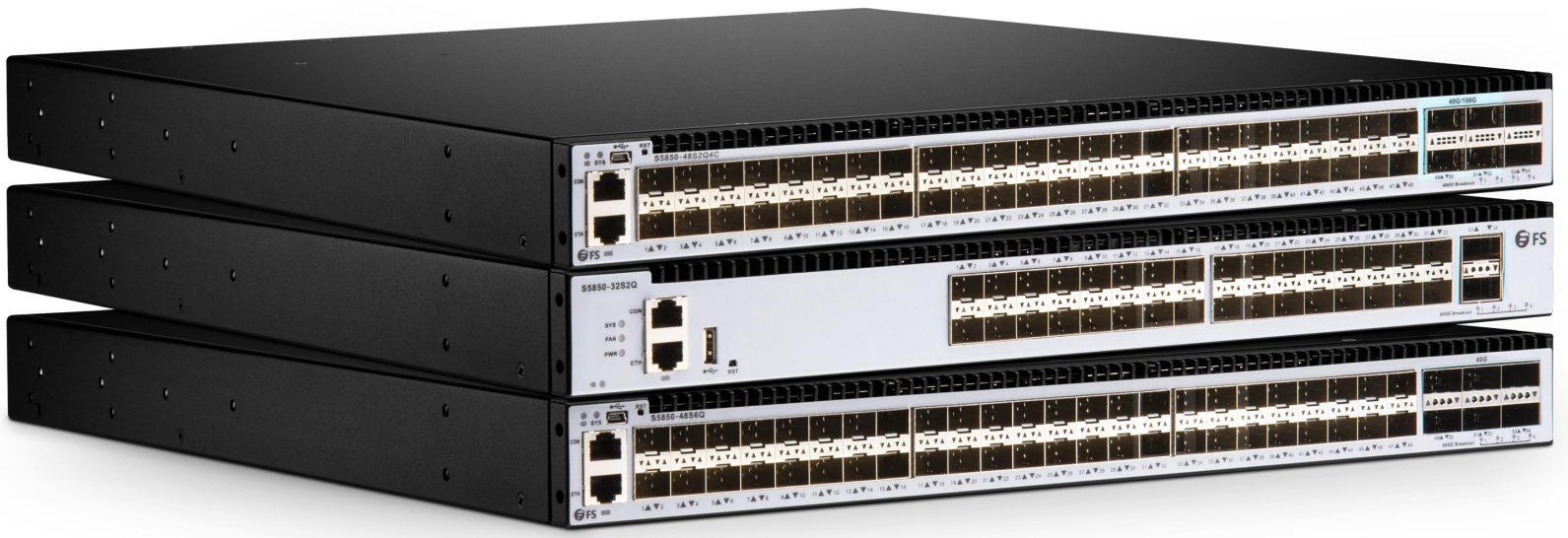
FS S5850 Series Routing Switches



Overview

The FS S5850 Series Routing Switches are high performance Ethernet switches to meet next generation Metro, Data Center and Enterprise network requirements, which support L2/L3/Data Center/Metro features. The S5850 come with complete system software with comprehensive protocols and applications to facilitate rapid service deployment and management for both traditional L2/L3 networks and Data Center networks.
The S5850 Series are cost-effective Ethernet access and aggregation platform to Enterprise, Data Center and Metro application.
The S5850 Series Switches currently includes three configurations:S5850-48S2Q4C/ S5850-48S6Q/S5850-32S2Q

Primary Features and Benefits

I.Multiple Software Images to Provide Flexible Deployment Options

The Fiberstore FS S5850 Series offers 2 different FiberstoreOS software images: IP Base and IP Services. The system vendors can choose the image with features for today and have the option for smoothly upgrading in the future.

Table 1- Primary Features in FiberstoreOS Software Images

IP Base	IP Services
L2 Switching/VLAN/Vlan Classification	IP Base +
Static Link Aggregation/LACP STP&RSTP&MSTP/Smart Link/ MLAG	OSPF/BGP/Route Map/PBR/ VRF/ BFD for Static Route& OSPF
IGMP Snooping v1&v2&v3	IGMP v1&v2&v3/PIM-SM&SSM
Static IPv4 Routing/RIPv1&v2/VRRP	QinQ/ERPS
ACL, QoS	
NVGRE/VXLAN/GENEVE	
Storm Control/Port Security/DHCP Snooping/IP Source Guard/ARP Inspection/ CPU Storm Protection/802.1x/Radius	
Telnet/TFTP/NTP/SSH/DNS/SNMPv1&v2&v3/ RMON/Port&Vlan Mirror/sFlow	

II.System Design for Green and Energy Saving

The FS S5850 Series supports the fans with speed control as well as power consumption adjustment which is based on the flow status of the ports (According to the temperature inside the box). Both can highly save the energy and go for green.

III.Customized Profile for Different Deployment Scenarios

The Flexible Table Management (FTMTM) technology employed by Fiberstore FS S5850 Series offers multiple table size configuration profiles as optimized choices for different network scenarios. FS S5850 could support up to 128K MAC address table or 8K IP routing table.
Besides these pre-defined profiles, application-specific profile is also applicable with Fiberstore Advanced Service.

IV.Data Center Features

FS S5850 support many new Data Center features, such as NVGRE/VXLAN/GENEVE, Priority Flow Control (PFC), Enhanced Transmission Selection (ETS), Quantized Congestion Notification (QCN), and Data Center TCP. MLAG features are also good candidates for TOR switch in data center network.

V.Uninterrupted Performance Assurance and Multi-Node Redundancy and Robust Fault Protection System

- Hardware
 −Hot-swappable power modules.
 −Power module supports AC 1+1 redundancy.
 −Fans support N+1 redundancy.
 −Real-time environment monitoring for chipset temperature, status of fan and power, etc.
- Software
 −LACP, ECMP, VRRP, VARP, STP/RSTP/MSTP, Smart Link, BFD, ERPS and load-balancing.
 −Fiberstore-patented Sysmon for CPU status monitoring and protection upon unpredictable fault.

VI.Outstanding QoS Control with Flexible Classification and Queuing Mechanism

Rich QoS mechanisms are implemented in Fiberstore FS S5850 Series including flow classification based on source/destination MAC, source/destination IP address, protocol type, TCD/UDP port number to meet complicated network requirements. Moreover, Fiberstore FS S5850 Series provides 8 hardware queues per port to support multi-stage scheduling (WDRR, SP) and Tail Drop/WRED. 3-stage shaping (queue/group/port) can be applied for flow management. Meanwhile, ingress and egress policer provide bandwidth monitoring with a granularity of up to 32Kbps. Both srTCM (Single Rate Three Color Marker) and trTCM (Two Rate Three Color Marker) can be supported.

VII. Triple-play Service Support with Bandwidth Guaranty for High Quality Application

The Fiberstore FS S5850 Series offers high bandwidth for Triple-Play services such as IPTV, video monitoring. The built-in QoS capabilities and flexible queuing technologies guarantee high quality of services.
Rich multicast protocol set (IGMP Snooping, IGMP v1/v2, PIM-SM) supports up to 16K multicast groups, 1K physical replications and 4K logical replications per group. With FiberstoreOS software, IPTV service and multicast time-delay control is fully supported.

VIII.Comprehensive Network Security Policy

The Fiberstore FS S5850 Series supports subscriber-class, switch-class and network-class security control.
Basic IPv4/IPv6/MAC ACL is employed to filter IPv4/IPv6/Non-IP packet respectively and can be applied to both port and VLAN. Besides that, extended IPv4/IPv6 ACL is also available. In a single ACL rule, both IP and MAC ACE can take effect to filter IP and Non-IP packets simultaneously.
Fiberstore ARP Inspection and IP Source Guard features prevent network from malicious ARP attack. CPU Traffic Protection, Storm Control features optimize CPU load. Centralized 802.1x authentication forbids illegal user access to the network.

Product Features and Benefits

Table 2-Descriptions and Specifications

Feature	Benefit
Triple-Play Services	● Advanced QoS functionalities provide differentiated class of service treatment to support triple-play service. ● Multicast VLAN Registration (MVR) continuously sends multicast streams in a multicast VLAN while isolating the streams from subscriber VLANs to reduce overall bandwidth requirement for multicast distribution in ring based network. ● Comprehensive security solution to provide protection of subscribers, switch, and network at the network edge.
Layer 2 VPN Service	● Fiberstore Selective QinQ feature strictly conforms to 802.1Q and 802.1ad and provides more flexibility to customers while classifying VLAN based on port, original VLAN or L2/L3 information for the purpose of segregating subscriber traffic in the network. ● VLAN translation in both ingress and egress translates VLAN IDs carried in the data packets between different virtual LANs or between VLAN and non-VLAN encapsulating interfaces at Layer 2.
Data Center	● 802.1Qbb PFC (Priority Flow Control) ● 802.1Qaz ETS (Enhanced Transmission Selection) ● 802.1Qau QCN (Quantized Congestion Notification) ● Layer 2 network scalability: MLAG ● NVGRE/VXLAN/GENEVE
Availability and Reliability	
Superior Redundancy for Fault Backup	● IEEE 802.1d Spanning Tree Protocol (STP) support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance. ● IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) allows a spanning-tree instance per VLAN, for Layer 2 load sharing on redundant links. ● IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) provides rapid spanning-tree convergence independent of spanning-tree timers and also offers the benefit of distributed processing. ● Link Aggregation Control Protocol (LACP) allows the creation of Ethernet channeling with devices that conform to IEEE 802.3ad. ● Equal-Cost MultiPath (ECMP) works for routing packets along multiple paths of equal cost for load balancing and redundancy. ● Virtual Router Redundancy Protocol (VRRP) is supported to create redundant, failsafe routing topologies. ● Fiberstore-patented Sysmon mechanism monitors real-time CPU status and pauses switch work while unexpected fault happens. ● ERPS (Ethernet Ring Protection Switching) is used to create a fault tolerant topology by configuring a primary and secondary path for

	each VLAN. ● SmartLink is a fault tolerant topology for two uplink application, can provide < 50ms protection time. ● Virtual-ARP(VARP) allows multiple switches to simultaneously route packets from a common IP address in an active-active router configuration. ● Multi-Chassis Link Aggregation(MLAG) is supported to logically aggregate ports across two switches.
High-Performance IP Routing	● Basic IP unicast routing protocols (static, Routing Information Protocol Version 1 [RIPv1], and RIPv2) are supported for small-network routing applications. ● Advanced IP unicast routing protocols (Open Shortest Path First [OSPF] and Border Gateway Protocol Version 4 [BGPv4]) is supported for load balancing and constructing scalable LANs. ● Protocol Independent Multicast sparse mode (PIM-SM) for IP multicast routing is supported. ● Up to 256 switch virtual interfaces (SVIs) are supported; all physical ports can be routed port. ● Proxy Address Resolution Protocol (ARP) allows to answer the ARP queries from a network host. ● Gratuitous Address Resolution Protocol (ARP) assists in the updating of other machines' ARP tables and helps detect IP conflicts and ensure load balancing on incoming traffic in some cases. ● IPv6 routing support in hardware for maximum performance. ● VRRP provides dynamic load balancing and failover for routed links.
Robust Multicast Control	● Internet Group Management Protocol (IGMP) snooping provides fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to only the requestors. ● IGMP Snooping TCN provides quick response capability to topology changes so that the service provider’s multicast service will not be paused even the topology is altered temporarily. ● IGMP immediate leave overrides the normal checks to see if there are other hosts or proxy devices on the local segment interested in the multicast group and shorten the time of changing channels for IPTV services. ● IGMP filtering provides multicast authentication by filtering out nonsubscribers and limits the number of concurrent multicast streams available per port. ● IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces to allow users on any downstream network to join an upstream sourced multicast group. ● Multicast VLAN Registration (MVR) allows one single multicast VLAN to be shared among different subscriber VLANs on the network which improves bandwidth utilization by reducing multicast traffic in the subscriber VLANs and simplifies multicast group management.

Bandwidth Optimization	● Per-port broadcast, multicast, and unicast storm control prevents faulty end stations from degrading overall systems performance. ● Equal-cost routing facilitates Layer 3 load balancing and redundancy across the stack. ● Switch-port autorecovery automatically attempts to reactivate a link that is disabled because of a network error. ● Up to 55 Link Aggregation groups are supported with 16 member ports per group.
QoS and Control	
Advanced QoS	● Fiberstore QoS queuing mechanism differentiates flows according to any L2/L3/L4 identity and enqueues flexibly; meanwhile modifies CoS/DSCP and limits throughput. ● Ingress and egress policer is provided based on 802.1p Class of Service (CoS), Differentiated Services Code Point (DSCP), VLAN ID and QoS ACLs (IP ACLs or MAC ACLs), which can include source and destination IP address, source and destination MAC address, Layer 4 TCP/UDP information, or any combination of these fields. ● Ingress and egress aggregate policer reinforces traffic policing across all of the applied ports. QoS applies the bandwidth limits specified in an aggregate policer cumulatively to all the flows matching the criteria. ● Weighted Random Early Detection (WRED) generally drops packets selectively based on IP precedence and packets with a higher IP precedence are less likely to be dropped than packets with a lower precedence; WRED ensures higher priority traffic to be delivered with a higher probability than lower priority traffic. ● In contrast to WRED, Tail Drop provides per QoS class congestion avoidance at the queues before a disruption occurs. ● Queue, service and port based three-level traffic shaping contributes to up to 64Kbps granularity. ● Weighted Deficit Round Robin (WDRR) extends the quantum idea from the DRR to provide weighted throughput for each queue. Different queues have different weights and the quantum assigned to each queue in its round is proportional to the relative weight of the queue among all the queues serviced by that scheduler. ● Strict Priority queue (SP) provides strict-priority queuing for a traffic class that enables delay-sensitive data, such as voice, to be sent before packets in other queues are sent. The priority queue is serviced first until it is empty. ● Strict priority queuing helps ensure that the highest-priority packets are serviced ahead of all other traffic. ● 8 egress queues per port help enable differentiated management of up to 8 traffic types across the stack. ● Support 8 differ-service domain, could provide flexible differ service for the ports.

	● There is no performance loss when using advanced QoS functionalities.
Network Security	
Comprehensive Security Solutions	● Subscriber Security –IEEE 802.1x allows dynamic, port-based security by providing user authentication. –IEEE 802.1x and port security are provided to authenticate the port and manage network access for all MAC addresses, including that of the client. –DHCP Snooping prevents malicious users from spoofing a DHCP server and sending out bogus addresses. This feature is used by other primary security features to prevent a number of other attacks such as Address Resolution Protocol (ARP) poisoning. –DHCP Snooping helps administrators with consistent mapping of IP to MAC addresses. This can be used to prevent attacks that attempt to poison the DHCP binding database and to rate-limit the amount of DHCP traffic that enters a switch port. –Dynamic ARP Inspection helps ensure user integrity by preventing malicious users from exploiting the insecure nature of the ARP protocol. –IP Source Guard prevents a malicious user from spoofing or taking over another user's IP address by creating a binding table between client's IP and MAC address, port, and VLAN. ● Switch Security –Secure Shell (SSH) Protocol, Kerberos, and Simple Network Management Protocol Version 3 (SNMPv3) provide network security by encrypting administrator traffic during Telnet and SNMP sessions. –Multilevel security on console access prevents unauthorized users from altering the switch configuration. –RADIUS authentication facilitates centralized control of the switch and restricts unauthorized users from altering the configuration. –Three MAC based security mechanisms are offered to control access: MAC filtering MAC port binding MAC number limitation per port CPU traffic protection refuses abnormal data flow to avoid malicious attack. ● Network Security –Fiberstore ACLs allows for multiple layer rules coexistence such L2 with L3, or even with L4. –Fiberstore security VLAN ACLs on all VLANs prevent unauthorized data flows from being bridged within VLANs. –Port-based ACLs for Layer 2 interfaces allow security policies to be applied on individual switch ports. –Three different mechanisms are supported to protect the STP topology from loops or undesired topology changes caused by

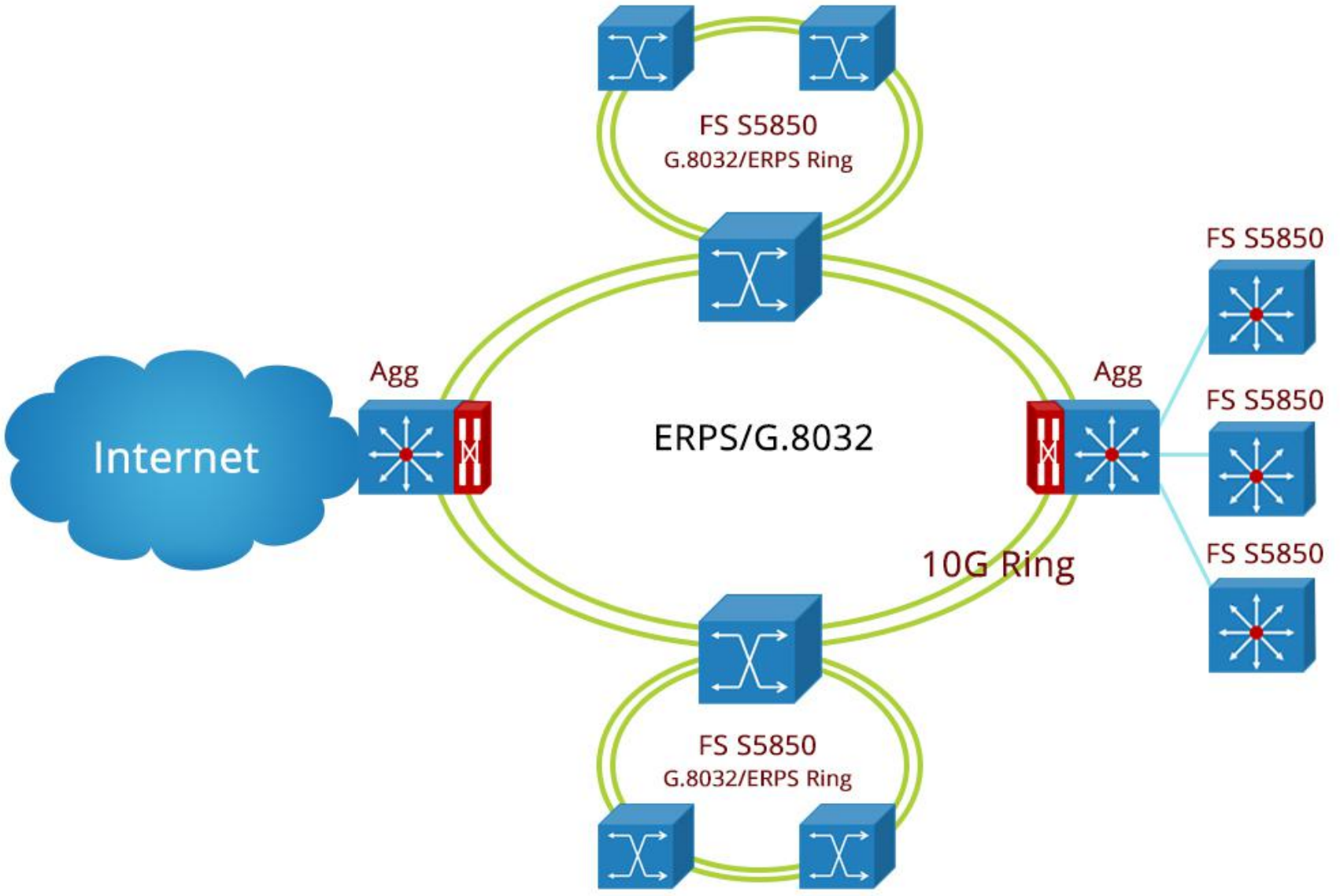
	addition of switches, mis-configuration of devices or even malicious attempts to override the current Spanning Tree Root Bridge. −Bridge Protocol Data Unit (BPDU) Guard −Bridge Protocol Data Unit (BPDU) Filtering −Root Guard −BPDU Guard and BPDU Filtering protect against possible loops created by switches added on ports configured with the STP Port Fast feature. Root Guard protect against added switches attempting to become the Root Bridge.
Manageability	
Superior Manageability	● FiberstoreOS Software CLI support provides common user interface and command set with all Fiberstore routing switches. ● Layer 2 traceroute eases troubleshooting by identifying the physical path that a packet takes from source to destination. ● Network Timing Protocol (NTP) client guarantees accurate and consistent time synchronization with the whole network. ● File Transfer Protocol (FTP) / Trivial File Transfer Protocol (TFTP) reduce the cost of administering software upgrades by downloading from a centralized location. ● Dynamic Host Configuration Protocol (DHCP) Relay allows a DHCP relay agent to broadcast DHCP requests to the network DHCP server. ● Multifunction LEDs per port for port status; half-duplex and full-duplex mode; and 10BASE-T, 100BASE-TX, 1000BASE-T, 10GBASE-LR indication as well as switch-level status LEDs for system, redundant-power supply, and bandwidth utilization provide a comprehensive and convenient visual management system.

Applications

I. Network Application 1: Metro L2 Ring Network

Ring network topology allows service provider to establish robust network and operate multiple services.
Figure 1 shows the deployment example using the Fiberstore FS S5850 Series for Metro L2 ring network topology as Aggregation or Access devices. FS S5850 mainly use QinQ/ERPS etc. features to deliver Metro Ethernet service.

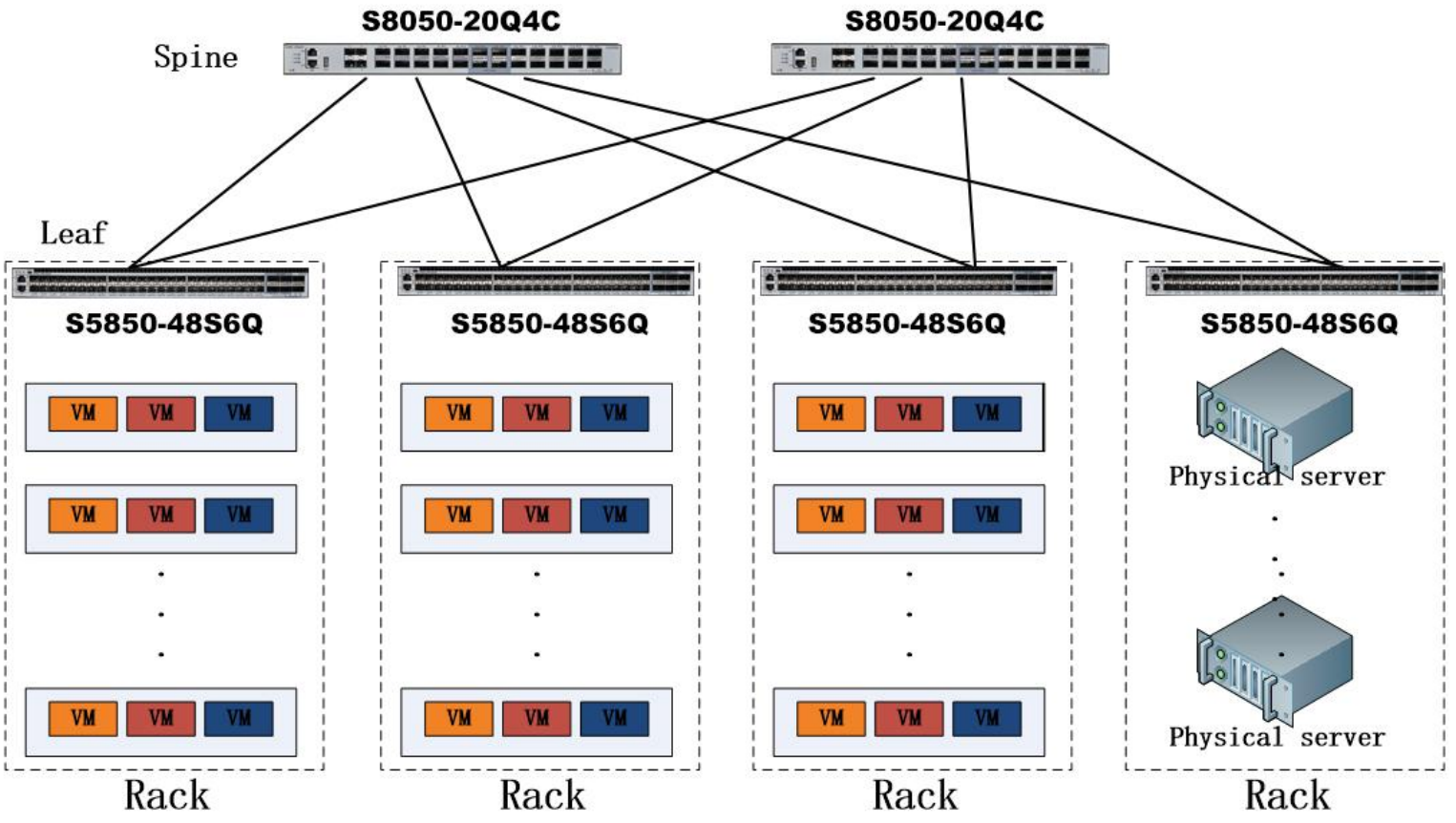
Figure1-Metro L2 Ring Network Topology with the FS S5850 Series



II.Network Application 2: Enterprise Data Center Network

FS S5850 Series can provide access ports for high density 10GE servers, and 40GE uplink ports to Aggregation or Core switches.
Figure 2 shows a deployment example using the Fiberstore FS S5850 Series for Data Center Access network topology as TOR access devices. FS S5850 may use the following features: VLAN, LACP, RSTP&MSTP, MLAG, DCB Features (PFC/QCN/ETS, Data Center TCP), OSPF, QoS, NVGRE/VXLAN/GENEVE etc.

Figure 2-Data Center Servers Access Network with FS S5850 Series



Product Specifications

Table 3-Model Comparison

	S5850-48S2Q4C	S5850-48S6Q	S5850-32S2Q	S5850-32S(Out Of Stock)
Total SFP+ Ports	48	48	32	32
Total QSFP+ Ports	2	6	2	-
Total QSFP28 Ports	4	-	-	-
Max 10GbE Ports	72	72	40	32
Max 40GbE Ports	6	6	2	-
Max 100GbE Ports	4	-	-	-
Switch Capability	1.92Tbps	1.44Tbps	800Gbps	640Gbps
Throughput	1200Mpps	1072Mpps	596Mpps	1200Mpps

Forwarding Technology	Store and Forward/Cut-Through			
Latency	612ns			
CPU	Freescale PowerPC P1010			
System Memory	1 GB			
Flash Storage Memory	2 GB			
Packet Buffer Memory	9 MB			
100/1000 Mgmt Ports	1			
RS-232 Serial Ports	1 (RJ-45)			
USB Ports	1			
Hot-swap Power Supplies	2 (1+1 redundant)			
Hot-swappable Fans	4 (N+1 redundant)			
Airflow Option	F-R			
Size(WxHxD)	44.0 x 4.36 x 47.0 cm (17.5 x 1.73 x 18.5 in.)	44.0 x 4.36 x 47.0 cm (17.5 x 1.73 x 18.5 in.)	44.0 x 4.36 x 40.0 cm (17.5 x 1.73 x 15.9 in.)	44.0 x 4.36 x 40.0 cm (17.5 x 1.73 x 15.9 in.)
Typical/Max Power Draw	160W/200W	150W/190W	120W/150W	120W/150W
Weight(With one PSU)	22lbs (8.3kg)	22lbs (8.3kg)	15lbs (7.0kg)	15lbs (7.0kg)
MTBF(Hours)	99,936.04	97,210.07	108,822.22	108,822.22
Max VLANs	4094			
Max MAC Entries	128K			
Jumbo Frames	9600 Bytes			
Max routes	8K			

Max ARP Entries	20K
Max Multicast Groups	8K

Table 4-Environmental Characteristics

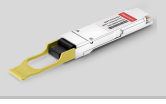
Description	Specification
Operating Temperature	● 0 to 45 °C (Long term) -5 to 55 °C (Short term)
Storage Temperature	● -40 to 70 °C
Relative Humidity	● 0 to 95% (non-condensing)
Acoustic Noise	● International Organization for Standardization (ISO) 7779: < 50dB

Table 5-Safety and Compliance

Description	Specification
Safety Certifications	● Ready to UL to UL 60950, Third Edition ● Ready to CE Marking ● Ready to NEBS level 3
Electromagnetic Emissions Certifications	● Ready to FCC Part 15 Class A ● Ready to CE
Warranty	● Five years warranty

Table 6- Supported Modules

	Image	Part Numnber	ID NO.	Description
10G SFP Transceiver		SFP-10GSR-85	#58773	10GBASE-SR SFP+ 850nm 300m DOM IND Transceiver
		SFP-10GLRM-31	#11590	10GBASE-LRM SFP+ 1310nm 220m DOM Transceiver
		SFP-10GLR-31	#58774	10GBASE-LR SFP+ 1310nm 10km DOM IND Transceiver
		SFP-10GER-55	#11592	10GBASE-ER SFP+ 1550nm 40km DOM Transceiver

		SFP-10GZR-55	#11595	10GBASE-ZR SFP+ 1550nm 80km DOM Transceiver
		SFP-10GZRC-55	#29799	10G SFP+ 1550nm 100km DOM Transceiver
40G SFP+ Transceiver		QSFP-SR4-40G	#17931	40GBASE-SR4 QSFP+ Transceiver 4 lanes 850nm,150m MPO
		QSFP-CSR4-40G	#34912	40G QSFP+ CSR4, 400m MPO
		QSFP-LX4-40G	#35205	40GBASE-LX4 QSFP+ 1310nm 2km Transceiver for SMF&MMF
		QSFP-IR4-40G	#34913	40GBASE-IR4-Lite QSFP+ 1310nm 2km LC, SMF
		QSFP-PIR4-40G	#34917	40GBASE-IR4-Lite QSFP+ 1310nm 1.4km MTP/MPO,SMF
		QSFP-LR4-40G	#24422	40GBASE-LR4 QSFP+ 1310nm 10km LC Transceiver,SMF
		QSFP-PLR4-40G	#35209	40GBASE-LR4-Lite PLR4 QSFP+ 1310nm 10km MPO,SMF
		QSFP-ER4-40G	#35211	40GBASE-ER4 QSFP+ 1310nm 40km LC,SMF
100G QSFP28 Transceiver		QSFP28-SR4-100G	#35182	100GBASE-SR4 QSFP28 850nm 100m Transceiver
		QSFP28-LR4-100G	#39025	100GBASE-LR4 QSFP28 1310nm 10km Transceiver

Ordering Information

Part Number	Description
S5850-48S2Q4C	● Standard 1U 19" rack mountable ● 48x10GE SFP+ Ports ● 2x40GE QSFP+ Ports ● 4x100GE QSFP28 Ports ● Dual modular power supply
S5850-48S6Q	● Standard 1U 19" rack mountable ● 48x10GE SFP+ Ports ● 6x40GE QSFP+ Ports ● Dual modular power supply

Datasheet

S5850-32S2Q	● Standard 1U 19" rack mountable ● 32x10GE SFP+ Ports ● 2x40GE QSFP+ Ports ● Dual modular power supply

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