

HP StorageWorks M-Series infrastructure

From entry-level to enterprise, HP StorageWorks M-Series switches and directors provide the scalability, availability, manageability, performance, and packaging density that companies need to build flexible storage area networks (SANs) and consolidate data access. With M-Series switches and directors, you keep pace with exponential storage growth and get the flexibility to meet even unexpected events.

New FlexPort technology enables customers to implement connectivity on demand, a capability not available until now in other switch products. End-users can start with a partially populated switch and pay for additional connectivity, when needed, in 4- and 8-port increments.



HP StorageWorks Edge Switch 2/12

The HP StorageWorks Edge Switch 2/12 delivers reliability, flexibility, and entry-level Fibre Channel (FC) capabilities. It's ideal for basic FC connectivity in beginning SAN installations, or at the edge of established environments.

Based on the award-winning HP StorageWorks Edge Switch 2/24 design, the Edge Switch 2/12 supports 4, 8, or 12-ports through the FlexPort technology option. This technology enables customers to implement connectivity on demand. They can start with a partially populated switch (4-ports) and purchase additional connectivity when needed in 4-port increments up to a total of 12-ports.

Key features and benefits

- Provides a cost effective entry point when moving from a direct attached storage (DAS) to SAN environment
- Features the award-winning technology of HP StorageWorks Edge Switch 2/24
- Scales with no disruption from 4- to 12-ports at 4-port increments via FlexPort technology
- Transceivers come standard with each switch

HP StorageWorks Edge Switch 2/24 and Edge Switch 2/32

The HP StorageWorks Edge Switch 2/24 and Edge Switch 2/32 offer unprecedented flexibility in supporting enterprise-wide SAN deployments and core-to-edge architectures. The Edge Switch 2/24 base model includes eight active switch ports, eight transceivers, and is upgradeable in 8-port upgrades to 24 active ports. The Edge Switch 2/32 comes with 16 ports upgradeable to 32 ports, in 8-port increments. The Edge Switch 2/24 and Edge Switch 2/32 provide 2 Gb/s throughput, FlexPort technology and seamless interoperability with the Director 2/140 and each other.

A 1U server is required for HP StorageWorks HA-Fabric Manager (HAFM) software v8.02 and later*. For ease of ordering, HAFM has been bundled with the 1U server under a single part number. In addition, there is support for the latest versions of IBM AIX, Tru64 UNIX, OpenVMS, Microsoft® Windows® 2003, and Novell NetWare operating systems supported by HP, complementing recently announced versions of HP-UX, Linux®, Solaris, and Microsoft Windows NT®/Windows 2000.

Key features and benefits

- Provides outstanding support for mission-critical applications by providing a rich set of high availability features.

*Note: Requires an element manager license.

HP StorageWorks Director 2/140 is engineered to support emerging technologies with its protocol-independent architecture. It is the open storage-networking platform to meet your future business needs.

- Offers extraordinary performance with twice the potential throughput of traditional 1 Gb/s switches
- Features centralized fabric management through the HP StorageWorks High Availability-Fabric Manager (HAFM)
- Provides non-disruptive firmware upgrades through HotCAT technology
- Offers connectivity on demand by means of FlexPort technology
- Provides effective bandwidth aggregation at the edge of core-to-edge SAN deployments
- Features seamless interoperability with other HA-Fabric edge switches and directors
- Transceivers come standard with each switch

HP StorageWorks Director 2/140

The HP StorageWorks Director 2/140 supports 2 Gb/s and 1 Gb/s mixed environments. The switch provides the availability, manageability, scalability, and performance that you need to build powerful, flexible SANs that support today's mission critical environments. The Director 2/140 is engineered to support emerging technologies with its protocol-independent architecture; it is the open storage-networking platform you need to meet your future business needs.

The Director 2/140 features the FlexPort technology option. This technology enables customers to implement connectivity on demand. You can start with a partially populated switch (32-ports) and purchase additional connectivity when needed in 4-port increments up to a total of 140-ports.

The Director 2/140 ensures data is continuously online with the highest level of availability on the market: 99.999 percent, certified to Mil-Spec 217-F. It features redundant power supplies and cooling fans, along with redundant active components that support automatic failover. Other high-availability capabilities include

hot-swapping for all field-replaceable units, non-disruptive firmware activation, and automatic fault detection and isolation. In addition, call-home and e-mail notifications automatically alert maintenance personnel to accelerate problem resolution. The Director 2/140 also maintains continuous data access and high performance in the event of a single component failure by allowing non-disruptive maintenance.

A 1U server is required for HP StorageWorks HAFM software v8.02 and later. For ease of ordering, HAFM has been bundled with the 1U server under a single part number. In addition, there is support for the latest versions of IBM AIX, Tru64 UNIX, OpenVMS, Windows 2003, and Novell NetWare operating systems supported by HP, complementing recently announced versions of HP-UX, Linux, Solaris, and NT/Windows 2000.

Key features and benefits

- Ensures business continuance through 99.999 percent availability, certified to Mil-Spec 217-F
- Reduces Total Cost of Ownership (TCO) for SAN infrastructure
- Enables storage consolidation, simplified management of data center SAN environment
- Provides broadest range of compatibility with SAN products
- Offers multi-vendor server and storage environment
- Features the widest range of HP SAN solutions
- Delivers backward compatibility
- Protects investments with support for next generation technologies
- Provides the scalability to meet business demands today and into the future
- Offers centralized management to maximize system administrator resources
- Transceivers come standard with each director

With the McDATA 4Gb SAN Switch for the HP p-class BladeSystem, customers connecting HP Blade Systems to Fibre Channel Storage Area Networks now have the ability to consolidate multiple servers, Fibre Channel switches and Ethernet switches into a single platform thus reducing overall solution costs.

The newest member of the M-Series family of Fibre Channel switches, the McDATA 4Gb SAN Switch for HP p-Class BladeSystem, delivers new technology for customers connecting HP BladeSystems to Fibre Channel SANs. With the introduction of the new McDATA 4Gb SAN Switch, IT managers now have the capability to consolidate multiple HP servers, Fibre Channel Switches and Ethernet switches into a single platform for connectivity to the networked infrastructure. This integration of technology results in space and cost savings due to a reduction of physical components, raising the reliability of the entire system. Time to deployments is drastically reduced as server interconnects are made once the McDATA 4Gb SAN Switch is plugged into the HP BladeSystem chassis.

Advances in our Fibre Channel switching technology has allowed us to physically reduce the size of the system down to a 4.5-inch by 3.5-inch cube that plugs into the back of the HP p-Class BladeSystem, resulting in a solution with practically zero footprint. Cabling between components that once had to be done manually, is now integrated into the HP BladeSystem, reducing administrative man hours and providing nearly instant deployment.

Key features and benefits

- **Simplicity without compromise**—Integrated design allows server and switch component consolidation, saving cost, space and time.
- **Management ease**—Browser based utility is included for setup and configuration. External 10/100 Mbps Ethernet port provides simple integration into fabric management applications.
- **Reduced costs**—The cost and space of the fabric switching element are reduced by eliminating and consolidating components. Power and cooling resources are shared, reducing cost points of failure. Minimal external cabling.
- **Server and Switch consolidation**—The McDATA 4Gb SAN Switch fits into the blade enclosure, effectively reducing the footprint of the IT architecture while providing the capabilities of standalone switches. SAN connections are made through the back of the BladeSystem, increasing system reliability with component reduction.
- **Change without chaos**—The HP p-class BladeSystem accepts up to two switches per chassis, dual switches coupled with redundant server connections ensure a highly available solution.
- **Small form factor**—The McDATA 4Gb SAN Switch fits into the blade enclosure, reducing the footprint of the IT architecture while providing the capabilities of standalone switches.

Technical specifications



Edge Switch 2/12

Edge Switch 2/24

Edge Switch 2/32

Director 2/140

Targeted environment	Departments	Departments, data centers	Departments, data centers	Data centers
Port bandwidth	200 MB	200 MB	200 MB	200 MB
Aggregate device bandwidth	Up to 2,400 MB	Up to 4,800 MB	6,400 MB	28,000 MB
OS support	Refer to the Heterogeneous Open SAN Design Guide at: http://h18000.www1.hp.com/products/storageworks/san/documentation.html Note: This website is available in English only.			
Storage system support	HP StorageWorks MA8000, EMA12000/16000, Enterprise Virtual Array (EVA), XP, Virtual Array (VA), Modular Smart Array 1000 (MSA1000)			
Ports	4-ports as standard; upgradeable to 12-ports in 4-port increments	8-ports as standard; upgradeable to 24-ports in 8-port increments	16-ports as standard; upgradeable to 32-ports in 8-port increments	32-ports as standard; upgradeable to 140-ports in 4-port increments
Topology	Shared Memory	Shared Memory	Crossbar	Crossbar
Form factor	1U	1U	1.5U	12U
Call home	No	Yes (Note 1)	Yes (Note 1)	Yes (Note 1)
Fabric-wide management	No	Yes	Yes	Yes
Hot-plug	Yes	Yes	Yes	Yes
Redundant power	No	Yes	Yes	Yes
SAN configurations	Refer to the Heterogeneous Open SAN Design Guide at: http://h18000.www1.hp.com/products/storageworks/san/documentation.html			
Fibre Channel protocols	FC-PH Rev 4.3, FC-PH-2, FC-PH-3, FC-GS-2, FC-FLA, FC-FG, FC-SW2			
SNMP	Fibre Alliance MIB v3.0; Fibre Channel Fabric Element MIB version 1.10; TCP/IP MIB II	Fibre Alliance MIB v3.0; Fibre Channel Fabric Element MIB v1.10; TCP/IP MIB II	Fibre Alliance MIB v3.0; Fibre Channel Fabric Element MIB v1.10; TCP/IP MIB II	
Fibre Channel element MIB				FE-MIB, TCP/IP MIB II
Groups				System, interface, address translation, IP, ICMP, TCP, UDP, SNMP
Classes of service	Class 2, Class 3, Class F	Class 2, Class 3, Class F	Class 2, Class 3, Class F	Class 2, Class 3, Class F
Port speed	1.0625 - 2.125 Gb/s, full duplex	1.0625 - 2.125 Gb/s, full duplex	1.0625 - 2.125 Gb/s, full duplex	2 Gb/s, full duplex
Buffer credits	60 per port	60 per port	60 per port	60 per port
Fabric latency	Less than 2 microseconds average	Less than 2 microseconds average	Less than 2 microseconds average	
Switch latency	Less than 1 microseconds average at 2 GB	Less than 1 microseconds average at 2 GB	Less than 2 microseconds average at 2 GB	Less than 2 microseconds average at 2 GB
Ports per chassis	12 G Ports	24 G Ports	32 G Ports	140 G Ports
Media type	Hot-plug, industry-standard LC Small Form Factor Pluggable (SFP)	Hot-plug, industry-standard LC SFP	Hot-plug, industry-standard LC SFP	Hot-plug, industry-standard LC SFP

Notes:

1. Call-home support provided through the HP StorageWorks HA-Fabric Manager.

Technical specifications



Edge Switch 2/12



Edge Switch 2/24



Edge Switch 2/32



Director 2/140

Supported optical media—types/distance

Shortwave	1,640 ft (500 m)	1,640 ft (500 m)	1,640 ft (500 m)	1,640 ft (500 m), 1 GB 1,148 ft (300 m), 2 GB
Longwave	6.2 mi (10 km), 21.9 mi (35 km)	6.2 mi (10 km), 21.9 mi (35 km)	6.2 mi (10 km), 21.9 mi (35 km)	6.2 mi (10 km), 21.9 mi (35 km)
With repeaters	60 mi (100 km)	60 mi (100 km)	60 mi (100 km)	60 mi (100 km)
Cabling, single mode	9/125 micron, 6.2 mi (10 km)	9/125 micron, 6.2 mi (10 km)	9/125 micron, 6.2 mi (10 km)	9/125 micron, 6.2 mi (10 km)
Cabling, multi-mode	50/125 micron, 1,640 ft (500 m), 62.5/125 micron, 1,148 ft (300 m)	50/125 micron, 1,640 ft (500 m), 62.5/125 micron, 1,148 ft (300 m)	50/125 micron, 1,640 ft (500 m), 62.5/125 micron, 1,148 ft (300 m)	50/125 micron, 1,640 ft (500 m), 62.5/125 micron, 1,148 ft (300 m)
Management options	Embedded Web Server, SNMP, Command Line Interface	HA-Fabric Manager, Embedded Web Server, SNMP, Command Line Interface	HA-Fabric Manager, Embedded Web Server, SNMP, Command Line Interface	HA-Fabric Manager, Open Systems Management Server, Embedded Web Server
Access	In-band, Ethernet (10/100 Mbps)	In-band, Ethernet (10/100 Mbps)	In-band, Ethernet (10/100 Mbps)	In-band, Ethernet (10/100 Mbps)
Fabric services	Simple Name Server, In- order delivery (Class 2, 3), Management Server (optional), Broadcast, Name Server Zoning	Simple Name Server, In- order delivery (Class 2, 3), Management Server (optional), Broadcast, Name Server Zoning	Simple Name Server, In- order delivery (Class 2, 3), Management Server (optional), Broadcast, Name Server Zoning	Simple Name Server, In- order delivery (Class 2, 3), Management Server (optional), Broadcast, Name Server Zoning
Diagnostics	Power-on self test, On-line port, Internal and external loopback, On-line system health check	Power-on self test, On-line port, CTP, SBAR, Internal and external loopback, On-line system health check	Power-on self test, On-line port, CTP, SBAR, Internal and external loopback, On-line system health check	Power-on self test, On-line port, CTP, SBAR, Internal and external loopback, On-line system health check
Serviceability	Hot-plug optics, Hot load firmware upgrades, Maintenance port (DSUB), Thermal event logging, Unit, port, FRU beaconing, System error LED, FRU failed LED	Hot load firmware upgrades, Unit, port, FRU beaconing, Call-home, e-mail (with HA-Fabric Manager), System error LED, Maintenance port (DSUB), FRU failed LED, Thermal protection	Hot-plug power supplies and fans, Hot-plug optics, Hot load firmware upgrades, Call-home, e-mail, Maintenance port (DSUB), Thermal protection, Unit, port, FRU beaconing, System error LED, FRU failed LED	Non-disruptive firmware upgrades, Call-home, e-mail (with HA-Fabric Manager software), Maintenance port (DSUB), Smart thermal protection, Unit, port, FRU beaconing, System error LED, FRU failed LED
Dimensions (HxWxD)	1.75 in (4.45 cm) x 17.50 in (44.45 cm) x 17.50 in (44.45 cm)	1.75 in (4.45 cm) x 17.50 in (44.45 cm) x 17.50 in (44.45 cm)	2.63 in (6.7 cm) x 17.50 in (44.45 cm) x 26.25 in (67 cm)	20.88 in (53.03 cm) x 17.50 in (44.45 cm) x 24.16 in (61.37 cm)
Weight	18 lbs (8 kg)	20 lbs (9 kg)	26 lbs (11.80 kg)	172 lbs (78 kg)

Technical specifications



McDATA 4Gb SAN Switch

Targeted environment	Departments, data centers
Ports	10-8 internal; 2 external
Topology	Switched fabric
Fabric-wide management	Yes
Groups	System, interface, address translation, IP, ICMP, TCP, UDP, SNMP
Classes of service	Class 2, Class 3, Class F
Port speed	2.125 GB, full duplex
Buffer credits	60 per port
Dimensions (HxWxD)	3.9 in (10 cm) x 6.5 in (16.5 cm) x 11 in (28 cm)
Weight	8.2 lbs/3.7 kg

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Ordering information	Part number	Product name
HP StorageWorks Edge Switch 2/12	348406-B21	Edge Switch 2/12; Note: Ships with 4 active ports, 4 shortwave transceivers, and Rackmount Kit included (supports 9K, 10K, 11K System/e cabinets)
	348408-B21	Edge Switch 2/12 E Port license; Note: 1 license required for inter-switch connectivity
	348407-B21	4-port FlexPort Upgrade for Edge Switch 2/12; Note: Includes port card, 4 shortwave transceivers, and a license
	A7498A	Full Volatility
HP StorageWorks Edge Switch 2/24	316095-B21	Edge Switch 2/24; Note: Ships with 8 active ports, 8 shortwave transceivers, and Rackmount Kit included (supports 9K, 10K, 11K System/e cabinets)
	316096-B21	8-port FlexPort Upgrade for Edge Switch 2/24; Note: Includes port card, 8 shortwave transceivers, and a license
	A7489A	HP StorageWorks High Availability (HA) Fabric Management Server (includes HA Fabric Manager Software)
	A7490A	HP StorageWorks HA Fabric Manager Upgrade Kit
	A7496A	Element Manager (required with purchase of HAFM)
	A7509A	HA Fabric Manager Appliance without HAFM software
	A7491A	SAN Planning*
	A7492A	Performance Monitoring*- 512 port license
	A7494A	Performance Monitoring*- 64 port license**
	A7493A	Event Management*- 512 port license
	A7495A	Event Management* - 64 port license**
	A7507A	Event Management/ Performance Monitoring* - 512 port license
	A7508A	Event Management/ Performance Monitoring* - 64 port license**
	A7503A	Open Trunking for 2/24
	A7498A	Full Volatility
	317070-B21	SANtegrity Binding Security software, 2/24 license
	HP StorageWorks Edge Switch 2/32	286810-B21
302660-B21		8-port FlexPort Upgrade for Edge Switch 2/32; Note: Includes port card, 8 shortwave transceivers, and a license
A7497A		Element Manager (required with purchase of HAFM)
A7489A		HP StorageWorks High Availability (HA) Fabric Management Server (includes HA Fabric Manager Software)
A7490A		HP StorageWorks HA Fabric Manager Upgrade Kit
A7509A		HA Fabric Manager Appliance without HAFM software

* Note: Requires the purchase of HAFM v8.02 or later

** You must own or purchase a 512 port license before you can add a 64 port license.

Ordering information	Part number	Product name
HP StorageWorks Edge Switch 2/32 (cont'd)	A7491A	SAN Planning*
	A7492A	Performance Monitoring*- 512 port license
	A7494A	Performance Monitoring*- 64 port license**
	A7493A	Event Management*- 512 port license
	A7495A	Event Management* - 64 port license**
	A7507A	Event Management/ Performance Monitoring* - 512 port license
	A7508A	Event Management/ Performance Monitoring* - 64 port license**
	A7504A	Open Trunking for 2/32
	A7498A	Full Volatility
	317071-B21	SANtegrity Binding Security software, 2/32 license
	HP StorageWorks Director 2/140	316093-B22
316094-B21		4-port Module Kit; Note: Includes port card and 4 shortwave transceivers
A7489A		HP StorageWorks High Availability (HA) Fabric Management Server (includes HA Fabric Manager Software)
A7490A		HP StorageWorks HA Fabric Manager Upgrade Kit
A7509A		HA Fabric Manager Appliance without HAFM software
A7491A		SAN Planning*
A7492A		Performance Monitoring*- 512 port license
A7494A		Performance Monitoring*- 64 port license**
A7493A		Event Management*- 512 port license
A7495A		Event Management* - 64 port license**
A7507A		Event Management/ Performance Monitoring* - 512 port bundle license
A7508A		Event Management/ Performance Monitoring* - 64 port upgrade bundle**
A7506A		Open Trunking for 2/140
A7498A		Full Volatility
317073-B21		SANtegrity Binding Security software, 2/140 license

* Note: Requires the purchase of HAFM v8.02 or later

** You must own or purchase a 512 port license before you can add a 64 port license.

Ordering information	Part number	Product name
McDATA 4Gb SAN Switch	A8001A	4 GB SAN Switch; Note: contains 8 internal, 2 external FC ports, autosensing 1/2/4 GB, 2 SFPs
SANtegrity Enhanced Software	T4263A	Software combining SANtegrity Binding with SANtegrity Authentication for added security
Optical Transceivers for all models	A6515A A6516A 300836-B21	Shortwave transceiver Longwave transceiver 35 km long-distance optical transceiver kit
2 GB optical cables for all models	LC-LC for between two 2 GB devices	
	221692-B21	2 m LC-LC Multi-Mode Fibre Channel Cable
	221692-B22	5 m LC-LC Multi-Mode Fibre Channel Cable
	221692-B23	15 m LC-LC Multi-Mode Fibre Channel Cable
	221692-B26	30 m LC-LC Multi-Mode Fibre Channel Cable
	221692-B27	50 m LC-LC Multi-Mode Fibre Channel Cable
	LC-SC for between a 1 GB and a 2 GB device	
	221691-B21	2 m LC-SC Multi-Mode Fibre Channel Cable
	221691-B22	5 m LC-SC Multi-Mode Fibre Channel Cable
	221691-B23	15 m LC-SC Multi-Mode Fibre Channel Cable
	221691-B26	30 m LC-SC Multi-Mode Fibre Channel Cable
	221691-B27	50 m LC-SC Multi-Mode Fibre Channel Cable

HP StorageWorks M-Series infrastructure

What's included	Standard with each Edge Switch 2/12: Universal Rack-mount kit supports 9K, 10K, 11K, System/e Cabinets (instructions, hardware, and brackets); Short wave SFP Hot plug optics (4) - 12-port; Accessory kit (Manuals & Documentation CD); RJ-45 cable Rubber Bumper; Null modem cable; Loopback plug; Power cords; Enterprise safety and regulatory information
	Standard with each Edge Switch 2/24: Universal Rack-mount Kit supports 9K, 10K, 11K, System/e Cabinets, (instructions, hardware, and brackets); Short wave SFP Hot plug optics (8) - 24-port; Accessory kit (Manuals & Documentation CD); RJ-45 cable Rubber Bumper; Null modem cable; Loopback plug; Power cords; Enterprise safety and regulatory information
	Standard with each Edge Switch 2/32: Universal Rack-mount kit supports 9K, 10K, 11K, System/e Cabinets (instructions, hardware, and brackets); Short wave SFP Hot plug optics (16); Accessory kit (Manuals & Documentation CD); RJ-45 cable Rubber Bumper; Null modem cable; Loopback plug; Power cords; Enterprise safety and regulatory information
	Standard with each Director 2/140: Rackmount kit in support of 9K, 10K, 11K or e/Cabinets; Two CTP cards; (16) 4-port UPM cards (with 32 SFPs); Accessory kit (Manuals and Documentation on CD); Torque driver and bit; Null modem cable; Two Ethernet Cables; Loopback plug; Velcro straps for cable management; Two power distribution units (PDUs) power cords; Enterprise safety and regulatory information; 32 shortwave transceivers
	Standard with each McDATA 4Gb SAN Switch: Ten (10) 4 GB auto sensing FC ports; 8 ports internal and 2 ports external via two 4 Gb/s SFPs; small fabric SAN management via the McDATA Web Server; documentation set

Warranty and support

Hardware: (1-1-1) ; One-year on-site, limited warranty, 8x5, next business day response, installation not included.

Note: The hardware warranty covers firmware and embedded non-saleable software. Saleable software carries its own warranty, see below.

Software: HP warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery. Exclusive remedy. The entire liability of HP and its suppliers and your exclusive remedy for software that does not conform to this Limited Warranty shall be the repair or replacement of the defective media. This warranty and remedy are subject to your returning the defective media during the warranty period to HP in the country in which you obtained the software.

For more information on warranty, please visit: <http://h18004.www1.hp.com/products/storageworks/warranty.html>

HP Services offers a wide range of additional warranty protection and/or HP Installation packages. These service offerings include a full range of Customer HP Care Pack services for both hardware and software.

For Hardware:

- Installation services
- Response—Upgrade on-site response from next business day to same day 4-hours
- Coverage—Extend hours of coverage from 5-days x 9-hours to 7-days x 24-hours
- Duration—Select duration of coverage for a period of years

For Software:

- Stand-alone telephone support
- Rights to new license version
- Media and documentation updates

For additional HP Care Pack (hardware and software) information, as well as orderable part numbers, please refer to: www.hp.com/hps/carepack/storage/cp_networked.html

HP also offers a wide array of custom-tailored services to leverage your SAN implementation for clear competitive advantage. Services like our SAN Implementation service or SAN Architecture service can help you transform your infrastructure into a rapidly scalable, highly responsive IT solution that frees you to focus on your business. For more information on these service options, please visit our website at: www.hp.com/go/san

HP StorageWorks M-Series infrastructure

Financial Services

HP Financial Services provides innovative financing and financial asset management programs to help you cost-effectively acquire, manage, and ultimately retire your HP solutions. For more information on these services, please contact your HP sales representative, or visit:
www.hp.com/go/hpfinancialservices

For more information

For more information on HP StorageWorks M-Series infrastructure switches and directors, contact any of our worldwide sales offices, or visit:
www.hp.com/go/san

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