H3C CR16000-M

Series Routers

Release Date:　　Jun 2022

Product overview

H3C CR16000-M routers are digital era-oriented cloud service routers applicable to government, finance, transport, power grid, healthcare, education, and carriers. With a carrier-level HA and programmable NP architecture design, the router provides abundant features to process cloud services, carrier-level high availability, and exceptional forwarding capacity.

With high-density 100GE, 10GE, and GE ports and 155M/622M/2.5G POS, CPOS, and E1/T1 WAN ports, the routers can be deployed at different network positions. The router runs the state-of-the-art Comware network operating system, which is open, containerized, and programmable to meet user requirements in new businesses.

The router offers the following features:

- SRv6, which provides customized programming, global control and scheduling, open network construction, simplified Ops deployment, and visible display in cooperating with AD-WAN controllers.

- iFIT, which provides visible service quality display and fast troubleshooting.

- FlexE and channelized sub-interfaces, which meet the network slicing requirement at different layers, allowing for strict isolation of different services and SLA for key services.

H3C CR16000-M series routers

Features and Benefits

Abundant cloud services

- Supports SRv6, which allows one-hop access to the cloud and simplifies service provisioning.

- Supports iFIT and Telemetry, enabling service status report in real time and granular network monitoring for refined management and effective service assurance.

- Supports AD-WAN carrier and branch network solutions, enabling network intelligent scheduling and refined management and prediction of network trends through service emulation and failure testing.

- Supports network slicing technologies such as FlexE, channelized sub-interfaces, and Flex-Algo. Using network slices at different layers including the physical layer, network layer, and transport layer, the router can separate services of different tenants in the cloud and provides SLA for different services.

Carrier-level high availability

- With the carrier-level hardware framework design, the router supports physical isolation of control, services, and switching, and provides independent switching fabric modules.

- Supports MPU and switching fabric module 1+1 redundancy.

- Supports front-to-rear airflow and supports redundant fan trays that provide 12 fans in total.

- Supports power module N+M redundancy and built-in AC and DC power modules.

- Supports BFD for BGP/IS-IS/RIP/OSPF/static routing and NSR/GR switchover.

Green design

- **High-efficient heat dissipation**—Adopts the front-to-rear airflow design, increasing heat dissipation efficiency by 40%. The router uses fan tray micro-modularization to make sure that the average module temperature is 5°C (41°F) lower than that in traditional mode. It also supports stable heat dissipation through air deflectors.

- **Energy efficiency and consumption reduction**—Supports low-power mode configuration through SerDes, cutting-edge DDR controllers, on-demand core startup, and flexible processor frequency configuration. Compared to the preceding generation, the NPs used on the CR16000-M routers have reduced power consumption by 41%.

- **Intelligent power module management**—Supports powering on modules in turn, which ensures long operation of the router and decreases EMI.

- **Automatic fan speed adjustment**—Supports fan tray status monitoring and fault alarms based on module temperature and automatic fan speed adjustment based on the ambient temperature and module configuration to reduce power consumption and operating noise.

Technical Specifications

Item	CR16000-M8	CR16000-M16
Bi-direction Forwarding Capacity	800Gbps	800Gbps
Chassis	Integrated chassis, which can be installed in a 19-inch rack	
MPUs	2	2
Line cards	8	16
Independent switching fabric modules	2	2
Cooling	Front-to-rear airflow	Front-to-rear airflow
Independent fan trays	Independent fan trays in redundancy	Independent fan trays in redundancy
Power system	Four built-in AC and DC power modules (N+M redundancy), without occupying any service module slot.	Four built-in AC and DC power modules (N+M redundancy) , without occupying any service module slot.

Technical Specifications

Dimensions (H × W× D)	267 × 440 × 440 mm (10.51 × 17.32 × 17.32 in, 6 RU)	356 × 440 × 440 mm (14.02 × 17.32 × 17.32 in, 8 RU)
Ports	FE, GE, 10GE (LAN/WAN), 100GE, 155M POS, 622M POS, 2.5G POS, CPOS, ATM, and E1/T1 ports	
	Interface type changing between 100GE and 40GE	
	Interface type changing between 155M POS, 622M POS, and GE	
	Interface type changing between ATM/ and POS	
Unicast routing	IPv4/IPv6 dual stack	
	Static routing, RIP, RIPng, OSPF, OSPFv3, IS-IS, IS-ISv6, BGP, and BGP4+	
	VRRP and VRRPv3	
	IPv6 neighbor discovery, PMTU discovery, TCP6, ping IPv6, traceroute IPv6, socket IPv6, static IPv6 DNS, specified IPv6 DNS server, and TFTP IPv6 client	
	IPv4 to IPv6 transition	
	ICMPv6 MIB, UDP6 MIB, TCP6 MIB, and IPv6 MIB	
	ECMP and UCMP	
	Policy-based routing	
	Routing policy	
	Tunnels such as GRE	
	Static routing FRR, OSPF FRR, ISIS FRR, and BGP FRR	
Multicast	Routing protocols, including PIM-DM, PIM-SM, PIM-SSM, MSDP, MBGP, and Anycast-RP	
	IGMPv1/v2/v3 and IGMP snooping v1/v2/v3	
	PIM6-DM, PIM6-SM, and PIM6-SSM	
	MLDv1/v2 and MLD snooping v1	
	Multicast policy and multicast QoS	
MPLS VPN	MPLS label distribution protocols such as LDP and RSVP-TE	
	P/PE compliant with RFC 2547bis	
	Three inter-AS MPLS VPN methods (option1/option2/option3)	
	HoPE	
	Multi-role host	
	L2VPN, L3VPN, inter-AS L2VPN and L3VPN	
	MPLS TE FRR and LDP FRR, with a switchover time of not more than 50ms	
	6PE and 6vPE	
	Distributed multicast VPN	
	ACL, which identifies traffic and forwards the traffic to different VPNs	
	MPLS VPN network troubleshooting features, including MPLS ping and MPLS traceroute	
	L2VPN access to L3VPN	
	Access to VPLS via QinQ	
BRAS service	PPPoE, PPPoEoVLAN, and PPPoEoQ access authentication	
	Layer 2 portal, Layer 3 portal, and QinQ portal access authentication	
	IPoE, IPoEoVLAN, and IPoEoQ access authentication	
	Leased access authentication such as subnet-leased, interface-leased, and L2VPN-leased access authentication	
	L2TP	
	Layer 2 transparent access and Layer 3 transparent access	

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	Authentication, authorization, and accounting cooperating with standard RADIUS/TACACS+ protocol
	RADIUS, TACACS, and COPS protocols
	iTA, which differentiates services by destination addresses to perform accounting, bandwidth control, and QoS
	Unified wired and wireless authentication solutions, which meet the demands for massive user access and wireless client mobility
	BRAS IRF, which offers redundancy and simplifies Ops
ACL	IPv4 and IPv6 ACL and EACL
	Ingress/Egress ACL
	Hardware-based ACL
QoS	HQoS
	Queue scheduling mechanisms such as PQ, WFQ, and CBWFQ
	More granular and flexible traffic control through HQoS
	Traffic shaping
	Congestion avoidance technologies such as tail drop and WRED drop
	Priority marking and remarking
	802.1p, TOS, DSCP, and EXP priority mappings
	Congestion avoidance, traffic policing, and traffic shaping
	Data packet marking based on IP addresses, port numbers, 802.1P, and DSCP values
	Data packet multilevel queue mechanisms include CQ, PQ, LLQ, and WFQ
	Multicast QoS
Ethernet features	802.1Q
	ARP
	802.1Q VLAN trunk
	QinQ termination
	802.3d (STP)/802.3w (RSTP)/802.3s (MSTP)
	IEEE 802.3ad (link aggregation), static link aggregation, and link aggregation across different modules
	Aggregation of ports with different transmission rates
	Port mirroring and flow mirroring
	FlexE
	Channelized sub-interfaces
SDN technologies	VXLAN and EVPN
	PCEP protocol
	Network information collection protocols such as BGP-LS
	NETCONF and YANG
	MPLS SR and SRv6
	CBTS
	OpenFlow
	BGP FlowSpec
	Telemetry
	5G bearer network technologies such as EVPN, SRv6, and 1588v2

Traffic analysis	NetStream, which supports the version 5, version 7, and version 9 data export formats, sampling, and flow statistics
	Multi-log host
	Hardware-based NTA
	IPv4/IPv6/MPLS traffic collection and analysis
	Traffic collection and analysis in the inbound and outbound directions of interfaces
	Abnormal traffic detection and monitoring
High availability	MPU, switching fabric module, power module, and fan tray redundancy
	Separation of the control plane and switching plane
	Independent switching fabric modules
	Automatic fan speed adjustment
	Built-in DC and AC power modules, which can be installed on the same router and do not occupy service slots
	NSF, NSR, and GR
	BFD, which supports fast failure detection and a switchover time of not more than 50ms
	iFIT, which can detect network failures in real time, troubleshoot the network failures, and implement visible management over performance data
System management	In-band and out-of-band network management
	Console/AUX Modem/Telnet/SSH2.0 CLI-based configuration
	FTP, TFTP, XMODEM, and SFTP file uploading and downloading management
	SNMP v1/v2/v3
	RMON v1/v2 (groups 1, 2, 3, and 9)
	NTP
	NQA
	Fault alarms and self-healing
	DHCP
	Data logs
	ICMP
	Syslog
	Traceroute
	Multithreading access to the device via Telnet
	1588v2
Ambient temperature	Operating: 0°C to 45°C (32°F to 113°F)

Application Scenarios

Backbone/vertical network

The CR16000-M routers can be deployed at the backbone/vertical network, which has high requirements for availability. You deploy two CR16000-M routers at the province and city levels for redundancy and deploy two CR16000-M routers at the county level with dual-homed connections to the uplink.

This networking scheme is applicable to the setup, expansion, and brownfield deployment of the backbone/vertical network in the government, finance, transport, power grid, healthcare, and education industries. This solution can be used in conjunction with the AD-WAN carrier solution.
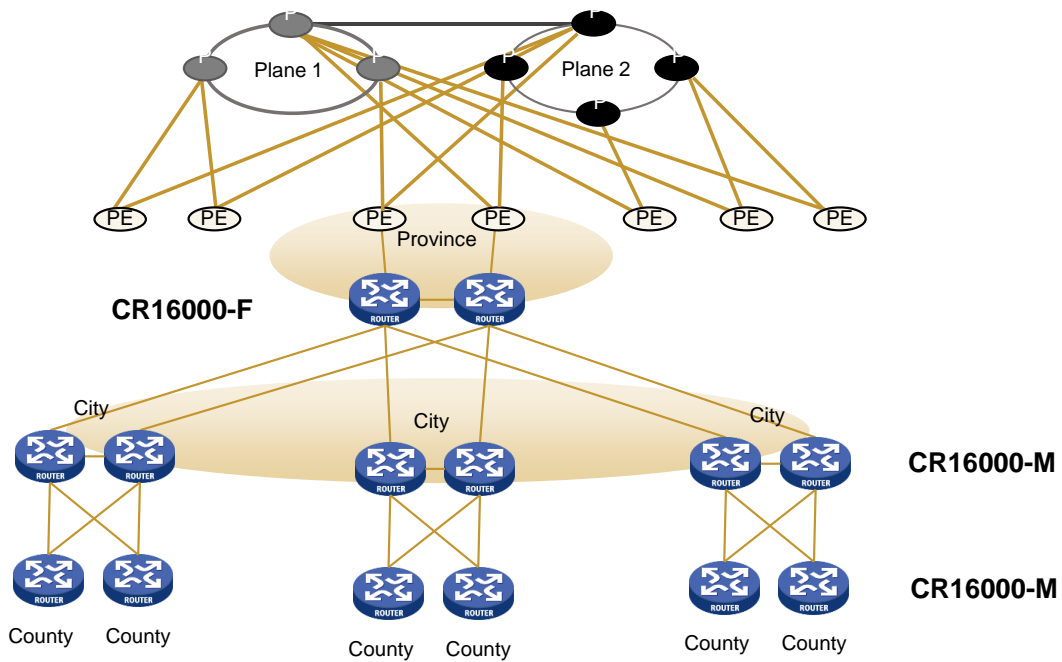
Enterprise branches

This network scheme is suitable for finance, large- and medium-sized enterprises, and HQ-branch network of chain enterprises. You can use this solution in conjunction with the AD-WAN branch solution to offer the following features:

- Multi-headquarters hierarchical networking.

- Zero-touch provisioning.

- Visible Ops GUI.

- Refined application identification.

- Diversified intelligent traffic scheduling policies.
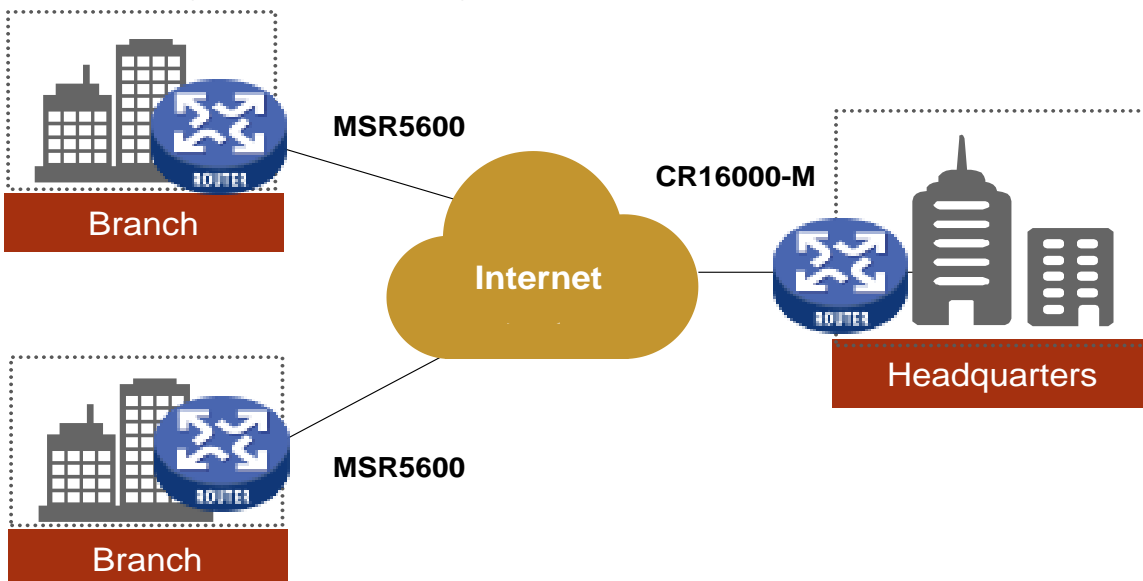
Data center egress

You can deploy CR16000-M routers as egress routers of data centers for large enterprises. The CR16000-M router supports one hop to cloud (data center) as long as they are reachable to the data center with IPv6, ignoring the backbone network link status. In addition, you can deploy SDN for automated service deployment, visible service flow, and intelligent traffic optimization, enhancing user experience.
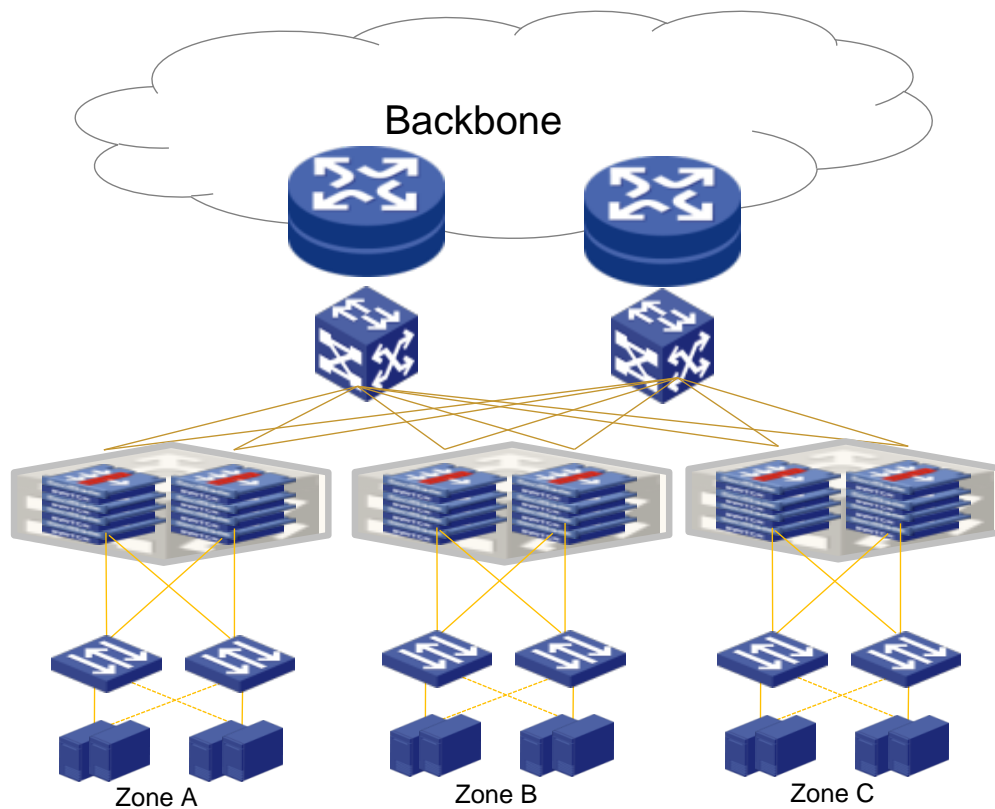
Ordering Guide

PID	Description
CR16000-M8	H3C CR16000-M8 router chassis
CR16000-M16	H3C CR16000-M16 router chassis
Power module	
PSR2400-12D	DC 2400W power module
PSR2500-12A	AC 2500W power module
MPU module	
SR07MPUA3-M	H3C CR16000-M Main Processing Unit (A3)
Switching fabric module	
SFE-A	H3C CR16000-M Network Service Processing Unit (A)
Interface module	
MIC-CQ2L-M	H3C CR16000-M 2-Port 100G Ethernet Optical Interface Card (QSFP28,LC) (MIC-M)
MIC-CQ1LF-M	H3C CR16000-M 1-Port 100G Flexible Ethernet Optical Interface Card (QSFP28,LC) (MIC-M)
MIC-CQ1L-M	H3C CR16000-M 1-Port 100G Ethernet Optical Interface Card (QSFP28,LC) (MIC-M)

MIC-XP10L-M	H3C CR16000-M 10-Port 10GBASE-R/W Ethernet Optical Interface Card (SFP+,LC) (MIC-M)
MIC-XP4L-M	H3C CR16000-M 4-Port 10GBASE-R/W Ethernet Optical Interface Card (SFP+,LC) (MIC-M)
MIC-GP24L-M	H3C CR16000-M 24-Port 1000BASE-X Ethernet Optical Interface Card (SFP,LC) (MIC-M)
MIC-GP12L-M	H3C CR16000-M 12-Port 1000BASE-X Ethernet Optical Interface Card (SFP,LC) (MIC-M)
MIC-GT12L-M	H3C CR16000-M 12-Port 1000BASE-X Ethernet Copper Interface Card (RJ45) (MIC-M)
MIC-PSP4L-M	H3C CR16000-M 4-Port OC-48c/STM-16c (2.5G) POS Optical Interface Card (SFP,LC) (MIC-M)
MIC-SP4L-M	H3C CR16000-M 4-Port OC-3c/STM-1c (155M) POS/ATM or 1-Port OC-12c/STM-4c (622M) POS/ATM Optical Interface Card (SFP,LC) (MIC-M)
MIC-TCP8L-M	H3C CR16000-M 8-Port OC-3c/OC-12c (622M/155M) POS/GE Optical Interface Card (SFP,LC) (MIC-M)
MIC-CLP4L-M	H3C CR16000-M 4-Port OC-3/STM-1 (155M) Channelized POS Optical Interface Card (SFP,LC) (MIC-M)
MIC-ET16L-M	H3C CR16000-M 16-Port E1 Copper Interface Card (HM96 Male Connector) (MIC-M)

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