

Overview

Moonshot-45Gc Switch Module

The HP Moonshot-45Gc Switch Module is designed to provide high speed, low-latency connectivity while dramatically reducing cost and complexity of deploying solutions at scale. The 45Gc Switch Module, together with the HP Moonshot-6SFP+ Uplink Module, provides 1GbE network connections to cartridges within the HP Moonshot 1500 chassis and 10Gb connectivity external to the chassis. Up to two switch modules are supported in each chassis. IRFmay be used to eliminate the cost of TOR switches and provide failover in the event of a switch or uplink failure.

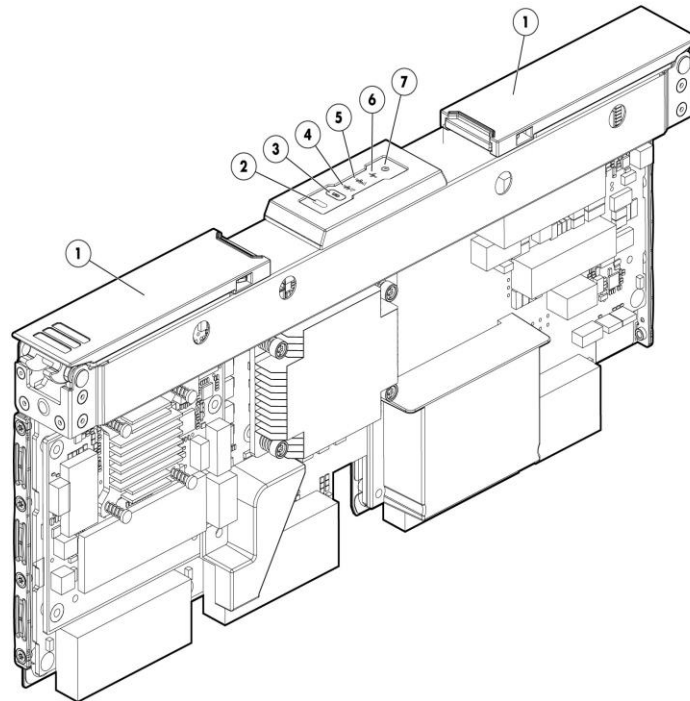


Figure 1 HP Moonshot-45Gc Switch Module

- | | |
|-------------------------------|----------------------|
| 1. Release Latch | 6. Health Status LED |
| 2. Access Panel Sensor | 7. Power LED |
| 3. Unit ID (UID) LED / Button | |
| 4. Downlink Activity LED | |
| 5. Uplink Activity LED | |

Models

HP Moonshot 45Gc Switch Module Kit

786617-B21

Standard Features

Performance

- 60Gb uplink bandwidth / 45Gb available server side bandwidth
- Non-blocking architecture
- Wire-speed switching and IPv4/IPv6 routing on all ports
- Combine up to 4 switches into a single virtual switch
- SFP+ ports support 6 x 1Gb
- Any uplink port can be used for IRF connections
- Cut-through switching
- Hardware-based wire-speed access control lists (ACLs)
- Data Center Bridging (DCBX)
- Support for VEPA (IEEE 802.1Qbg)

Management

- Remote configuration and management CLI
- Standards-based SNMP management via SNMPv1, v2c and v3
- Out of band management via iLO Chassis Manager
- HP IMC (Intelligent Management Center)
- SDN with OpenFlow 1.3
- RJ45 console port
- sFlow
- Manager and operator privilege levels
- Command authorization via RADIUS
- Complete session logging for problem resolution
- LLDP Discovery protocol
- IPv6 management
- Multiple flash images
- Multiple configuration files
- Syslog
- Network Time Protocol (NTP)
- IEEE 1588v2 Precision Time Protocol (PTP)

Security

- IEEE 802.1X user authentication
- MAC-based authentication with RADIUS server
- Access Control Lists (ACLs)
- Secure FTP
- STP Root Guard
- DHCP Protection from unauthorized DHCP servers
- IP Source Guard
- Dynamic ARP protection to prevent eavesdropping
- Endpoint Admission Defense (EAD)
- RADIUS/TACACS+
- Secure management via SSHv2 and SNMPv3
- Unicast Reverse Path Forwarding (URPF)
- Monitor link and Smart link
- IPsec
- IKE (Internet Key Exchange)
- Disable password recovery

Level 2 Switching

- 128K MAC addresses
- 4094 VLANs
- IEEE 802.1ad QinQ VLANs
- Per VLAN Spanning Tree (PVST+)

Standard Features

- Private VLANs (PVLAN)
- Multicast VLAN Registration Protocol (MVRP)
- Jumbo frame support
- Port Aggregation
- Spanning Tree Protocol, MSTP, RSTP, STP Root Guard
- IP Multicast Snooping and data-driven IGMP
- Transparent Interconnect of Lots of Links (TRILL)
- Shortest Path Bridging (SPB)
- Multiple Label Switching (MPLS)
- Virtual Private LAN Service (VPLS)

Level 3 Routing

- IPv4 routing protocols - static routes, RIP, OSPF and BGP
- IPv6 routing protocols - static routes, RIPng, OSPFv3 and BGP+
- IPv6 tunneling
- IP Multicast - PIM-SSM, PIM-DM, PIM-SM, IGMP for IPv4 and IPv6
- Equal-Cost Multipath (ECMP)
- Policy-based routing
- DHCP and DHCPv6 client
- VRRP

Quality of Service (QoS)

- Advanced classifier-based QoS (with eight queues) - classifies traffic using multiple match criteria
- based on Layer 2, 3 and 4 information and applies QoS policies such as priority level and rate limit to selected traffic on a per-port or per-VLAN basis
- Traffic policing - supports Committed Access Rate (CAR) and line rate
- Powerful QoS feature - creates traffic classes based on access control lists (ACL), IEEE 802.1p precedence, IP, DSCP or Type of Service (ToS) precedence; supports filter, redirect, mirror or remark; supports the following congestion actions: strict priority (SP) queuing, weighted round robin (WRR), weighted fair queuing (WFQ), and weighted random early discard (WRED)
- Storm restraint - allows limitation of broadcast, multicast, and unknown unicast traffic rate to cut down on unwanted broadcast traffic on the network

Resiliency and High Availability

- Intelligent Resilient Framework (IRF) - Creates virtual resilient switching fabrics, up to four Moonshot-45XGc switch modules acting as a single Layer 2/3 switch; Switches do not have to be co-located and can be part of a disaster recovery system; Servers or switches can be attached using standard LACP for automatic load balancing and high availability; Simplifies network operation by eliminating Spanning Tree, ECMP and VRRP; IRF supports up to four members in a group.
- Device Link Detection Protocol (DLDP) - Monitors Link connectivity and shuts down ports at both ends if unidirectional traffic is detected
- Virtual Router Redundancy Protocol (VRRP)

Monitoring and Diagnostics

- OAM (802.3ah) - Detects data link layer problems in the "last mile"; monitors link status between two devices
- CFD (802.1ag) - Connectivity Fault Detection (CFD) provides L2 link OAM mechanism used for link connectivity detection and fault location
- Mirroring - Port mirroring enables traffic on a port to be simultaneously sent to a network analyzer for monitoring; Flow-based mirroring

Compatibility

HP Interconnect modules

NOTE: Up to two identical pairs of Switch and Uplink modules are supported in the Moonshot 1500 Chassis. Dual switch modules are required for network redundancy, regardless of cartridge configuration.

NOTE: Check Compatibility matrix below for supported switch and uplink modules

NOTE: For information HP Moonshot Cartridges and Uplink Modules, please see the following:

Cartridge:

HP ProLiant m300 Server Cartridge

<http://www8.hp.com/h20195/v2/GetHtml.aspx?docname=c04111351>

HP ProLiant m400 Server Cartridge

<http://www8.hp.com/h20195/v2/GetHtml.aspx?docname=c04384048>

HP ProLiant m710 Server Cartridge

<http://www8.hp.com/h20195/v2/GetHtml.aspx?docname=c04384063>

Uplink

HP Moonshot-6SFP+ Uplink Module

<http://www8.hp.com/h20195/v2/GetHTML.aspx?docname=c04111292>

Switch	Speed	Cartridges							Uplink		
		m300	m350	m400	m700	m710	m710p	m800	Moonshot-6SFP+ Uplink	Moonshot-16SFP+ Uplink	Moonshot-4QSFP+ Uplink
Fastpath Switches											
Moonshot-45G Switch	1Gb	✓		✓ 1Gb speed only		✓ 1Gb speed only	✓ 1Gb speed only		✓		
Moonshot-180G Switch	1Gb	✓	✓	✓ 1Gb speed only	✓	✓ 1Gb speed only	✓ 1Gb speed only	✓		✓	✓
Comware Switches											
Moonshot-45Gc Switch	1Gb	✓		✓ 1Gb speed only		✓ 1Gb speed only	✓ 1Gb speed only		✓		
Moonshot-45XGc Switch	1Gb	✓		✓ 1Gb speed only		✓ 1Gb speed only	✓ 1Gb speed only			✓	✓
	10Gb			✓		✓	✓			✓	✓

Service and Support

Service and Support Recommended HP Care Pack Services for your HP product (4 and 5 year Service offerings are also available)

HP Technology Services

HP Technology Services delivers confidence, reduces risk and helps customers realize agility and stability. Connect to HP to help prevent problems and solve issues faster. Our support technology lets you to tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, any time.

Protect your business beyond warranty with HP Care Pack Services

HP Care Pack Services enable you to order the right service level, length of coverage and response time as you purchase your new server, giving you full entitlement for the selected support.

Recommended HP Care Pack Services for your HP product

(4 and 5 year Service offerings are also available)

Optimized Care

Foundation Care 24x7, three-year Care Pack Service

HP Foundation Care 24x7 connects you to HP 24 hours a day, seven days a week for assistance on resolving issues. Hardware onsite response within four hours if needed; collaborative software included in this Care Pack service provides troubleshooting assistance on industry leading software running on your HP server. Simplify your support experience and make HP your first call for hardware or software questions.

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=4AA4-8876ENW&cc=us&lc=en>

Standard Care

Foundation Care NBD, three-year Care Pack Service

HP Foundation Care Next Business Day connects you to HP during business hours for assistance on resolving issues – features next business day hardware onsite response if needed and software call back within two hours. Collaborative software support is included and provides troubleshooting assistance on industry leading software running on your server. Simplify your support experience and make HP your first call for hardware or software questions.

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=4AA4-8876ENW&cc=us&lc=en>

Related Services

HP Moonshot Installation & Startup Service

HP Installation and Startup Service for the Moonshot System provides for the installation of one system and its associated Moonshot servers and network switches, as well as operating system deployment and basic configuration of OS network parameters to establish network connectivity

HP Datacenter Care service

HP Datacenter Care helps you improve IT stability and security, increase the value of IT, and enable agility and innovation. It is a structured framework of repeatable, tested, and globally available services “building blocks.” You can deploy, operate, and evolve your datacenter wherever you are on your IT journey. With HP Datacenter Care, you benefit from a personalized relationship with HP via a single point of accountability for HP and others’ products. For more information, visit

<http://www.hp.com/services/datacentercare>

HP Self-Service Spares Service answers the question: What do you do when you need parts? We can set it up so that you get spare parts onsite through our automated self-service spares. You simply go to the part of your data center where the parts live, scan them out, scan in the broken one, and you're done. We maintain your inventory of good spares, so that what you need is ready to go when you need it. And we provide monthly service excellence reports illustrating onsite inventory performance.

Connect your devices to HP

Unlock all of the benefits of your technology investment by connecting your products to HP. Achieve up to 77%1 reduction in down time, near 100%2 diagnostic accuracy and a single consolidated view of your environment. By connecting, you will receive 24x7 monitoring, pre-failure alerts, automatic call logging, and automatic parts dispatch. HP Proactive Care Service and HP Datacenter Care Service

Service and Support

customers will also benefit from proactive activities to help prevent issues and increase optimization. All of these benefits are already available to you with your server storage and networking products, securely connected to HP support.

Defective Media Retention (DMR) and Comprehensive Defective Material Retention

If your business deals with sensitive or legally protected data, you know that it's not a simple matter to return a defective hardware component, but keeping it conflicts with the terms and conditions of many standard warranty agreements. If you don't return the component, you'll be charged for the replacement part.

HP Foundation Care services are available with defective media retention of failed hard drives and comprehensive defective material retention of those other data-retentive components, such as memory, switches, processors and more. This may be purchased as an optional add-on to your HP Foundation Care service purchase. This service is critical for customers who:

- Need to control and secure their classified, proprietary and confidential data.
- Are subject to current data privacy regulations.
- Want a simpler, more cost-effective solution when choosing not to return a malfunctioning disk drive or other data retentive component.

For more information on our data privacy services, see <http://www.hp.com/services/dataprivacy>.

HP Support Center

HP provides several tools that make it simpler to get help from HP:

HP Support Center is personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more: <http://www.hp.com/go/hpsc>

HP's Support Center Mobile App allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalize IT support anywhere, anytime. HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement.

NOTE: HP Support Center Mobile App is subject to local availability.

For more information

To learn more on HP Moonshot System, please contact your HP sales representative.

Technical Specifications

Product Specifications Hardware	Ports	Forty-five (45) 1Gb Ethernet downlink ports Six (6) 10 Gb Ethernet uplink ports One (1) serial console interface accessible through the uplink module One (1) internal serial interfaces to iLO Chassis Manager for use through the Virtual Serial Port (VSP)	
	Performance	Throughput	1.5 million pps (64-byte packets) per 1G port; 14.8 million pps per 10G port
		Switching Capacity	480 Gbps
	Memory	2 GB SDRAM; 128 MB flash; 9 MB packet buffer	
	Indicators / Switch	Module power, green/amber Module health, red/amber/green Module locator (UID), blue (LED & push button switch) Aggregated Uplink ports link/activity, green Aggregated Downlink ports link/activity, green	
Physical Characteristics	Length	14.82 in (376 mm)	
	Width	6.75 in (141 mm)	
	Height	1.44 in (37 mm)	
	Weight	1.707 kg (3.76 lbs)	
Environmental Ranges	Temperature Range	Operating 50° to 95° F (10° to 35° C) Non-operating -22° to 140° F (-30° to 60° C)	
	Power Consumption	Relative Humidity (non-condensing)	Operating 10% to 90% Non-operating 5% to 95%
Altitude		Operating 10,000 ft. (3048 m) Non-operating 30,000 ft. (9144 m)	
Typical		60W	
Maximum		100W	

Standards Support

General Protocols

- IEEE 802.1D MAC
- IEEE 802.1ag Service Layer OAM
- Bridges IEEE 802.1p Priority
- IEEE 802.1Q VLANs
- IEEE 802.1Qbg Virtual Edge Bridging
- IEEE 802.1s (MSTP)
- IEEE 802.1v VLAN classification by Protocol and Port
- IEEE 802.1w Rapid Reconfiguration of Spanning Tree
- IEEE 802.1X PAE
- IEEE 802.1AX / 802.3ad Link Aggregation Control Protocol (LACP)
- IEEE 802.3ae 10 Gigabit Ethernet
- IEEE 1588 v2 Precision Time Protocol (PTP)
- RFC 768 UDP
- RFC 792 ICMP
- RFC 793 TCP

Technical Specifications

- RFC 826 ARP
- RFC 854 TELNET
- RFC 925 Multi-LAN Address Resolution
- RFC 951 BOOTP
- RFC 1058 RIPv1
- RFC 1350 TFTP Protocol (revision 2)
- RFC 1519 CIDR
- RFC 1542 BOOTP Extensions
- RFC 2131 DHCP
- RFC 2453 RIPv2
- RFC 3768 VRRP
- RFC 4675 RADIUS VLAN & Priority
- 802.1r GARP Proprietary Attribute Registration Protocol (GPRP)

DCB

- 802.1Qaz DCBx
- 802.1Qaz ETS
- 802.1Qbb PFC

IP Multicast

- RFC 2934 Protocol Independent Multicast MIB for IPv4
- RFC 3376 IGMPv3 (host joins only)
- RFC 3618 Multicast Source Discovery Protocol (MSDP)
- RFC 4601 PIM Sparse Mode

IPv6

- RFC 4443 ICMPv6
- RFC 4541 IGMP & MLD Snooping Switch
- RFC 4861 IPv6 Neighbor Discovery
- RFC 4862 IPv6 Stateless Address Auto-configuration

Layer 3

- Static routes
- RIP / RIPv1
- OSPF / OSPFv3
- BGP / BGP+
- IPv6 tunneling
- PIM-SM
- PIM-SSM
- PIM-DM
- IGMP
- ECMP
- Policy-based routing
- DHCP and DHCPv6 client

MIBs

- IEEE 8021ag CFM-MIB

Technical Specifications

- IEEE 8021Q CFM-MIBv2
- IEEE 8021AB LLDP-MIB
- IEEE 8021AB LLDP-EXT-DOT1-MIB
- IEEE 8021AB LLDP-EXT-DOT3-MIB
- ANSI/TAA 1057 LLDP-EXT-MED-MIB
- IEEE 8023 LAG-MIB
- RFC 1213 MIB
- RFC 1493 BRIDGE-MIB
- RFC 2096 IP-FORWARD-MIB
- RFC 2233 IF-MIB
- RFC 2273 SNMP-NOTIFICATION-MIB
- RFC 2571 SNMP-FRAMEWORK-MIB
- RFC 2572 SNMP-MPD-MIB
- RFC 2573 SNMP-TARGET-MIB
- RFC 2674 P-BRIDGE-MIB
- RFC 2674 Q-BRIDGE-MIB
- RFC 3414 SNMP-USER-BASED-SM-MIB
- RFC 3415 SNMP-VIEW-BASED-ACM-MIB
- RFC 3417 SNMPv2-TM-MIB
- RFC 3418 SNMPv2-MIB
- RFC 3826 SNMP-USM-AES-MIB
- RFC 4022 TCP-MIB
- RFC 4044 FC-MGMT-MIB
- RFC 4113 UDP-MIB
- RFC 4133 ENTITY-MIB
- RFC 4273 BGP4-MIB
- RFC 4747 T11-FC-VIRTUAL-FABRIC-MIB
- RFC 4750 OSPF-MIB
- RFC 4750 OSPF-TRAP-MIB
- RFC 4936 T11-FC-ZONE-SERVER-MIB
- SFLOW-MIB (V5)

Safety and Compliance Complies with UL 60950-1, CAN/CSA C22.2 No. 60950-1 and EN 60950-1. UL certified.

Safety Certifications CE Marking
RoHS 6/6 compliant

Emissions Classifications (EMC) Class A

Environment-friendly Products and Approach **End-of-life Management and Recycling** Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: <http://www.hp.com/go/green>. To recycle your product, please go to: <http://www.hp.com/go/green> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/green>.

Summary of Changes

Date	Version History	Action	Description of Change
28-Sept-2015	Version 1	Created	HP Moonshot-45Gc Switch Module

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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.