

## Lab Testing Summary Report

March 2012

Report SR120130B

Product Category:

**Enterprise  
Switch**

Vendor Tested:



**HUAWEI**

Product Tested:

**S6700-EI Series  
Switches**



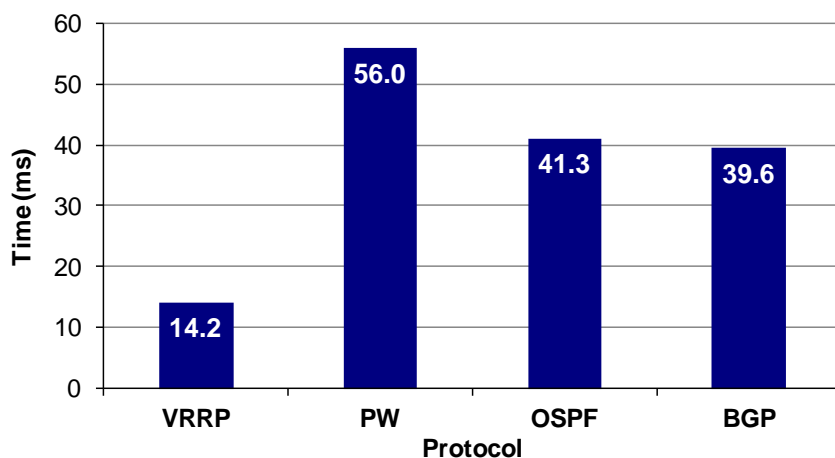
### Key findings and conclusions:

- Huawei S6700-EI switches, with up to 48 10GE ports, provide high performance for server access and enterprise aggregation used in data center or campus environments
- S6700-EI supports iStack technology with bidirectional bandwidth of 160Gbps, for up to nine devices
- Smart Ethernet Protection (SEP) protocol delivers fault convergence in under 50ms for ring networks
- Proven interoperable with Cisco protocols

**H**uawei Technologies engaged Miercom to conduct an evaluation of the S6700-EI series of 10GE cape-shaped switches. These switches are designed for core aggregation or data center use where they provide 10GE server access. The S6700-48-EI has 48 GE SFP or 10GE SFP+ ports, two redundant power supply slots and one USB port. We examined this switch for performance, resiliency of the architecture, service features including policy-based QoS and security, and IPv6 support.

The S6700-EI series consists of models S6700-24-EI and S6700-48-EI. The latter switch was chosen for testing because it has the features and

**Figure 1: Huawei S6700-48-EI Switch  
Bidirectional Forwarding Detection Convergence Time**



Source: Miercom, March 2012

*Total convergence time is displayed for failover using BFD with different protocols.*

capabilities of the series, but represents the highest level of performance the series has to offer. The S6700-EI 48-port switch supports hot-swappable power and fan modules. A module can be replaced without shutting down the system and rebooting. This feature also saves network downtime and provides for a more efficient business operation. In addition to fan and power modules, a blade can be replaced without shut down. With proper Ethernet trunking and spanning trees in place, the system should experience no downtime.

## Basic Features

S6700-EI switches are designed for simple management and easy maintenance. To do this, they have included features such as auto configuration (in the event of corruption or improperly configured files), SNMP v1-3, LLDP, GVRP (which is a substitute for Cisco's VTP), as well as DLDP (a substitute for Cisco's UDLD).

Security features are important for the implementations for which the S6700-EI is designed. The switch series includes DoS attack, ARP injection or attack, ICMP spoofing, and CPU defensibility. In addition to the heightened security measures, there is also port isolation, IP, MAC, and VLAN binding, as well as manual-override IP, MAC, and VLAN limitations on a per port basis. Each port is capable of 802.1x authentication and limited access for AAA, RADIUS, and TACACS authentication. While switching security is provided, there is also switch administration security by enabling SSHv2 for management and HTTPS for Web configuration.

The S6700-EI Series supports IPv4 and IPv6 dual stacking, successfully migrating from an IPv4 to IPv6 network. Including manual tunnels, Layer 3 line speed forwarding, IPv6 routing, OSPFv3, NDP, and dual stacking, the S6700-EI makes networking and migrating from IPv4 to IPv6 seamless.

**Table 1: Chart of Features of the S6700-EI Series of Switches**

Model	S6700-48-EI *	S6700-24-EI
Port Density	48 GE, 10GE SFP/SFP+	24 GE, 10GE SFP/SFP+
Forwarding Performance	715 Mpps	357 Mpps
Switching Capacity	960 Gbps	480 Gbps
MAC Address Table	128K	128K
VLANs	4K	4K
LLDP	✓	✓
OSPF	✓	✓
Rich Authentication	✓	✓
STP/MSTP	✓	✓
VRRP	✓	✓
Multicast	✓	✓
QoS/ACL	✓	✓
Advanced Security Features	✓	✓
SNMP Management	✓	✓

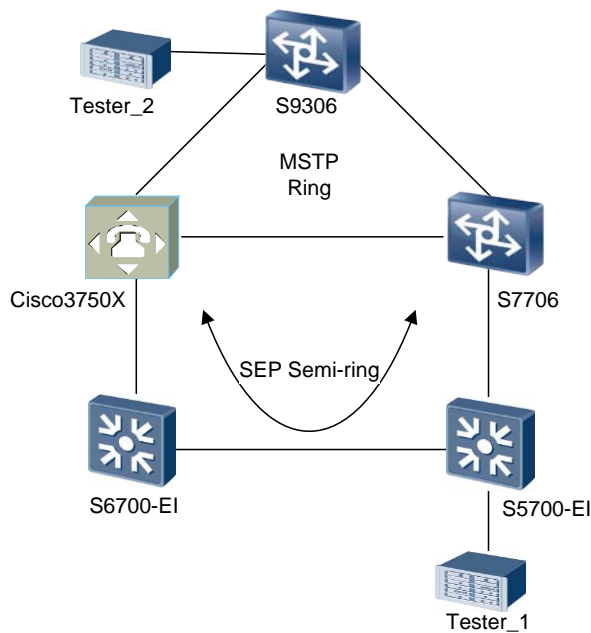
Source: Miercom, March 2012

\* - Tested model

## Performance

Because the S6700-EI series is designed for use in data centers, the focus of the performance testing was on high intensity switching. This switch is robust and resilient by having a large buffer, high throughput, low latency, and advanced security features. Using a test center, Huawei demonstrated that the S6700-48-EI switch had good performance results. The switch capacity achieved 960 Gbps bi-directionally utilizing all 48 10-Gigabit fiber SFP+ ports. In addition, 715 Million packets per second were forwarded.

**Figure 2: Huawei S6700-EI Switch  
MSTP Ring and  
SEP Semi-Ring Topology**



Source: Miercom, March 2012

*A complex MSTP and semi-ring topology unique to Huawei switch infrastructure.*

## Features

**BFD and OAM** Huawei S6700-EI series has fault detection built into their hardware. Bidirectional Forwarding Detection (BFD) and Operations, Administration and Maintenance (OAM) are designed to detect and correct specific faults.

Fault detection and switchover had times of 3.3ms for trouble detection and 50ms for convergence. The switch was able to detect a fault and switch to another card or network path with minimal packet loss incurred.

To test this feature, BFD was associated with different protocols, such as BGP, LSP, PW, and VRRP. All tests successfully achieved trouble protection and convergence of end-to-end in 200ms, and work well with other vendor protocols. VRRP is standard protocol and can be deployed in place of HSRP from Cisco.

These tests were conducted by setting up a network with the BFD associated to one protocol at a time. A network cable was unplugged and we measured the total dropped packets and the time taken for the BFD to detect the fault and switch over to a valid path. See [Figure 1](#) on [page 1](#).

The S6700-EI 48-port switch was very responsive to fault detection and convergence handling. OAM maintained fault detection in under 10ms. Network problems were detected quickly. Identification and convergence were handled in under 50ms.

**iStack Technology** Huawei S6700-EI supports patented iStack technology. iStack enables a different level of redundancy not possible in link teaming, trunking, or spanning trees. It can support 160Gbps bandwidth between switches to ensure that no traffic will be lost when there is a fault in either uplink or downlink connections. The S6700-48-EI switch is ideal in scenarios where low latency but redundancy and high throughput are required in the terabit routing class.

To simulate a power failure failover, a power cable was pulled when the switch was operating. During the power failure, the system failed over to a new power supply flawlessly, with no packet loss or abnormal operation observed. In addition to switching over power supplies without packet loss, the S6700-EI 48-port switch was also capable of PoE redundancy without packet loss.

## Reliability

Huawei supports multi-ring and semi-ring network topologies. Standard ring networks were tested by disconnecting and reconnecting each link in succession and checking for packet loss and connectivity in between trials. For interoperability, a SEP and MSTP ring network was configured with a Huawei S6700-48-EI switch and a Cisco C3750X switch. These switches were able to work together and were fully functional with a Huawei ring setup. For the SEP and MSTP ring networks, an MSTP ring was set up using two Huawei switches and

a Cisco switch. A SEP semi-ring was connected to the MSTP ring and network traffic was verified. *Figure 2* on *page 3* shows the ring topology used for this test.

The switches are designed to unblock a port in the event a network cable is down and the blocked port is required for ring completion. In the setup of the topology, one port on the MSTP ring was set to discard packets or block and one port on the SEP ring was also set to discard packets. Traffic was still able to pass from Tester 1 to Tester 2 using the unblocked path. Both testers in the topology were traffic load generators.

To test convergence of the rings, one cable was pulled from the MSTP ring. It was noted that once the switch detected a cable was pulled, the blocked port was unblocked, enabling traffic delivery between load generators. Next, a cable was pulled on the SEP ring and had the same results. The blocked port was unblocked and traffic was re-routed across the new path to reach the second load generator.

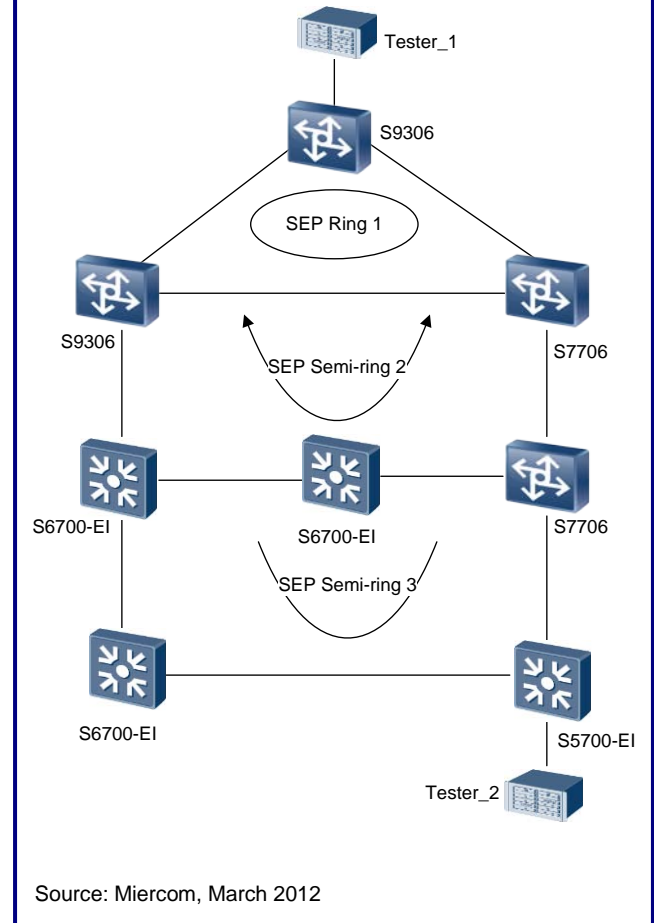
SEP open rings, that can be stacked into multi-ring setups, were also tested. This type of setup allows large, redundant networks across several types of switches with complex and varying configurations. Aside from standard rings, Rapid Ring Protection Protocol (RRPP) and semi-ring were also enabled. *Figure 3* shows one of the test scenarios used to verify operation of the rings.

This ring topology was tested using the same methodology as the previous rings. All rings tested worked and converged in a minimal amount of time with low packet loss.

## Bottom Line

The S6700-EI series is used to provide core aggregation in a data center environment. With up to 48 10GE ports, this switch has advanced

**Figure 3: Huawei S6700-EI Switch SEP Multi-Ring Topology**



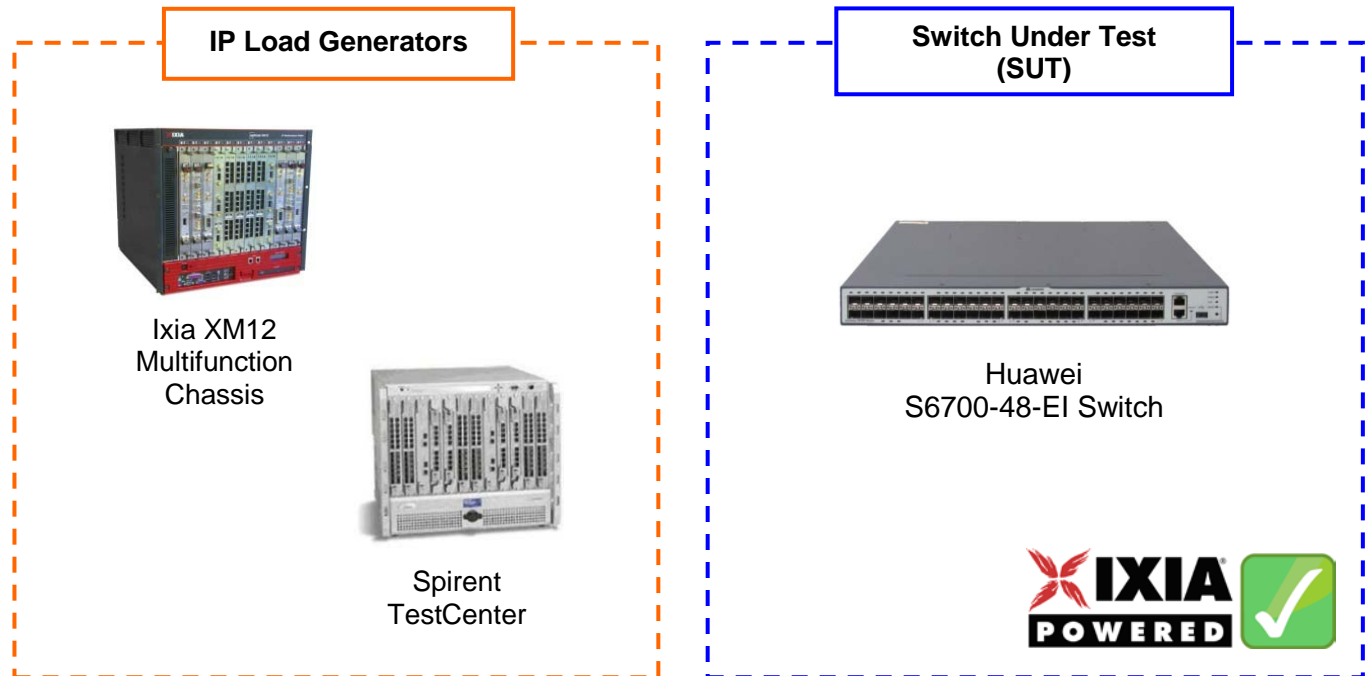
*A highly redundant, complex multi-tiered SEP semi ring topology is shown with a SEP ring.*

features, such as iStack, to prevent traffic loss when links are down.

The series interoperates with Cisco switches and can be added to a multi-vendor environment. The S6700-48-EI switch blades and modules are hot-swappable, maintaining network uptime and resiliency.

With rich security and QoS policies, this switch is an excellent choice for data center or campus environments.

## Test Bed Diagram



Source: Miercom, March 2012

## How We Did It

The Huawei S6700-48-EI switch was evaluated for performance, reliability, and features. Testing verified that each of the features discussed in this report operated as described. Energy efficiency was evaluated by measuring energy consumption with energy saving features enabled, and then disabled, to compare savings. Miercom and Huawei engineers used load generators to ensure that the maximum potential of the switch was revealed. For feature testing, the load generators were configured to specifically test certain functionalities to verify they were working appropriately and routing correctly.

The Huawei S6700-EI 48-port switch chassis was running firmware version 5.7 OS. Two different traffic generators were used during the course of the tests, Ixia XM12 using IxNetwork version 5.50.121.48 and Spirent TestCenter running version 3.76.0076.

RFC 2544, RFC 3918, and RFC 2889 standards were used for load testing and benchmarking. Industry applicable metrics for latency, throughput, and other statistical measurements such as out of sequence errors and jitter were attained to ensure validity of the metrics observed. Statistics were analyzed to produce results for public distribution.

Miercom recognizes Ixia as an industry leader in energy efficiency testing of networking equipment. Ixia's unique approach utilizes coordination of energy measurements with network traffic load – allowing energy consumption to be graphed against network traffic volume. Real-world traffic is generated by Ixia's test platform and test applications, principally IxNetwork for Layer 2-3 routing and switching traffic and IxLoad for Layer 4-7 application traffic.

The tests in this report are intended to be reproducible for customers who wish to recreate them with the appropriate test and measurement equipment. Current or prospective customers interested in repeating these results may contact [reviews@miercom.com](mailto:reviews@miercom.com) for details on the configurations applied to the Device Under Test and test tools used in this evaluation. Miercom recommends customers conduct their own needs analysis study and test specifically for the expected environment for product deployment before making a product selection.

## Miercom Performance Verified

The performance of Huawei S6700-48-EI enterprise-class switch was verified by Miercom. In hands-on testing, Huawei demonstrated advanced performance features such as:

- Up to 48 10GE ports for data center deployments
- S6700-EI supports iStack technology with bidirectional bandwidth of 160Gbps for up to nine devices
- Switches interoperable with Cisco for mixed vendor use
- Hot-swappable blades, power and fan modules ensure network uptime



**S6700-48-EI  
Switch**



**HUAWEI**

Huawei Technologies, Co., Ltd.

<http://enterprise.huawei.com>

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