USG9500 Series

Terabit Level Next-Generation Firewall

A fully connected world is becoming a reality. Glasses, watches, and even home appliances and health check products are going smart and digitally connected. In this big data era, the growth of network traffic is exponential, network access methods are diverse, and services can scale on demand.

Mobile working offers convenience, allowing people to be productive at home or anywhere. However, traditional security architectures cannot effectively protect agile and ubiquitous connections from equally ubiquitous vulnerabilities, risks, and intrusions that may compromise data security and privacy. Security has been the top priority in the ICT world.

Therefore, cloud service providers and large data centers and enterprises are upgrading their firewalls at network borders to high-performance and full-featured next generation firewalls (NGFWs). All enterprises that are exploring the viability of mobile working are advised to evaluate the functionality and performance of their firewalls for bottlenecks, and to upgrade their devices before becoming a target of emerging threats.

Product Appearance

USG9520

USG9560

USG9580

Product Description

The USG9500 series comprises the USG9520, USG9560, and USG9580, and provides industry-leading security capabilities and scalability. The firewall throughput of the series is up to 1.92 Tbps.

By using dedicated multi-core chips and a distributed hardware platform, the USG9500 provides industry-leading service processing and expansion capabilities. Moreover, all key components are redundant to ensure service continuity on high-speed networks, providing a level of availability that is normally seen in core routers. The distributed technology uses line-rate intelligent traffic distribution for data forwarding. All data flows are equally distributed to service processing units (SPUs) to prevent performance bottlenecks. Therefore, the service processing capability increases linearly with service modules, supporting the long-term development of customer networks.

The USG9500 provides multiple types of I/O interface modules (LPUs) for external connections and data transmissions. Line processing units (LPUs) and SPUs have the same interface slots and can be mixed and matched as needed. The SPUs of the USG9500 process all services. The motherboard of each SPU can hold expansion cards that house multi-core CPUs, which together with the software modules allow the SPUs to process all services on the USG9500. To ensure service continuity, the USG9500 provides SPU redundancy and a heartbeat detection mechanism between the SPU and LPU If one SPU fails, all functions are switched to other SPUs without interrupting service transmission. In addition, the USG9500 provides GE, 10GE, 40GE and 100GE interfaces and supports cross-board port bundling to improve throughput and port density.

Highlights

Most accurate access control – *ACTUAL-based comprehensive protection*

The core function of both traditional firewalls and NGFWs is access control. However, access control is based on port and IP address on traditional firewalls. In contrast, the USG9500 provides a more fine-grained access control:

- **Comprehensive protection:** Provides integrated control and protection based on application, content, time, user, attack, and location (ACTUAL). The application-layer protection and application identification are combined. For example, the USG9500 can identify Oracle-specific traffic and implement intrusion prevention accordingly to increase efficiency and reduce false positives.
- **Based on application:** Accurately identifies over 6000 applications (including mobile and web applications) and their services, and then implements access control and service acceleration accordingly. For example, the USG9500 can identify the voice and data services of an instant messaging application and apply different control policies to the services.
- **Based on user:** Supports eight user authentication methods, including RADIUS, LDAP, and AD authentication, synchronization of user information from an existing user authentication system, user-based access control, and QoS management.
- **Based on location:** Uses IP address geolocation to identify from where application and attack traffic originates, promptly detects network anomalies, and implements differentiated user-defined access control for traffic from different locations.

Most pragmatic NGFW features – *equivalent to multiple devices to reduce TCO*

As more information assets are accessible from the Internet, cyber attacks and information theft are rampant, requiring a wider range of protection from next-generation firewalls. The USG9500 provides comprehensive protection:

- **Versatility:** Integrates traditional firewall functions, VPN, intrusion prevention, antivirus, data leak prevention (DLP), bandwidth management, and online behavior management into one device to simplify deployment and improve efficiency.

- **Intrusion prevention system (IPS):** Detects and prevents exploits of over 5000 vulnerabilities and web application attacks, such as cross-site scripting and SQL injection.
- **Antivirus (AV):** Prevents over 5 million viruses and Trojan horses using the high-performance antivirus engine and the daily-updated virus signature database.
- **Data leak prevention:** Identifies and filters file and content transfers. The USG9500 can identify more than 120 file types, regardless of whether file name extensions are maliciously changed. In addition, the USG9500 can restore and implement content filtering for over 30 types of files, such as Word, Excel, PPT, PDF, and RAR files, to prevent leaks of critical enterprise information.
- **SSL decryption:** Serves as a proxy to perform application-layer protection, such as IPS, AV, DLP, and URL filtering, for SSL-encrypted traffic.
- **Anti-DDoS:** Identifies and prevents 10 types of DDoS attacks, such as SYN and UDP flood attacks.
- **Online behavior management:** Implements cloud-based URL filtering to prevent threats from malicious websites by using a URL category database that contains 85 million URLs, controls online behaviors such as posting to social media and FTP upload and download, and audits Internet access records.
- **Secure interconnection:** Supports various VPN features, such as IPSec, L2TP, MPLS, and GRE VPN, to ensure secure and reliable connections between enterprise headquarters and branch offices.
- **QoS management:** Flexibly manages the upper and lower traffic thresholds and supports application-specific policy-based routing and QoS marking to preferentially forward traffic of specified URL categories, such as financial websites.
- **Load balancing:** Supports server load balancing, such as load balancing based on link quality, bandwidth, and weight in scenarios where multi-egresses are available.

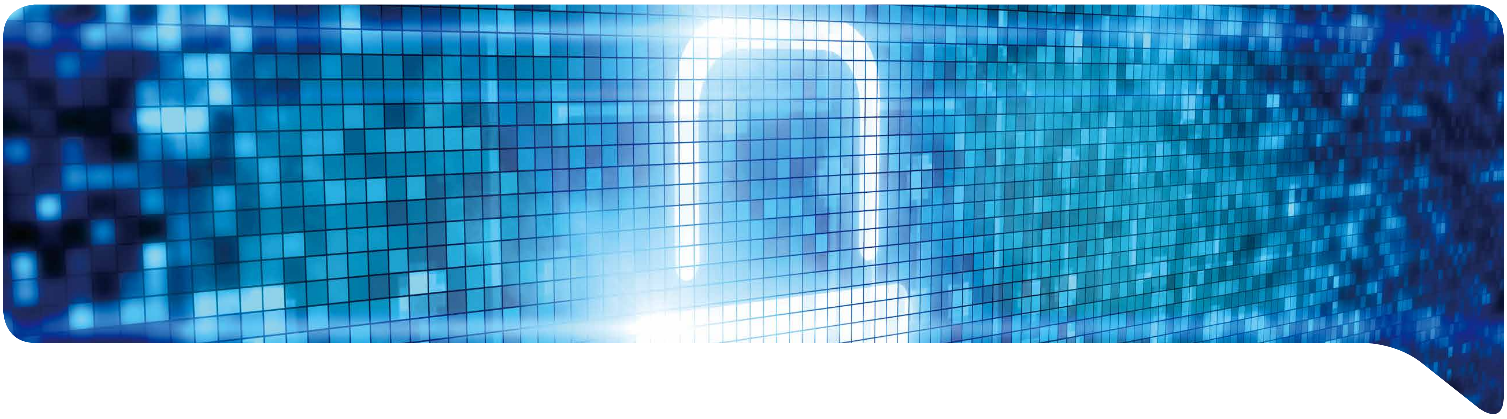
Most advanced network processor + multi-core CPU + distributed architecture – *allowing linear increase of performance to break the performance bottleneck*

The USG9500 uses a hardware platform that is often used in core routers to provide modularized components. Each LPU has two network processors (NPs) to provide line rate forwarding. The SPU uses multi-core CPUs and a multi-threaded architecture, and each CPU has an application acceleration engine. These hardware advantages, combined with Huawei's optimized concurrent processing technology, increase CPU capacity to ensure the high speed parallel processing of multiple services, such as NAT and VPN. LPUs and SPUs function separately. The overall performance increases linearly with the number of SPUs so that customers can easily scale up the performance at a low cost.

With the revolutionary system architecture, the USG9500 is the industry's highest-performance security gateway in terms of throughput and concurrent connections. The dedicated traffic distribution technology allows for linear performance growth with the number of SPUs. The USG9500 delivers a maximum of 1.92 Tbps large-packet throughput, 2.56 billion concurrent connections, and 4095 virtual firewalls to meet the performance demand of high-end customers, such as television and broadcast companies, government agencies, energy companies, and education organizations.

Most stable and reliable security gateway – *full redundancy to ensure service continuity*

Network security is important for the normal operation of enterprises. To ensure the service continuity on high-speed networks, the USG9500 supports active/standby and active/active redundancy, port aggregation, VPN redundancy, and SPU load balancing. The USG9500 also supports dual-MPU active/standby switchover,



which is normally seen in high-end routers, to provide high availability. The mean time between failures (MTBF) of the USG9500 is up to 200,000 hours, and the failover time is less than one second.

Most diverse virtualization functions – *for cloud networks*

Cloud computing relies on virtualization and secure high-speed network connections. To support cloud technologies, the USG9500 delivers high throughput and supports virtual systems that have dedicated resources, independently forward traffic, and are configured and managed separately to meet the requirements of different customers. You can assign different resources to virtual systems as needed, configure different policies, log management, and audit functions on virtual systems based on the requirements of tenants, and customize traffic forwarding processes on virtual systems. The forwarding planes of virtual systems are separated to ensure the data security of tenants and that any resource exhaustion on one virtual system does not affect other virtual systems.

Specifications

Model Item	USG9520	USG9560	USG9580
Performance and Capacity			
Firewall throughput (1518 byte)*	120 Gbit/s	960 Gbit/s	1.92 Tbit/s
Firewall throughput (IMIX)	120 Gbit/s	960 Gbit/s	1.92 Tbit/s
Maximum number of concurrent sessions	160,000,000	1,280,000,000	2,560,000,000
IPSec VPN performance (AES)	120 Gbit/s	700 Gbit/s	1400 Gbit/s
Maximum number of concurrent IPSec VPN tunnels	256,000	1,000,000	1,000,000
Expansion and I/O			
Number of expansion slots	3	8	16
Number of MPU slots	2		
Interface types	GE, 10GE, 40GE, and 100GE interfaces		
SPU	Firewall and application security SPUs		
Dimensions, Power Supply, and Operating Environment			
Dimensions (H × W × D, mm)	175 × 442 × 650 (4U, DC) 220 × 442 × 650 (5U, AC)	620 × 442 × 650 (14U)	1420 × 442 × 650 (32U)

Model Item	USG9520	USG9560	USG9580
Weight (Full configuration)	Empty: 15 kg (DC) Full configuration: 30.7 kg (DC) Empty: 25 kg (AC) Full configuration: 40.7 kg (AC)	Empty: 43.2 kg Full configuration: 112.9 kg	Empty: 94.4 kg Full configuration: 233.9 kg
AC power supply	90 V AC to 264 V AC; 175 V AC to 264 V AC (recommended)		
DC power supply	-72 V to -38 V; -48 V (rated)		
Power	Typical: 1066W(DC) Typical: 1185W(AC) Most: 1272W(DC) Most: 1414W(AC)	Typical: 4520W(DC) Typical: 4282W(AC) Most: 4823W(DC) Most: 5132W(AC)	Typical: 7387W(DC) Typical: 7858W(AC) Most: 8930W(DC) Most: 9500W(AC)
Working temperature	Extended operation: 0°C to 45°C Storage: -40°C to +70°C		
Ambient humidity	Long term: 5% RH to 85% RH, non-condensing Short term: 5% RH to 95% RH, non-condensing		

* Performance is tested under ideal conditions. Real result may vary with different deployment environments.

Security Features

Basic Firewall Functions

Transparent, routing, and hybrid modes
Stateful inspection
Blacklist and whitelist
Access control
Application specific packet filter (ASPF)
Security zones

Egress Load Balancing

ISP-based routing
Intelligent uplink selection
Transparent DNS proxy at egress
User-based traffic control
Application-based traffic control
Link-based traffic control
Time-based traffic control

Ingress Load Balancing

Intelligent DNS at ingress
Server load balancing
Application-based QoS

URL Filtering

URL database of 85 million URLs
80+ URL categories
Trend and top N statistics based on users, IP addresses, categories, and counts
Query of URL filtering logs

VPN

DES, 3DES, and AES encryption
MD5 and SHA-1 authentication
Manual key, PKI (X509), and IKEv2
Perfect forward secrecy (DH group)
Anti-replay
Transport and tunnel modes
IPSec NAT traversal
Dead peer detection (DPD)

EAP authentication
EAP-SIM, EAP-AKA
VPN gateway redundancy
IPSec v6, IPSec 4 over 6, and IPSec 6 over 4
L2TP tunnel
GRE tunnel

Anti-DDoS

Prevention of SYN, ICMP, TCP, UDP, and DNS floods
Prevention of port scan, Smurf, teardrop, and IP sweep attacks
Prevention of attacks exploiting IPv6 extension headers
TTL detection
TCP-mss detection
Attack logs

High Availability

Multi-DC cluster
Active/active and active/standby modes
Hot standby (Huawei redundancy protocol)
Configuration synchronization
Data backup between SPUs in a chassis
Firewall and IPSec VPN session synchronization
Device fault detection
Link fault detection
Dual-MPU switchover

Management

Web UI (HTTP/HTTPS)
CLI (console)
CLI (remote login)
CLI (SSH)
U2000/VSM network management system
Hierarchical administrators
Software upgrade
Configuration rollback
STelnet and SFTP

Certification

Safety certification
Electro Magnetic Compatibility (EMC) certification
CB, Rohs, FCC, MET, C-tick, and VCCI certification
ICSA Labs: Firewalls, IPS, IPSec, SLL-TLS, Anti-Virus

NAT/CGN

Destination NAT/PAT
NAT NO-PAT
Source NAT-IP address persistency
Source IP address pool groups
NAT server
Bidirectional NAT
NAT-ALG
Unlimited IP address expansion
Policy-based destination NAT
Port range allocation
Hairpin connections
SMART NAT
NAT64
DS-Lite
IPv6 rapid deployment (6RD)

Service Awareness

Identification and prevention of over 6000 protocols: P2P, IM, game, stock charting/trading, VoIP, video, stream media, email, mobile phone services, Web browsing, remote access, network management, and news applications

Antivirus

Detection of 5 million viruses
Flow-based inspection for higher performance
Inspection of encrypted traffic
Trend and top N statistics by virus family

PKI

Online CA certificate enrollment
Online CRL check
Hierarchical CA certificates
Support for public-key cryptography standards (PKCS#10 protocol)
CA certificate
Support for SCEP, OCSP, and CMPv2 protocols
Self-signed certificates

Intrusion Prevention System

Protocol anomaly detection
User-defined signatures
Automatic update of the knowledge bases

Zero-day attack defense

Prevention of worms, Trojan horses, and malware attacks

Networking/Routing

Support for POS, GE, and 10GE interfaces

DHCP relay/server

Policy-based routing

IPv4/IPv6 dynamic routing protocols, such as RIP, OSPF, BGP, and IS-IS

Interzone/inter-VLAN routing

Link aggregation, such as Eth-trunk and LACP

Virtual System

Up to 4095 virtual systems (VSYS)

VLAN on virtual systems

Security zones on virtual systems

User-configurable resources on virtual systems

Inter-virtual system routing

Virtual system-specific Committed Access Rate (CAR)

Separate management of virtual systems

Resource isolation for different tenants

Logging/Monitoring

Structured system logs

SNMPv2

Binary logs

Traceroute

Log server (LogCenter)

User Authentication and Access Control

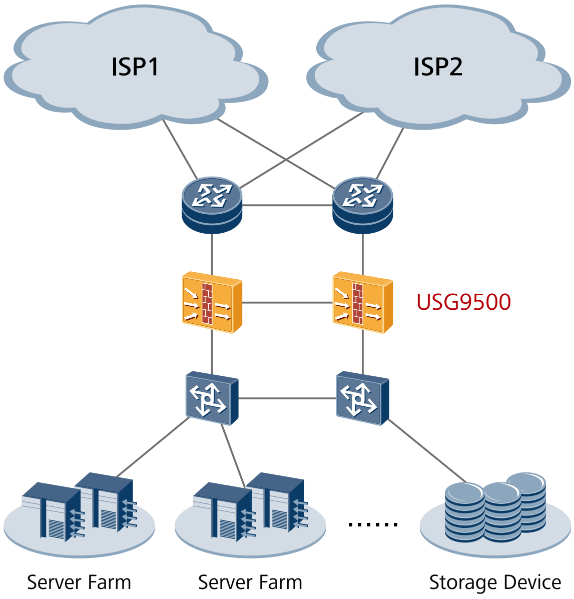
Built-in (internal) database

RADIUS accounting

Web-based authentication

Note: Not all versions support all listed features. Contact your Huawei representative for details.

Application Scenario



Background and Challenges

With the dramatic increase in the volume of enterprise data, data centers provide more types of services, handle more traffic, and become more important for enterprises—they also attract more hackers. Data centers have evolved from data concentration to server consolidation based on virtualization technologies in the cloud era. This evolution has brought security challenges to data centers. Now, security is the key factor that determines their efficiency and availability.

Customer Requirements

Upgrading data centers to cloud data centers will increase the volume of remote access traffic that a cloud data center handles. Separate security planes are therefore required for different services and tenants; however, deploying traditional security devices at the egress of data centers will complicate internal traffic policing and management and expose data centers to malicious access and attacks. As a result, the functions and performance of traditional security devices at the egress of data centers cannot meet new requirements and have become a bottleneck of data centers.

Solution

As shown in the preceding figure, two USG9500 firewalls are deployed at the ingress of a large IDC/VDC/enterprise network. Virtual systems can be created on the firewalls for different tenants. The bandwidth and number of available sessions of virtual systems can be configured as needed. The virtual systems are isolated from each other, and the external network is isolated from the internal network. Adding SPUs to the USG9500 increases the volume of traffic it can handle, which is more cost-effective than purchasing new devices in terms of per Gigabit power consumption, and also facilitates smooth capacity expansion. The service awareness and log analysis reports provide visibility into network security and forensic evidence. IPS and anti-DDoS boards can be added to block viruses from external networks. To ensure availability and implement millisecond-level switchover, two devices are deployed in active/active or active/standby mode.

Ordering Information

	Host
USG9520-BASE-AC-51	USG9520 AC Standard Configuration (include X3 AC Chassis, 2*MPU)
USG9520-BASE-DC-51	USG9520 DC Standard Configuration (include X3 DC Chassis, 2*MPU)
USG9560-BASE-DC-51	USG9560 DC Basic Configuration (include X8 DC Chassis, 2*SRU, 1*SFU)
USG9580-BASE-DC-51	USG9580 DC Standard Configuration (include X16 DC Chassis, 2*MPU, 4*SFU)
	USG9500 SPUs
SPU-X3-20-O-E8KE	20G X3 Firewall Service Processing Unit(oversea)

	Host
SPU-X8X16-20-O-E8KE	20G X8&X16 Firewall Service Processing Unit(oversea)
SPC-20-O-E8KE	20G Firewall Performance Expansion Card(oversea)
SPU-X8X16-B	X8&X16 Service Processing Unit(Base Board)
SPC-APPSEC-FW	Application Security Service Processing Card
SPU-X3-B	X3 Service Processing Unit(Base Board)
SPU-X3-B2	X3 Service Processing Unit 2(Base Board)
SPUA-20-O-H	Enhanced 20G Firewall Service Processing Unit A 60&80
SPUA-20-O-M	Enhanced 20G Firewall Service Processing Unit A 20
SPCA-20-O-H&M	Enhanced 20G Firewall Service Expansion Card A
SPUB-20-O-H	Enhanced 20G Firewall Service Processing Unit B 60&80
SPUB-20-O-M	Enhanced 20G Firewall Service Processing Unit B 20
SPCB-20-O-H&M	Enhanced 20G Firewall Service Expansion Card B
SPCA-APPSEC-FW	Enhanced Application Security Service Processing Card A
SPCB-APPSEC-FW	Enhanced Application Security Service Processing Card B
	USG9500 LPUs
E8KE-X-LPUF-101	100G Line Processing Unit
FW-LPUF-120	120G Line Processing Unit
FW-LPUF-240	240G Line Processing Unit
FW-6X10G-SFP+	6*10GE SFP+ Daughter Card
FW-1X100G-CFP	1*100GE CFP Daughter Card
FW-12X10G-SFP+	12*10GE SFP+ Daughter Card
E8KE-X-101-1X40GE-CFP	1-Port 40GBase LAN CFP Flexible Card
FW-3X40G-QSFP+	3-Port 40GBase-QSFP+ Flexible Card
E8KE-X-101-5X10GE-SFP+	5-Port 10GBase LAN/WAN-SFP+ Flexible Card A
FW-20X1G-RJ45	20-Port 10/100/1000Base-RJ45 Flexible Card
E8KE-X-101-24XGE-SFP	24-Port 100/1000Base-X-SFP Flexible Card
LPUI-101	1-Port 100GBase-CFP Integrated Line Processing Unit

Note: This table lists only some parts of the USG9500. For more information, contact your Huawei representative.

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