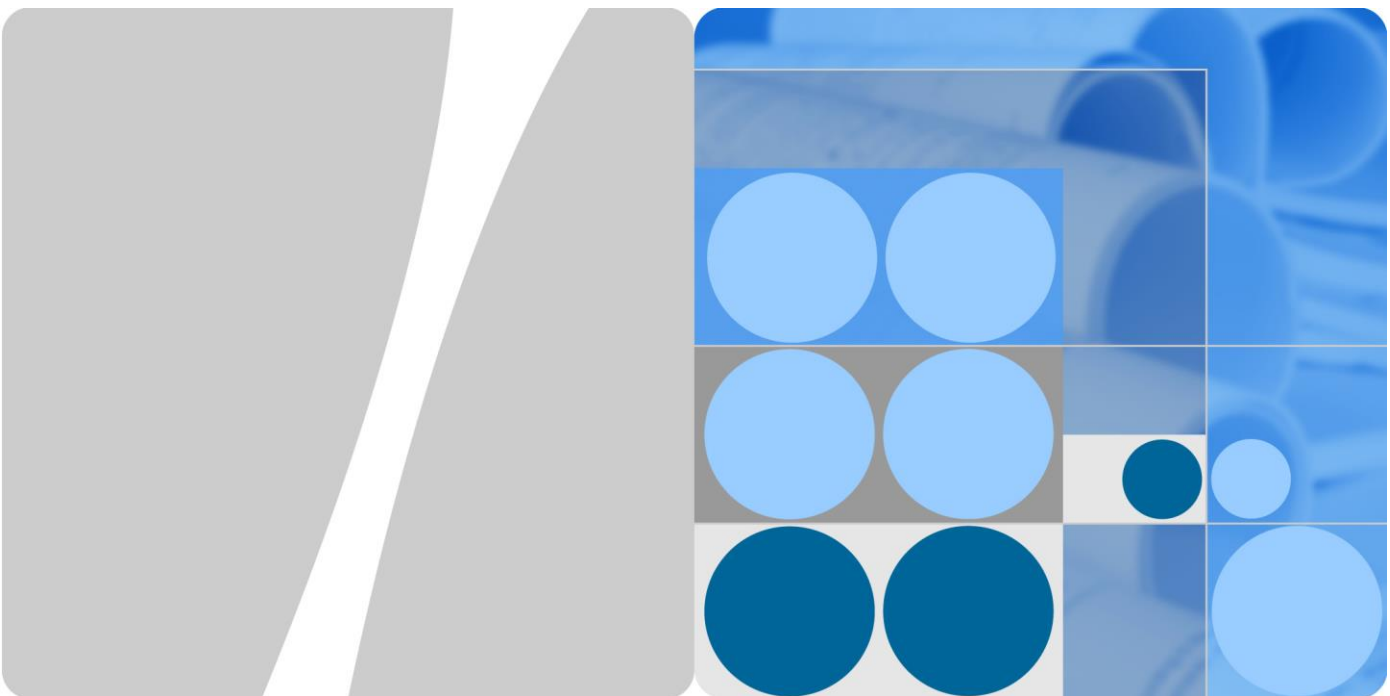




**HUAWEI B311-221 LTE CPE
V100R001**

Product Description

Issue **02**
Date **2019-08-15**

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About This Document

Summary

This document provides information regarding the features, main functions and services, technical specifications, and technical references of the product.

This document includes:

Chapter	Details
1 Product Overview	Provides an overview of the product.
2 Technical Specifications	Describes the specifications of the product hardware, software, and user interface.
3 Services and Applications	Describes the main functions and applications of the product.
4 System Structure and Scenario Constraints	Describes the product system structure.
5 Technical References	Describes the standards and communication protocols of the product.
6 Packing List	Describes the devices and accessories that comprise the product package



NOTE

The document is an invitation to offer but not an offer. It is intended to describe the general features and functions of a product. The features and functions of certain products may vary with the requirements of customers.

History

Issue	Date	Details
01	2019-05-24	Initial official release.
02	2019-08-15	Updated the appearance.

Acronyms and Abbreviations

Acronym or Abbreviation	Full Spelling
3GPP	3rd Generation Partnership Project
ACS	Auto Configuration Server
AES	Advanced Encryption Standard
ALG	Application Layer Gateway
AMR-NB	Adaptive Multi-Rate compression - Narrowband
AMR-WB	Adaptive Multi-Rate compression - Wideband
AP	Access Point
APN	Access Point Name
ARP	Address Resolution Protocol
CLAT	Customer-side Translator
CPE	Customer Premises Equipment
CS	Circuit Switched
CSFB	Circuit Switched Fallback
DC-HSPA+	Dual-Carrier - High Speed Packet Access Evolution
DHCP	Dynamic Host Configuration Protocol
DL	Downlink
DMZ	Demilitarized Zone
DNS	Domain Name Server
DTMF	Dual-Tone Multi-Frequency
EDGE	Enhanced Data rates for Global Evolution
E-UTRA	Evolved Universal Terrestrial Radio Access Network
FDD	Frequency Division Duplex
HOTA	Huawei Firmware Over the Air
HSPA	High Speed Packet Access
HSPA+	High Speed Packet Access Evolution
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol

Acronym or Abbreviation	Full Spelling
IPSec	Internet Protocol Security
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ICMP	Internet Control Message Protocol
L2TP	Layer Two Tunneling Protocol
LAN	Local Area Network
LED	Light Emitting Diode
LTE	Long Term Evolution
MAC	Media Access Control
MDI	Medium Dependent Interface
MDIX	Medium Dependent Interface Crossover
MIMO	Multi-input Multi-output
MME	Mobility Management Entity
NAT	Network Address Translation
NAPT	Network Address and Port Translation
PC	Personal Computer
PCC	Primary Component Carrier
PGW	PDN Gateway
PIN	Personal Identification Number
PLAT	Provider-side Translator
PPTP	Point-to-Point Tunneling Protocol
QAM	Quadrature Amplitude Modulation
QR	Quick Response
RFC	Request For Comments
RTCP	Real-time Transport Control Protocol
RTP	Real-time Transport Protocol
SCP	Service Control Point
SDRAM	Synchronous Dynamic Random Access Memory
SDP	Session Description Protocol
SGW	Serving Gateway
SIP	Session Initiation Protocol

Acronym or Abbreviation	Full Spelling
SMA	SubMiniature version A
SMS	Short Message
SOHO	Small Office Home Office
SSID	Service Set Identifier
TDD	Time Division Duplex
TKIP	Temporal Key Integrity Protocol
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunications System
UPnP	Universal Plug and Play
USB	Universal Serial Bus
USIM	UMTS Subscriber Identity Module
VoIP	Voice over IP
VoLTE	Voice over LTE
VPN	Virtual Private Network
WAN	Wide Area Network
WEP	Wireless Encryption Protocol
Wi-Fi	Wireless Fidelity
WMM	Wi-Fi Multimedia
WPA/WPA2-PSK	Wi-Fi Protected Access/Wi-Fi Protected Access II - Pre-Shared Key
WPA2-PSK	Wi-Fi Protected Access II - Pre-Shared Key
WPS	Wi-Fi Protected Setup

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1 Product Overview

The HUAWEI LTE CPE B311-221 is a Long Term Evolution (LTE) wireless gateway for multiple users in household or small office environments. It enables users to access the Internet.

The B311-221 supports 3GPP Release 9 with UE downlink/uplink category 4. The supported service functions are as follows:

- Data service up to DL 150Mbps (64QAM) and UL 50Mbps (16QAM)
- Working band: LTE: B1/3/7/8/20/38, UMTS: B1/B8, GSM: B2/B3/B5/B8
- Voice service: CS/ VoIP (Optional) / VoLTE (Optional)
- Wi-Fi: 2.4 GHz 802.11b/g/n 2x2 MIMO up to 300Mbps. Maximum Users: 32
- 1 GE port for LAN/WAN
- Multi APN function (Optional) for Data, Voice (VoIP), TR-069 services
- Routing mode: NAT enable (Default) / IP pass-through (Optional)
- VPN client service (L2TP, PPTP)
- Customer management via WebUI or HUAWEI SmartHome APP (iOS or Android)
- Operator maintenance via TR-069 (Optional) and TR-143 (Optional)
- Huawei Firmware Over the Air (HOTA)

Figure 1-1 B311-221 appearance



2 Technical Specifications

2.1 Hardware Specifications

Table 2-1 Technical specifications of the B311-221 main unit

Item	Description	
Technical standard	WAN	3GPP Release 9
	LAN	IEEE 802.3/802.3u
	WLAN	IEEE 802.11b/g/n
Working band/frequency	LTE	B1/B3/B7/B8/B20/B38
	UMTS	B1/B8
	GSM	B2/B3/B5/B8
	WLAN	2.402 GHz~2.482 GHz
External port	- One power adapter port - One LAN/WAN port (RJ45), IEEE 802.3/802.3u - One phone port (RJ11) - One external LTE antenna ports (SMA) - One SIM card slot (Mini-SIM)	
Antennas	- Built-in LTE/UMTS/GSM primary antenna - Built-in LTE/UMTS secondary antenna - Built-in WLAN 2.4 GHz antenna	

Item	Description						
LED Indicators	- One power indicator (White) - One Internet status indicator Cyan: LTE network accessed Blue: UMTS network accessed Yellow: GSM network accessed Green: Ethernet network accessed Red: No SIM card is inserted or detected, or the SIM card has insufficient balance - One Wi-Fi/WPS/Hi indicator (White) Flash slowly: A pairable HiLink device is detected. Flash quickly: HiLink pairing is in progress. Off: Wi-Fi is disabled.  NOTE - The indicator starts to flash slowly only when B311-221 detects a new HiLink device. - HiLink devices include Honor routers, Honor set-up boxes, Honor handsets (EMUI 5.0 and later), and more. - One LAN indicator (White) - One group of signal strength indicators (White)						
Buttons	- One Power ON/OFF switch - One WPS/Hi button The Wi-Fi indicator flashes slowly when the router detects a HiLink device. Press the WPS button to connect the HiLink device to the router's Wi-Fi. When the Wi-Fi indicator is steady on, press the WPS button to enable WPS. - One Reset button						
Maximum transmit power	LTE	B1/B3/B7/B8/B20/B38: 23dBm±2dB					
	UMTS	B1/B8: 24dBm+1/-3dB					
	GSM	- B2/B3: 30dBm±2dB - B5/B8: 33dBm±2dB					
	WLAN	802.11b: 13 dBm 802.11g/n: 14.5 dBm					
Receiving sensitivity	LTE	Band	1.4MHz (dBm)	3MHz (dBm)	5MHz (dBm)	10MHz (dBm)	15MHz (dBm)
		B1			-100	-97	-95.2
		B3	-101.7	-98.7	-97	-94	-92.2
		B7			-98	-95	-93.2

Item	Description							
		B8	-102.2	99.2	-97	-94		
		B20			-97	-94	-91.2	-90
		B38			-100	-97	-95.2	-94
	UMTS	- B1: -106.7dBm - B8: -103.7dBm						
	GSM	B2/B3/B5/B8: -102dBm						
	WLAN	802.11b: -85 dBm（11 Mbps） 802.11g: -71 dBm（54 Mbps） 802.11n: -69 dBm（65 Mbps）						
Power consumption	< 12 W							
AC/DC power supply	- AC (input): 100V-240V 50Hz/60Hz - DC (output): 12V/1A							
Dimensions (Maximum)	181 mm (Width) x 126 mm (High) x 36 mm (Deep)							
Weight	About 218 g (excluding the power adapter)							
Temperature	- Working temperature: 0 ℃ to 40 ℃ - Storage temperature: -20 ℃ to +70 ℃							
Humidity	5% – 95% (non-condensing)							
Certification/Compliance	CE certification ROHS REACH WEEE Wi-Fi certification Erp GCF							

2.2 Antenna Specifications

2.2.1 Build-in LTE Antenna

Table 2-2 LTE antenna specifications

Item	Description
Frequency	FDD LTE

Item	Description
	• B1: UL 1920–1980 MHz DL 2110–2170 MHz • B3: UL 1710–1785 MHz DL 1805–1880 MHz • B7: UL 2500–2570 MHz DL 2620–2690 MHz • B8: UL 880–915 MHz DL 925–960 MHz • B20: UL 832–862 MHz DL 791–821 MHz TDD LTE • B38: UL 2570–2660 MHz DL 2570–2660 MHz UMTS • B1: UL 1920–1980 MHz DL 2110–2170 MHz • B8: UL 880–915 MHz DL 925–960 MHz GSM • B2: UL 1850–1910 MHz DL 1930–1990 MHz • B3: UL 1710–1785 MHz DL 1805–1880 MHz • B5: UL 824–849 MHz DL 869–894 MHz • B8: UL 880–915 MHz DL 925–960 MHz
Input impedance	50 Ω
Standing wave ratio	< 3
Main antenna efficiency	LTE • B1: -1.5 dB • B3: -2.5 dB • B7: -2.5 dB • B8: -2.5 dB • B20: -2.5 dB • B38: -2 dB UMTS • B1: -1.5 dB • B8: -2.5dB GSM • B5/B8: -2.5 dB • B2/B3: -2.5 dB
Diversity antenna efficiency	LTE • B1: -2.5 dB • B3: -2.5 dB • B7: -2.5 dB • B8: -3 dB • B20: -2 dB • B38: -2 dB UMTS • B1: -2.5 dB

Item	Description
	B8: -3 dB
Main antenna gain	LTE - B1/B3/B7/B8/B20/B38: 1~2 dBi UMTS - B1/B8: 1~2 dBi GSM - B5/B8: 1~2 dBi - B2/B3: 1~2 dBi
Diversity antenna gain	LTE B1/B3/B7/B8/B20/B38: 1~2 dBi
TX/RX	1T2R
Polarization	Linear polarization

2.2.2 Build-in Wi-Fi Antenna

Table 2-3 WLAN 2.4 GHz antenna specifications

Item	Description
Frequency	2.402 GHz – 2.482 GHz (Channel 1 – Channel 13)
Input impedance	50 Ω
Standing wave ratio	< 2
Efficiency	-2 dB
Gain	≤ 3.8 dBi
Polarization	Linear polarization

2.3 Software Specifications

Table 2-4 Software specifications

Item	Description
LTE features	DL 2x2 MIMO
	DL 64QAM, UL 16QAM
Mobile network	APN management APN auto adapter

Item	Description	
Gateway	Router	- Supports the default route: 0.0.0.0. - Supports manual configuration of LAN IP addresses. - Supports Address Resolution Protocol (ARP).
	DHCP server	- The DHCP server can be enabled or disabled. - The address pool of the DHCP server can be configured. - The lease can be configured. - The DNS relay under the DHCP server can be enabled.
	NAT	- Supports NAT and NAPT (compliant with RFC2663, RFC3022, and RFC3027). - Supports cone NAT.
	ARP	
	ICMP	
	IPv4v6 dual stack IPv6 only (Optional , CLAT for LAN side IPv4 device access Internet) IPv4 only  NOTE When the CLAT function is enabled, the IPv4 device Internet access service cannot reach the maximum throughput. Under IPv6 only, NAT-base service (such as port forwarding and port triggering) is not available.	
	VPN pass-through	
VPN client	- Support L2TP VPN client - Support PPTP VPN client (Optional)	
SMS	- Writing/sending/receiving - Writing/sending/receiving extra-long messages	
Data service	- LTE FDD: DL 150Mbps, UL 50Mbps - DC-HSPA+: DL 42 Mbps, UL 5.76 Mbps - HSPA+: DL 21 Mbps (64QAM), UL 5.76 Mbps - HSPA: DL 14.4 Mbps, UL 5.76 Mbps - WCDMA PS: DL 384 Kbps, UL 384 Kbps - EDGE: DL 236.8Kbps, UL 236.8 Kbps - GPRS: DL 85.6 Kbps, UL 85.6 Kbps	
	WLAN 802.11b/g/n	
	Supports multi APNs (Optional, one for data, one for voice, and one for TR-069).	

Item	Description	
Voice	VoIP (Optional)	Supports G.711a/G.711u/G.726 (-24/-32)/G.722/G.729 codec.
		Supports SIP (RFC3261).
		Supports SDP (RFC2327).
		Supports RTP/RTCP (RFC1889/RFC1890/RFC3550).
		Supports in-band/SIP info/RFC2833 DTMF.
		Supports the following phone features: • Caller ID generation • Call waiting • Call forwarding (unconditional, busy, and no answer forwarding) • Call hold • Three-way conference
	CS	Supports CS voice communication over UMTS and GSM networks.
		Supports circuit switched fallback (CSFB).
		Supports the following phone features: • Caller ID generation • Call waiting • Call forwarding (unconditional, busy, and no answer forwarding) • Call hold • Three-way conference • Originating Identification Presentation/Restriction • Outgoing Communication Barring
	VoLTE (Optional)	• Supports AMR-NB codec • Supports AMR-WB codec
		Supports SRVCC to UMTS
		Supports SRVCC to GSM
		Supports in-band/out-band (RFC2833) DTMF

Item	Description	
		Supports the following phone features: • Caller ID generation • Call waiting • Call forwarding (unconditional, busy, and no answer forwarding) • Call hold • Three-way conference • Originating Identification Presentation/Restriction • Outgoing Communication Barring
Firewall setup	• Firewall enable/disable • URL filtering • LAN IP filtering • Port forwarding (Virtual server) • Port triggering (Special Application) • DMZ service • UPnP service • ALG settings	
LAN	• 10/100/1000 Mbps auto-negotiation • MDI/MDIX auto-sensing • IEEE 802.3/802.3u-compatible	
WLAN	Broadcasts and hides service set identifiers (SSIDs)	
	Complies with IEEE 802.11b/g/n	
	WPS	
	WMM	
	Encryption	WEP, AES, and TKIP + AES
	Security mode	• Open • WPA2-PSK • WPA/WPA2-PSK • WEP
	MAC address authentication	• Supports the MAC address authentication whitelist. • Supports the MAC address authentication blacklist. • Supports a maximum of 10 MAC address entries.
	STA	• Supports inquiry of STA status. • Supports a maximum of 32 connected stations.

Item	Description	
Operator maintenance (Optional)	• Supports TR-069 Amendment III • Supports TR-098 Amendment II • Supports TR-143 Amendment I • Supports TR-104 Amendment I (if VoIP is available)	
USIM	PIN management and USIM card authentication	
NTP	Supports daylight saving time (DST) (Optional).	
Maintenance	Supports export of current diagnosis results and operation logs.	
HUAWEI SmartHome APP	• View data traffic usage and SMS. • Manage connected devices. • Change CPE's SSID and password.	
System requirements	Operating system	Windows 7, Windows 8, Windows 8.1, Windows 10 (Not support Windows RT), MAC OS X 10.9, 10.10, 10.11 and 10.12 with latest updates.
	Web browser	• Microsoft Internet Explorer 8.0 with latest updates. • FireFox 49.0 with latest updates. • All major versions of Chrome in the last year (53.0 with latest updates). • Safari 10.0 with latest updates (MACOS).
	Your computer's hardware system should meet or exceed the recommended system requirements for the installed OS version.	

3 Services and Applications

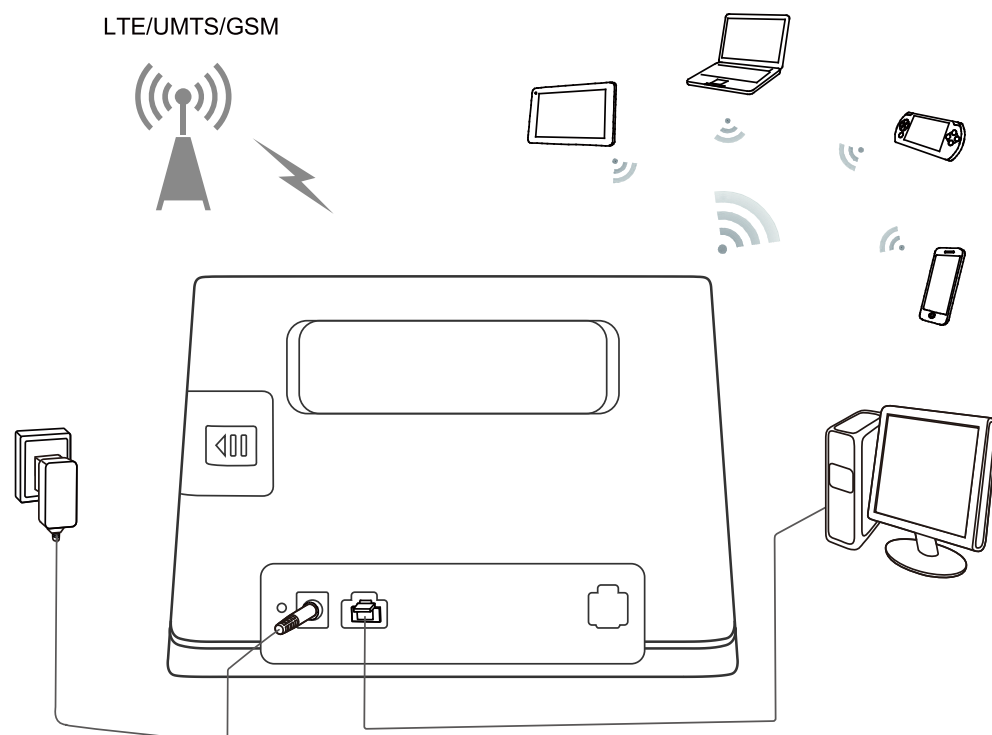
3.1 Data Services

The B311-221 can access the Internet through mobile networks and Ethernet networks. By connecting to the B311-221 using Wi-Fi or a network cable, users can obtain access to high-speed Internet services and establish a local area network (LAN).

3.1.1 Accessing the Internet through a Mobile Network (LTE/UMTS/GSM)

The B311-221 can access the Internet through mobile networks.

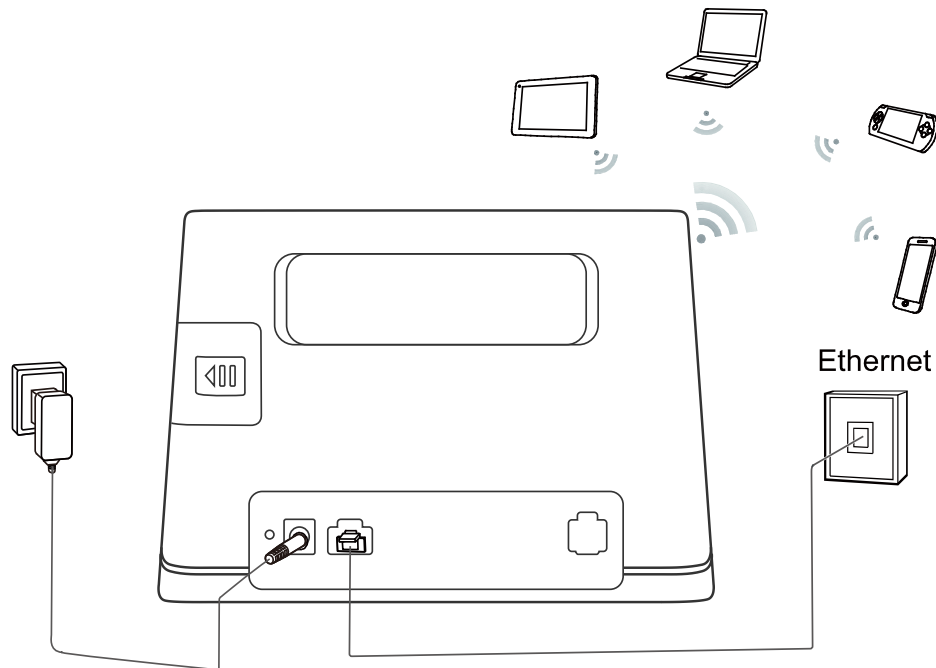
Figure 3-1 Accessing the Internet through a mobile network



3.1.2 Accessing the Internet through an Ethernet Network

The B311-221's LAN/WAN port can be connected to a wall-mounted Ethernet port using a network cable.

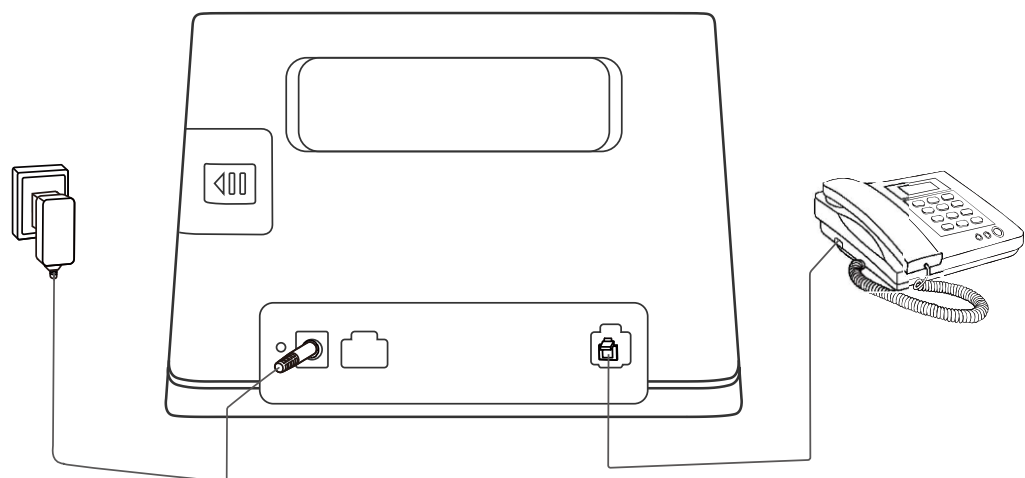
Figure 3-2 Accessing the Internet through an Ethernet network



3.2 Voice Services

The B311-221 provides one telephone port that can be connected to telephones for calling.

Figure 3-3 Connecting telephones to the B311-221



3.3 SMS

The B311-221 supports message writing/sending/receiving and group sending (up to 50 -contacts at a time).

3.4 Security Service

The B311-221 supports comprehensive and robust security services. It provides a firewall function and PIN protection mechanisms. These features allow users to connect their computers to the Internet and simultaneously protect their computers against security threats from the Internet.

3.4.1 Firewall Service

The B311-221 supports the enabling or disabling of a firewall on the network connection, which protects the device and network from attacks by hackers on the Internet and controls access to the Internet.

3.4.2 MAC Filtering

The B311-221 supports configuration of the Media Access Control (MAC) address to restrict network access.

3.4.3 Wi-Fi Authentication

The gateway supports the following user authentication protocols for WLAN:

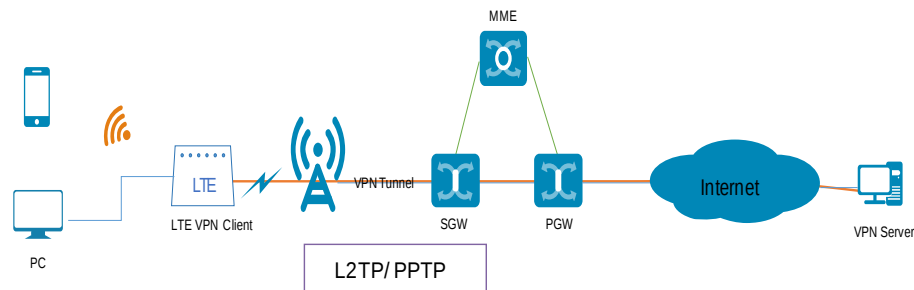
- No encryption
- WEP, WPA2-PSK (AES), WPA/WPA2-PSK (TKIP/AES).

3.5 VPN Function

3.5.1 VPN Client

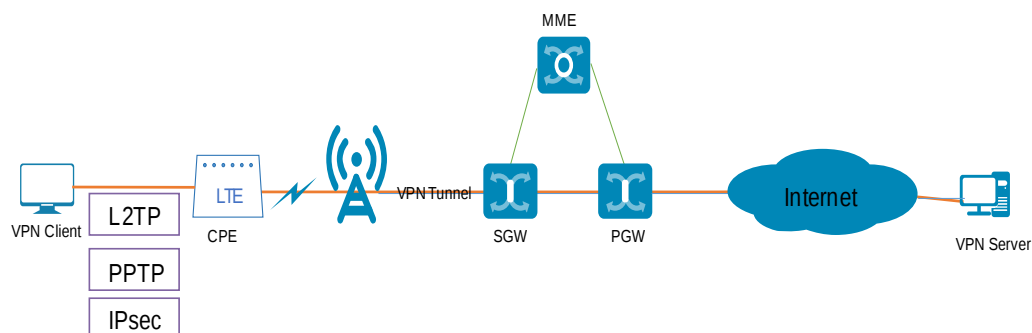
VPN tunneling involves establishing and maintaining a logical network connection (that may contain intermediate hops). On this connection, packets constructed in a specific VPN protocol format are first encapsulated within some other base or carrier protocol, then transmitted between the VPN client and server, and finally decapsulated on the receiving side.

The B311-221 supports L2TP and PPTP tunneling protocols.



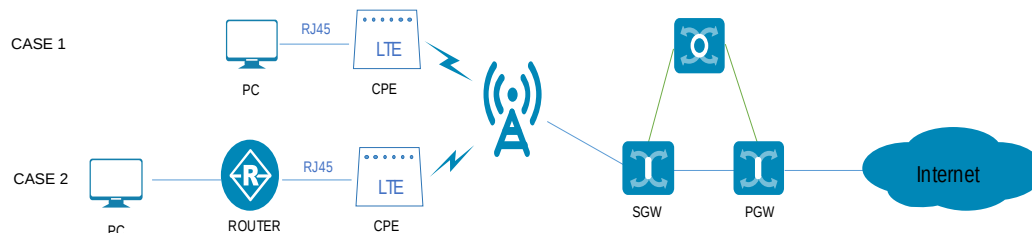
3.5.2 VPN Pass-Through

The B311-221 supports L2TP/PPTP/IPsec VPN pass-through for the LAN side device. The LAN side device can create a VPN tunnel to the VPN server.



3.6 IP Pass-Through

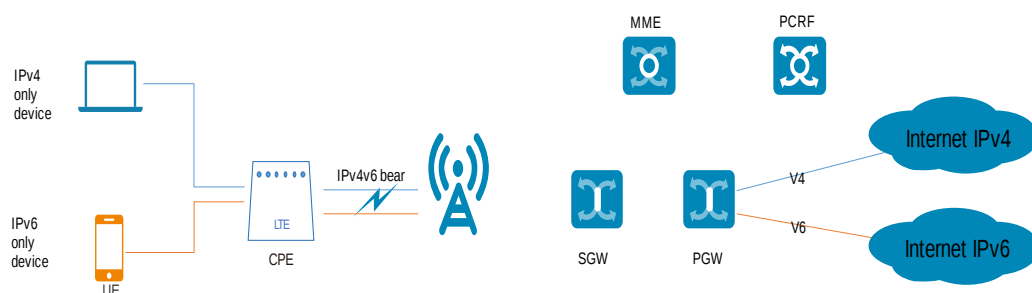
The LTE CPE obtains the WAN IP address and passes it through to the PC (Case 1) or Router (Case 2), and then the PC (Case 1) or Router (Case 2) can directly use the WAN IP address.



3.7 IPv6 Only and IPv4v6 Dual Stack

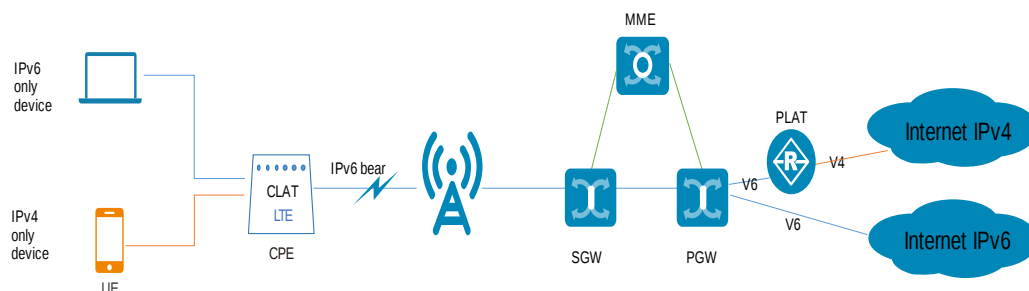
3.7.1 IPv4v6 Dual Stack

CPE provides dual stack function.



3.7.2 IPv6 Only (CLAT)

The LTE CPE supports IPv6 only with the transition solution CLAT for IPv4 device.



NOTE

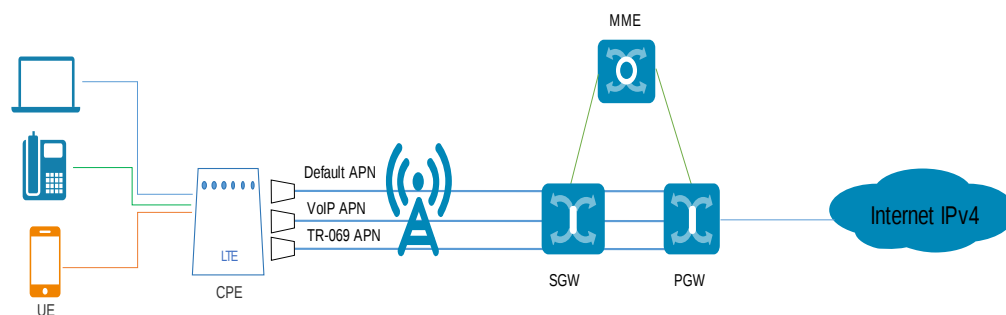
When the IPv6 only (CLAT) function is enabled, NAT-based functions (like DMZ/Port Forwarding/Port trigger) cannot be used.

When an IPv4 device accesses the Internet, the performance is degraded because packets need to be packetized and unpacked. However, IPv6 devices are not affected.

3.8 Multi-APN

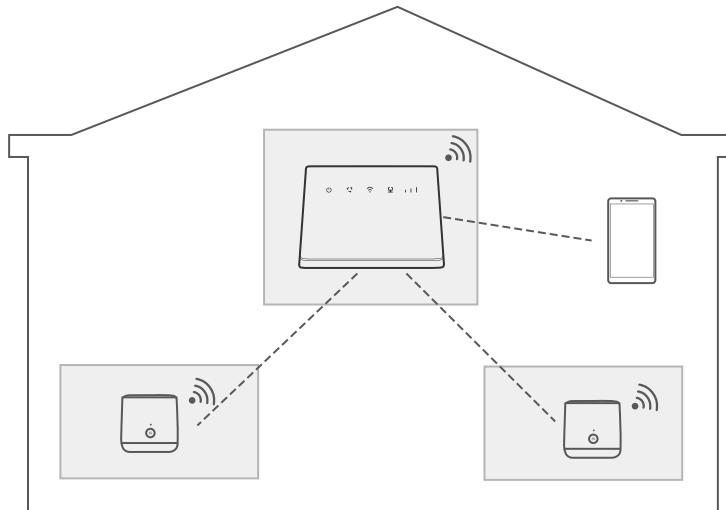
The B311-221 supports the establishment and maintenance of three APNs. These three APN connections isolate data, voice, and remote management services on an operator's network.

The B311-221 supports an independent APN for CPE internal/VoIP/TR-069.



3.9 HiLink

- Supports up to two HiLink devices to connect to B311-221 through the WPS/Hi button to create an expanded network.
- Supports quick connection between a HiLink device (such as Honor set-up boxes and Honor handsets running on EMUI 5.0 and later) and B311-221 through the WPS/Hi button.



3.10 Customer management

3.10.1 WebUI

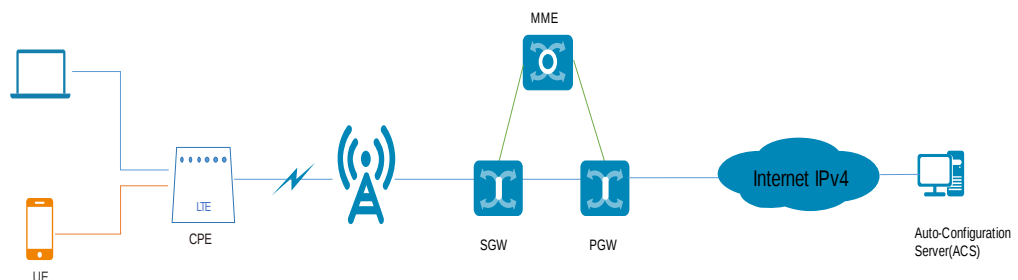
The B311-221 supports local configuration through the Web UI. You can perform device management and network configuration to ensure normal and stable performance.

3.10.2 HUAWEI SmartHome APP

Scan the QR code (can be found in the Quick Start Guide and Web UI) to download the HUAWEI SmartHome APP and configure the router from your phone.

3.11 Operator maintenance

The B311-221 supports Operator maintenance through the TR-069. Operator remote manages the CPE software update/parameters configuration via TR-069.



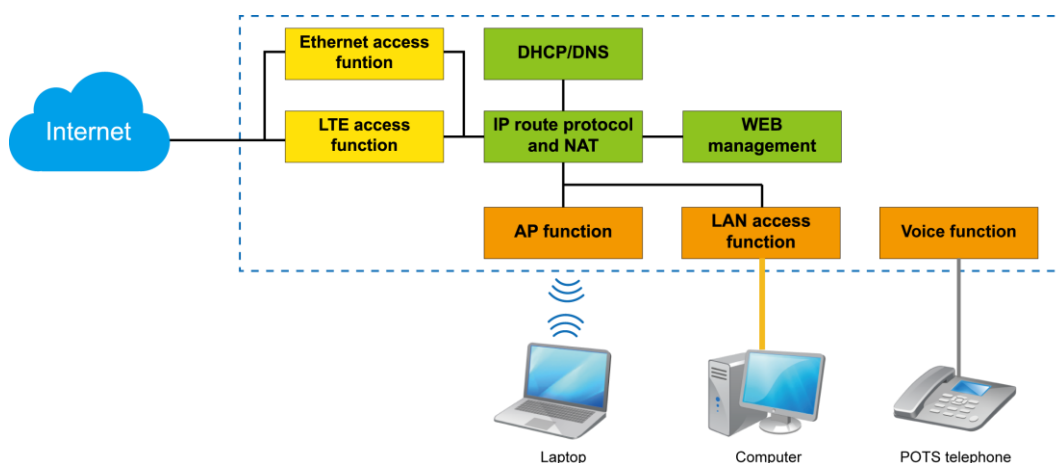
3.12 HOTA

The B311-221 supports the HOTA feature, which allows users to remotely update the device firmware through the HOTA server.

4 System Structure and Scenario Constraints

4.1 System Architecture

Figure 4-1 System structure



The following describes the modules shown in Figure 4-1.

- **LTE access function:** The B311-221 adopts the LTE access technology at the WAN side.
- **LAN access function:** One 10/100/1000 Mbps high-speed Ethernet ports are provided at the LAN side. The B311-221 provides the switching function for local networking and sharing of the broadband network when it is connected to terminal devices.
- **AP function:** An 802.11b/g/n-compliant WLAN AP interface is provided for wireless networking at home. The interface is compliant with the IEEE 802.11b/g/n standard and the WEP, WPA/WPA2-PSK, WPA2-PSK security authentication mechanisms.
- **DHCP/DNS:** The DHCP server dynamically allocates IP addresses to PCs.
- **Web-based management:** You can configure the B311-221 and modify and view the configuration of the B311-221.
- **IP routing protocol and NAT:** The B311-221 has high-speed routing capability. With the built-in NAT, the B311-221, together with LTE terminals, can provide flexible broadband access solutions and networking schemes.

- Voice function: The B311-221 supports voice services.

4.2 Scenario Constraints

The B311-221 is a household wireless broadband access product designed for use in scenarios with relatively few network access devices and relatively low network reliability requirements, such as homes or small office and home offices (SOHOs).

The B311-221 is not an enterprise-grade product. It cannot be used by medium- or large-sized enterprises or in scenarios with high network reliability requirements, such as banks, securities agencies, traffic control, and communications device backhaul.

The B311-221 has the following constraints:

- When the IP Pass-Through mode is enabled, the HOTA function cannot be used.
- When the L2TP/PPTP VPN client function is enabled, the throughput performance will slow down.
- A maximum of 32 devices can be connected to the WLAN in theory; the actual number of devices that can be connected and served depends on actual conditions.

5 Technical References

5.1 Standards and Communication Protocols

5.1.1 Standards and Communication Protocols of the Product

Table 5-1 Standards and communication protocols of the product

Item	Description
Physical layer	RFC894
ARP	RFC826
IP	RFC791, RFC1122, RFC1071, RFC1141, RFC1624, RFC792, RFC950, RFC1256
ICMP	RFC792, RFC950, RFC1256
TCP	RFC793
UDP	RFC768
DHCP	RFC1531, RFC1533
NAT	RFC1631, RFC2663, RFC3022, RFC3027
VoIP	RFC3261,RFC2327,RFC1889,RFC1890,RFC3550

5.1.2 Standards and Communication Protocols of the Wireless Uu Interface

This device supports 3GPP Release 9.

6 Packing List

Table 6-1 Packing list

Description	Quantity	Remarks
Wireless Gateway	1	Standard
Power supply adapter	1	Standard
Quick Start	1	Standard
Ethernet cable	1	Optional
Warranty card	1	Optional
Phone cable	1	Optional

The HUAWEI B311-221 wireless gateway has an optional external antenna.