This IBM® Redbooks® Product Guide describes the Cisco MDS 9396S 16G Multilayer Fabric Switch for IBM System Storage®. The Cisco MDS 9396S 16G Multilayer Fabric Switch (Figure 1) is the latest generation of the high performance, high density, and highly reliable Cisco MDS Series Fabric switches. It combines high performance with outstanding flexibility and cost effectiveness. This robust, compact, 2-rack-unit (2RU) switch scales from 48 to 96 line-rate 16-Gbps Fibre Channel ports.

The Cisco MDS 9396S is excellent for these situations:

► A stand-alone SAN in large departmental storage environments

► A middle-of-row or top-of-the-rack switch in medium-sized redundant fabrics

► An edge switch in enterprise data center core-edge topologies

The Cisco MDS 9396S is powered by Cisco NX-OS Software and Cisco Data Center Network Manager (DCNM) software. It delivers advanced storage networking features and functions with ease of management and compatibility with the entire Cisco MDS 9000 Family portfolio for reliable end-to-end connectivity.

Figure 1 shows the Cisco MDS 9396S 16G Multilayer Fabric Switch.

Figure 1   Cisco MDS 9396S 16G Multilayer Fabric Switch

Did you know?

You can use the Cisco MDS 9396S 16G Multilayer Fabric Switch to achieve these benefits:

► Gain "pay-as-you-grow" scalability in a high-density switch supporting up to ninety-six 16 Gbps Fibre Channel ports in a compact, two-rack-unit (2RU) form factor

► Provide autosensing Fibre Channel ports, delivering up to 16 Gbps of high-speed, dedicated bandwidth for each port

► Boost availability with In-Service Software Upgrades (ISSU) enabling the switch to be upgraded without impacting network traffic

Main features

This section describes the main features of the Cisco MDS 9396S 16G Multilayer Fabric Switch.

High performance and flexibility at lower cost

Up to 96 autosensing Fibre Channel ports are capable of speeds of 2, 4, 8, 10, and 16 Gbps, with 16 Gbps of dedicated bandwidth for each port. The base switch model includes 48 enabled ports and can be scaled up as needed by adding one or more 12-port Cisco MDS 9396S On-Demand Port Activation licenses. The Cisco MDS 9396S, a high-end fabric switch, scales from 48 to 96 high-performance Fibre Channel ports in a 2RU compact form factor. It offers more buffer-to-buffer credits than previous-generation fabric switches and also supports 32 virtual SANs (VSANs), making it an excellent choice for stand-alone small and midsize business (SMB) Fibre Channel networks.

High-availability platform for mission-critical deployments

In environments in which downtime is intolerable, the Cisco MDS 9396S offers In-Service Software Upgrades (ISSU). With this feature, Cisco NX-OS Software can be upgraded while the Fibre Channel ports carry traffic. The Cisco MDS 9396S includes dual redundant hot-swappable power supplies and fan trays, PortChannels for Inter-Switch Link (ISL) resiliency, and F-port channeling for resiliency on uplinks from a Cisco MDS 9396S operating in N-Port Virtualization (NPV) mode. New hardware-based slow-port detection and recovery provide enhanced performance and monitoring capabilities.

Simplified storage management with sophisticated diagnostics

The Cisco MDS 9396S offers built-in storage network management and SAN plug-and-play capabilities. All features are available through a command-line interface (CLI) or Cisco Prime DCNM for SAN Advanced Edition, a centralized management tool. Cisco DCNM task-based wizards simplify management of single or multiple switches and fabrics. For virtual infrastructure, it manages the entire path: from the virtual machine and switch to the physical storage. The Cisco MDS 9396S also supports Power On Auto Provisioning (POAP) to automate software image upgrades and configuration file installation on newly deployed switches. Additionally, it provides intelligent diagnostics, protocol decoding, network analysis tools, and Cisco Call Home for added reliability, faster problem resolution, and reduced service costs.

Intelligent network services and advanced traffic management

The Cisco MDS 9396S uses virtual SAN (VSAN) technology for hardware-enforced, isolated environments within a physical fabric. It offers access control lists (ACLs) for hardware-based, intelligent frame processing. Advanced traffic management features, such as fabric-wide quality of service (QoS) and Inter-VSAN Routing (IVR), are included in the optional Cisco MDS 9000 Family Enterprise Package. QoS prioritizes application data traffic for better and more predictable network service. Zone-based QoS simplifies configuration and administration by using the familiar zoning concept. IVR facilitates resource sharing across VSANs without compromising scalability, reliability, availability, or network security. The optional Cisco MDS 9300 Family Enterprise and DCNM Package Bundle includes both the Cisco MDS 9300 Family Enterprise Package and Cisco DCNM for SAN Advanced Edition for Cisco MDS 9300 Series.

Comprehensive network security framework

An extensive set of innovative and powerful security features and functions is available with the optional Cisco MDS 9000 Family Enterprise Package. It offers fabric-wide, per-VSAN role-based authentication, authorization, and accounting (AAA) services using RADIUS, Lightweight Directory Access Protocol (LDAP), Microsoft Active Directory (AD), and TACACS+. It also deploys VSAN fabric isolation, intelligent port-level packet inspection, Fibre Channel Security Protocol (FC-SP) host-to-switch and switch-to-switch authentication, Secure File Transfer Protocol (SFTP), Secure Shell Version 2 (SSHv2), and Simple Network Management Protocol Version 3 (SNMPv3) implementing Advanced Encryption Standard (AES). Other security features include control-plane security, hardware-enforced zoning, and management access.

Summary of features and benefits

Table 1 summarizes the main features and benefits of the Cisco MDS 9396S 16G Multilayer Fabric Switch for IBM System Storage.

Table 1   Features and benefits

Feature	Benefit
Common software across all platforms	Reduce total cost of ownership (TCO) by using Cisco NX-OS and Cisco DCNM for consistent provisioning, management, and diagnostic capabilities across the fabric.
POAP	Automate deployment and upgrade of software images.
Smart zoning	Reduce consumption of hardware resources and administrative time that is needed to create and manage zones.
Intelligent diagnostics and hardware-based slow-port detection	Enhance reliability, accelerate problem resolution, and reduce service costs by using Fibre Channel ping and pathtrace to identify exact path and timing of flows, as well as Cisco Switched Port Analyzer (SPAN) and Remote SPAN (RSPAN) and Cisco Fabric Analyzer to capture and analyze network traffic.
Virtual output queuing	Help ensure line-rate performance on each port by eliminating head-of-line blocking.
High-performance ISLs	Optimize bandwidth utilization by aggregating up to 16 physical ISLs into a single logical PortChannel bundle with multipath load balancing.
ISSU	Reduce downtime for planned maintenance and software upgrades.

Licensing

Table 2 describes optional licenses that can be purchased to enable additional features and capabilities on the Cisco MDS 9396S 16G Multilayer Fabric Switch for IBM System Storage.

Table 2   Optional licenses

License	Description
Cisco MDS 9396S 12-port On-Demand Activation	Enables 12 additional Fibre Channel ports (up to 96 total ports on the switch).
Cisco MDS 9300 Family Enterprise Package	► Includes advanced traffic-engineering and network security features such as IVR, QoS and zone-based QoS, FC-SP, port security, VSAN-based access control, and fabric binding for open systems. ► Licensed per switch for all the ports on the switch.
Cisco DCNM for SAN Advanced Edition for Cisco MDS 9300 Series	► Includes advanced management capabilities such as VMware vCenter integration, performance trending, advanced provisioning, backup, and dashboards. ► Licensed per switch for all the ports on the switch. License is hosted on a server.
Cisco MDS 9300 Family Enterprise and DCNM Package Bundle	Includes both Cisco MDS 9300 Family Enterprise Package and Cisco Prime DCNM for SAN Advanced Edition for Cisco MDS 9300 Series.

Product specifications

Table 3 lists technical specifications for the Cisco MDS 9396S.

Table 3   Product specifications

Item	Specification
Protocols	► FC-PH, Revision 4.3 (ANSI INCITS 230-1994) ► FC-PH, Amendment 1 (ANSI INCITS 230-1994/AM1-1996) ► FC-PH, Amendment 2 (ANSI INCITS 230-1994/AM2-1999) ► FC-PH-2, Revision 7.4 (ANSI INCITS 297-1997) ► FC-PH-3, Revision 9.4 (ANSI INCITS 303-1998) ► FC-PI, Revision 13 (ANSI INCITS 352-2002) ► FC-PI-2, Revision 10 (ANSI INCITS 404-2006) ► FC-PI-3, Revision 4 (ANSI INCITS 460-2011) ► FC-PI-4, Revision 8 (ANSI INCITS 450-2008) ► FC-PI-5, Revision 6 (ANSI INCITS 479-2011) ► FC-FS, Revision 1.9 (ANSI INCITS 373-2003) ► FC-FS-2, Revision 1.01 (ANSI INCITS 424-2007) ► FC-FS-2, Amendment 1 (ANSI INCITS 424-2007/AM1-2007) ► FC-FS-3, Revision 1.11 (ANSI INCITS 470-2011) ► FC-FS-4, Revision 1.10 ► FC-LS, Revision 1.62 (ANSI INCITS 433-2007) ► FC-LS-2, Revision 2.21 (ANSI INCITS 477-2011) ► FC-LS-3, Revision 3.10 ► FC-SW-2, Revision 5.3 (ANSI INCITS 355-2001) ► FC-SW-3, Revision 6.6 (ANSI INCITS 384-2004) ► FC-SW-4, Revision 7.5 (ANSI INCITS 418-2006) ► FC-SW-5, Revision 8.5 (ANSI INCITS 461-2010) ► FC-SW-6, Revision 1.8 ► FC-GS-3, Revision 7.01 (ANSI INCITS 348-2001) ► FC-GS-4, Revision 7.91 (ANSI INCITS 387-2004) ► FC-GS-5, Revision 8.51 (ANSI INCITS 427-2007) ► FC-GS-6, Revision 9.4 (ANSI INCITS 463-2010) ► FC-GS-7, Revision 10.3 ► FCP, Revision 12 (ANSI INCITS 269-1996) ► FCP-2, Revision 8 (ANSI INCITS 350-2003) ► FCP-3, Revision 4 (ANSI INCITS 416-2006) ► FCP-4, Revision 2b (ANSI INCITS 481-2011) ► FC-SB-2, Revision 2.1 (ANSI INCITS 349-2001) ► FC-SB-3, Revision 1.6 (ANSI INCITS 374-2003) ► FC-SB-3, Amendment 1 (ANSI INCITS 374-2003/AM1-2007) ► FC-SB-4, Revision 3.0 (ANSI INCITS 466-2011) ► FC-SB-5, Revision 2.00 (ANSI INCITS 485-2014) ► FC-BB-2, Revision 6.0 (ANSI INCITS 372-2003) ► FC-BB-3, Revision 6.8 (ANSI INCITS 414-2006) ► FC-BB-4, Revision 2.7 (ANSI INCITS 419-2008) ► FC-BB-5, Revision 2.0 (ANSI INCITS 462-2010) ► FC-BB-6, Revision 2.00 (ANSI INCITS 509-2014) ► FC-VI, Revision 1.84 (ANSI INCITS 357-2002) ► FC-SP, Revision 1.8 (ANSI INCITS 426-2007) ► FC-SP-2, Revision 2.71 (ANSI INCITS 496-2012) ► FC-SP-2, Amendment 1 (ANSI INCITS 496-2012/AM1-2014) ► FAIS, Revision 1.03 (ANSI INCITS 432-2007) ► FAIS-2, Revision 2.23 (ANSI INCITS 449-2008) ► FC-IFR, Revision 1.06 (ANSI INCITS 475-2011) ► FC-FLA, Revision 2.7 (INCITS TR-20-1998) ► FC-PLDA, Revision 2.1 (INCITS TR-19-1998) ► FC-Tape, Revision 1.17 (INCITS TR-24-1999)

Item	Specification
Protocols (continued)	▶ FC-MI, Revision 1.92 (INCITS TR-30-2002) ▶ FC-MI-2, Revision 2.6 (INCITS TR-39-2005) ▶ FC-MI-3, Revision 1.03 (INCITS TR-48-2012) ▶ FC-DA, Revision 3.1 (INCITS TR-36-2004) ▶ FC-DA-2, Revision 1.06 (INCITS TR-49-2012) ▶ FC-MSQS, Revision 3.2 (INCITS TR-46-2011) ▶ Fibre Channel classes of service: Class 2, Class 3, and Class F ▶ Fibre Channel standard port types: E, F and FL ▶ Fibre Channel enhanced port types: SD, ST, and TE ▶ In-band management using IP over Fibre Channel (RFC 2625) ▶ IPv6, IPv4, and Address Resolution Protocol (ARP) over Fibre Channel (RFC 4338) ▶ Extensive IETF-standards-based TCP/IP, SNMPv3, and remote monitoring (RMON) MIBs
Ports	▶ Available in a 48-port base configuration ▶ Enable incremental ports on the 48-port base model, with the 12-port On-Demand Activation license
Performance	▶ Port speed: 2/4/8/10/16-Gbps autosensing with 16-Gbps of dedicated bandwidth per port ▶ Buffer credits: Up to 500 per port without Enterprise license and up to 4095 per port with optional Enterprise license ▶ PortChannel: Up to 16 physical links
Reliability and availability	▶ ISSU ▶ Hot-swappable, dual redundant power supplies ▶ Hot-swappable fan tray with integrated temperature and power management ▶ Hot-swappable Enhanced Small Form-Factor Pluggable (SFP+) optics ▶ Passive backplane ▶ Stateful process restart ▶ Any port configuration for PortChannels ▶ Fabric-based multipathing ▶ Per-VSAN fabric services ▶ Port tracking ▶ Virtual Router Redundancy Protocol (VRRP) for management connections ▶ Online diagnostics

Item	Specification
Network management	- Access methods: - Out-of-band 10/100/1000 Ethernet port - RS-232 serial console port - USB - Access protocols - CLI using the console and Ethernet ports - SNMPv3 using the Ethernet port and in-band IP over Fibre Channel access - Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S) - Distributed device alias service - Network security - Per-VSAN role-based access control (RBAC) using RADIUS and TACACS+-based AAA functions - SFTP - SSHv2 implementing AES - SNMPv3 implementing AES - Management applications - Cisco MDS 9000 Family CLI - Cisco DCNM
Programming interfaces	- Scriptable CLI - Cisco DCNM web services API
Physical dimensions	- Dimensions (H x W x D): 8.64 x 44.25 x 56.59 cm (3.4 x 17.42 x 22.28 in.), 2RU - Rack-mountable in standard 19-inch Electronic Industries Alliance [EIA] rack - Weight of fully configured chassis: 17.8 kg (39.24 lb)
Power	- Power supply: 1200 W with 180 to 264 V ac input; and 800 W with 90 to 180 V ac input. (2 per switch) - Power supply: Power grid redundancy (1+1) with 180 to 264 V ac input only - Power cord: Notched C15 socket connector connecting to C16 plug on power supply - ac input: 100 to 240 V ac (10% range) - Frequency: 50 to 60 Hz (nominal) - Maximum power consumption 700 W (on base model configuration running 16-Gbps 100% traffic load at 25°C) 800 W (on fully populated configuration running 16-Gbps 100% traffic load at 25°C) - Airflow: Port-side exhaust (air flows from back to front) - Airflow - Maximum 255 cubic feet per minute (CFM) - Nominal 110 CFM - Cisco recommends maintaining a minimum air space of 6.4 cm (2.5 in.) between walls and chassis air vents, and a minimum horizontal separation of 15.2 cm (6 in.)between two chassis to prevent overheating.

Item	Specification
Temperature range	► Temperature, ambient operating: 0 to 40°C (32 - 104°F) ► Temperature, ambient non-operating, and storage: -40 to 70°C (-40 to 158°F) ► Relative humidity, ambient (noncondensing) operating: 10 - 90% ► Relative humidity, ambient (noncondensing) non-operating and storage: 10 - 95% ► Altitude, operating: -60 to 2000 m (-197 to 6500 ft)
Approvals and compliance	► Safety compliance ► CE Marking ► UL 60950 ► CAN/CSA-C22.2 No. 60950 ► EN 60950 ► IEC 60950 ► TS 001 ► AS/NZS 3260 ► IEC60825 ► EN60825 ► 21 CFR 1040 ► EMC compliance ► FCC Part 15 (CFR 47) Class A ► ICES-003 Class A ► EN 55022 Class A ► CISPR 22 Class A ► AS/NZS 3548 Class A ► VCCI Class A ► EN 55024 ► EN 50082-1 ► EN 61000-6-1 ► EN 61000-3-2 ► EN 61000-3-3
Fabric services	► Name server ► Registered State Change Notification (RSCN) ► Login services ► Fabric Configuration Server (FCS) ► Public loop ► Broadcast ► In-order delivery
Advanced functions	► VSAN ► IVR ► NPV ► PortChannel with multipath load balancing ► Flow-based and zone-based QoS
Supported Cisco optics, media, and transmission distances	For detailed information about all supported transceivers, see Cisco MDS 9000 Family pluggable transceivers: http://www.cisco.com/en/US/prod/collateral/ps4159/ps6409/ps4358/product_data_sheet09186a00801bc698.html

System requirements

Cisco MDS 9000 NX-OS Software Release 6.2(13)a or later supporting Cisco MDS 9396S and Cisco DCNM Software Release 7.2 or later.

Ordering information

Table 4 indicates all part numbers and associated configurable options for the Cisco MDS 9396S 16G Multilayer Fabric Switch for IBM System Storage.

Table 4   Ordering information

Product name	Machine type and model (MTM) or feature
Cisco MDS 9396S 16G Multilayer Fabric Switch for IBM System Storage, w/ 48 active ports (port-side exhaust), no SFPs - base switch	9711-S96
Shipping Charge	AGE9
Shipping No Charge	AG00
TAA Compliant Order	0983
FC 10Gb SW SFP+	5020
FC 10Gb LW SFP+	5022
10GBASE-SR SFP+	5410
10GBASE- LR 10km SFP+	5420
10GBASE- ER xxkm SFP+	5480
FC 16Gb SW SFP+	5602
FC 16Gb SW SFP+ - 4 Pack	5604
FC 16Gb 10km LW SFP+	5611
FC 16Gb 10km LW SFP+ - 4 Pack	5614
FC 8Gb SW SFP+	5830
FC 8Gb SW SFP+ - 4 Pack	5834
FC 8Gb 10km LW SFP+	5850
FC 8Gb 10km LW SFP+ - 4 Pack	5854
FC 8 Gb LC 40 Km SFP+	5855
MDS 9300 Enterprise Pkg	7310
MDS 9300 Enterpise+DCNM Bundle License	7320
MDS 9300 DCNM Advanced Edition	7311
MDS 9396S 16G FC 12-port upgrade license	7312
5m 50u LC/LC Fiber Cable	5605
25m 50u LC/LC Fiber Cable	5625
Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	9110
Power Cord, 250VAC 10A 3112 Plug, Australia	9111
Power Cord, 250VAC 10A CEE 7/7 Plug, EU	9112
Power Cord, 250VAC 10A CEI 23-16/VII Plug, Italy	9113

Product name	Machine type and model (MTM) or feature
Power Cord, 250VAC 10A BS1363 Plug (13 A fuse), UK	9114
Power Cord, 250VAC 10A IRAM 2073 Plug, Argentina	9115
Power Cord, 250VAC 10A SABS 164/1 Plug, South Africa	9116
Power Cord, 250VAC 10A, Straight C15, MP232 Plug, SWITZ	9117
Power Cord, 250VAC 10A GB1002 Plug, China	9118
Power Cord, 250VAC 10A SI16S3 Plug, Israel	9119
Cabinet Jumper Power Cord, 250 VAC13A, C14-C15 Connector	9120
Power Cord, 125VAC 13A KSC8305 Plug, Korea	9121
Power Cord, 125VAC 15A CNS10917-2, Taiwan	9122
Power Cord, 250VAC 10A, Brazil	9123
Bulk Order MES Feature	9555

Note: For detailed information about all supported transceivers, see Cisco MDS 9000 Family pluggable transceivers:

http://www.cisco.com/en/US/prod/collateral/ps4159/ps6409/ps4358/product_data_sheet09186a00801bc698.html

Related information

For more information, see the following resources:

► Cisco MDS 9396S 16G Multilayer Fabric Switch for IBM System Storage

http://ibm.com/systems/storage/san/ctype/9396S/

► Cisco MDS 9000 Family pluggable transceivers

http://www.cisco.com/en/US/prod/collateral/ps4159/ps6409/ps4358/product_data_sheet09186a00801bc698.html

► IBM System Storage Interoperation Center (SSIC)

http://www.ibm.com/systems/support/storage/ssic/interoperability.wss

► IBM Offering Information page (announcement letters and sales manuals)

http://www.ibm.com/common/ssi/index.wss?request_locale=en

On this page, enter Cisco MDS 9396S, select the information type, and then click Search. On the next page, narrow your search results by geography and language.

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