

# Huawei S6720-EI Series Next-Generation Enhanced 10GE Switches

## Feature Validation and Performance Evaluation

### Executive Summary

The S6720-EI series switches are high performance fixed switches developed by Huawei, providing high-density 10GbE service ports and 40GbE uplink ports with line-rate forwarding. Based on next-generation high-performance hardware and Huawei Versatile Routing Platform (VRP), the S6720-EI switches provide super large table capacity and a wide variety of services, comprehensive security policies, various QoS features and easy management and maintenance. All of these features make the S6720-EI an ideal choice as access switches in data centers or core switches in campus networks.

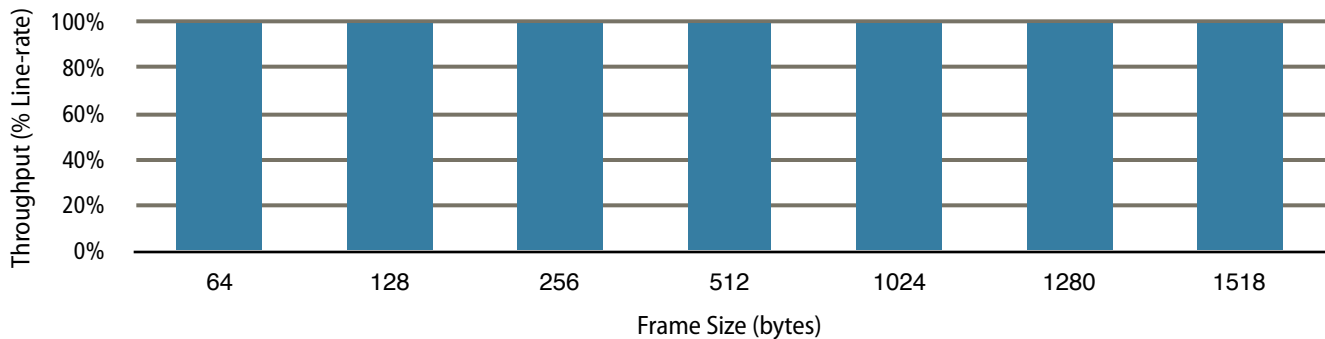
Tolly engineers evaluated Huawei S6720-EI series switches in multiple areas including the high-density 10GbE ports hardware, forwarding capability, table capacity, long-distance and high performance stack, security, MPLS, sFlow traffic statistics monitoring, Zero Touch Provisioning and high availability.

### The Bottom Line

Huawei S6720-EI Series Switches:

- 1 Provide full line-rate 10GbE service ports and up to 6\*40GbE line-rate uplink ports
- 2 Support extremely large table capacity. MAC table: 288K; ARP table: 124K; IPv4 FIB: 128K; IPv6 FIB: 64K
- 3 Support stacking with the 10GbE service ports or the 40GbE uplink ports providing up to 480Gbps bidirectional stacking bandwidth. Support long distance stacking up to 40 kilometers
- 4 Support MPLS with MPLS Layer 2 and Layer 3 VPN, Traffic Engineering, QoS, etc.
- 5 Support the Zero Touch Provisioning (ZTP) feature with the Huawei eSight Unified Management Platform

**Huawei S6720-EI Switch Layer 2 Throughput**  
 with 24/48 10GbE ports and 6 40GbE ports  
 (as reported by Spirent TestCenter 4.42)



Note: 100% line-rate throughput with zero frame loss in all tests. Full-mesh topology was used for each type of ports (40GbE with 40GbE, and 10GbE with 10GbE). The aggregated throughput was 480Gbps for the S6720-30C-EI-24S-AC model and 720Gbps for the S6720-54C-EI-48S-AC model. One four 40GbE ports interface module was used in the back slot for either model.

Source: Tolly, August 2015

Figure 1



Tolly.

# Test Results

## Hardware

### High Density Ports

The S6720-30C-EI-24S-AC model provides 24 fixed 10GbE SFP+ ports and two fixed 40GbE QSFP+ ports. It also has one slot on the back panel to provide another four 40GbE QSFP+ ports with the interface module. Similarly, the S6720-54C-EI-48S-AC provides 48 fixed 10GbE SFP+ ports, two fixed 40GbE QSFP+ ports on the front panel and four 40GbE QSFP+ ports at back with the interface module.

### Memory and Flash

The S6720-EI switches supports 2,048 MBytes memory and 446 MBytes flash storage.

## Performance

### Forwarding Capability

Tolly engineers verified that the S6720-EI switch provided 100% line-rate forwarding with all the ports (including all fixed ports and four 40GbE ports on the interface module in the back slot) for 64-, 128-, 256-, 512-, 1024-, 1280- and 1518-byte frame sizes. Full-mesh topology was used for each type of ports (40GbE with 40GbE, and 10GbE with 10GbE). The aggregated throughput was 480Gbps for the S6720-30C-EI-24S-AC model and 720Gbps for the S6720-54C-EI-48S-AC model. See Figure 1 for the results.

The packet forwarding capability was 720 Mpps for the S6720-30C-EI-24S-AC model and 1080 Mpps for the S6720-54C-EI-24S-AC model. See the test methodology section for detail.

### Latency

The latency of 10 GbE ports on the S6720-EI switch is less than 1µs. See Table 1 for detailed results with different packet sizes.

### Capacity

#### MAC Table

The S6720-EI switch's MAC table supported 288K MAC addresses. Traffic matching the MAC addresses in the MAC table was forwarded without broadcasting.

#### ARP Table

The S6720-EI switch's ARP table supported 124K entries.

#### IPv4 FIB

The S6720-EI switch's IPv4 FIB table supported 128K routes. Traffic matching the destination addresses in the FIBv4 table was forwarded without loss.

#### IPv6 FIB

The S6720-EI switch's IPv6 FIB table supported 64K routes. Traffic matching the destination addresses in the FIBv6 table was forwarded without loss.

Huawei Technologies, Co., Ltd



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### Port Buffer

One 10GbE port on the S6720-EI switch supported 8MB buffer.

### Stack

The S6720-EI switch supported stacking with sixteen 10GbE ports on each switch or six 40GbE ports on each switch.

While using six 40GbE ports on each switch to stack, the six 40Gbps stacking links between two switches supported line-rate 240Gbps traffic.

With one optical attenuator to simulate the the optical signal power level deduction on the fiber stacking cables, Tolly engineers verified that the S6720-EI switches could stack across the 40 kilometers (km) distance.

Huawei S6720-EI Switch 10GbE Ports Layer 2 Latency (as reported by Spirent TestCenter 4.42)

Frame Sizes	Average Latency (µs) - LIFO						
	64-Byte	128-Byte	256-Byte	512-Byte	1024-Byte	1280-Byte	1518-Byte
S6720-54C-EI-48S-AC	0.903	0.906	0.966	0.962	0.988	0.965	0.939

Note: Bidirectional 100% line-rate traffic between 10GbE port 1 and port 2 was used. Store-and-forward latency measured LIFO latency. Thus, store-and-forward results reported here do not include the time required to store the frame.

Source: Tolly, August 2015

Table 1



### Huawei S6720-EI Series Next-Generation Enhanced 10GE Switch Tolly Verified Features, Performance and Capacity

Hardware		Security	
✓	Fixed Ports: 24/48 x 10GbE SFP+ and 2 x 40GbE QSFP+ One slot on the back panel: supports one 4 x 40GbE QSFP+ sub-card	✓	CPU Attack Defense: Blacklist, Control Plane Committed Access Rate (CPCAR)
✓	Memory: 2,048 MBytes	✓	Attack Source Tracing: Whitelist, Attack source tracing, Attack source punishment
✓	Flash: 446 MBytes	<b>MPLS</b>	
<b>Performance</b>		✓	MPLS L2VPN (VPLS and VLL)
✓	100% Line-rate forwarding with 24/48 x 10GbE ports + 6 x 40GbE ports for 64- to 1518-byte frame sizes in full-mesh topology for each type of ports 480Gbps/720Gbps aggregated throughput 720Mpps/1080Mpps packet forwarding capability*	✓	MPLS L3VPN
✓	< 1µs latency across the 10GbE ports	✓	MPLS TE
<b>Capacity</b>		✓	MPLS QoS (DiffServ)
✓	MAC Table: 288K MAC addresses	<b>Traffic Statistics</b>	
✓	ARP Table: 124K entries	✓	sFlow
✓	IPv4 FIB: 128K routes	<b>Zero Touch Provisioning</b>	
✓	IPv6 FIB: 64K routes	✓	Zero Touch Provisioning (ZTP) using the eSight Unified Management Platform Root and client
✓	Port Buffer: 8MB on one 10GbE port	<b>High Availability</b>	
<b>Stack</b>		✓	ITU-T G.8032 Ethernet Ring Protection Switching (ERPS)
✓	Stacking with 16 x 10GbE ports on each switch		
✓	Stacking with 6 x 40GbE ports on each switch		
✓	240Gbps bidirectional stacking throughput (480Gbps aggregated) with 6 x 40Gbps stacking links		
✓	40 kilometers (km) stacking distance		

Note: \* See the Test Methodology section for detail.

Source: Tolly, August 2015

Table 2



## Tolly. Security

Certain types of protocol packets including ARP requests, ICMP, DHCP Discover, etc. are sent to switch's CPU for processing. It's critical that the switch provides certain attack defense features to prevent the CPU from overloading.

### CPU Attack Defense

Two functions of CPU Attack Defense were verified on the S6720-EI switch by Tolly engineers.

**Blacklist** - Administrators can create a blacklist by defining an ACL. Then the switch discard the packets matching the ACL rules.

**CPCAR** - Control Plane Committed Access Rate (CPCAR) limits the rate of protocol packets sent to the control plane and schedules the packets to protect the control plane. The switch identifies service packets based on ACLs and applies the default CAR value to protocol packets so that a limited number of protocol packets are sent to the control plane.

### Attack Source Tracing

Three functions of Attack Source Tracing were verified on the S6720-EI switch by Tolly engineers.

**Whitelist** - The switch does not trace the source of users in the whitelist, ensuring that valid packets from users in the whitelist can be sent to the CPU for processing.

**Attack source tracing** - Administrators can set the threshold and sampling ratio for attack source tracing. When the number of protocol packets sent from an attack source in a specified period exceeds the threshold, the switch traces and logs the attack source to notify the administrator.

**Attack source punishment** - Administrator can configure attack source punishment to

discard or shut down the interface that received attack packets.

### MPLS

MPLS Virtual Private LAN Service (MPLS VPLS) and Virtual Leased Line (MPLS VLL) L2VPN, MPLS L3VPN, MPLS QoS and MPLS Traffic Engineering (MPLS TE) were all verified on the S6720-EI switch.

### Traffic Statistics

#### sFlow

The sFlow protocol was verified to be supported on the S6720-EI switch by Tolly engineers.

### Zero Touch Provisioning

Tolly engineers verified that the Huawei eSight Unified Management Platform supported the Zero Touch Provisioning (ZTP) feature. Administrators can plan the network topology using eSight's graphic Web interface and specify the configuration for each remote device. A root switch which is managed by eSight can then automatically deploy planned configurations to the remote devices when the out-of-box remote devices connects to the network. The S6720-EI switch supported

working as the root device and the remote client device.

### High Availability

#### ITU-T G.8032

The S6720-EI switch supported ITU-T G.8032 Ethernet Ring Protection Switching (ERPS).

## Test Setup & Methodology

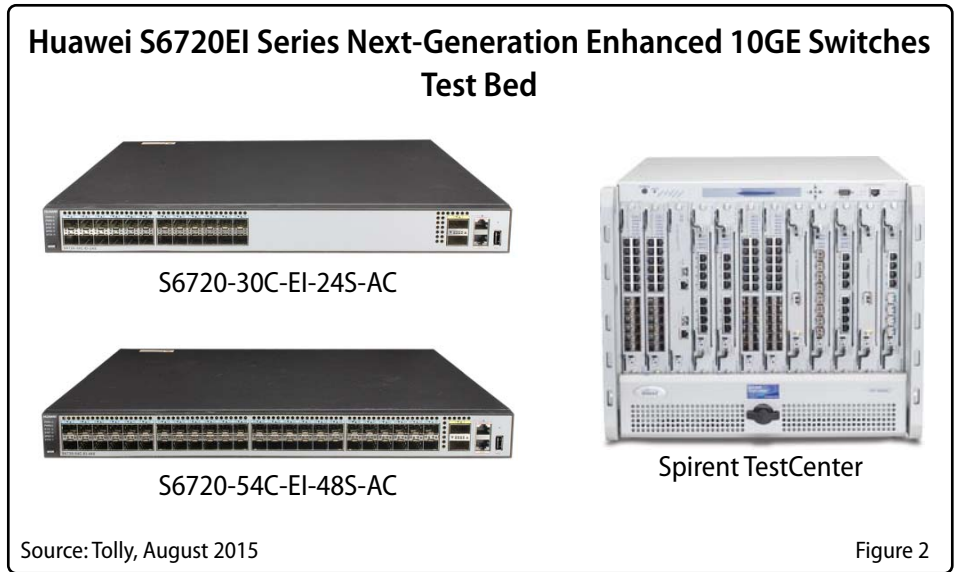
### Test Methodology

#### Capacity

Each capacity level was evaluated individually in a manner appropriate to that feature.

#### Performance

In the networking industry, some vendors' data sheets use 1.4881 as the ratio to convert Gbps throughput to Mpps packet forwarding rate while some vendors round the ratio to 1.5. When using 1.5 as the ratio, the forwarding capability of one S6720-54C-EI-48S-AC switch is  $720 * 1.5 = 1,080$  Mpps.





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### Test Equipment Summary

The Tolly Group gratefully acknowledges the providers of test equipment/software used in this project.

Vendor	Product	Web
Spirent	TestCenter 4.42	 <a href="http://www.spirent.com">http://www.spirent.com</a>

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