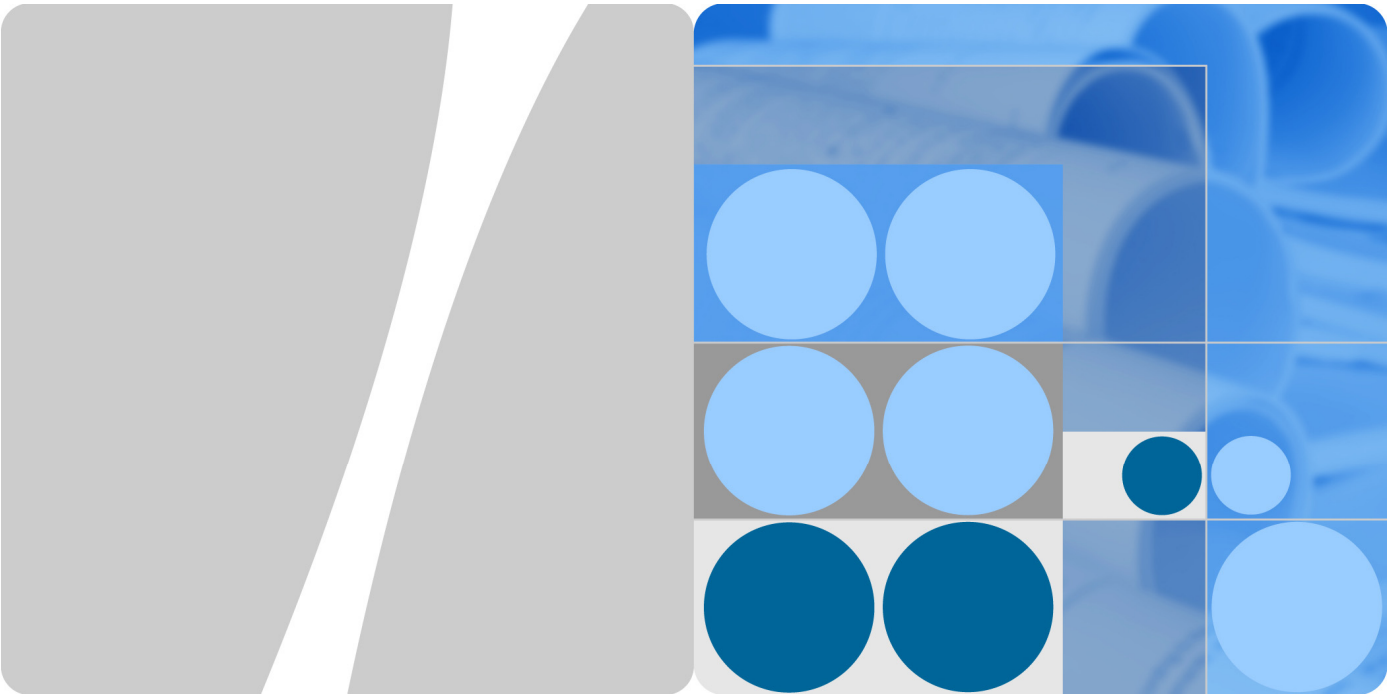
# Product Description



HUAWEI E5186s-22a LTE CPE
V200R001

**Issue** 02

**Date** 2014-03-26

**HUAWEI TECHNOLOGIES CO., LTD.**

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# About This Document

## Purpose

This document describes the main functions, supported services, and system architecture of the HUAWEI E5186s-22a Long Term Evolution (LTE) Customer-Premises Equipment (CPE) V200R001 (E5186s-22a for short).

This document is organized as follows.

| Chapter | Description |
| --- | --- |
| 1 Overview | Supported network modes, basic services and functions, and appearance of the E5186s-22a. |
| 2 Product Features | Features and technical specifications of the E5186s-22a. |
| 3 Services and Applications | Services provided by the E5186s-22a. |
| 4 System Architecture | System architecture of the E5186s-22a. |
| 5 Packing List | Items included with the E5186s-22a. |

# Change History

| Version | Change Description | Date |
|---|---|---|
| 01 | First release | 2013-12-17 |
| 02 | • Change the frequency bands of LTE<br>• Change the maximum transmission rate of LTE TDD downlink packet data service from 110 Mbit/s to 220 Mbit/s<br>• Modify the maximum transmit power of WLAN<br>• Modify the system architecture diagram<br>• Delete “External Antenna” in table 5-1 | 2014-03-26 |

# Contents

# 1 Overview

As a high-performance LTE CPE device, the E5186s-22a enables users to get access to wireless and wired networks. The E5186s-22a supports the following frequency bands:

- LTE
  - Frequency division duplex (FDD): 2600/2100/1800/900/800 MHz
  - FDD Down Link (DL) Carrier Aggregation (CA): 1800 MHz + 2600 MHz, 1800 MHz + 800 MHz, 2600 MHz + 800 MHz, 1800 MHz intra-band contiguous, 2600 MHz intra-band contiguous
  - Time division duplex (TDD): 2600 MHz
  - TDD DL CA: 2600 MHz intra-band contiguous
- DC-HSPA+/HSPA+/HSPA/UMTS: 2100/900 MHz
- EDGE/GPRS/GSM: 1900/1800/900/850 MHz

The E5186s-22a can work in any of the following network standards:

- LTE
- Dual Carrier High Speed Packet Access Plus (DC-HSPA+)
- High Speed Packet Access Plus (HSPA+)
- High Speed Uplink Packet Access (HSUPA)
- High Speed Downlink Packet Access (HSDPA)
- Universal Mobile Telecommunications System (UMTS)
- Enhanced Data Rates for Global Evolution (EDGE)
- General Packet Radio Service (GPRS)
- Global System for Mobile Communications (GSM)

The E5186s-22a provides the following services and functions:

- Data services
- Voice services
- Short message service (SMS)
- USB Sharing services
- Security functions
- Maintenance and management

Figure 1-1 shows the appearance of the E5186s-22a.

**Figure 1-1** E5186s-22a appearance

# 2 Product Features

## 2.1 Main Features

The following lists the main features of the E5186s-22a:

- Access to LTE/DC-HSPA+/HSPA+/HSPA/UMTS/EDGE/GPRS/GSM wireless networks
- Access to wired Ethernet networks
- LTE FDD downlink packet data service at a maximum transmission rate of 300 Mbit/s (theoretical value)
- LTE FDD uplink packet data service at a maximum transmission rate of 50 Mbit/s (theoretical value)
- LTE TDD downlink packet data service at a maximum transmission rate of 220 Mbit/s (theoretical value)
- LTE TDD uplink packet data service at a maximum transmission rate of 10 Mbit/s (theoretical value)
- DC-HSPA+ downlink packet data service at a maximum transmission rate of 43.2 Mbit/s (theoretical value)
- HSPA+ downlink packet data service at a maximum transmission rate of 21.6 Mbit/s (theoretical value)
- HSPA downlink packet data service at a maximum transmission rate of 14.4 Mbit/s (theoretical value)
- HSPA uplink packet data service at a maximum transmission rate of 5.76 Mbit/s (theoretical value)
- UMTS packet data service at a maximum transmission rate of 384 kbit/s (theoretical value)
- UMTS circuit-switched data service at a maximum transmission rate of 64 kbit/s (theoretical value)
- EDGE packet data service at a maximum transmission rate of 236.8 kbit/s (theoretical value)
- GPRS packet data service at a maximum transmission rate of 85.6 kbit/s (theoretical value)
- IEEE802.11a/b/g/n/ac
- Wi-Fi 2.4 GHz and 5 GHz bands
- LAN/WAN autonegotiation Ethernet port

- Gigabit Ethernet port
- Support for HUAWEI Mobile WiFi App
- Functioning as a Dynamic Host Configuration Protocol (DHCP) server and supporting Network Address Translation (NAT)
- Internet Protocol version 6 (IPv6)/Internet Protocol version 4 (IPv4)dual stack
- Wi-Fi and Wi-Fi protected setup (WPS)
- Windows XP SP3, Windows Vista SP1/SP2, Windows 7, Windows 8, Windows 8.1, Mac OS X 10.7, 10.8, and 10.9 with latest upgrades
- LTE/UMTS/GSM external antenna ports
- USB 2.0 host port
- Personalized light emitting diode (LED) indicators

# 2.2 Technical Specifications

## 2.2.1 Hardware Specifications

Table 2-1 lists the hardware specifications of the E5186s-22a.

**Table 2-1** Hardware specifications

| Item | Description |
|---|---|
| Technical standards | WAN: LTE/DC-HSPA+/HSPA+/HSPA/UMTS/EDGE/GPRS/GSM |
| | LAN: IEEE 802.3/802.3u |
| | WLAN: IEEE 802.11 a/b/g/n/ac |
| Working bands | LTE:<br>• FDD 2600/2100/1800/900/800 MHz<br>• FDD DL CA 1800 MHz + 2600 MHz, 1800 MHz + 800 MHz, 2600 MHz + 800 MHz, 1800 MHz intra-band contiguous, 2600 MHz intra-band contiguous<br>• TDD 2600 MHz<br>• TDD DL CA 2600 MHz intra-band contiguous |
| | DC-HSPA+/HSPA+/HSPA/UMTS: 2100/900 MHz |
| | EDGE/GPRS/GSM: 1900/1800/900/850 MHz |
| | WLAN: 2.4GHz, 5GHz (indoor use only) |
| Memory | 128 MB NAND Flash<br>128 MB Double Data Rate (DDR) Synchronous Dynamic Random Access Memory (SDRAM) |
| External ports | One power port |
| | Two RJ11 ports for telephone connections |
| | Three gigabit Ethernet RJ45 ports for LAN connections |

| Item | Description | |
|---|---|---|
| | One gigabit Ethernet RJ45 port for both LAN and WAN connections | |
| | One USB 2.0 host port | |
| | One micro subscriber identity module (SIM) card port | |
| | Two external antenna ports | |
| Buttons | One power switch | |
| | One Wi-Fi button | |
| | One WPS button | |
| | One RESET button | |
| LED indicators | One POWER indicator | |
| | One Wi-Fi indicator | |
| | One VOICE indicator | |
| | One MODE indicator | |
| | One signal strength indicator | |
| | Three LAN indicators | |
| | One LAN/WAN indicator | |
| Maximum transmit power | LTE: Conform to Power Class 3 Definition | |
| | UMTS: Conform to Power Class 3 Definition | |
| | WLAN | 802.11a: 17 dBm |
| | | 802.11b: 16 dBm |
| | | 802.11g: 16 dBm |
| | | 802.11n: 16 dBm |
| | | 802.11ac: 17 dBm |
| Receiving sensitivity | LTE: Confirm to 3GPP Requirements | |
| | UMTS: Confirm to 3GPP Requirements | |
| | WLAN | 802.11a: –65 dBm at 54 Mbit/s |
| | | 802.11b: -76 dBm at 11 Mbit/s |
| | | 802.11g: –65 dBm at 54 Mbit/s |
| | | 802.11n: –64 dBm at 65 Mbit/s |
| | | 802.11ac: –59 dBm at 78 Mbit/s |

| Item | Description |
|---|---|
| Power consumption | < 20 W |
| Power supply | AC: 100–240 V |
| | DC: 12 V/2 A |
| Dimensions (H x W x D) | 190 mm × 200 mm × 32 mm |
| Weight | About 550 g |
| Temperature | Working temperature: 0°C to +40°C |
| | Storage temperature: –20°C to +70°C |
| Humidity | 5%–95% RH |

## 2.2.2 Antenna Specifications

**Table 2-2** Specifications of the LTE main antenna

| Item | Description |
|---|---|
| Frequency range | 790–2690 MHz |
| Input impedance | 50 Ω |
| Standing wave ratio (SWR) | < 3 |
| Efficiency | > 50% |
| Gain | 0–3 dBi |
| Polarization type | Linear polarization |

**Table 2-3** Specifications of the WLAN antenna at 2.4 GHz

| Item | Description |
|---|---|
| Frequency range | 2.4–2.483 GHz |
| Input impedance | 50 Ω |
| SWR | < 3 |
| Efficiency | > 50% |
| Gain | < 2.5 dBi |
| Polarization type | Linear polarization |

**Table 2-4** Specifications of the WLAN antenna at 5 GHz

| Item | Description |
|---|---|
| Frequency range | 5–6 GHz |
| Input impedance | 50 Ω |
| SWR | < 3 |
| Efficiency | > 50% |
| Gain | < 3.5 dBi |
| Polarization type | Linear polarization |

## 2.2.3 Software Specifications

Table 2-5 lists the software specifications of the E5186s-22a.

**Table 2-5** Software specifications

| Item | Description | |
|---|---|---|
| Gateway | Supports the default route: 0.0.0.0 | |
| | Supports the default gateway address: 192.168.8.1 | |
| | Supports the Address Resolution Protocol (ARP). | |
| | Supports the Internet Control Message Protocol (ICMP). | |
| | Supports the domain name service (DNS). | |
| | Supports the Digital Living Network Alliance (DLNA) | |
| | Supports Samba sharing | |
| | Supports external USB storage devices and USB printer | |
| | NAT | Supports NAT and Network Address and Port Translation (NAPT), which complies with RFC2663, RFC3022, and RFC3027. |
| | | Supports CONE NAT |
| | | Supports fragmented message identification during common NAT. |
| | DHCP server | Enables and disables the DHCP server. |
| | | Configures DHCP server address pools. |
| | | Sets the lease time. |
| | | Displays the status of the DHCP server address pools, including host names, Media Access Control (MAC) addresses, IP addresses, and remaining lease time. |

| Item | Description | |
|---|---|---|
| SMS | Writing/Sending/Receiving | |
| | Writing/Sending/Receiving extra-long messages | |
| Voice and fax | VoIP | Supports the Session Initiation Protocol (SIP) |
| | | Supports G.711a, G.711u, G.729a, G.729b, G.726 (-24/-32), G.722, and G.723.1 for encoding and decoding |
| | CS voice | Supports CS voice communication over UMTS and GSM networks |
| | | Supports the circuit switched fallback (CSFB) |
| | Fax | T.38 fax |
| | | Fax pass through |
| Firewall | Enables and disables the firewall. | |
| | Filters LAN MAC addresses. | |
| | Filters LAN IP addresses. | |
| | Filters URLs. | |
| | Supports demilitarized zone (DMZ). | |
| | Supports Universal Plug and Play (UPnP). | |
| | Supports Application Level Gateway (ALG). | |
| WLAN | Broadcasts and hides service set identifiers (SSIDs). | |
| | Complies with IEEE 802.11a/b/g/n/ac. | |
| | Supports WPS. | |
| | Authentication | Supports OpenSystem authentication. |
| | | Supports encryption using wired equivalent privacy (WEP), Wi-Fi protected access preshared key (WPA-PSK), and WPA2-PSK keys. |
| | | Supports the Advanced Encryption Standard (AES) encryption algorithm. |
| | | Supports the TKIP and AES hybrid encryption algorithm. |
| | MAC address authentication | Supports the MAC address authentication whitelist. |
| | | Supports the MAC address authentication blacklist. |

| Item | Description | |
|---|---|---|
| | | Supports a maximum of 10 MAC address entries. |
| | Supports automatic transmission rate adjustment. | |
| | Station management | Supports station status queries. |
| | | • Supports a maximum of 32 connected stations at 2.4 GHz.<br>• Supports a maximum of 32 connected stations at 5 GHz. |
| IPv6/IPv4 dual stack | DHCPv6/v4 server and client | |
| | DNSv6/v4 server and client | |
| | Display IPv6/v4 WAN address | |
| HUAWEI Mobile WiFi App | View service provider's name, the roaming status and signal strength | |
| | View the data traffic usage and SMS | |
| | Manage the connected devices | |
| | Change CPE's SSID and password | |
| System requirements | Operating system: supports Windows XP SP3, Windows Vista SP1/SP2, Windows 7, Windows 8, Windows 8.1, Mac OS X 10.7, 10.8, and 10.9 with latest upgrades. | |
| | Hardware configuration: meets the configuration requirements of the operating system. | |

# 3 Services and Applications

## 3.1 Data Services

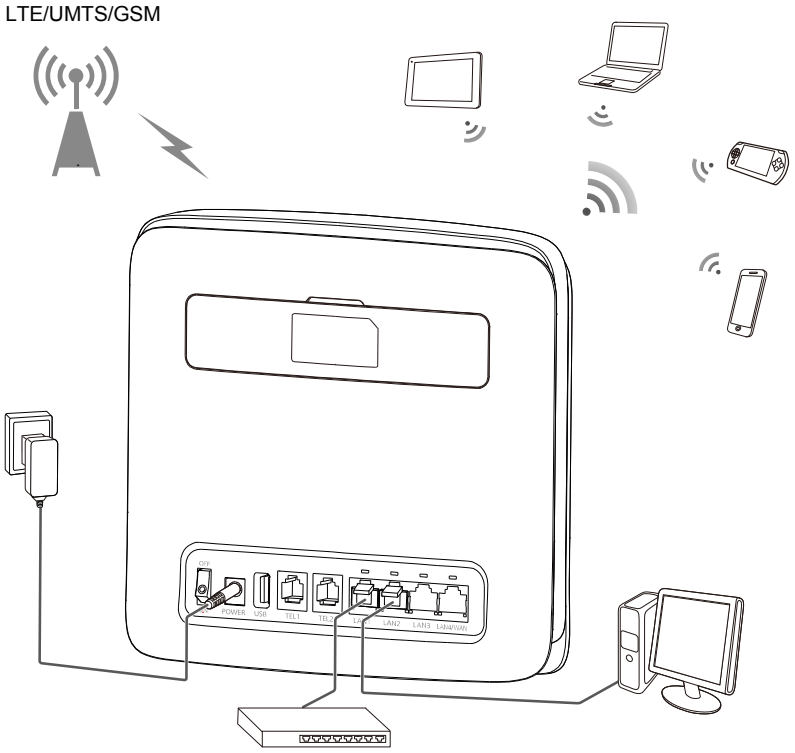
By connecting to the E5186s-22a over a wireless or wired network, users can get access to high-speed Internet services.

The E5186s-22a can simultaneously set up wireless connections with 64 Wi-Fi devices and establish a local area network (LAN) by connecting to concentrators and switches.

### 3.1.1 Accessing the Internet Using an LTE, UMTS, or GSM Network

The E5186s-22a uses an LTE, UMTS, or GSM network to access the Internet.

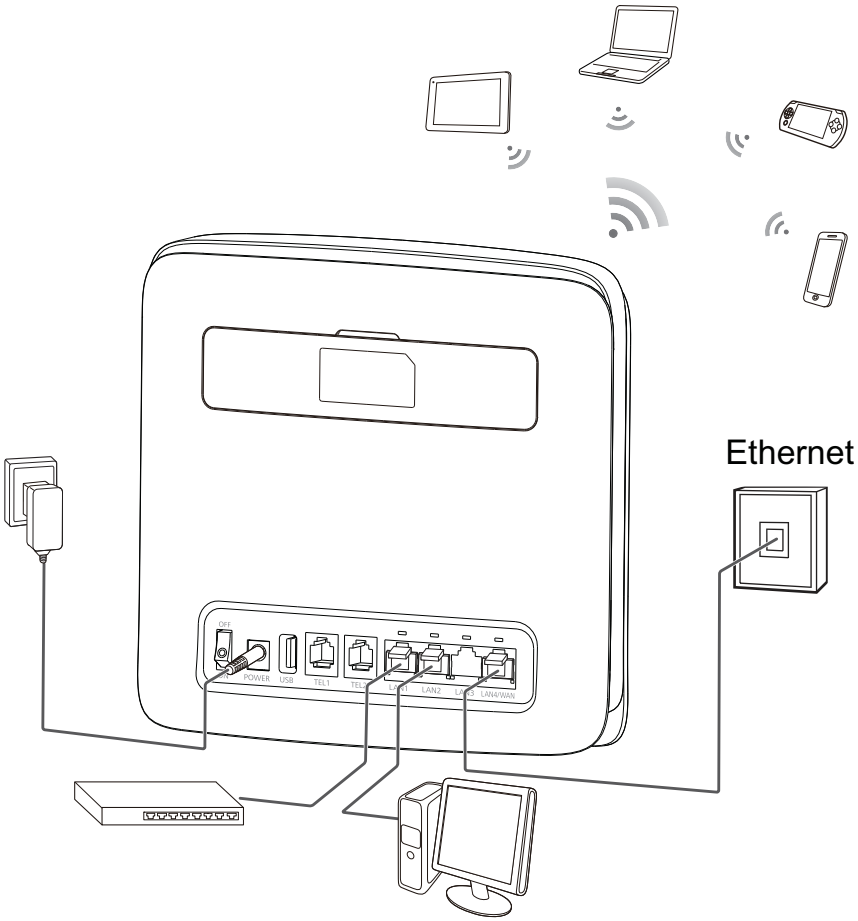
**Figure 3-1** Accessing the Internet using an LTE, UMTS, or GSM Network



## 3.1.2 Accessing the Internet Using Ethernet

The LAN/WAN multiplexed port supports automatic identification of the LAN/WAN port in access mode, and automatic selection of accessing manners of ADSL domestic wideband, DHCP hotel wideband or static IP wideband. You can easily access the Internet using the Ethernet by connecting the LAN/WAN multiplexed port to the Ethernet with a network cable.

**Figure 3-2** Accessing the Internet using Ethernet




## 3.2 Voice Services

The E5186s-22a provides two telephone ports to which users can connect telephones to implement basic voice functions or connect fax machines to use fax services.

**Figure 3-3** E5186s-22a connected to telephones

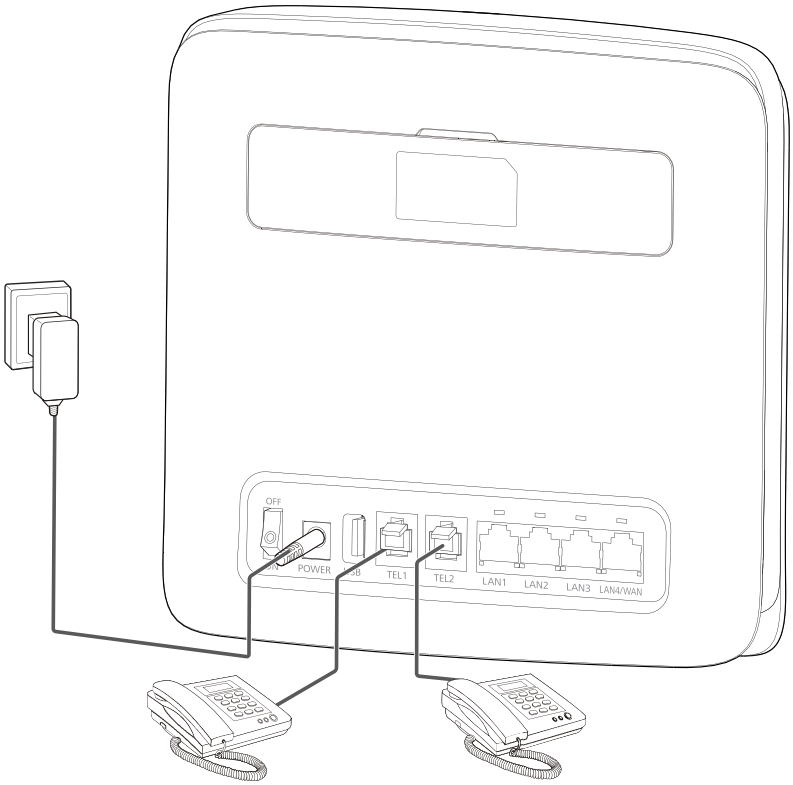
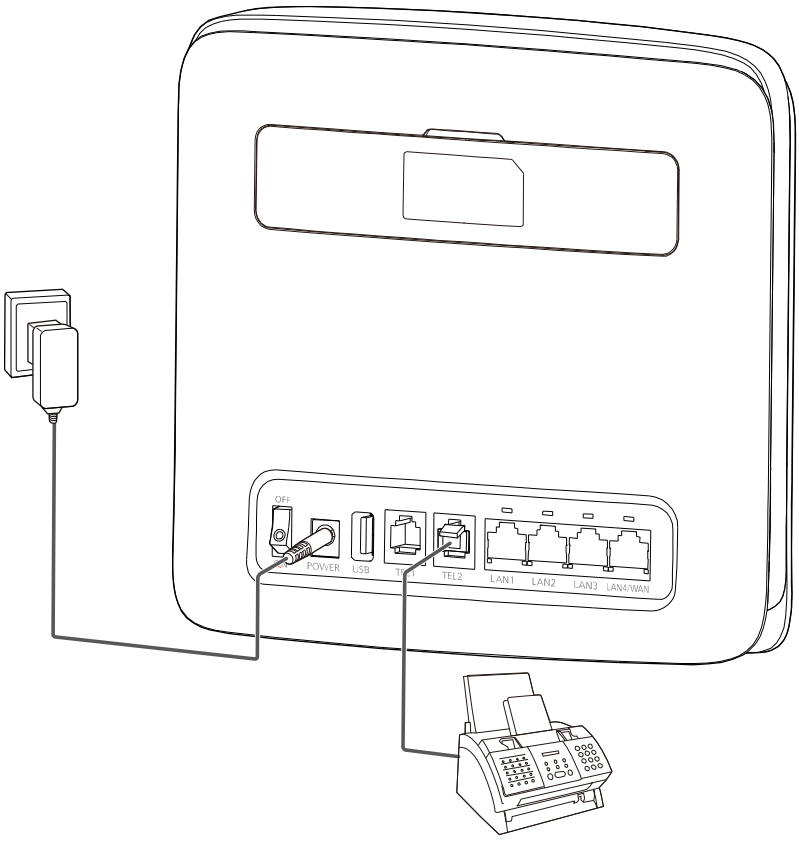


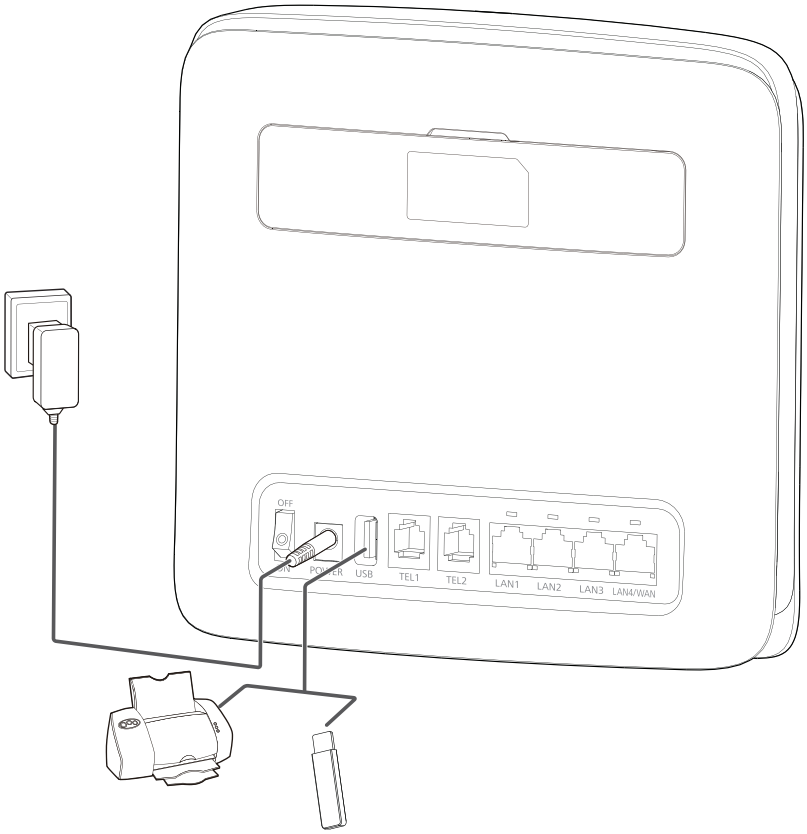

**Figure 3-4** E5186s-22a connected to a fax machine



# 3.3 USB Sharing Services

With one USB port, users can connect a USB storage device to the USB port on the E5186s-22a to save and share files. Only USB storage devices in FAT and FAT32 formats are supported. Users can also connect a USB printer to the USB port on the E5186s-22a for printing services.

**Figure 3-5** E5186s-22a connected to a USB storage device or USB printer




# 3.4 Security Services

The E5186s-22a offers security features, such as network firewalls, user authentication, and personal identification number (PIN) protection, to protect users from network security threats.

## 3.4.1 Firewall

The E5186s-22a has the following firewall functions:

- Firewall switch: Enable and disable the firewall.
- LAN MAC address filtering: Prevent specified MAC addresses on a LAN from accessing the network.
- LAN IP address filtering: Prevent specified IP addresses on a LAN from accessing the network.
- URL filtering: Prevent computers on a LAN from visiting specified URLs.

### 3.4.2 User Authentication

The E5186s-22a complies with the following user authentication protocols:

- WEP
- WPA-PSK
- WPA2-PSK

### 3.4.3 PIN Protection

If PIN protection is enabled, after the E5186s-22a restarts, users must enter the correct PIN each time they log in to the web management page.

## 3.5 Maintenance and Management

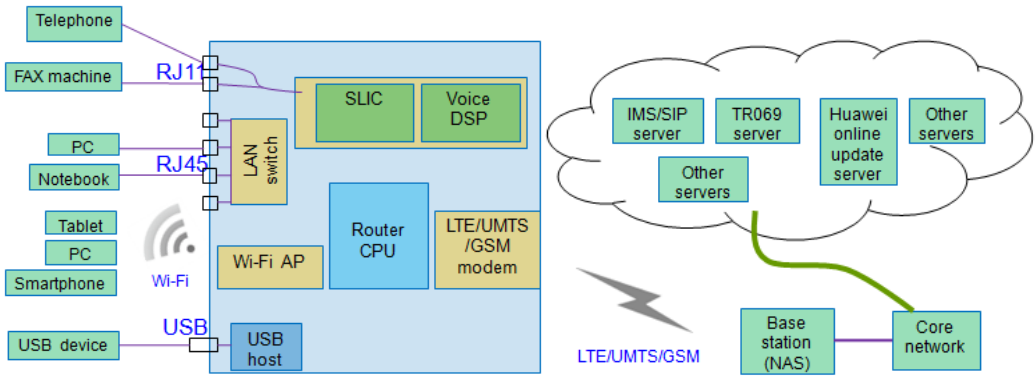
The E5186s-22a allows users to locally manage connected devices, complete network settings, and check the device status to ensure consistent performance.

# 4 System Architecture

## 4.1 System Architecture Diagram

Figure 4-1 shows the E5186s-22a system architecture.

**Figure 4-1** E5186s-22a system architecture




## 4.2 Functional Modules

- LTE/UMTS/GSM modem

  Processes the access, management, and data transmission of LTE/DC-HSPA+/HSPA+/HSPA/UMTS/EDGE/GPRS/GSM.
- CPU

  Transmits data and voices from the wireless metropolitan area network (WMAN) to the LAN.
- Subscriber Line Interface Circuit (SLIC)

  Connects telephones or a fax to the E5186s-22a.
- LAN/WAN switch

  Transmits data over Ethernet ports. When the Ethernet port works as a WAN port, it supports data transmitting.
- Wi-Fi access point (AP)

  Enables wireless devices to connect to a LTE/UMTS/GSM network using Wi-Fi or related standards.

- USB 2.0 host port
  Connects a USB storage device to the E5186s-22a.

# 5 Packing List

Table 5-1 lists the items included with the E5186s-22a.

**Table 5-1** Items in the E5186s-22a package

| Item | Quantity | Remarks |
|---|---|---|
| LTE CPE | 1 | Mandatory |
| Power adapter | 1 | Mandatory |
| Ethernet cable | 1 | Mandatory |
| Quick Start | 1 | Mandatory |
| Safety Information | 1 | Mandatory |
| Warranty Card | 1 | Optional |
| USB cable | 1 | Optional |

# A Acronyms and Abbreviations

| | |
|---|---|
| **Numerics** | |
| 3G | The Third Generation |
| **A** | |
| AC | Alternating Current |
| AES | Advanced Encryption Standard |
| ALG | Application Level Gateway |
| ARP | Address Resolution Protocol |
| AP | Access Point |
| APN | Access Point Name |
| **C** | |
| CPE | Customer-Premises Equipment |
| CSFB | circuit switched fallback |
| **D** | |
| DC | Direct Current |
| DC-HSPA+ | Dual Carrier High Speed Packet Access Plus |
| DDR | Double Data Rate |
| DHCP | Dynamic Host Configuration Protocol |
| DL | Down Link |
| DMZ | demilitarized zone |
| DNS | domain name service |
| **E** | |
| EDGE | Enhanced Data Rates for GSM Evolution |
| **F** | |
| FDD | frequency division duplex |

| | |
|---|---|
| **G** | |
| GPRS | General Packet Radio Service |
| GSM | Global System for Mobile Communications |
| **H** | |
| HSPA+ | High Speed Packet Access Plus |
| HSPA | High Speed Packet Access |
| HSDPA | High Speed Downlink Packet Access |
| HSUPA | High Speed Uplink Packet Access |
| **I** | |
| ICMP | Internet Control Message Protocol |
| IP | Internet Protocol |
| **L** | |
| LAN | Local Area Network |
| LED | Light Emitting Diode |
| LTE | Long Term Evolution |
| **M** | |
| MAC | Media Access Control |
| MDI | Medium Dependent Interface |
| MDIX | Medium Dependent Interface Crossover |
| **N** | |
| NAPT | Network Address and Port Translation |
| NAT | Network Address Translation |
| **P** | |
| PIN | Personal Identification Number |
| **S** | |
| SDRAM | Synchronous Dynamic Random Access Memory |
| SIM | subscriber identity module |
| SIP | Session Initiation Protocol |
| SMS | Short Message Service |
| SOHO | Small Office Home Office |
| SSID | service set identifier |
| **T** | |

| | |
|---|---|
| TDD | time division duplex |
| TKIP | Temporal Key Integrity Protocol |
| **U** | |
| UL | Up Link |
| UMTS | Universal Mobile Telecommunications System |
| UPnP | Universal Plug and Play |
| URL | Uniform Resource Locator |
| USB | Universal Serial Bus |
| **W** | |
| WAN | Wide Area Network |
| Wi-Fi | Wireless Fidelity |
| WLAN | Wireless Local Area Network |
| WPA-PSK | Wi-Fi Protected Access Pre-shared Key |
| WPS | Wi-Fi Protected Setup |