AR1000V Virtual Router
Detail Brochure

Huawei Technologies Co., Ltd.

AR1000V

The AR1000V is a virtual router launched by Huawei to transform traditional enterprise networks into SD-WANs. Based on Network Functions Virtualization (NFV) technology, the AR1000V can be deployed on the server using the x86 hardware platform, private cloud, and public cloud. It is an access gateway for enterprise cloud applications, and its key features include application-based intelligent traffic steering, outstanding performance, and automatic O&M. It expands the enterprise WAN and provides ultimate cloud application experience for enterprises.

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1 Trends and Challenges

In response to the increasing diversification of enterprise services, a growing number of enterprises are virtualizing their networks and IT facilities and moving them to the cloud to save network costs and quickly bring services online. This is achieved by deploying VPCs on private or public clouds. In addition, applications that enterprises depend on (such as Microsoft Office and Salesforce) are starting to be provided by application providers in Software as a Service (SaaS) mode. In the future, 85% of enterprise applications will be deployed on the cloud.

The development of cloud-based services causes the number of applications and volume of traffic to increase sharply. Traditional enterprise WANs cannot achieve cloudification of enterprise network infrastructure and services, and face the following challenges:

- Branches need to access cloud applications through the headquarters or data center, causing a long delay and performance bottlenecks.
- Enterprise service cloudification requires higher WAN bandwidth, leading to the increase of private lines year by year.
- Enterprises cannot implement consistent security and management policies on public cloud networks and enterprise networks.
- The traditional enterprise WAN status cannot be detected, causing the difficulty in O&M.

To address the preceding issues and cope with trends of network device cloudification and virtualization, Huawei launches the AR1000V virtual router that integrates routing, switching, security, VPN, and QoS functions. The AR1000V has features including software and hardware decoupling, easy service deployment, and intelligent O&M. The AR1000V can be deployed in the enterprise headquarters (hub), Point of Presence (PoP), and cloud environment to extend the enterprise network to the cloud. It implements the same security and management policies as those on the internal network of an enterprise. The AR1000V can use hybrid links to connect to a WAN. Based on application-based intelligent traffic steering, it optimizes the enterprise's cloud access path and improves the experience of enterprise access to cloud services. It plays an important role in the transformation from the traditional enterprise WAN to SD-WAN.

2 Product Overview

Figure 2-1 Architecture of the AR1000V
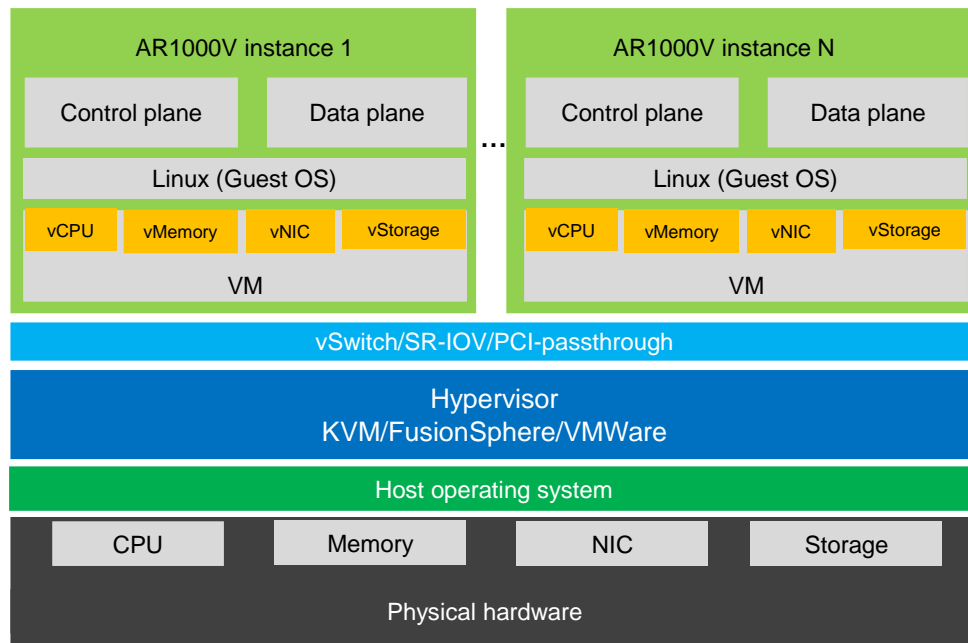
The AR1000V is a customer premises equipment (CPE) in virtual network function (VNF) mode. The system architecture consists of the following entities:

- Physical hardware and host operating system: The universal x86 hardware platform provides hardware resources such as the CPU, memory, network adapter, and storage medium, and basic operating system services.

- Hypervisor: It supports mainstream virtualization platforms, such as KVM/FusionSphere/VMware, as the intermediate software layer between physical servers and VM instances. It manages VMs, allows multiple VM instances to share hardware resources, and isolates and protects VMs.

- vSwitch/SR-IOV/PCI-passthrough: It implements information exchange between VM instances and between VM instances and external networks.

- VM instance: The Linux operating system is used. An VM instance is allocated independent vCPU, memory, storage medium, and vNIC resource to carry VNF instances on the AR1000V that integrates routing, switching, security, and VPN functions.

3 Highlights

The following are some of the key features of the AR1000V virtual router:

Leading architecture and superior performance

- Is an NFV product based on industry-leading Huawei VRP platform, featuring good stability and maturity.
- Decouples the control plane from the forwarding plane and uses the multi-core CPU, ensuring no bottleneck for service forwarding.

Compatibility with multiple platforms and easy service deployment

- Is compatible with mainstream virtualization platforms such as KVM/FusionSphere/VMware.
- Runs in the public cloud to expand enterprise networks to the cloud.
- Uses software implementation, and is able to be quickly and flexibly deployed in the PoP, hub site, and cloud environment.

SD-WAN cloud access

- Provides application-based intelligent traffic steering and accelerated flexible cloud access, improving enterprise customers' cloud application experience.
- Is managed by the Agile Controller. The Agile Controller provides centralized management, refined control, and visualized O&M, simplifying service deployment and reducing network maintenance costs.
- Automatically orchestrates overlay tunnels between enterprise sites to quickly establish secure and reliable network connections.

4 Typical Applications

4.1 Enterprise Aggregation Router

Huawei AR1000V can be deployed at the hub of the enterprise headquarters or used as an aggregation node of the enterprise network. It functions as the aggregation router of an enterprise to implement interworking between the headquarters and its branch. It uses the same software platform as the AR series hardware router. This ensures that the operation interface, management tools, and user experience are the same. The AR1000V features high forwarding performance, good scalability, and numerous VPN functions. It can be deployed with VNF instances such as the Virtual Firewall (vFW) and Virtual WAN optimization controller (vWoC) on servers to implement multiple network functions. It also provides secure and reliable network services for enterprise customers and reduces network investment.

Figure 4-1 AR1000V used as the hub of the headquarters
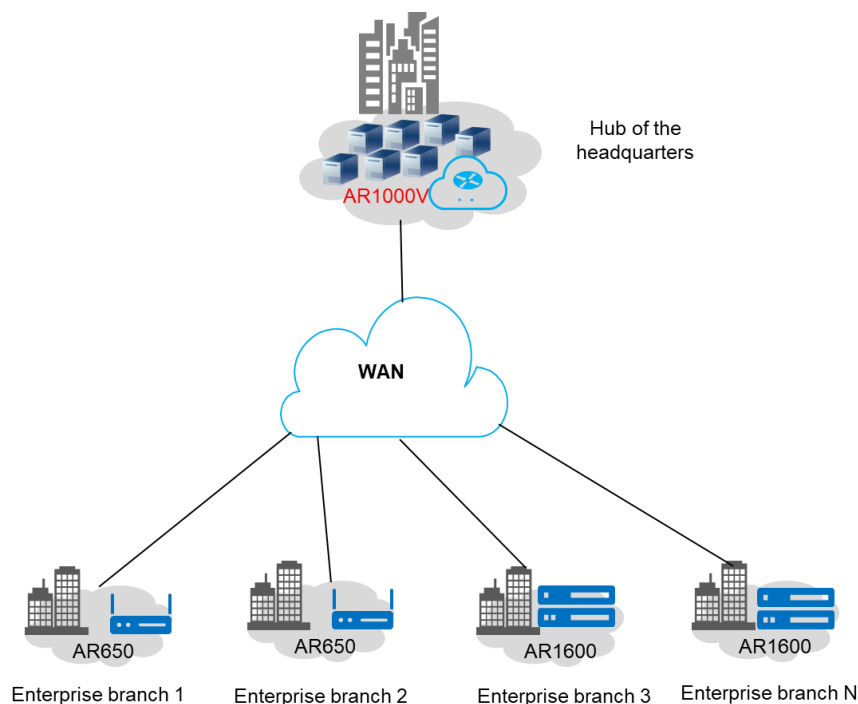
4.2 Cloud Access in the SD-WAN Solution

Huawei AR1000V is purely a software product. It is deployed in a VM as a VNF instance and functions as a Virtual CPE (vCPE) on the SD-WAN network. It uses hybrid links to connect to the WAN, monitors the link status in real time, intelligently selects the optimal path based on the application and link status, optimizes enterprise branch's cloud access path, and improves cloud access efficiency. In addition, the Agile Controller provides centralized management and visualized and controllable services and performance, reducing WAN interconnection costs and improving O&M efficiency.

Figure 4-2 AR1000V used as the cloud access gateway
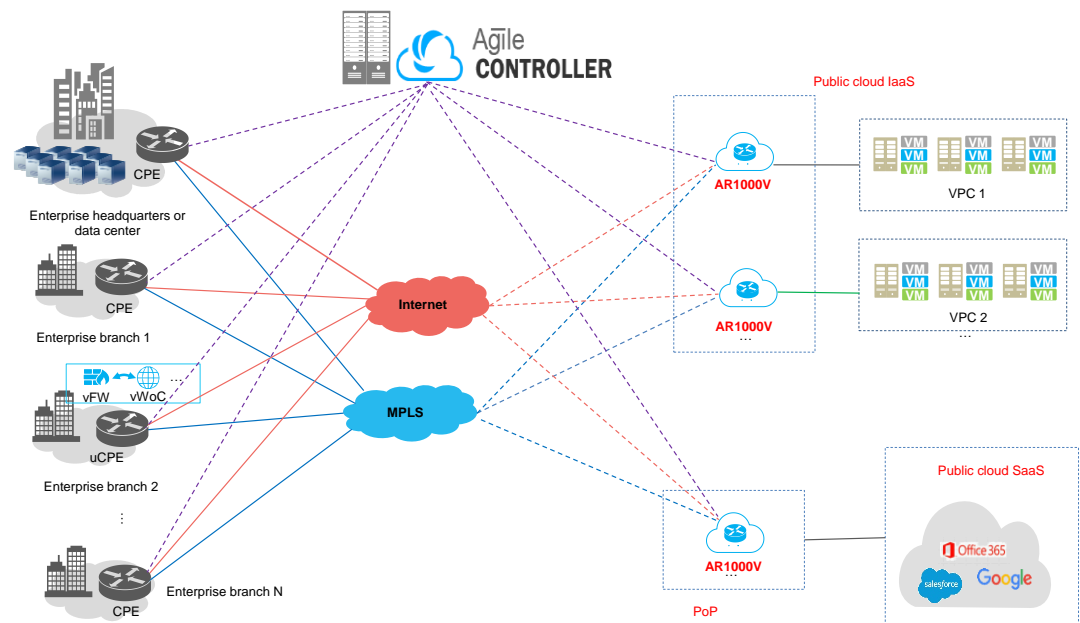
In the public cloud IaaS scenario, the AR1000V is deployed in the VPC of the public cloud and establishes a secure connection with the VPC of the enterprise IaaS service. As a node on the enterprise network, the AR1000V expands the enterprise network to the cloud and adopts unified security, management, and QoS policies. It allows enterprises to securely access IaaS services. In addition, cloud access traffic does not bypass the headquarters. This shortens the response delay, reduces the performance requirements of the hub at the headquarters, and improves the IaaS cloud service experience of enterprises.

In the public cloud SaaS scenario, the AR1000V is deployed on the server of the PoP or cloud environment to access the SaaS service near the PoP, improving the cloud access efficiency. PoP security and management policies reduce the security risks from enterprise branches accessing SaaS services, and improve the SaaS access experience of enterprise users.

5 Product Specifications

Table 5-1 Technical specifications of the AR1000V

Specification	AR1000V
Performance specification	
Throughput ***	Up to 10Gbps
Basic forwarding ***	Up to 20Mpps
IPsec throughput ***	Up to 5Gbps
VM resource specifications	
vCPU	1 to 16 vCPUs (depending on the service scenarios, the 2.30 GHz CPU frequency is recommended.)
Memory	2 GB to 16 GB (depending on the service scenarios)
Storage	10 GB
Number of vNIC interfaces	2 to 16 (depending on the service scenarios)
Hypervisor	FusionSphere 6.0/6.1 VMWare 5.5/6.0 Red Hat KVM
vNIC type	Virtio (I/O semi-virtualization, supported by only FusionSphere and Red Hat KVM) Single-root I/O virtualization (SR-IOV) PCI-Passthrough
Software specifications	
Basic functions	ARP, DHCP server/client/relay, DNS client/proxy, NAT, and PPPoE client
IPv4 unicast routing	Static route, OSPF, BGP, routing policies, policy-based routing including local policy-based routing, interface policy-based routing, and smart policy routing (SPR), RIP, and IS-IS

Specification	AR1000V
Basic IPv6 functions	IPv6 ND, IPv6 PMTU, IPv6 FIB, and IPv6 ACL
IPv6 unicast routing	Routing policy, static route, RIPng, OSPFv3, IS-ISv6, and BGP4+
QoS	DiffServ domain, traffic policing (CAR), traffic shaping, MQC (traffic classifier, traffic behavior, and traffic policy), 3-level scheduling on an interface and 3-level shaping (hierarchical QoS), Smart Application Control (SAC), priority mapping, congestion management, and congestion avoidance
VPN	GRE, IPSec VPN, DSVPN, and VXLAN
Security	AAA, PKI, ACL, firewall, IPS, URL filtering, CPCAR, RADIUS authentication, blacklist, attack source tracing, ARP security, ICMP attack defense, and URPF
Reliability	VRRP, interface backup, and BFD
Management and maintenance	Upgrade management, device management, command line, NTP, web NMS, SSH (v1/v2) NetStream, NQA, IP FPM, TCP FPM, TWAMP, SNMP (v1/v2c/v3), NetConf/YANG,and CWMP

*** Solution performance is depending on testing environment，and IPsec performance is based on 1400Bytes packet size

Table 5-2 Software features

Feature	Description
Standard edition	ARP, OSPF, BGP, RIP, IS-IS IPv4, IPv6 GRE, IPSec, VXLAN VRRP, BFD, interface backup QoS, HQoS, firewall, CPCAR DHCP, NAT, DNS, NetStream Management and maintenance
Advanced edition	All features of the standard edition IPS, URL filtering, SAC, and DSVPN

Table 5-3 Minimum VM resource requirements for the AR1000V

Throughput	Standard Package	Advanced Package
100 Mbps	1 vCPU/2 GB	1 vCPU/2 GB
500 Mbps	1 vCPU/2 GB	1 vCPU/2 GB
1 Gbps	1 vCPU/2 GB	2 vCPU/4 GB

Throughput	Standard Package	Advanced Package
5 Gbps	2 vCPU/4 GB	8 vCPU/8 GB
10Gbps	4 vCPU/4 GB	16 vCPU/16 GB

For more information, visit http://enterprise.huawei.com or contact Huawei local sales office.