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**Bezpieczeństwo,  
Efektywność,  
Optymalizacja**





# H3C CR16000-M

## Series Routers

Release Date: Aug 2024



## 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-M1A  | CR16000-M8 | CR16000-M16 |
|------------------------|--|------------|-------------|
| Switching Capacity     | 640Gbps  | 800Gbps    | 800Gbps     |
| Forwarding Performance | 173Mpps  | 216Mpps    | 216Mpps     |
| Chassis                | Integrated chassis, which can be installed in a 19-inch rack |            |             |

## H3C CR16000-M Series Routers

|                                      |  |  |   |
|--------------------------------------|--|--|---|
| MPUs                                 | Fixed-port router  | 2  | 2   |
| Line cards                           | 1 Flexible card  | 8  | 16  |
| Independent switching fabric modules | Fixed-port router  | 2  | 2   |
| Cooling                              | Front-to-rear airflow  | Front-to-rear airflow  | Front-to-rear airflow   |
| Independent fan trays                | Three independent fan trays in redundancy  | Independent fan trays in redundancy  | Independent fan trays in redundancy   |
| Power system                         | Two independent power supplies in redundancy, supporting AC/DC/HVDC  | 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. |
| MTBF                                 | 35 years   | 35 years   | 35 years  |
| MTTR                                 | 0.5 hours  | 0.5 hours  | 0.5 hours   |
| Dimensions (H × W × D)               | 44 × 440 × 435 mm (1.73 × 17.32 × 17.13 in, 1 RU)  | 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                                | <p>FE, GE, 10GE (LAN/WAN), 100GE, 155M POS, 622M POS, 2.5G POS, CPOS, ATM, and E1/T1 ports</p> <p>Interface type changing between 100GE and 40GE</p> <p>Interface type changing between 155M POS, 622M POS, and GE</p> <p>Interface type changing between ATM/ and POS</p> |  |   |

|                        |  |
|------------------------|--|
| <p>Unicast routing</p> | <p>IPv4/IPv6 dual stack</p> <p>IPv4 FIB table with up to 4M entries</p> <p>IPv6 FIB table with up to 2M entries</p> <p>IPv4 Routing table with up to 25M entries</p> <p>IPv6 Routing table with up to 12M entries</p> <p>Static routing, RIP, RIPng, OSPF, OSPFv3, IS-IS, IS-ISv6, BGP, and BGP4+</p> <p>VRRP and VRRPv3</p> <p>IPv6 neighbor discovery, PMTU discovery, TCP6, ping IPv6, traceroute IPv6, socket IPv6, static IPv6 DNS, specified IPv6 DNS server, and TFTP IPv6 client</p> <p>IPv4 to IPv6 transition</p> <p>ICMPv6 MIB, UDP6 MIB, TCP6 MIB, and IPv6 MIB</p> <p>ECMP and UCMP</p> <p>Policy-based routing</p> <p>Routing policy</p> <p>Tunnels such as GRE</p> <p>Static routing FRR, OSPF FRR, ISIS FRR, and BGP FRR</p> |
| <p>Multicast</p>       | <p>Routing protocols, including PIM-DM, PIM-SM, PIM-SSM, MSDP, MBGP, and Anycast-RP</p> <p>IGMPv1/v2/v3 and IGMP snooping v1/v2/v3</p> <p>PIM6-DM, PIM6-SM, and PIM6-SSM</p> <p>MLDv1/v2 and MLD snooping v1</p> <p>Multicast policy and multicast QoS</p>   |
| <p>MPLS VPN</p>        | <p>MPLS label distribution protocols such as LDP and RSVP-TE</p> <p>P/PE compliant with RFC 2547bis</p> <p>Three inter-AS MPLS VPN methods (option1/option2/option3)</p> <p>HoPE</p> <p>Multi-role host</p> <p>L2VPN, L3VPN, inter-AS L2VPN and L3VPN</p> <p>MPLS TE FRR and LDP FRR, with a switchover time of not more than 50ms</p> <p>6PE and 6vPE</p> <p>Distributed multicast VPN</p> <p>ACL, which identifies traffic and forwards the traffic to different VPNs</p> <p>MPLS VPN network troubleshooting features, including MPLS ping and MPLS traceroute</p> <p>L2VPN access to L3VPN</p> <p>Access to VPLS via QinQ</p>  |

|                   |   |
|-------------------|---|
| BRAS service      | <p>PPPoE, PPPoEoVLAN, and PPPoEoQ access authentication</p> <p>Layer 2 portal, Layer 3 portal, and QinQ portal access authentication</p> <p>IPoE, IPoEoVLAN, and IPoEoQ access authentication</p> <p>Leased access authentication such as subnet-leased, interface-leased, and L2VPN-leased access authentication</p> <p>L2TP</p> <p>Layer 2 transparent access and Layer 3 transparent access</p> <p>RADIUS, TACACS, and COPS protocols</p> <p>iTA, which differentiates services by destination addresses to perform accounting, bandwidth control, and QoS</p> <p>Unified wired and wireless authentication solutions, which meet the demands for massive user access and wireless client mobility</p> <p>BRAS IRF, which offers redundancy and simplifies Ops</p> |
| ACL               | <p>IPv4 and IPv6 ACL and EACL</p> <p>Ingress/Egress ACL</p> <p>Hardware-based ACL</p>   |
| QoS               | <p>HQoS</p> <p>Queue scheduling mechanisms such as PQ, WFQ, and CBWFQ</p> <p>More granular and flexible traffic control through HQoS</p> <p>Traffic shaping</p> <p>Congestion avoidance technologies such as tail drop and WRED drop</p> <p>Priority marking and remarking</p> <p>802.1p, TOS, DSCP, and EXP priority mappings</p> <p>Congestion avoidance, traffic policing, and traffic shaping</p> <p>Data packet marking based on IP addresses, port numbers, 802.1P, and DSCP values</p> <p>Data packet multilevel queue mechanisms include CQ, PQ, LLQ, and WFQ</p> <p>Multicast QoS</p>  |
| Ethernet features | <p>802.1Q</p> <p>Ethernet Virtual Circuits ( EVC)</p> <p>ARP</p> <p>802.1Q VLAN trunk</p> <p>QinQ VLAN encapsulation</p> <p>QinQ termination</p> <p>MAC address limit</p> <p>MAC table size with up to 1M</p>   |

|                          |  |
|--------------------------|--|
|                          | <p>802.3d (STP)/802.3w (RSTP)/802.3s (MSTP)</p> <p>IEEE 802.3ad (link aggregation), static link aggregation, and link aggregation across different modules</p> <p>Aggregation of ports with different transmission rates</p> <p>Port mirroring and flow mirroring</p> <p>FlexE</p> <p>Channelized sub-interfaces</p>   |
| <p>SDN technologies</p>  | <p>VXLAN and EVPN</p> <p>PCEP protocol</p> <p>Network information collection protocols such as BGP-LS</p> <p>NETCONF and YANG</p> <p>MPLS SR and SRv6</p> <p>CBTS</p> <p>OpenFlow</p> <p>BGP FlowSpec</p> <p>Telemetry</p> <p>5G bearer network technologies such as EVPN, SRv6, and 1588v2</p>  |
| <p>Traffic analysis</p>  | <p>NetStream, which supports the version 5, version 7, and version 9 data export formats, sampling, and flow statistics</p> <p>Multi-log host</p> <p>Hardware-based NTA</p> <p>IPv4/IPv6/MPLS traffic collection and analysis</p> <p>Traffic collection and analysis in the inbound and outbound directions of interfaces</p> <p>Abnormal traffic detection and monitoring</p>   |
| <p>High availability</p> | <p>MPU, switching fabric module, power module, and fan tray redundancy</p> <p>Separation of the control plane and switching plane</p> <p>Independent switching fabric modules</p> <p>Automatic fan speed adjustment</p> <p>Hot swapping for all components, and hot swapping of switching fabric modules without removing fan modules</p> <p>Built-in DC and AC power modules, which can be installed on the same router and do not occupy service slots</p> <p>NSF, NSR, and GR</p> <p>BFD, which supports fast failure detection and a switchover time of not more than 50ms</p> <p>iFIT, which can detect network failures in real time, troubleshoot the network failures, and</p> |



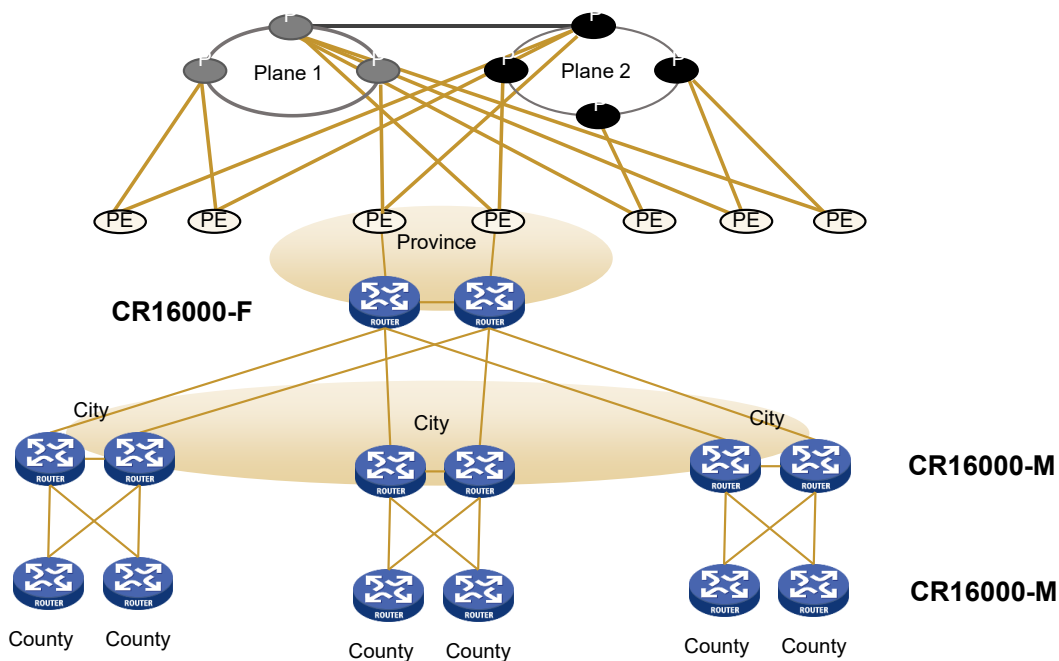
|                       |   |
|-----------------------|---|
|                       | implement visible management over performance data  |
| System management     | In-band and out-of-band network management<br>Console/AUX Modem/Telnet/SSH2.0 CLI-based configuration<br>FTP, TFTP, XMODEM, and SFTP file uploading and downloading management<br>SNMP v1/v2/v3<br>RMON v1/v2 (groups 1, 2, 3, and 9)<br>NTP<br>NQA<br>Fault alarms and self-healing<br>DHCP<br>Data logs<br>ICMP<br>Syslog<br>Traceroute<br>Multithreading access to the device via Telnet<br>1588v2 |
| Operating environment | Operating: 0°C to 45°C (32°F to 113°F)  |
| Regulatory compliance | Directive 2014/30/EU<br>EN 55032 Class A, EN 55024\EN 55035<br>EN 60950-1, EN 61000-3-2, EN 61000-3-3<br>IEC 60950-1<br>UL 60950-1  |

## 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.

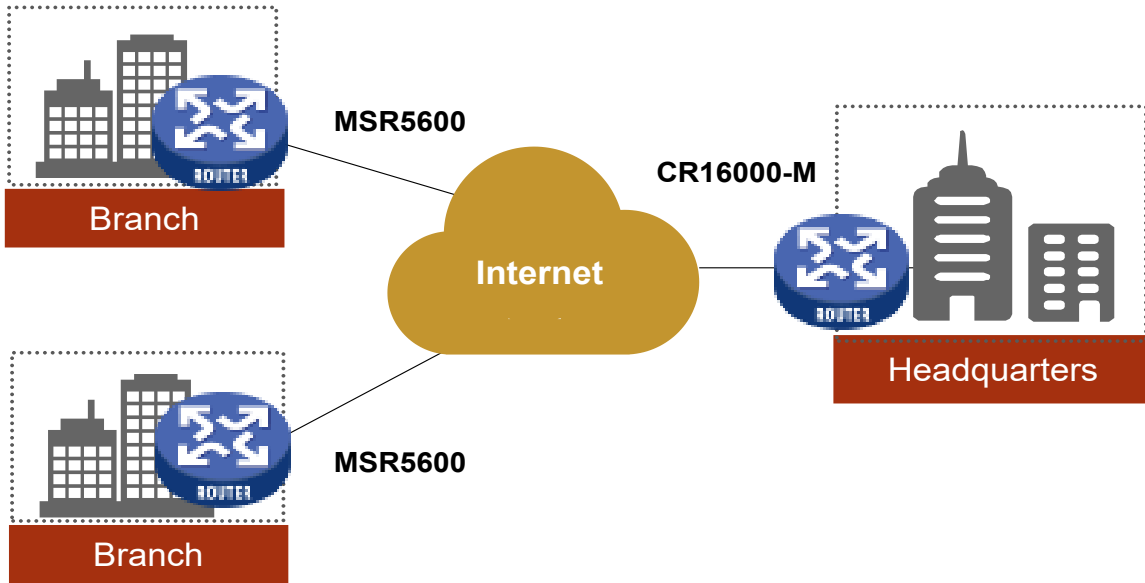
This networking scheme is applicable to the setup, expansion, and brownfield deployment of the backbone/vertical network in the government, finance, transport, power grid, healthcare, and education industries. This solution can be used in conjunction with the AD-WAN carrier solution.



## Enterprise branches

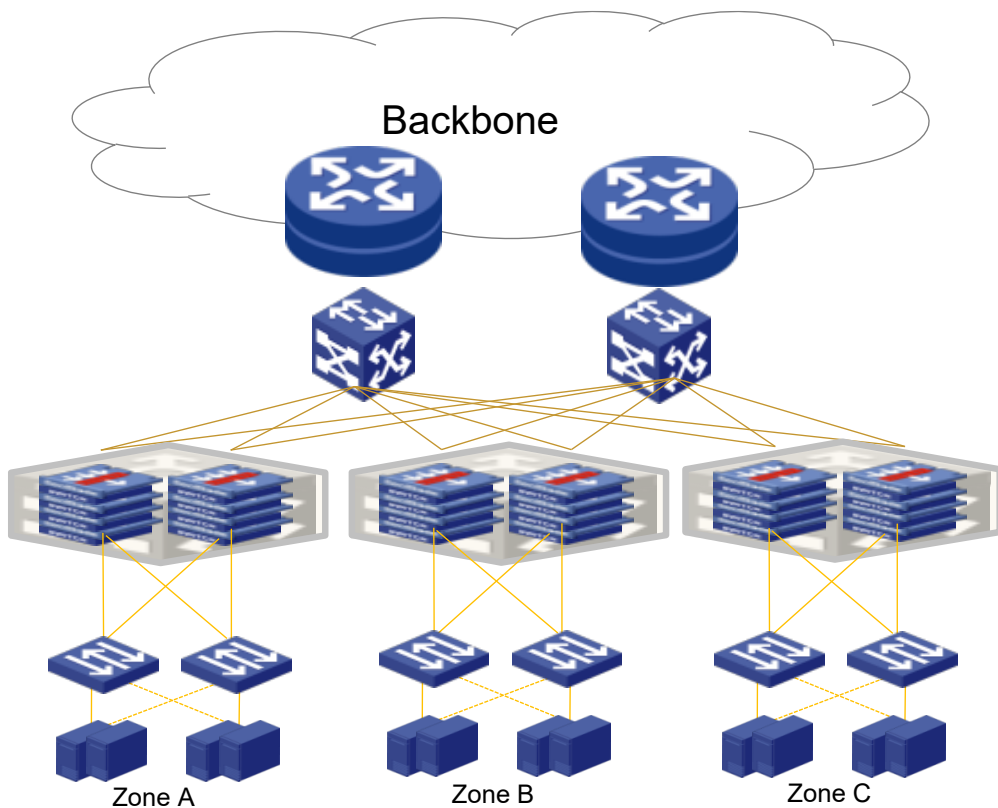
This network scheme is suitable for finance, large- and medium-sized enterprises, and HQ-branch network of chain enterprises. You can use this solution in conjunction with the AD-WAN branch solution to offer the following features:

- 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   |
| CR16000-M1A                    | H3C CR16000-M1A high-end router  |
| <b>Power module</b>            |  |
| PSR2400-12D                    | DC 2400W power module  |
| PSR2500-12A                    | AC 2500W power module  |
| PSR450-12D                     | 450W DC Power Supply Module  |
| PSR450-12A1                    | 450W AC Power Supply Module  |
| PSR450-12AHD                   | 450W HVDC Power Supply Module  |
| <b>MPU module</b>              |  |
| SR07MPUA3-M                    | H3C CR16000-M Main Processing Unit (A3)  |
| <b>Switching fabric module</b> |  |
| SFE-A                          | H3C CR16000-M Network Service Processing Unit (A)                                      |
| <b>Interface module</b>        |  |
| 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)                 |



## H3C CR16000-M Series Routers

|             |   |
|-------------|---|
|             | (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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