Huawei NetEngine AR650 Series Enterprise Routers

Huawei AR650 series enterprise routers are 1U fixed routers designed for use in small- and medium-sized enterprise branches. The AR650 integrates various service features such as SD-WAN, routing, switching, security, DSL, Voice and WLAN, providing diversified services and high performance.

Product Overview

Huawei's next-generation NetEngine AR650 series enterprise routers use multi-core processors and a non-blocking switching structure, helping to deliver three times the industry average performance. The NetEngine AR650 also integrates functions such as SD-WAN, cloud management, routing, switching, VPN, WLAN, and security, ensuring diversified and cloud-based services are fully supported. Huawei NetEngine AR650 series enterprise routers can be deployed at branches of SMBs and small-sized enterprises as required to provide enterprise network egress capabilities.

NetEngine AR650 series consists of models such as the NetEngine AR651, NetEngine AR651W, NetEngine AR651EW, NetEngine AR651W-8P, NetEngine AR657W. Huawei provides various models which can meet networking requirements of enterprises of different scales.

 NetEngine AR651	• Fixed WAN ports: 2 x GE Combo • Fixed LAN ports:8 x GE electrical(can be configured as WAN) • Dimensions (H x W x D): 44.0 mm x 300.0 mm x 220.3 mm
 NetEngine AR651W	• Fixed WAN ports: 2 x GE Combo • Fixed LAN ports:8 x GE electrical(can be configured as WAN) • Wi-Fi: 802.11 a/b/g/n/ac (2.4G+5G) • Dimensions (H x W x D): 44.0 mm x 300.0 mm x 220.3 mm
 NetEngine AR651EW	• Fixed WAN ports*: 2 x 10GE SFP+，2 x GE electrical • Fixed LAN ports:8 x GE electrical(can be configured as WAN) • Wi-Fi: 802.11 a/b/g/n/ac/ax (2.4G+5G) • Dimensions (H x W x D): 44.0 mm x 300.0 mm x 220.3 mm
 NetEngine AR651W-8P	• Fixed WAN ports: 2 x GE Combo • Fixed LAN ports:8 x GE electrical(can be configured as WAN) • Wi-Fi: 802.11 a/b/g/n/ac (2.4G+5G) • PoE: compliance with IEEE 802.3af and 802.3at • Dimensions (H x W x D): 44.0 mm x 300.0 mm x 220.3 mm

NetEngine AR657W

- Fixed WAN ports: 2 x GE Combo, 1 x VDSL2
- Fixed LAN ports:8 x GE electrical(can be configured as WAN)
- Wi-Fi: 802.11 a/b/g/n/ac (2.4G+5G)
- Dimensions (H x W x D): 44.0 mm x 300.0 mm x 220.3 mm

*Note: NetEngine AR651EW 10GE optical ports is also compatible with GE/2.5GE speed.

Features and Benefits

Features and Benefits

Service Requirement	Features and Benefits
High performance	• Integrates the ARM multi-core processor, LSW switching chip, and hardware encryption/decryption engine, based on the self-developed SOC chip architecture • Three times the industry average performance, providing the lowest latency for key services
High reliability	• Link backup for enterprise services, improving reliability • Fault detection and determination in milliseconds, minimizing service interruption time
5G wireless access	• Supports RU-201 modules, provide high wireless bandwidth experience • RU-201 supports 2.5GE LAN ports to ensure high-performance packet forwarding in 5G high-bandwidth backhaul scenarios; accommodates both SA and NSA architectures, offering flexible network access • Works in conjunction with traditional wired links for mutual backup, guaranteeing uninterrupted services For more information about RU-201, see the RU-201 Datasheet.
Easy O&M	Multiple management modes, including SD-WAN management, SNMP-based network management, web-based network management, and cloud-based management, simplifying network deployment and reducing OPEX
Service convergence	Integration of functions such as routing, switching, VPN, security, and WLAN, meeting diversified enterprise service requirements, saving space, and reducing TCO
Security	Built-in firewall, IPS(AR651/AR651W/AR651EW/AR651W-8P/AR657W), URL filtering, Antivirus(AR651/AR651W/AR651EW/AR651W-8P/AR657W) and multiple VPN technologies, providing comprehensive security protection capabilities
SD-WAN	• Built-in SD-WAN solution, building cost-effective and business-friendly connections over the Internet • ZTP (Email-, USB-, DHCP-based and Registration Query Center deployment), minimizing skill requirements and provisioning devices in minutes • First packet identification (FPI) for SaaS applications and service awareness for complex applications, identifying over 90% of applications • Traffic steering based on bandwidth and link quality, ensuring experience of key applications and improving bandwidth utilization to up to 90%

Architecture Highlights

Architecture Feature	Benefits
Multi-core processor	High-performance multi-core processors, supporting high-speed WAN connections, powerful route calculation capabilities, and enhanced L4-L7 service processing

Architecture Feature	Benefits
Extensive network interfaces	Extensive flexible interface such as 10M/100M/GE/2.5G/10G speed, 5G RU, xGPON, VDSL/ADSL, Wi-Fi 5/Wi-Fi 6, and PoE/PoE+

Product Specifications

NetEngine AR650 Series Technical Specifications

Item	NetEngine AR651	NetEngine AR651W	NetEngine AR651W-8P	NetEngine AR657W	NetEngine AR651EW
System Parameters					
Forwarding performance (NAT + ACL + QoS, IMIX)	1 Gbps				
Forwarding performance (NAT + ACL + QoS, IMIX, Boost License)	2 Gbps				
IPsec performance (IMIX)	2 Gbps				
IPsec performance (1400 bytes)	3.7 Gbps				
SD-WAN IPsec performance* (IMIX)	1.5 Gbps				
SD-WAN IPsec performance* (1400 bytes)	3.5 Gbps				
SD-WAN performance** (IMIX)	800 Mbps				
SD-WAN performance** (1400 Bytes)	1.85 Gbps				
SD-WAN typical performance*** (IMIX)	600 Mbps				
SD-WAN typical performance*** (1400 bytes)	1.8 Gbps				
Fixed WAN ports	2 x GE combo			2 x GE Combo, 1 x VDSL2	2 x 10GE SFP+, 2 x GE electrical
Fixed LAN ports	8 x GE electrical (all can be switched to WAN ports)				
5G uplink	Support RU-201				
MIC slot	1 x MIC				
Wi-Fi	-	Dual-band (2.4 GHz and 5 GHz), 802.11a/b/g/n/ac			Dual-band (2.4 GHz and 5 GHz), 802.11a/b/g/n/ac/ax

Item	NetEngine AR651	NetEngine AR651W	NetEngine AR651W-8P	NetEngine AR657W	NetEngine AR651EW
xDSL	-	-	-	ADSL Annex A, M, B and J, T1.413 ANSI ADSL DMT issue 2, ITU G.993.2 (VDSL2), VDSL2 Vectoring (G993.5)	-
PoE	-	-	PoE+/PoE	-	-
PoE capability	-	-	GE0 to GE7 support PoE+ out, with a maximum output power of 100 W. PoE and PoE+ auto-sensing: •PoE: 15.4 W per port (up to 6 ports) •PoE+: 30 W per port (up to 3 ports)	-	-
USB port	1 x USB 2.0				
Auxiliary or console port	1 x RJ45 console port				
Memory	2 GB				
Dimensions and Weight					
Dimensions without packaging (H x W x D)	44.0 mm x 300.0 mm x 220.3 mm x				
Dimensions with packaging (H x W x D)	110 mm x 435 mm x 360 mm				
Weight	1.8 kg	1.82 kg	1.92 kg	1.88 kg	1.78 kg
Installation type	Rack, work bench, against the wall				
Chassis height [U]	1 U				
Power Specifications, Power Consumption, and Heat Dissipation					
Rated input voltage (V)	100 V to 220 V, 50 Hz/60 Hz				
Input voltage range (V)	90 V to 270 V, 45 Hz to 65 Hz				
Maximum input current (A)	3 A	1.5 A	12 V adapter: 1.5A	1.5 A	1.5 A

Item	NetEngine AR651	NetEngine AR651W	NetEngine AR651W-8P	NetEngine AR657W	NetEngine AR651EW
			48 V adapter: 2A		
Maximum output power (W)	36 W	60 W	12 V adapter: 60W 48 V adapter: 100W	60 W	60 W
Typical power consumption (W)	25.2 W	36.6 W	12 V adapter: 40W 48 V adapter: -	39 W	38.6 W
Maximum power consumption (W)	29 W	42 W	12 adapter: 46W 48 adapter: 115W	45 W	45.2 W
Fan module	Built-in unpluggable fan modules				
Airflow	Left to right				
Noise	41.9 dB(A)	49.7 dB(A)	50 dB(A)	41.9 dB(A)	34 dB(A)
Environment Parameters					
Operating temperature	0 ºC to 45 ºC				
Operating humidity	5% to 95% (non-condensing)				
Operating altitude	< 5000 m				
Storage temperature	–40 ºC to +70 ºC				

*: Scenario where the SD-WAN IPsec performance specification applies: IPsec. This specification applies to the combined total of traffic in inbound and outbound directions.

**: Scenario where the SD-WAN performance specification applies: IPsec + QoS. This specification applies to the combined total of traffic in inbound and outbound directions.

***: Scenario where the typical SD-WAN typical performance specification applies: IPsec + QoS + SA + AppFlow. This specification applies to the combined total of traffic in inbound and outbound directions.

Software Features and Protocols

Features and Protocols	
Basic functions	DHCPv4 server/client/relay, DHCPv6 server/client/relay, PPPoE server/client, PPPoA server/client, PPPoEoA server/client, NAT, Interface management, and DNS
LAN	IEEE 802.1P, IEEE 802.1Q, IEEE 802.3, VLAN management, VLAN aggregation, MAC management, STP/RSTP/MSTP, and QinQ

|	
WLAN (AP)	AP management, WLAN user management, WLAN radio management (802.11a/b/g/n/ac), WLAN QoS (WMM), and WLAN security (WEP, WPA, WPA2, key management) (supported by the AR651W, AR651W-8P, AR651EW, andAR657W)
IPv4 unicast routing	Routing policies, static routes, RIP, OSPF, IS-IS, BGP, and IP FRR
IPv6 unicast routing	Static routes, routing policies, RIPng, OSPFv3, IS-ISv6, and BGP4+
Basic IPv6 functions	IPv6 ND, IPv6 PMTU, IPv6 FIB, IPv6 ACL, ICMPv6, DNSv6, DHCPv6, and PPPoE client IPv6
IPv6 tunneling	IPv6 over IPv4 manual tunnel, automatic tunnel, GRE tunnel, IPv6 over IPv4 tunnel, 6to4, and ISATAP
Multicast	IGMP v1/v2/v3, PIM-SM, PIM-DM, MSDP, MBGP, IPv6 PIM, and MLD
MPLS	LDP, MPLS L3 VPN, VLL, PWE3, static LSP, dynamic LSP, MPLS TE, IP FRR, LDP FRR, and TE FRR
VPN	IPsec VPN, GRE, DSVPN, A2A VPN, L2TP VPN, L2TPv3 VPN, Ethernet over GRE, VXLAN, and SD-WAN EVPN
QoS	DiffServ mode, priority mapping, traffic policing (CAR), traffic shaping, congestion avoidance, congestion management, MQC (traffic classifier, traffic behavior, and traffic policy), hierarchical QoS, WLAN QoS, FR QoS, and Smart Application Control (SAC)
WAN optimization	FEC, multi-fed and selective receiving, and per-packet load balancing
Security	ACL (v4/v6), domain-based stateful firewall, 802.1X authentication, MAC address authentication, portal authentication, AAA authentication, RADIUS authentication, HWTACACS authentication, PKI, broadcast storm suppression, ARP security, ICMP attack defense, URPF, CPCAR, blacklist, attack source tracing, online behavior management, IPS, URL filtering, and antivirus
Management and maintenance	Upgrade management, device management, web-based network management, GTL, SNMP (v1/v2c/v3), RMON, NTP, CWMP, Auto-Config, URL-based/USB-based/DHCP deployment, NETCONF/YANG, CLI, Netstream, IP FPM, TCP FPM, TWAMP Light, IP accounting, and NQA

Safety and Regulatory Standards

Safety and Regulatory Standards	
EMC standards compliance	CISPR32 Class A EN 55032 Class A CISPR24 EN 55024 ETSI EN 300 386 ETSI EN 301 489-1 ETSI EN 301 489-17 ETSI EN 301 489-52
Environmental standards compliance	RoHS REACH WEEE
Safety standards compliance	IEC 60950-1 EN 60950-1

Networking and Application

- **SD-WAN Using Hybrid Links**

In the SD-WAN Solution, the NetEngine AR650 functions as the gateway of SMBs and small-sized enterprise branches and supports hybrid access using multiple physical links, such as Internet links, and LTE links. The solution also leverages Huawei's next-generation controller, the iMaster NCE, which implements centralized and visualized management. The NetEngine AR650 provides extensive SD-WAN features and delivers optimal service experience for enterprises through intelligent application identification, intelligent traffic steering, and intelligent acceleration. For details about Huawei SD-WAN Solution, visit https://e.huawei.com/en/solutions/enterprise-network/campus-network/sd-wan.

SD-WAN networking
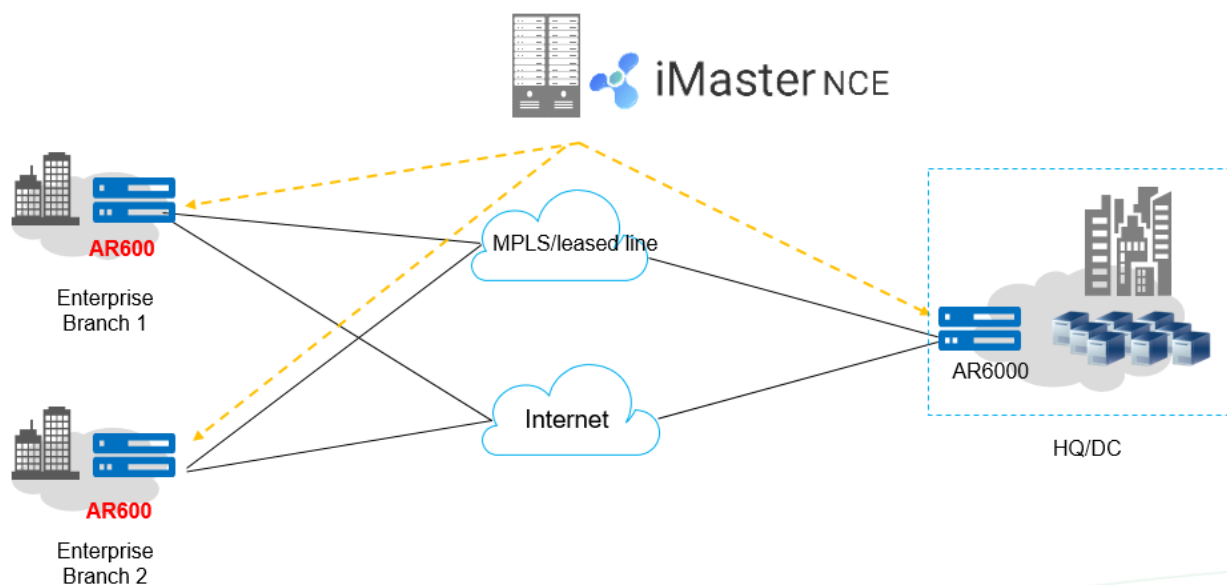
- **WAN Interconnection Scenario**

In this scenario, the NetEngine AR650 series routers are used as enterprise branch egresses and provide flexible WAN access methods to support remote network connections. A single NetEngine AR650 router can satisfy different access requirements, for example, for the private line, Ethernet, 3G, LTE, and WLAN access, helping the customer reduce deployment and maintenance costs while helping them extract much value.

WAN interconnection networking
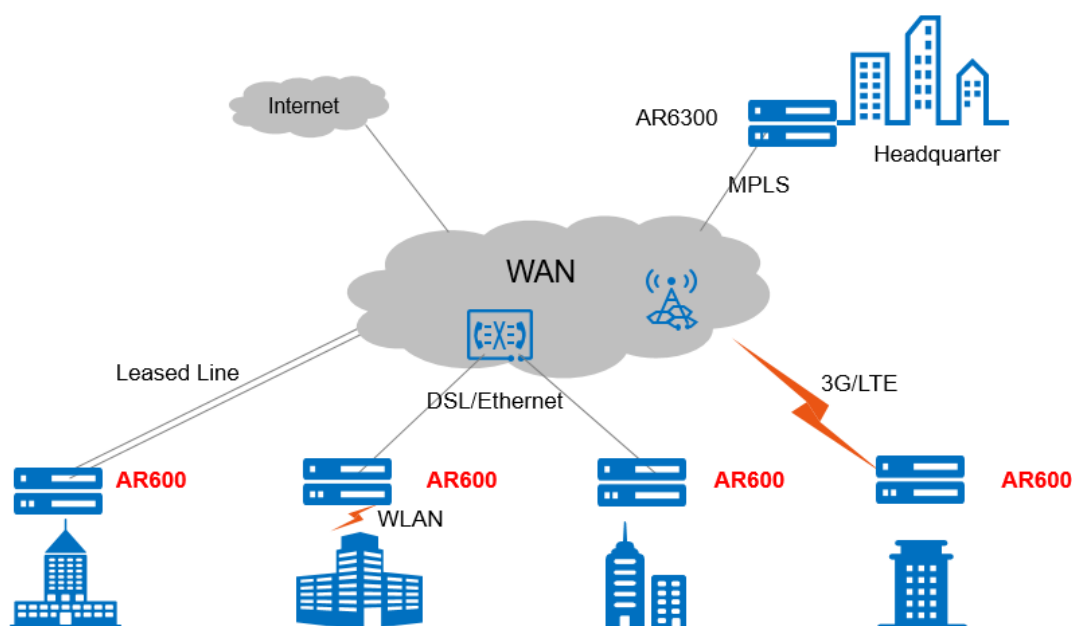
- **Building Different Types of VPNs by Leveraging Internet Resources**

The NetEngine AR650 provides various secure access functions for communication between enterprise branches and between branches and headquarters. These functions also allow an enterprise's partners to access its resources. Secure tunnels such as GRE VPN, IPSec VPN, DSVPN, L2TP VPN, and EVPN tunnels can be set up between the headquarters and branches for secure data access and transmission. The NetEngine AR650 supports quick tunnel deployment and authentication for branches. Furthermore, partners authenticated and authorized by the AR650 can remotely access the enterprise resources over these tunnels.

VPN networking
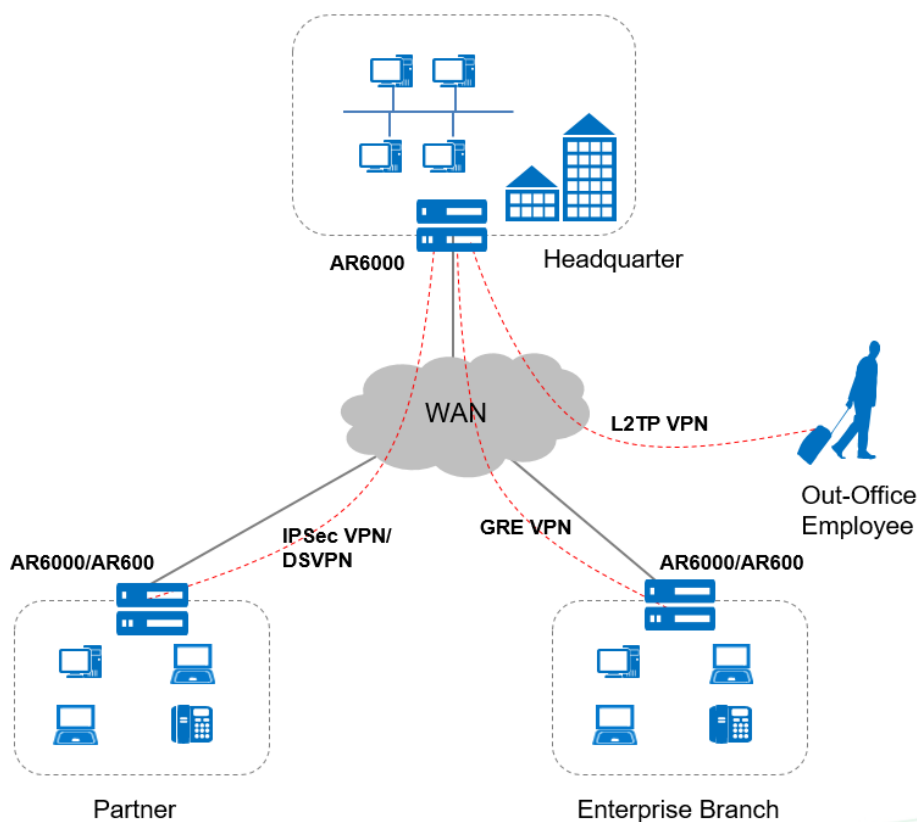
Ordering Information

The configuration of the NetEngine AR650 series includes device model selection and software configuration.

- Device model

Select the device model according to the uplink interface type and service requirements.

- Software

The NetEngine AR650 series software consists of the basic software and licensed software.

Ordering Components

Chassis Configuration	Description
NetEngine AR651	AR651, 2*GE combo WAN, 8*GE LAN, 1*USB2.0, 1*MIC slot
NetEngine AR651W	AR651W, 2*GE combo WAN, 8*GE LAN, 1*USB2.0, 802.11a/b/g/n/ac, 2*2MIMO, 1*MIC slot
NetEngine AR651EW	AR651EW,2*10GE SFP+ WAN,2*GE WAN,8*GE LAN, 1*USB2.0, 802.11a/b/g/n/ac/ax, 2*2MIMO, 1*MIC slot
NetEngine AR651W-8P	AR651W-8P,2*GE combo WAN,8*GE LAN (PoE+),1*USB2.0,802.11a/b/g/n/ac,2*2MIMO,1*MIC slot
NetEngine AR657W	AR657W, 2*GE combo WAN, 1*VDSL 35B WAN, 8*GE LAN, 1*USB2.0,802.11a/b/g/n/ac, 2*2 MIMO, 1*MIC slot

Software Sales Model	License	Ordering Information
Threat protection service	LAR0TP1001 (1 year) LAR0TP1004 (2 years) LAR0TP1007 (3 years) LAR0TP1010 (4 years) LAR0TP1013 (5 years)	Threat Protection Service Subscribe x Year (applicable to the AR650) , including: • IPS signature database update • URL remote query for URL filtering • Antivirus signature database update
Independent Sale Model	LAR0DATAE08	AR650 Value-Added Data Package, including: • L2TPv3 • L2VPN • IP FPM • SPR
	LAR0SECE08	AR650 Value-Added Security Package, including: • SAC • DSVPN • Efficient VPN • IPS • Antivirus • URL filtering
	LAR0IPS08	AR650 IPS Service Subscribe 1 Year, including: • IPS signature database update
	LAR0PERFE08	AR650 Performance License, including: • Improving the service forwarding performance from 1 Gbps to 2 Gbps
	LAR0PONE01	AR600&6100&6200&6300 Passive Optical Network Value-added Package, including: • Passive optical modules S600E and S800E are supported
N1 Model	N1-Campus-F-AR650	N1-CloudCampus(exclude SD-WAN),Foundation,AR650 Series,Per Device
	N1-LANWAN-F-AR650	N1-CloudCampus SD-WAN(include SD-WAN),Foundation,AR650,Per Device
	N1-LANWAN-A-AR650	N1-CloudCampus SD-WAN(include SD-WAN),Advanced,AR650 Series,Per Device

Other Information

MIC Interface Module	Ordering Information
MIC-LTE4AU-V2	TDD/FDD/WCDMA/DC-HSDPA Interface Card Standards compliance and frequency bands supported: • LTE FDD: Band 1/2/3/4/5/7/8/28 • LTE TDD: Band 40 • WCDMA: Band 1/2/5/8 • GSM: 900/1800(MHz) Rate: • LTE FDD: uplink rate of 50 Mbit/s and downlink rate of 150 Mbit/s • LTE TDD: uplink rate of 30 Mbit/s and downlink rate of 130 Mbit/s • DC-HSPA+: uplink rate of 5.76 Mbit/s and downlink rate of 42 Mbit/s • WCDMA: uplink rate of 384 kbit/s and downlink rate of 384 kbit/s • EDGE: uplink rate of 236.8 kbit/s and downlink rate of 296 kbit/s • GPRS: uplink rate of 85.6 kbit/s and downlink rate of 107 kbit/s
Support 5G RU Model	**Supported Standards and Frequency Bands**

RU-201	•5G: NR Band 1/3/5/7/8/20/28/38/40/41/75/77/78/79/80/81/82/83/84
	•LTE: Band 1/3/5/7/8/18/19/20/26/28/32/34/38/39/40/41/42/43
	•DL MIMO:
	    5G 4x4: NR Band 1/3/7/38/40/41/77/78/79
	    5G 2x2: NR Band 5/8/20/28/75

	LTE 4x4: Band 1/3/7/38/39/40/41/42/43
	LTE 2x2: Band 5/8/18/19/20/26/28/32/34
	•UL MIMO:
	5G 2x2: NR Band1/38/40/41/77/78/79

More Information

For more information about Huawei next-generation AR enterprise routers, visit http://e.huawei.com 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

Huawei Technologies Co., Ltd.
Address: Huawei Industrial Base
Bantian, Longgang Shenzhen 518129
People's Republic of China
Website: e.huawei.com