

# Huawei Technologies Co., Ltd. Quidway S-Series Layer 2/Layer 3 LAN Switches

## Tolly Verified Feature/Functionality Certification



## Test Summary

**Premise:** Wire-rate performance on today's Layer 2/Layer 3 switches is often a given for many suppliers. What truly sets apart switches today is the breadth of functions and features supported. Buyers need to understand whether switches have the capability to support Quality of Service, or handle latency-sensitive applications by providing them with the necessary bandwidth. Buyers need to know if prospective switches support virtual LANs, and other advanced services. Understanding this feature/function availability helps buyers make informed purchase decisions.

Huawei Technologies Co., Ltd., commissioned The Tolly Group to evaluate seven members of the Quidway LAN switch line, which is designed to serve the needs of enterprise network users. Tolly Group engineers exercised three Layer 2 switches and four Layer 3 switches in a series of tests designed to certify the advanced functions of the switches.

On the Layer 2 side, engineers tested the Huawei Quidway S3026G, a 24-port Fast Ethernet device with two GBIC uplink ports. Engineers also tested the Huawei Quidway S3050C, with its 48 Fast Ethernet ports and two Gigabit Ethernet uplink ports. On the Gigabit Ethernet side, engineers tested a Quidway S5024G with 20 10/100/1000Base-T Gigabit Ethernet ports and four 1000Base-X GBIC ports.

On the Layer 3 side, engineers tested a Quidway S3528G with 24 Fast Ethernet ports and four 1000Base-X GBIC ports; a Quidway S3552P with 48 Fast Ethernet ports and a single 1000Base-X SFP port; a Quidway S5516 with eight Gigabit Ethernet interfaces (maximum 16 Gigabit Ethernet ports supported); and finally, a Quidway S6506 with eight Gigabit Ethernet ports (maximum 48 Gigabit Ethernet ports supported).

### Test Highlights

- Interoperates with Cisco 1751 at Layer 3 during tests of routing protocols including RIP v1/v2, OSPF, BGP-4 and multicasting (PIM Dense Mode/Sparse Mode)
- Supports link aggregation, Jumbo Frames, "Rapid" Spanning Tree, QoS – eight queues, 802.1p
- Offers secure system and user management features

### Huawei Quidway Layer 2 LAN Switch Tolly Verified Certifications Earned

Certification ID	Certification	Switch model		
		S3026G	S3050C	S5024G
10508	10/100 Auto-negotiation	✔	✔	NA
10513	10/100/1000 Auto-negotiation	NA	✔	✔
10514	Auto MDI/MDIX	✔	✔	✔
10515	Port Mirroring	✔	✔	✔
10503	Jumbo Frame Support - 9K	NA	NA	✔
10585	QoS - Four Traffic Queues	✔	✔	✔
10533	QoS Recognition (IEEE 802.1p)	✔	✔	✔
10511	Link Aggregation (IEEE 802.3ad)	✔	✔	✔
10532	VLAN Support (IEEE 802.1Q)	✔	✔	✔
10583	User authentication via Layer 3 (IP)-based ACLs	✔	✔	✔
10584	User authentication via Layer 4 (TCP/UDP)-based ACLs	✔	✔	✔
10537	Port Access Authentication via MAC Address	✔	✔	✔
10785	Static MAC configuration	✔	✔	✔
10534	Rate Limiting per port	✔	✔	✔
10786	IGMP Snooping	✔	✔	✔
10528	Layer 2 Wire Speed Fast Ethernet - All Ports (Fixed Configuration Switch)	✔ <sup>1</sup>	✔ <sup>1</sup>	NA
10554	Layer 2 Wire Speed Gigabit Ethernet - All Ports (Fixed Configuration Switch)	NA	NA	✔
10787	Mgmt. Access Authentication via Local User Database	✔	✔	✔
10559	User Authentication via IEEE 802.1x	✔	✔	✔
10788	System Upgrade via File Transfer Protocol (FTP)	✔	✔	✔
10526	Save/Load Configuration to Text File	✔	✔	✔


Key: = Pass = Not Applicable

<sup>1</sup>Change of switch registers is required to achieve wire-speed performance

Source: The Tolly Group, August 2004

Figure 1

Huawei Quidway Layer 3 Switch Tolly Verified Certifications Earned						
Certification ID	Category	Certification	Switch model			
			S3528G	S3552P	S5516	S6500
10508	LAN Connectivity	10/100 Auto-negotiation	✔	✔	NT	NT
10513	LAN Connectivity	10/100/1000 Auto-negotiation	N/A	N/A	NT	✔
10514	LAN Switch Core	Auto MDIX	✔	✔	NT	✔
10515	LAN Switch Core	Port Mirroring	✔	✔	✔	✔
10503	LAN Switch Core	Jumbo Frame Support - 9K	N/A	N/A	N/A	✔
10587	LAN Switch Core	QoS - Eight Traffic Queues	✔	✔	✔	✔
10533	LAN Switch Core	QoS Recognition (IEEE 802.1p)	✔	✔	✔	✔
10511	LAN Switch Core	Link Aggregation (IEEE 802.3ad)	✔	✔	✔	✔
10532	LAN Switch Core	VLAN Support (IEEE 802.1Q)	✔	✔	✔	✔
10785	LAN Switch Core	Static MAC configuration	✔	✔	✔	✔
10534	LAN Switch Core	Rate Limiting per port	✔	✔	✔	✔
10786	LAN Switch Core	IGMP Snooping	✔	✔	✔	✔
10528	LAN Switch Core	Layer 2 Wire Speed Fast Ethernet - All Ports (Fixed Configuration Switch)	✔	✔	N/A	N/A
10543	LAN Switch Core	IPv4 (L3) Wire Speed Fast Ethernet - All Ports (Fixed Configuration Switch)	✔	✔	N/A	N/A
10583	LAN Switch Core	User authentication via Layer 3 (IP) based Access Control List	✔	✔	✔	✔
10584	LAN Switch Core	User authentication via Layer 4 (TCP/UDP) based Access Control List	✔	✔	✔	✔
10537	LAN Switch Core	Port Access Authentication via MAC Address	✔	✔	✔	✔
10733	Cisco Interop. - Advanced Features	Virtual Router Redundancy Protocol (VRRP)	✔	✔	✔	✔
10724	Cisco Interop. - Routing Protocols	PIM Dense Mode - IP Multicasting	✔	✔	✔	✔
10725	Cisco Interop. - Routing Protocols	PIM Sparse Mode - IP Multicasting	✔	✔	✔	✔
10720	Cisco Interop. - Routing Protocols	IPv4 - RIP v1 - Routing Protocol Support	✔	✔	✔	✔
10721	Cisco Interop. - Routing Protocols	IPv4 - RIP v2 - Routing Protocol Support	✔	✔	✔	✔
10723	Cisco Interop. - Routing Protocols	IPv4 - OSPF - Routing Protocol Support	✔	✔	✔	✔
10789	Cisco Interop. - Routing Protocols	IPv4 - BGP-4 - Routing Protocol Support	✔	✔	✔	✔
10787	System Security and User Management	Management Access Authentication via Local User Database	✔	✔	✔	✔
10559	System Security and User Management	User Authentication via IEEE 802.1x	✔	✔	✔	✔
10788	System Management	System Upgrade via File Transfer Protocol (FTP)	✔	✔	✔	✔
10526	System Management	Save/Load Configuration to Text File	✔	✔	✔	✔

Key:  = Pass    **N/A** = Not Applicable    **NT** = Feature Available but not tested due to the limited type of interfaces and/or the limited number of interfaces

Source: The Tolly Group, August 2004 Figure 2

Engineers tested a diverse set of features and functions, almost 30 capabilities on some models. Engineers examined such capabilities as auto negotiation, port mirroring, support for Jumbo Frames, virtual LAN (VLAN) services, Quality of Service (QoS), rate limiting and more. Tests were conducted during July and August 2004 at The Tolly Group's Boca Raton, FL. facilities.

Test results show that the Huawei switches were awarded Tolly Verified certifications for all of the tests in which they participated.

## RESULTS

The number of Tolly Verified certifications awarded to the seven Quidway switches cannot be covered in its entirety in this report. Readers are encouraged to visit The Tolly Group's Web site to learn more about the individual Tolly Verified certifications awarded to the Huawei Quidway switches. Go to: <http://www.tolly.com/TV/TVVendorDetail.aspx?VendorID=208>.

The sections below offer some insight

into the advanced features certified by The Tolly Group.

### JUMBO FRAMES SUPPORT – 9K, TOLLY VERIFIED 10503

This certification verifies that the device under test transports Ethernet Jumbo Frames (9000-byte), thus demonstrating that it can be used in high-performance data storage networking applications in conjunction with Ethernet network interface cards that support Jumbo Frames.

#### QoS RECOGNITION (IEEE 802.1P) TOLLY VERIFIED 10533

The tested Quidway switches passed this certification that verifies a device's capability to distinguish and prioritize traffic based on the 802.1p Quality of Service standard. For verification purposes a given device must be able to differentiate between two streams that are "tagged" using this standard. Traffic is forwarded exercising both queues. During over-subscription traffic tagged as "high" should receive preferential treatment (i.e. more bandwidth).

#### PORT ACCESS AUTHORIZATION VIA MAC ADDRESS, TOLLY VERIFIED 10537

This certification verifies that the device under test provides functionality that allows network managers to limit client port access to stations that have specific Layer 2 MAC addresses.

#### QoS - FOUR TRAFFIC QUEUES TOLLY VERIFIED 10585

The tested Quidway switches earned this certification that uses a complex stream to verify the actual number of internal processing queues in the switch. In the verification, Tolly Group engineers observed the Quidway switches handling traffic over four prioritized queues, apportioning bandwidth according to priority policy and a weighted round-robin queuing algorithm. (*Note: the specific priority queuing method used is not specified by the TV certification.*)

#### ANALYSIS

Buyers of enterprise-class switches need to dig deeper when they are in the market for Layer2/Layer3 switches. Wire-rate performance is but one factor. These days, it is imperative that switches support a number of advanced features necessary to provide leading-edge services like VoIP and wireless. The Huawei Quidway switches demonstrated support for QoS, Rapid Spanning Tree support, Jumbo Frames and a number of other advanced functions that are necessary for today's enterprise applications. Tolly Verified certification of more than 30 key functions proves that the Quidway switches are architected with enterprise customers in mind.

#### TEST CONFIGURATION AND METHODOLOGY

For Layer 2/Layer 3 performance tests, The Tolly Group tested Huawei Technologies Quidway S3528G Version VRP3.10.06 and Quidway S3552P Version VRP3.10.06, a 24-port 10/100 Fast Ethernet Layer 3 edge switch with four Gigabit Ethernet uplinks and a 48-port 10/100 Fast Ethernet Layer 3 edge switch with four Gigabit Ethernet uplinks, respectively. For the full-system test, engineers configured the Quidway S3528G so that the first set of 10 Fast Ethernet ports (port 1-10) connected with the first Gigabit Ethernet port (port 25), the last set of 10 Fast Ethernet ports (port 15-24) connected with the second Gigabit Ethernet port (port 26), and the remaining two Gigabit Ethernet ports (port 27-28) paired each other and the remaining Fast Ethernet ports (port 11-14) were destined for each other in a full-mesh configuration.

Engineers also configured the Quidway S3552G in which the first set of 10 Fast Ethernet ports (port 1-10) connected with the first Gigabit Ethernet port (port 49), the second set of 10 Fast Ethernet ports (port 11-20) connected with the second Gigabit Ethernet port (port 50), and the third set of 10 Fast Ethernet ports (port 21-30) connected with the third Gigabit Ethernet port (port 51), the fourth set of 10 Fast Ethernet ports (port 31-40) connect with the fourth Gigabit Ethernet port (port 52), and the remaining Fast Ethernet ports (port 41-48) were destined for each other in a full-mesh configuration. For Layer 3 performance tests, engineers configured the Layer 3 switches in the manner that all ports were on different IP subnets to ensure Layer 3 operations. For bidirectional steady state, zero-loss ( $\leq 0.001\%$ ) throughput tests of 64-, 128-, 256-, 512-, 1024- and 1,518-byte frames, engineers used SmartBits SmartFlow to generate Layer 2/Layer 3 traffic in the configuration described above with an initial load of 100%.

For Layer 2-only performance tests, The Tolly Group tested Huawei Technologies Quidway S5024G Version VRP3.10.10, which is a 24 Gigabit Ethernet Layer 2 switch. For the full-system test, engineers configured a test bed in which all 24 Gigabit Ethernet

**Huawei  
Technologies  
Co., Ltd.**

**Quidway  
S-series  
Switches**



#### Tolly Verified Certifications

#### Huawei Technologies Co., Ltd. Quidway S-Series Switches Product Specifications\*

##### Performance

- Wire-speed layer 2/3 packet by packet forwarding based on longest-prefix match algorithm, MSTP, ECMP, VRRP, policy-based routing and QinQ VLAN VPN Multicast (IGMP, PIM-SM, PIM-DM)

##### High availability

- Support for MSTP, ECMP, VRRP, policy-based routing and QinQ VLAN VPN Multicast (IGMP, PIM-SM, PIM-DM)

##### Layer 3 Protocols

- Unicast (RIPv1/v2, OSPF, BGP)
- Multicast (IGMP, PIM-SM, PIM-DM)

##### Security

- Extended MAC-based 802.1x authentication specification
- Built-in 802.1x authentication server
- MAC+port binding to avoid address spoofing

##### Network protocols

- IEEE 802.1D, 802.1w, 802.1s, 802.3, 802.3u, 802.3x, 802.3z, 802.1Q, 802.1p, 802.1x

##### Application protocols

- IEEE FTP, TFTP, BOOTP, Telnet

##### For more information contact:

Huawei Technologies Co., Ltd.  
Bantian, Longgang District  
Shenzhen 518129 P.R.China  
Tel : +86-755-28780808  
Fax: +86-755-28780808  
<http://www.huawei.com>  
E-mail: [information@huawei.com](mailto:information@huawei.com)

*\*Vendor-supplied information not verified by  
The Tolly Group*

Huawei Quidway S-Series Switches Tested				
Model	Switch category	H/W Version	S/W Version	Configuration
Quidway S3026G	Layer 2	REV.B	VRP@ 3.10 Release 0022	Fast Ethernet switch with 24 10/100Base-T ports and two 1000Base-X GBICs
Quidway S3050C	Layer 2	REV.A	VRP@ 3.10 Release 0021	Fast Ethernet switch with 48 10/100Base-T and two optional Gigabit Ethernet slots
Quidway S5024G	Layer 2	REV.C	VRP@ 3.10 Release 0010	Gigabit Ethernet switch with 20 10/100/1000Base-T ports and four 1000Base-X GBICs
Quidway S3528G	Layer 3	REV.B	VRP@ 3.10 Release 0006	Fast Ethernet Layer 3 switch with 24 10/100Base-T ports and four 1000Base-X GBICs
Quidway S3552P	Layer 3	REV.B	VRP@ 3.10 Release 0006	Fast Ethernet Layer 3 switch with 48 10/100Base-T and four 1000Base-X SFP
Quidway S5516	Layer 3	REV.0	VRP@ 3.10 (CN) Release 0027	Gigabit Ethernet routing switch with maximum 16 Gigabit Ethernet ports
Quidway S6506	Layer 3	REV.B	VRP@ 3.10 (CN) Release 0033	Gigabit Ethernet multi-service routing switch with maximum 48 Gigabit Ethernet ports

Source: The Tolly Group, August 2004 Figure 3

ports were destined for each other in a full-mesh configuration. For bidirectional steady state, zero-loss ( $\leq 0.001\%$ ) throughput tests of 64-, 128-, 256-, 512-, 1024- and 1,518-byte frames, engineers used SmartBits SmartFlow to generate Layer 2 traffic in the configuration described above with an initial load of 100%.

Full test methodology details of the various Tolly Verified certifications earned by the Quidway S3026G, Quidway S3050C, Quidway S5024G, Quidway S3528G, Quidway S3552P, Quidway S5516 and Quidway S6506 can be found at [http://www.tolly.com/TV/TV\\_home.aspx](http://www.tolly.com/TV/TV_home.aspx).

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

Vendor	Product	Web address
Funk Software	Steel-Belted Radius Server v4.71	<a href="http://www.funk.com">http://www.funk.com</a>
Spirent Communications	SmartBits 6000B	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>
Spirent Communications	SmartBits LAN-3325A	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>
Spirent Communications	SmartBits LAN-3101A	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>
Spirent Communications	SmartWindow 8.0	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>
Spirent Communications	SmartFlow 4.0.	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>



## TOLLY GROUP SERVICES

With more than 15 years of testing experience of leading-edge network technologies, The Tolly Group employs time-proven test methodologies and fair testing principles to benchmark products and services with the highest degree of accuracy. Plus, unlike narrowly focused testing shops, The Tolly Group combines its vast technology knowledge with focused marketing services to help clients better position product benchmarks for maximum exposure. The company offers an unparalleled array of reports and services including: Test Summaries, Tolly Verifieds, performance certification programs, educational Webcasts, white paper production, proof-of-concept testing, network planning, industry studies, end-user services, strategic consulting and integrated marketing services. Learn more



about The Tolly Group services by calling (561) 391-5610, or send E-mail to [sales@tolly.com](mailto:sales@tolly.com).

For info on the Fair Testing Charter, visit: <http://www.tolly.com/Corporate/FTC.aspx>

## PROJECT PROFILE

**Sponsor:** Huawei

**Document number:** 204153

**Product class:** Layer 2/Layer 3 switches

**Products under test:**

- Quidway S3026G SW Ver. VRP 3.10 Release 0022
- Quidway S3050C SW Ver. VRP 3.10 Release 0021
- Quidway S5024G SW Ver. VRP 3.10 Release 0010
- Quidway S3528G SW Ver. VRP 3.10 Release 0006
- Quidway S3552P SW Ver. VRP 3.10 Release 0006
- Quidway S5516 SW Ver. VRP 3.10 (CN) Release 0027
- Quidway S6506 SW Ver. VRP 3.10 (CN) Release 0033

**Testing window:** July and August 2004

**Software status:**

- Generally available

For more information on this document, or other services offered by The Tolly Group, visit our World Wide Web site at <http://www.tolly.com>, send E-mail to [sales@tolly.com](mailto:sales@tolly.com), call (561) 391-5610.

*Information technology is an area of rapid growth and constant change. The Tolly Group conducts engineering-caliber testing in an effort to provide the internetworking industry with valuable information on current products and technology. While great care is taken to assure utmost accuracy, mistakes can occur. In no event shall The Tolly Group be liable for damages of any kind including direct, indirect, special, incidental, and consequential damages which may result from the use of information contained in this document. All trademarks are the property of their respective owners.*

*The Tolly Group doc. 204153 rev. clk 09 Nov 04*