Huawei SD-WAN Solution Datasheet

Huawei SD-WAN Solution is purpose-built to provide full-scenario on-demand interconnections between branches, between branches and data centers, and between branches and clouds. Standing out with features such as application-based intelligent traffic steering and acceleration as well as intelligent O&M, this solution redefines full-process service experience in enterprise WAN interconnections.

Trends and Challenges Facing Enterprise Networks

With the continuous cloudification of enterprise IT architectures and widespread use of public clouds, increasingly more enterprises are starting to shift their infrastructures (such as enterprise data centers) to the cloud, abandon traditional closed IT architectures, and instead use open network architectures. To further this, enterprises' mission-critical applications are migrated onto the cloud, such as the office, production ERP system, and sales system. Under this situation, enterprises increasingly rely on the Software as a Service (SaaS) provided by application service providers, and prefer to access key applications required for daily office work from the cloud through the Internet.

Cloud transformation is more than a technical revolution, but more importantly, a business model innovation. As enterprises migrate their branch services to the cloud, they face new challenges including the following:

- **Breaking traditional closed WAN architectures and achieving agile WAN interconnections**

  Digitalization and globalization require enterprise branch sites to interconnect quickly with each other through diversified carrier access networks across wider areas. In the next few years, more enterprise services will be deployed on the cloud, and the legacy branches, headquarters, and data centers of enterprises will need to be more open and more flexibly connect to the Internet, public clouds, and SaaS applications. Under this situation, the key to successful digital transformation of enterprises is to efficiently and rapidly interconnect enterprise WANs through different carrier networks to meet their huge, complex organization and service interconnection demands.

- **Ensuring application experience despite bandwidth sharing by massive numbers of applications and service conflicts**

  The rapid development of the Internet has seen the coverage and performance of networks increase considerably. Internet-based networks are now becoming the primary choice for enterprises apart from traditional private lines, but a major drawback of them is that service quality cannot be guaranteed. In addition, traditional networks lack insights into services and cannot learn the status of applications. If burst traffic causes link congestion or quality deterioration, experience of mission-critical services cannot be guaranteed.

- **Simplifying network O&M and changing traditional O&M paradigms (inadequate support for diversified device types, inefficient and error-prone manual configuration through the CLI due, service traffic invisibility, and low O&M efficiency)**

  Traditional O&M requires highly skilled dedicated personnel to maintain devices on site. As enterprise branches are becoming more widely distributed across geographical locations, the number and types of devices are increasing sharply, making traditional O&M challenging and costly. Additionally, the increase and cloudification of services complicate traffic transmission from branches to branches, public clouds, and private clouds on WANs, and therefore traditional network O&M methods can no longer adapt to service development.

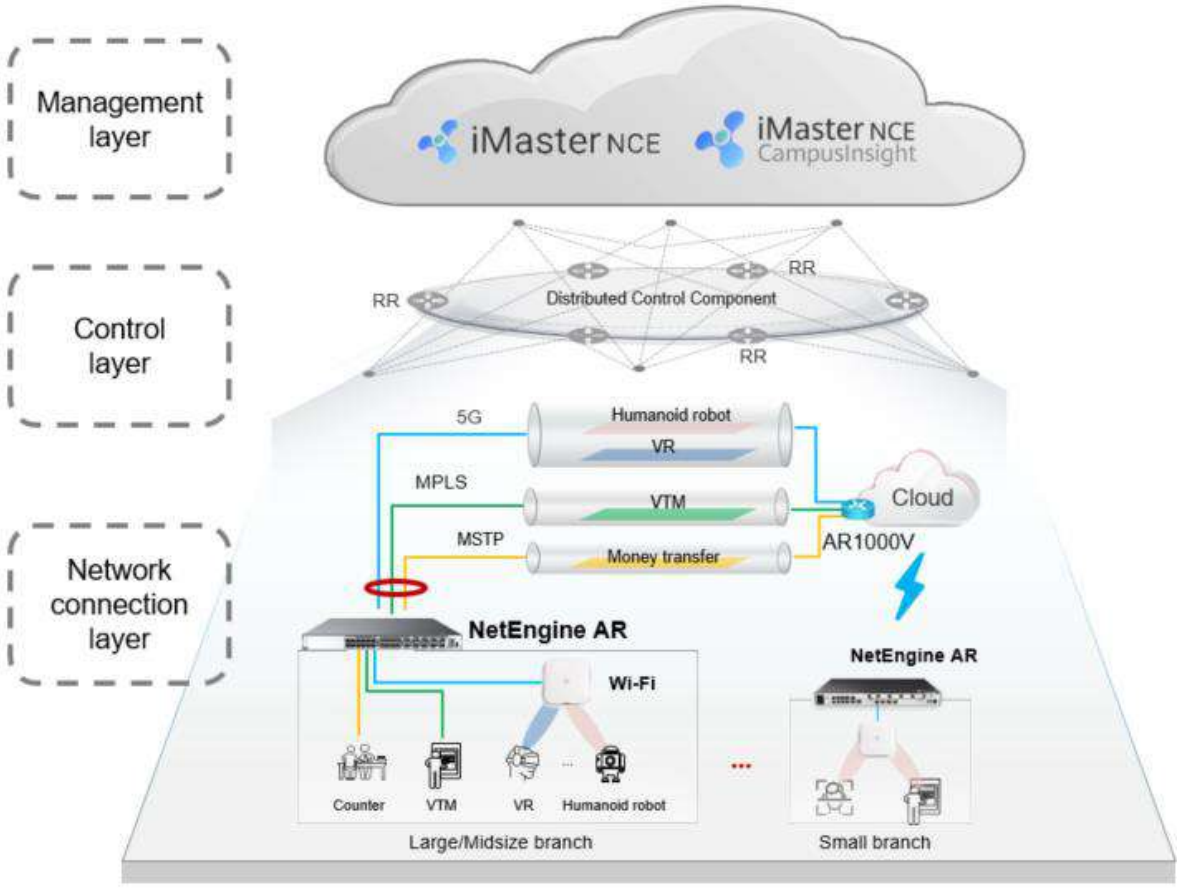
Huawei SD-WAN Solution

Huawei SD-WAN Solution addresses the issues facing enterprise networks, including closed WAN architectures, difficult service experience guarantee, slow service rollout, and difficult O&M. This solution provides full-scenario on-demand interconnections between branches, between branches and data centers, and between branches and clouds. With compelling features such as application-based intelligent traffic steering and acceleration as well as intelligent O&M, the SD-WAN Solution redefines full-process service experience in enterprise WAN interconnections.

Architecture of Huawei SD-WAN Solution

The overall architecture of Huawei's SD-WAN Solution comprises the network connection layer, control layer, and management layer.

Overall Architecture of the SD-WAN Solution



- **Network connection layer**

  Enterprises deploy cost-effective NetEngine AR routers and use overlay technology to build full network interconnections between the headquarters, branches, and public or private clouds on demand through links such as Internet links and traditional private lines.

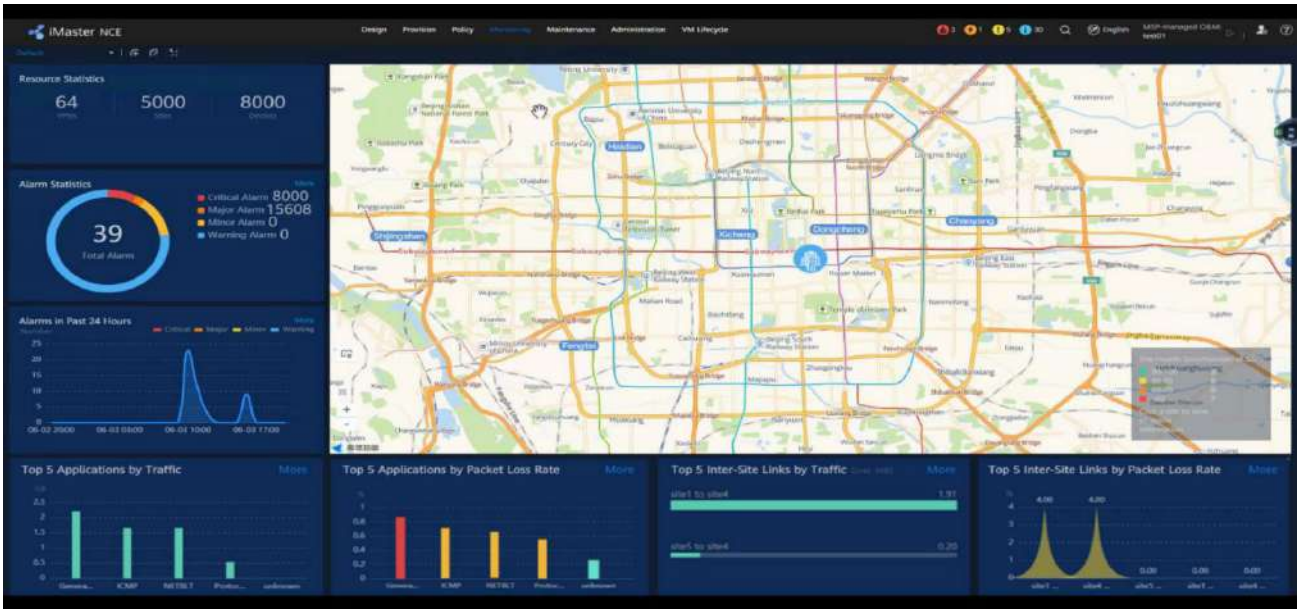
- **Control layer**

  Reflect routers (RRs) work with iMaster NCE to implement automatic deployment and configuration of networks in each area, automatic policy provisioning, route transfer between sites in each area, and inter-area network interconnection.

- **Management layer**

  iMaster NCE implements full-process management on enterprise interconnection services. In the southbound direction, iMaster NCE uses NETCONF/YANG to implement unified management of devices such as RRs and CPEs, CPE-RR mapping and orchestration, configuration and orchestration of different virtual private network (VPN) topologies, as well as management and provisioning of network service policies. In the northbound direction, iMaster NCE provides standard RESTful APIs for easy interconnection with third-party applications and the cloud platforms.

iMaster NCE supports a large screen with an integrated O&M and monitoring GUI, and displays the network-side status based on the topology, GIS, and 45+ reports, improving O&M efficiency and service experience.



iMaster NCE-CampusInsight is a network analyzer. As an optional component of iMaster NCE, it uses telemetry to collect network indicators in seconds, enabling experience visualization for each user, in every application, at any moment. Drawing on AI and ML technologies, iMaster NCE-CampusInsight precisely identifies 85% of potential issues while efficiently locating faults and intelligently optimizing the network in minutes.

Characteristics of Huawei SD-WAN Solution

- **5G ultra-broadband for on-demand interconnection**

  5G gigabit wireless and ultra-broadband connection: Supports 5G uplinks, cabling-free, enables network provisioning within minutes, and also supports per-flow load balancing for improved 5G link utilization.

  Flexible networking and on-demand service interconnection: Up to 20,000 CPEs can be networked. Huawei NetEngine AR routers provide various wired and wireless WAN interfaces, and support the hub-spoke, full-mesh, and partial-mesh networking options. Customers can flexibly select single-layer or multi-layer networking best tailored to their network scale and needs. Carriers can also deploy multi-tenant high-performance CPEs as gateways to provide enterprise tenants with services for interconnection with traditional private line networks and POP networking services. The multi-tenant interworking gateway (IWG) provides flexible access between SD-WAN sites and legacy MPLS sites, facilitating smooth evolution of legacy enterprise networks to SD-WAN networks.

  IPV6 enable: Support LAN/WAN IPV6.

  Multiple cloud access modes and one-hop service connection to the cloud: The SD-WAN Solution allows tunnels to be established between branch CPEs and private clouds, so that service traffic is transmitted one-hop from branch sites to private clouds. Through the IWG, a carrier can provide enterprises with communication between SD-WAN and legacy networks, allowing for one-hop connection of branch sites to the MPLS backbone network. This solution also supports local Internet access or centralized Internet access through the headquarters for access to cloud SaaS services.

- **Intelligent traffic steering for outstanding experience**

  Application-based intelligent traffic steering, guaranteeing service experience: Huawei SD-WAN Solution supports abundant application identification technologies. First-packet identification (FPI), service awareness (SA), and customized application identification combine to double the application identification accuracy and efficiency. In-line detection technology is used to implement multi-dimensional optimal route selection based on the application SLA, application priority, and bandwidth utilization, ensuring that the traffic of mission-critical applications is transmitted over the optimal link.

  Application optimization for enhanced experience: Multi-path packet duplication ensures reliable service transmission. Per-flow/per-packet load balancing implements refined traffic management. The innovative adaptive forward error correction (A-FEC) mechanism embedded with quality awareness ensures lossless experience of audio and video applications even when the packet loss rate is 30%.

  End-to-end encryption for secure interconnection: End-to-end IPsec encryption as well as secure and reliable devices ensure secure service transmission and secure interconnection with third-party security clouds.

- **Simplified deployment, and intelligent O&M**

  Simplified deployment: Various zero touch provisioning (ZTP) methods are provided to implement device plug-and-play with zero site visits. The application-centric wizard-based configuration automates the entire process from device deployment, network orchestration, and application policies, to visualized O&M, shortening the service configuration time from 30 minutes to 5 minutes.

  Visualized O&M: The SD-WAN Solution supports topology visualization based on applications, links, sites, and the entire network, and also supports more than 40 agile reports.

  Intelligent network O&M: Powered by AI and big data analytics technologies, iMaster NCE-CampusInsight redefines the scope of network monitoring. It uses Telemetry technology to collect network data in real time, and adopts big data analytics and machine learning (ML) algorithms to learn network behaviors and identify faults. In addition, it enables visible experience assurance, proactive fault detection, intelligent root cause analysis, and intelligent network optimization. The resulting benefits include comprehensively assured service experience, slashed network O&M costs, and superb network service experience.

Key Features of the SD-WAN Solution

Feature	Description
MSP management	Tenant management Cloud inspection
ZTP	Email-based deployment USB-based deployment
Networking	Single-/Dual-CPE + Single-/Multi-link
Tunnel management	VPN tunnel IPsec encryption
Connection management	Site interconnection Local Internet access Centralized Internet access
Intelligent traffic steering	Link quality detection Application quality detection Traffic steering policy (based on link quality and application)
Value-added services	QoS policy ACL policy URL blacklist and whitelist Firewall policy IPS policy Antivirus
Monitoring and O&M	Intra-site monitoring Inter-site monitoring One-stop topology-based O&M Rights- and domain-based management Real-time monitoring
WAN optimization	A-FEC Multi-path packet duplication Per-packet load balancing
Cloud connectivity	Alibaba Cloud e-Cloud

Feature	Description
	AWS HUAWEI CLOUD
MSP configuration	Network management service IWG configuration
Native IPv6	IPv6 on Ethernet interfaces IPv6 interface deployment IPv6 GRE IPv6 static route
Large-screen monitoring	MSP/Carrier large-screen monitoring
Southbound access and openness	Multiple southbound IP addresses for device registration SND package management powered by southbound open programmability

NetEngine AR8000 & NetEngine AR6000 Performance and Interface Specifications

Model	NetEngine AR8140-12G10XG	NetEngine AR6300/AR6280		NetEngine AR6710-L26T2X4/AR6710-L50T2X4	NetEngine AR6140E-9G-2AC	NetEngine AR6121E
		SRU-600H	SRU-400H			
SD-WAN performance in typical scenarios**	15 Gbps: peak performance 8 Gbps: 3000 tunnels, 1M sessions, and 3 VPNs 7 Gbps: 6000 tunnels, 2M sessions, and 3 VPNs	1 Gbps: single tunnel 4 Gbps: > 16 tunnels	1 Gbps: single tunnel 3 Gbps: > 16 tunnels	800 Mbps	800 Mbps	800 Mbps
SD-WAN performance in basic scenarios***	20 Gbps: peak performance 14 Gbps: 3000 tunnels, 1M sessions, and 3 VPNs 12 Gbps: 6000 tunnels, 2M sessions, and 3 VPNs	1.4 Gbps: single tunnel 6 Gbps: > 16 tunnels	1.4 Gbps: single tunnel 4 Gbps: > 16 tunnels	1200 Mbps	1200 Mbps	1200 Mbps
Fixed LAN/WAN interfaces****	WAN/LAN interfaces: 10 x 10GE optical + 8 x GE combo + 4 x GE electrical	WAN/LAN interfaces: 14 x 10GE optical ports (compatible with GE	WAN/LAN interfaces: 14 x 10GE optical (compatible with GE optical interfaces) + 10 x GE electrical	WAN interfaces: 2 x GE electrical, 2 x 10GE optical LAN interface: 24 x GE electrical (AR6710-L26T2X4) / 24 x	WAN interfaces: 2 x GE optical + 2 x GE electrical LAN/WAN interfaces: 2	WAN interfaces: 1 x 10GE optical (compatible with GE optical interfaces) + 2 x GE combo LAN/WAN

		optical interfaces) + 10 x GE electrical		GE electrical (AR6710-L50T2X4)	x GE optical + 3 x GE electrical	interfaces: 8 x GE electrical + 1 x GE combo

NetEngine AR600 Performance and Interface Specifications

Model	NetEngine AR651W/AR651W-8P/AR651	NetEngine AR611W/ AR617VW / AR617VW-LTE4EA
SD-WAN performance in typical scenarios**	600 Mbps	50 Mbps
SD-WAN performance in basic scenarios***	800 Mbps	80 Mbps
Fixed LAN/WAN interfaces****	WAN interfaces: 2 x GE combo LAN/WAN interfaces: 8 x GE electrical	WAN interface: 1 x GE combo LAN/WAN interfaces: 4 x GE electrical

**: The following service model is used in the typical SD-WAN scenario: EVPN + IPsec + FPI + SA + HQoS + NetStream. The performance data is the sum of bidirectional flows.

***: The following service model is used in the basic SD-WAN scenario: EVPN + IPsec + HQoS. The performance data is the sum of bidirectional flows.

****: WAN/LAN interfaces are WAN interfaces by default and can be configured as LAN interfaces. LAN/WAN interfaces are LAN interfaces by default and can be configured as WAN interfaces.

Application Scenarios of Huawei SD-WAN Solution

Enterprise-Built SD-WAN Interconnection

Large enterprises with distributed branch sites, diversified service types, and high requirements on private line quality can deploy their own iMaster NCE systems to manage SD-WAN networks. This can help them overcome challenges such as explosive growth of service traffic, poor experience of mission-critical applications, and difficult O&M.

Enterprise SD-WAN Solution:

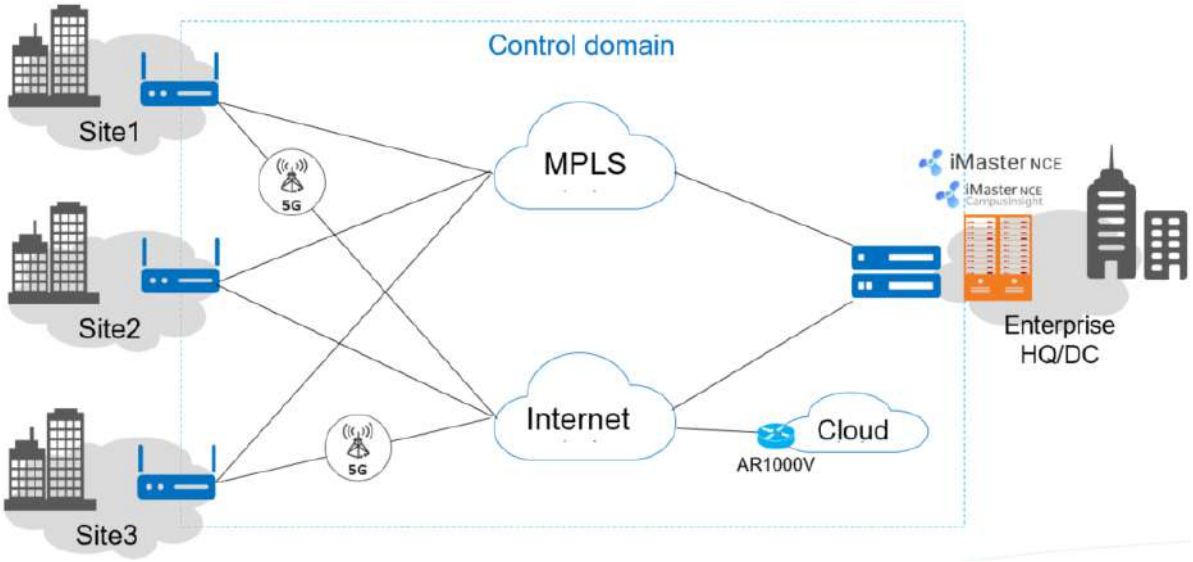
An enterprise deploys one set of iMaster NCE to manage its own SD-WAN services.

The enterprise headquarters and branches can use dual CPEs as gateways and access the network through both MPLS and Internet links, meeting the high quality requirements for private lines. Sites where wired links are unavailable can also use 5G/LTE links to access the network, The AR1000V is deployed on the cloud to optimize the cloud access path and improve the cloud access efficiency. CPEs at the headquarters or large branch sites can function as RRs. Independent devices can also be deployed as RRs.

Hierarchical QoS policies and bandwidth- or application-based intelligent traffic steering are configured to ensure experience of mission-critical services, implement load balancing, and improve bandwidth utilization.

This solution provides ZTP, automatic service orchestration and delivery, multi-dimensional visualized management for links and services, and various fault diagnosis and inspection tools to simplify network deployment and O&M of a large number of branches.

Enterprise-built SD-WAN Interconnection Scenario



Carrier SD-WAN Multi-Tenant Scenario

Carriers need to provide network deployment and O&M services for enterprises of different scales in various industries, helping enterprises quickly complete network deployment and service rollout. In addition, carriers transform from network pipe providers to service providers to provide network and value-added services for enterprises.

Carrier SD-WAN Solution:

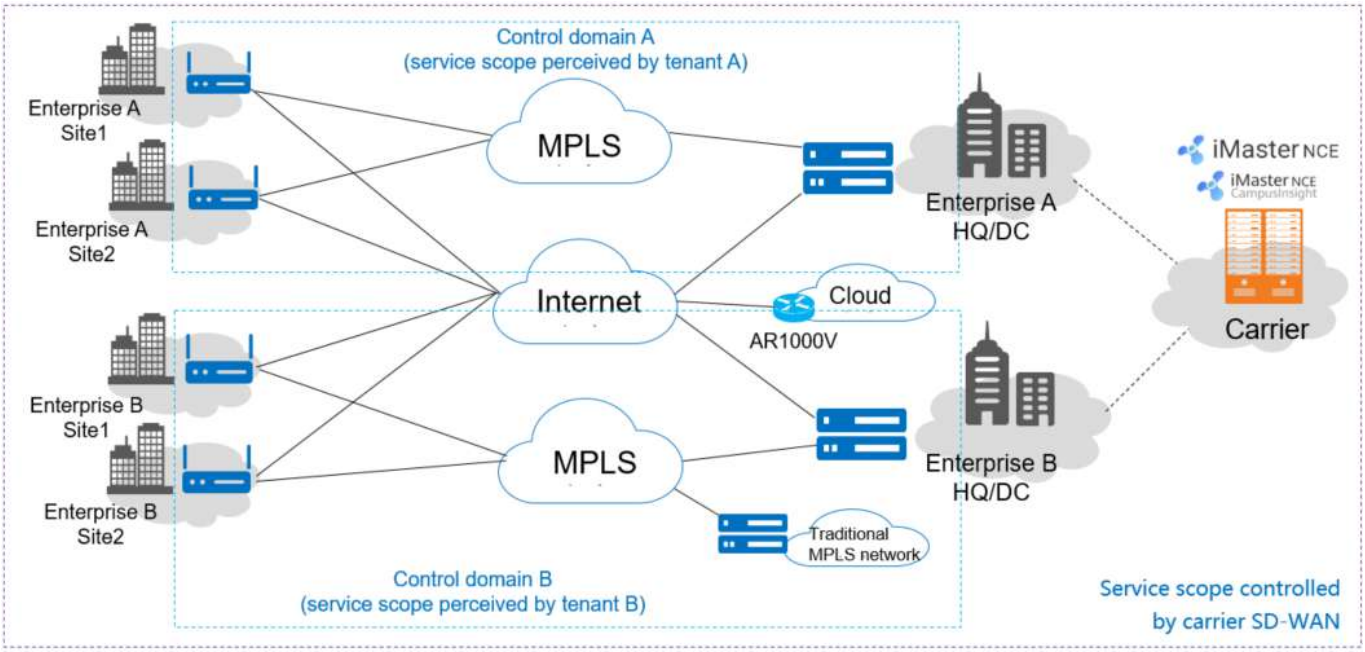
Carriers use the multi-tenant mode of iMaster NCE to deploy multi-tenant-capable RRs so that SD-WAN networks are available for multiple enterprises. Enterprises are tenants, leasing the SD-WAN networks of carriers. For security, tenants are isolated and are invisible to each other, and each tenant independently maintains its own SD-WAN network.

Enterprise branches can flexibly connect to the Internet through multiple links to communicate with other branches and access SaaS applications. Tenants can select hierarchical QoS policies, as well as intelligent traffic steering and security policies based on the link quality, application priority, bandwidth utilization, and load balancing to ensure experience of key services, improve bandwidth utilization, and achieve optimal security.

Carriers use the visualized O&M system of iMaster NCE to maintain SD-WAN networks and provide VASs for enterprises.

An enterprise network needs to support communication between SD-WAN sites and legacy branch sites to meet the operation requirements of inventory customer assets. Carriers can deploy IWGs that support the multi-tenant function to interconnect with Autonomous System Boundary Routers (ASBRs) on legacy networks. In addition, this solution meets the interconnection requirements of multiple SD-WAN sites and legacy branch sites.

Carrier SD-WAN Multi-Tenant Scenario



Huawei SD-WAN Solution Products

The SD-WAN Solution consists of the following components: iMaster NCE, iMaster NCE-CampusInsight, RRs, CPEs and vCPE. The following table describes the functions of each component.

Component	Product	Function
Controller	iMaster NCE	Provides centralized and automated management of network devices.
Network analyzer	iMaster NCE-CampusInsight	Collect network indicators in seconds, draw on AI and ML technologies, locate faults and optimize the network.
Distributed control component	RR	Distributes VPN route and tunnel information between CPEs.
CPE	NetEngine AR8000, NetEngine AR6000 and AR600 series routers, such as NetEngine AR651 and NetEngine AR6280	NetEngine AR branch access routers, which all support SD-WAN
vCPE	AR1000V	A virtual router which based on Network Functions Virtualization (NFV) technology, can be deployed on the server using the x86 hardware platform, private cloud, and public cloud.

Diverse SD-WAN Service Modes: Select the Right One for Your SD-WAN

To meet different customer requirements, Huawei provides two SD-WAN network service modes.

SD-WAN Service Mode	Customer Characteristics and Requirements	Remarks
Huawei Public Cloud	There are a small number of branches with no independent O&M team. Complex user and application access control policies are not required to ensure service experience.	Purchase the cloud management network service of HUAWEI CLOUD to manage network devices of small- and midsize enterprises or multi-branch organizations.
On-premises	A midsize or large enterprise has a large number of branches and independent O&M teams. Relatively complex user and application access control policies are required.	Purchase iMaster NCE-Campus and iMaster NCE-CampusInsight and deploy them in on-premises mode to manage network devices.

Software Package Functions

SD-WAN N1 software packages include mandatory software packages for common scenarios and optional function packages.

Feature	Description	N1 Mode		Add-on Package	
		Foundation Package	Advanced Package	SRv6	CampusInsight-based Application Analysis
Management and O&M	Deployment: email-, USB-, DHCP-, and registration center-based deployment; template-based batch deployment; device replacement	√	√		
	Basic monitoring and O&M: device/link/topology/application quality/network traffic monitoring, alarm, event, and log monitoring, fault diagnosis, reports, and northbound APIs	√	√		
Networking and routing	Networking: Hub-spoke/Full-mesh/Partial-mesh, dynamic tunnel	√	√		
	Hierarchical networking, multi-hub networking, and multi-VPN	√	√		
	Interconnection with traditional networks: communication through IWGs; communication through SD-WAN sites	√	√		
	Internet access: local Internet access, centralized Internet access, and hybrid Internet access, and NAT	√	√		
Application experience	Application identification: 5-tuple, DPI, FPI, and customized application/application group	√	√		
	Intelligent traffic steering: traffic steering based on link quality and load balancing	√	√		
	QoS: traffic classification, QoS, HQoS, and QoS in the outbound direction of hubs	√	√		
	Per-packet load balancing	√	√		
	Multi-path packet replication	√	√		

Feature	Description	N1 Mode		Add-on Package	
		Foundation Package	Advanced Package	SRv6	CampusInsight-based Application Analysis
	FEC/A-FEC	√	√		
Security	Basic security (IPsec, ACL)	√	√		
	Service security (Firewall)	√	√		
	Access security (MAC address authentication and 802.1X authentication)	√	√		
SRv6	SRv6 BE, EVPN			√	
	SRv6 TE			√	
	SRv6 protection (FRR)			√	
CampusInsight	Basic CampusInsight-based analysis capabilities (including Telemetry, network health, and issue analysis)		√		
	NetStream traffic analysis				√
Cloudification	AR1000V automatic orchestration on the public cloud		√		

More Information

For more information, visit https://e.huawei.com/en/ or contact us in the following ways:

- Global service hotline: http://e.huawei.com/en/service-hotline
- Logging in to the Huawei Enterprise technical support website: http://support.huawei.com/enterprise/
- Sending an email to the customer service mailbox: support_e@huawei.com

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