# Huawei VP9660
# V600R006C10

# Product Overview

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# Contents

# 1 Product Positioning and Features

## 1.1 Product Positioning

The HUAWEI VP9660 Multipoint Control Unit (VP9660 for short) is a new generation of high-capacity transcoding Multipoint Control Units (MCUs) with support for dynamic port allocation, smooth expansion, and 4K30 universal transcoding.

The VP9660 can be used for large sized enterprises: As the media exchange platform of the conference system, the VP9660 supports smooth expansion and applies to the government, taxation, power, and finance industries as well as medium and large sized enterprises.

## 1.2 Product Features

### Powerful Capability for Ultimate Conference Experience

- 4K 30 fps full encoding and decoding

  The VP9660 supports independent encoding and decoding for each video channel. With the H.265 4K video encoding and decoding technology, the VP9660 supports 4K 30 fps full HD. The VP9660 supports 4K 30 fps full encoding and decoding for up to 32 video channels.

- Continuous presence per port

  The VP9660 provides continuous presence per port. This allows endpoints to join the same conference at any protocol and bandwidth, and each endpoint user can have the best possible experience for their endpoint capability and bandwidth. Participants in a conference can have different continuous presence views.

- AAC-LD three-channel audio technology

  The VP9660 supports the latest Advanced Audio Coding-Low Delay (AAC-LD/LC) protocol, contributing to CD-quality audio for voice communication. With three-channel of AAC-LD audio technology, the VP9660 achieves sound localization.

- Transcoding for presentation sharing

  The VP9660 provides transcoding for presentation sharing, allowing endpoints with various presentation receiving capabilities to join the same conference and view the

conference presentation. Thanks to transcoding for presentation sharing, functions of displaying presentations in continuous presence and dynamic management of presentation bandwidth are available, enabling all participants to view the presentation and helping ensure the optimal conference experience.

● Resource-free presentation transcoding

The VP9660 is able to provide transcoding for presentation sharing without use of any port resources, saving customers' port investment.

● Dynamic port allocation

The VP9660 provides dynamic allocation of port resources, which improves resource usage efficiency and return on investment (ROI). Resource occupied by endpoints at different resolutions:

- H.264: 1-channel 1080p 60 fps = 2-channel 1080p 30 fps = 2-channel 720p 60 fps = 4-channel 720p 30 fps

- H.265: 1-channel 4K 30 fps = 1-channel 1080p 60 fps = 2-channel 1080p 30 fps = 2-channel 720p 60 fps = 4-channel 720p 30 fps

  An H.265 port can be used as an H.264 port.

## Open, Convergent, and Easy to Use

● Endpoints at any protocols

The VP9660 allows network connections from endpoints at H.323 and SIP .

● Multiple integration solutions

The VP9660 is interoperable with Huawei telepresence, traditional HD and SD videoconferencing, mobile, and audio-only endpoints, Huawei videoconferencing and surveillance convergence solution, and the RSE6500, and connects to Huawei Home Presence terminals.

● Easy to use

The VP9660 provides a graphical built-in web interface to simplify O&M, and supports multiple conference joining modes and conference control functions.

## Secure and Reliable

● Powerful network adaptability

The VP9660 uses Huawei's proprietary super error concealment (SEC) 3.0 to ensure uninterrupted video delivery even if the packet loss rate reaches 20%. The VP9660 supports adaptive jitter buffer (AJB) technology to implement dynamic adjustment based on jitter information, ensuring the best audio-visual experience.

● Advanced encryption technology

The VP9660 supports multiple media, signaling, and management encryption protocols, including:

- H.235 (AES)

- Secure Real-time Transport Protocol (SRTP)

- Transport Layer Security (TLS)

- Hypertext Transfer Protocol Secure (HTTPS)

- Secure Shell (SSH)

- Simple Network Management Protocol (SNMP) V3

The VP9660 also provides identity authentication and encrypted communication. This helps to prevent account forgery and protect against the interception of conference messages during transmission, ensuring conference information security to the highest level.

● Multiple backup technologies

The VP9660 adopts backup for the entire system, main control board, service board, network port, power supply, and chipset, which ensures the smoothness of a video conference.

● The VP9660 adopts the carrier-class and plug-in structure design and supports board expansion, allowing smooth upgrade of the system capacity.

# 2 Application Scenario

The VP9660 provides multiple ports for a variety of broadband and narrowband data connection types, such as IP data connection, facilitating network setup.

## 2.1 Cascaded Network

Cascaded networks are gaining in popularity as videoconferencing technology is advancing and users demand increasingly larger system capacity. Cascading technology breaks the capacity limits of a single MCU and enables MCUs to be distributed in different areas and large-scale videoconferencing networks across regions to be set up.

**Figure 2-1** shows a cascaded network.

**Figure 2-1** Cascaded network
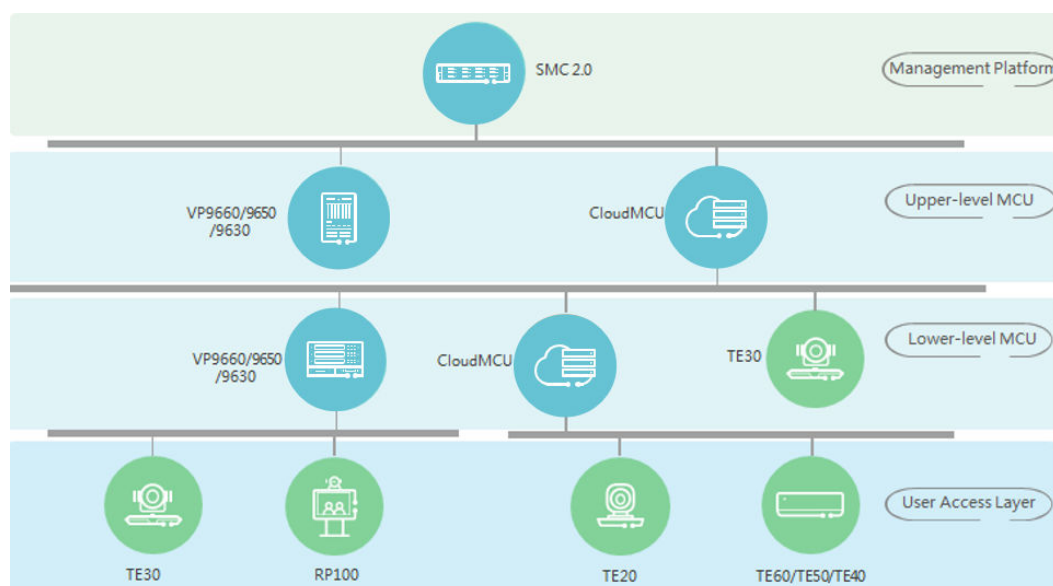


On a cascaded network, MCUs are cascaded. A multi-layer dedicated network is a large-scale network consisting of country, state, and city levels or state, city, and town levels.

- Cascading between VP9000 series MCUs and CloudMCUs and cascading between VP9000 series MCUs and ViewPoint 8000 MCUs are supported.

- All levels of MCUs are managed by the SMC2.0.

- Multiple channels can be set up between the upper- and lower-level MCUs, and multiple media streams can be transmitted simultaneously. Therefore, the participants can view video from any other site.

- High-bandwidth services are available with transrating capability.

- Recording servers can be deployed for conference recording, live broadcasting, and on-demand playback.

# 2.2 On-Premises Network

Huawei's videoconferencing solution is a comprehensive video conference solution that supports immersive remote conferences, desktop and mobile video access, and enterprise streaming media applications. The solution is developed to serve customers from governments, enterprises of all sizes, and a variety of industries, including transportation, public safety, and finance.

Figure 2-2 shows the on-premises network.

Figure 2-2 On-premises network
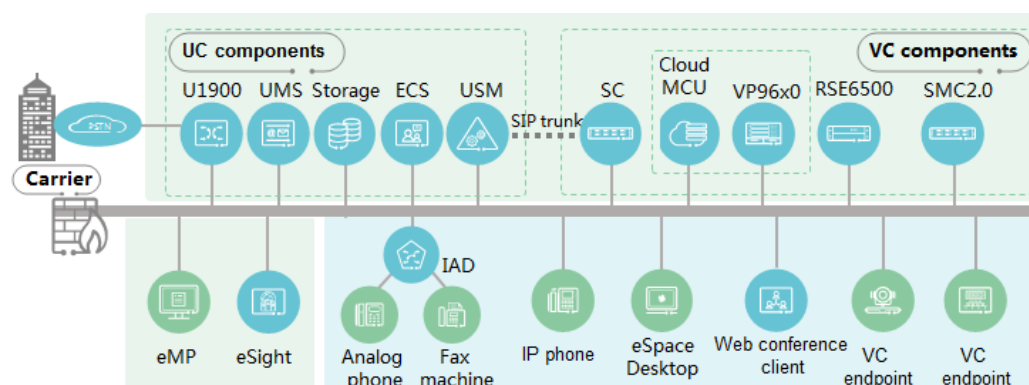


Figure 2-3 shows the enterprise on-premises conference-only network.

Figure 2-3 On-premises network (conference-only)
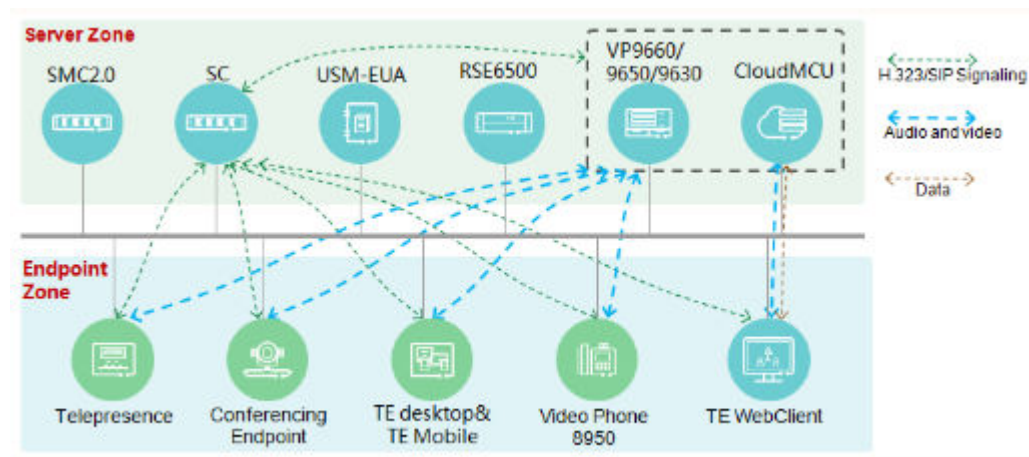
On an on-premises network, the SMC2.0, MCU (VP9600 series MCU or CloudMCU), videoconferencing endpoints, and IP network are deployed. The MCU functions as the media switching platform in the system.

- The VP9600 series MCUs can be deployed independently or together with CloudMCU.

- The VP9600 series MCUs locate in the media switching layer to allow access from a variety types of terminals in the lower layer and is managed by the SMC2.0.

# 3 Product Structure

The VP9660 is a cabinet MCU. The VP9660 incorporates the chassis, power module, dust filter, fan assemblies, and boards.

## 3.1 Chassis

The VP9660 provides a maximum of two central control boards and eight service boards, which are inserted into the VP9660 vertically. The VP9660 provides 2+2 AC or DC power modules. **Figure 3-1** shows the VP9660.

⚠ CAUTION

Do not insert both AC and DC power modules into the VP9660.

**Figure 3-1** VP9660

## Chassis Structure

**Figure 3-2** shows the chassis components of the VP9660.

**Figure 3-2** VP9660 chassis components
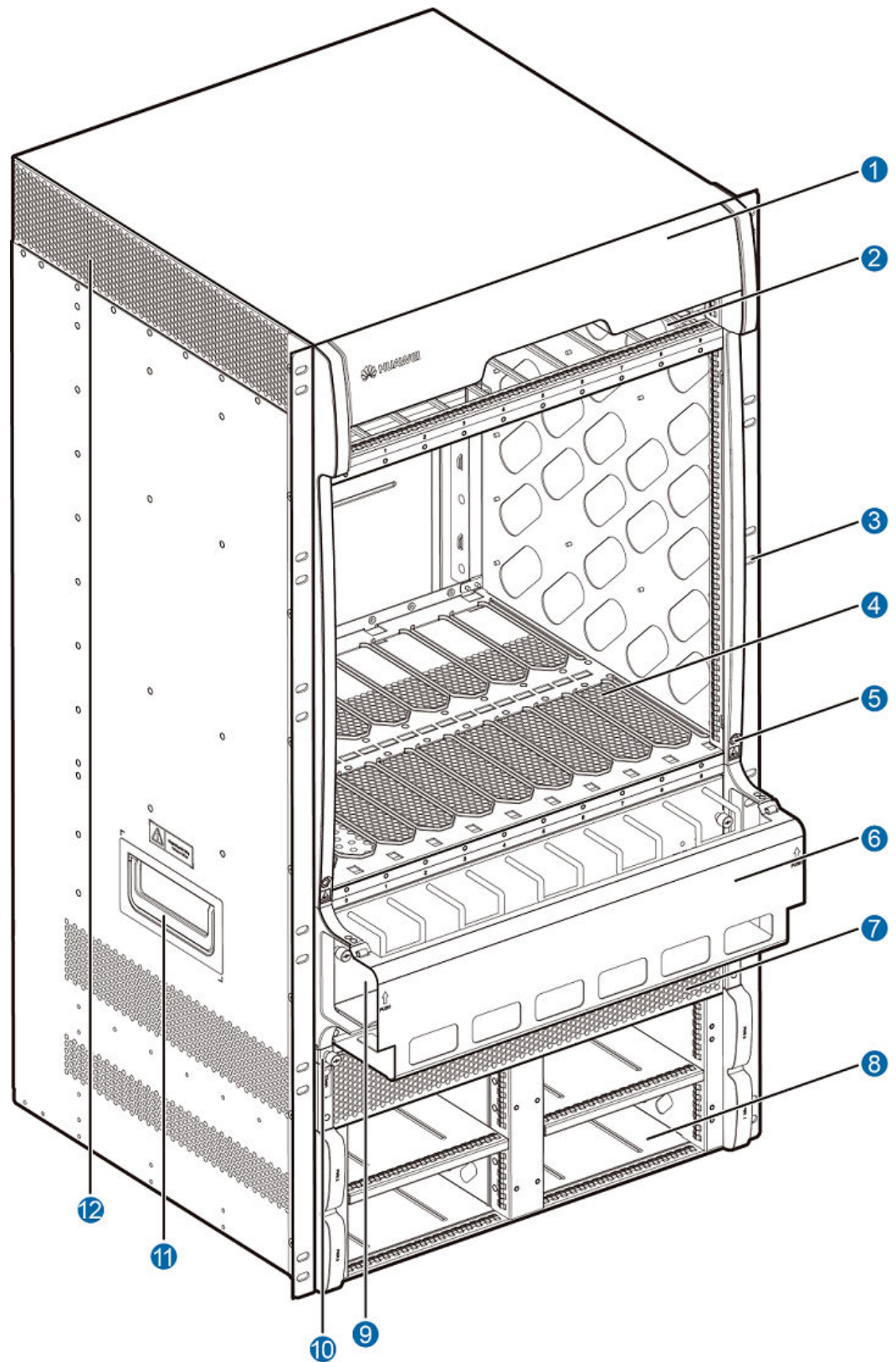
| 1 Front panel of the air outlet trough | 2 Upper fan assembly | 3 Mounting ear screw hole |
|---|---|---|
| 4 Board slots | 5 ESD holes | 6 Cable trough panel |
| 7 Air intake trough | 8 Power module slot | 9 Lower fan assembly |
| 10 Dust filter | 11 Chassis handle | 12 Air outlet |

## Heat Dissipation System

The VP9660 heat dissipation system incorporates the following:

- Fan assembly: dissipates the heat of the board inside the chassis.
- Fan supplied with the power module: dissipates the heat of the power module.

  The VP9660 fan assemblies are located on the upper and central parts of the chassis. Air can blow from the front, left, or right of the fan assemblies into the chassis to cool the boards inside. The fan assembly provides a fan monitoring board, which can generate alarms when faults occur in the fan.

**NOTICE**

For heat dissipation, do not leave any slots empty. If a slot has no board installed, install a filler panel.

The fan supplied with the power module is at the bottom of the chassis. The air channel of the power module is separated from the fan assembly. The air enters into the power module from the front side and vents out from the rear side for heat dissipation.

As shown in **Figure 3-3**, each fan assembly provides two indicators and no power switch.

**Figure 3-3** VP9660 upper fan assembly
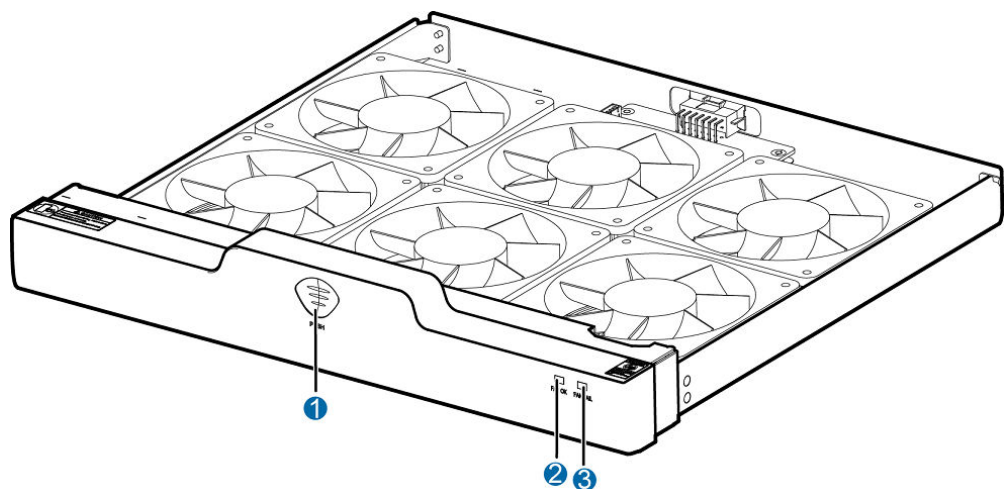
| 1 Button | 2 FAN OK indicator | 3 FAN FAIL indicator |
|---|---|---|

**□NOTE**

Press the button before you remove the fan assembly.

**Table 3-1** describes the fan assembly indicators.

**Table 3-1** Fan assembly indicators

| Indicator | Status | Description |
|---|---|---|
| FAN OK | Steady green | The fan is operating correctly. |
| | Off | The fan is malfunctioning. |
| FAN FAIL | Steady red | The fan is malfunctioning. |
| | Off | The fan is operating correctly. |

**Figure 3-4** shows the lower fan assembly of the VP9660.

**Figure 3-4** VP9660 lower fan assembly
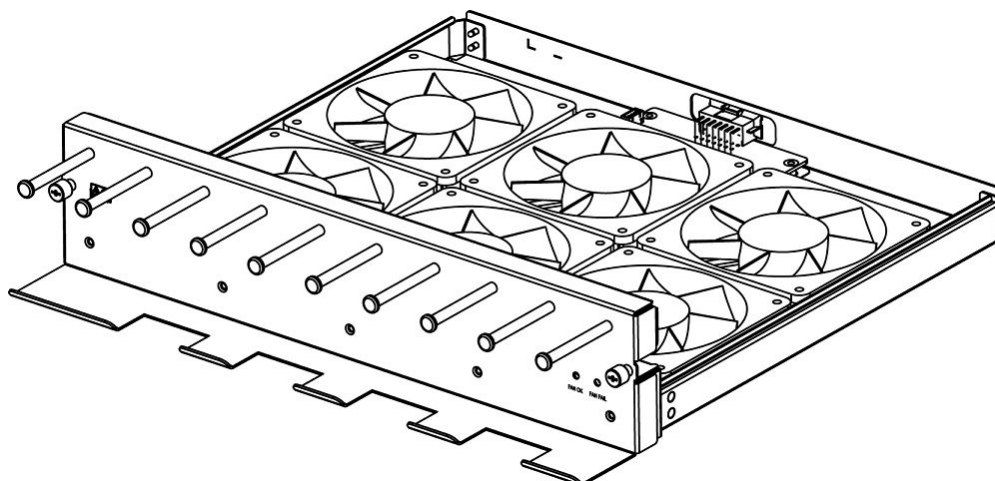


**□NOTE**

The descriptions of the upper fan assembly indicators also apply to the lower fan assembly indicators. The lower fan assembly provides two captive screws.

## Power Module

The power modules are located at the bottom of the VP9660 chassis, as shown in **Figure 3-2**, and provide 2+2 AC or DC power backup.

**NOTICE**

- To isolate the VP9660 from its power supply, remove the power cables from all power modules.
- Do not insert both AC and DC power modules in the VP9660.
- To achieve power backup, connect power cables to all power modules and set the power switches to ON.

The VP9660 is shipped with four power modules.

- If DC power modules are provided, the VP9660 requires two power modules to be fully powered. The other two power modules serve as backups.
- If AC power modules are provided and the input voltage is equal to or higher than 176 V, the VP9660 requires two power modules to be fully powered. The other two power modules serve as backups.

**NOTICE**

If the input voltage is lower than 176 V, four power modules are required to fully power the VP9660.

- Location and appearance

  **Figure 3-5** shows the AC power module. The AC power module provides a power socket on the left of its front panel. The power socket uses an International Electrotechnical Commission (IEC) C14 inlet and has a power plug lock. The dust filter is in the center of the front panel. The fan supplied with the power module is installed inside the power module shielded by a dust filter fixed outside.

  **Figure 3-5** AC power module
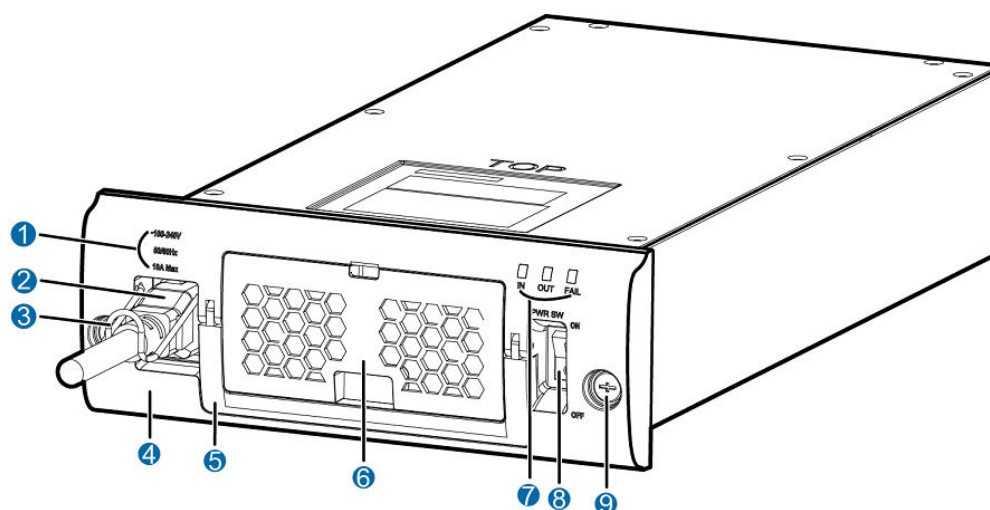
  

| 1 Label with the rated voltage and current | 2 Power plug | 3 Power plug lock |
| --- | --- | --- |

| 4 Decorative panel | 5 Power module handle | 6 Integrated fan (with a dust filter outside) |
|---|---|---|
| 7 Power indicator | 8 Power switch | 9 Captive screw |

Figure 3-6 shows the DC power module. A DC power module provides a power socket in the lower left corner of the module's front panel and is connected to a cable with a cord end terminal. The dust filter is in the center right of the front panel. The fan supplied with the power module is installed inside the power module shielded by a dust filter fixed outside.

**Figure 3-6** DC power module
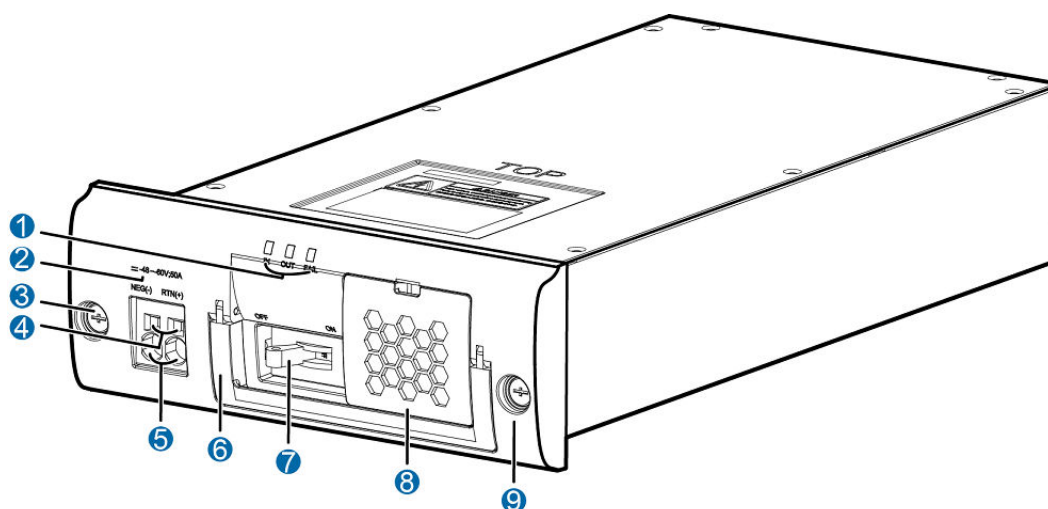


| 1 Power indicator | 2 Label with the rated voltage and current | 3 Captive screw |
|---|---|---|
| 4 Port for removing the power cable | 5 Wiring terminal socket | 6 Power module handle |
| 7 Power switch | 8 Integrated fan (with a dust filter outside) | 9 Decorative panel |

● Wiring terminal sockets

Table 3-2describes the wiring terminal sockets.

**Table 3-2** Wiring terminal sockets

| Wiring Terminal Socket | Cable Name | Cable Color |
|---|---|---|
| RTN (+) | Battery ground (BGND) cable | Black |
| NEG (-) | -48 V DC power cable | Blue |

- Indicators

  Table 3 describes the indicators in the power module. The real time status of the power module can be ascertained by viewing these indicators.

**Table 3-3** Power module indicators

| Indicator | Status | Description |
|---|---|---|
| IN | Steady green | The power module input is abnormal. |
| | Off | The power module input is abnormal. |
| OUT | Steady green | The power module output is normal. |
| | Off | The power module output is abnormal. |
| FAIL | Steady green | The power module is malfunctioning. |
| | Off | The power module is operating correctly. |

## Dust Filter

The dust filter filters dust and maintains airflow in the chassis to dissipate heat for components inside. **Figure 3-7** shows the dust filter.

**Figure 3-7** Dust filter
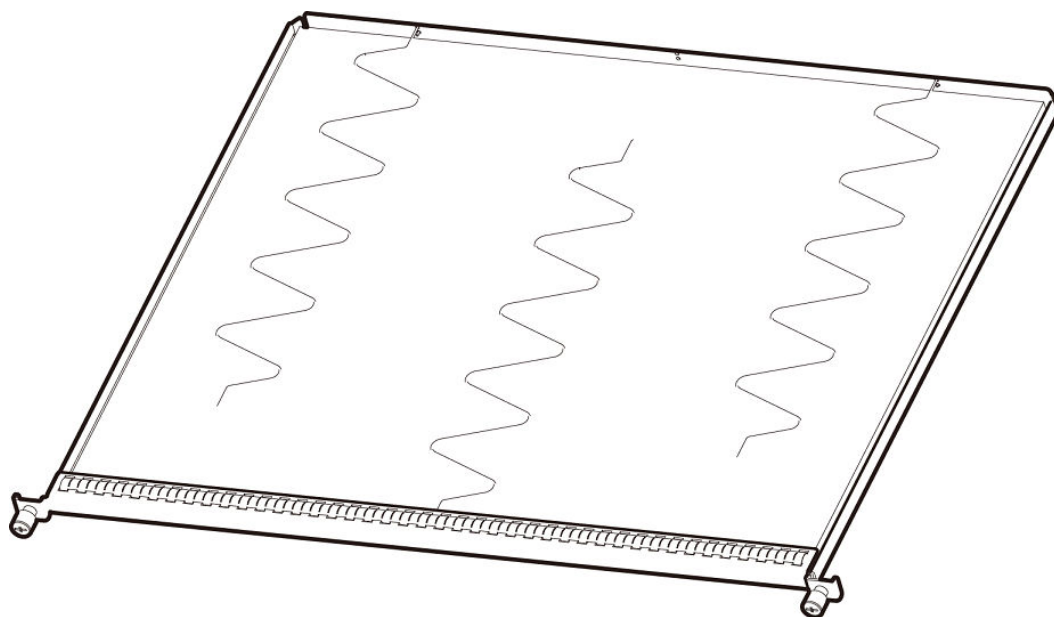
📖**NOTE**

> To ensure adequate dissipation and ventilation and to prevent the dust filter from being blocked, clean the dust filter periodically. The recommended frequency is three months. If the dust-proof environment is poor, clean the dust filter more frequently. If possible, replace the dust filter yearly.

# 3.2 Boards

A board is an integrated circuit board that provides a certain function. The board types available for an MCU depend on the MCU model.

## Board Types

The MCU boards can be classified into different types according to their functions. The boards of different types cannot replace each other. **Table 3-4** describes the functions of different boards.

**Table 3-4** Board types

| Board Type | Description |
| --- | --- |
| Main control board | Used for service control and processing of signals. |
| Service board | Used for processing of media streams. |

## HCCB Board

The HEVC Central Control Board B (HCCB) board is the main control board of the VP9660. As the core processing unit of the VP9660, the HCCB board is mandatory. **Figure 3-8** shows the board slots.

**Figure 3-8** VP9660 board slots (0-9 from left to right)
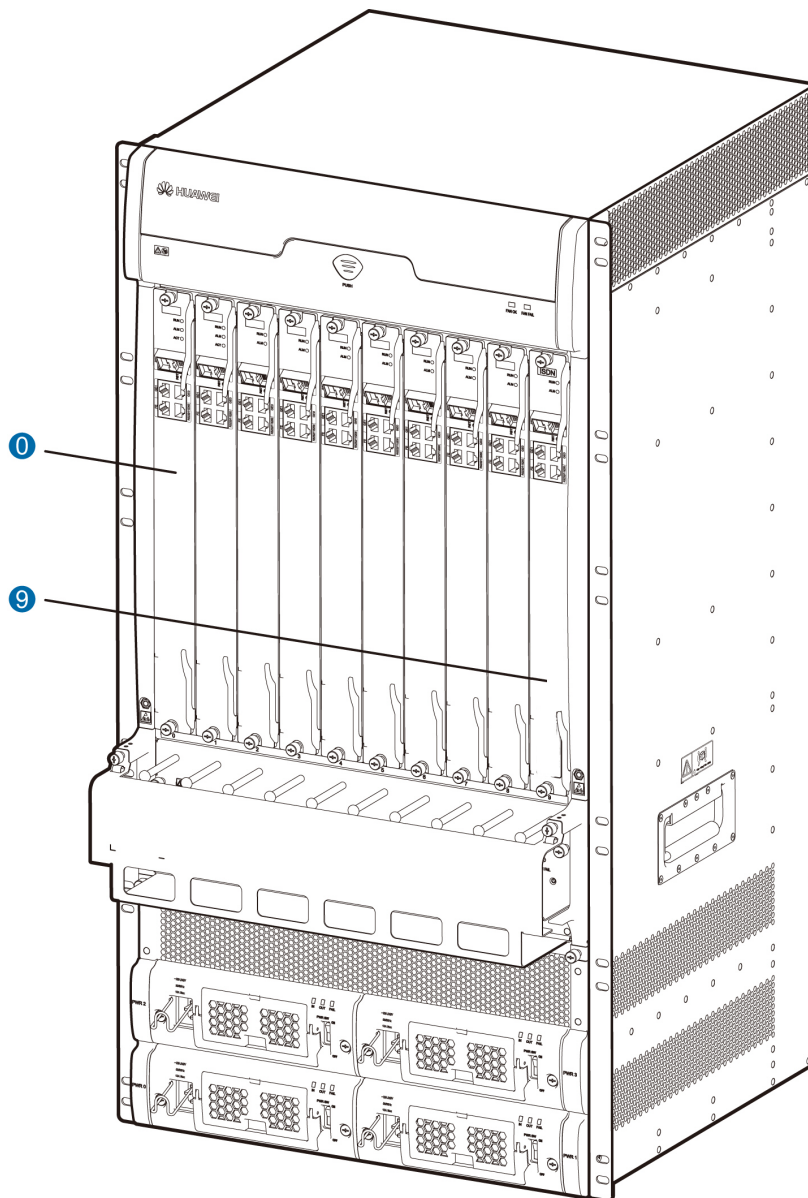
**Figure 3-9** VP9660 board slots notes



Insert HCCB boards into slots 0 and 1. When two HCCB boards are inserted, one is the active board and the other standby.

● Board front panel

  **Figure 3-10** shows the HCCB board front panel.

**Figure 3-10** HCCB board front panel
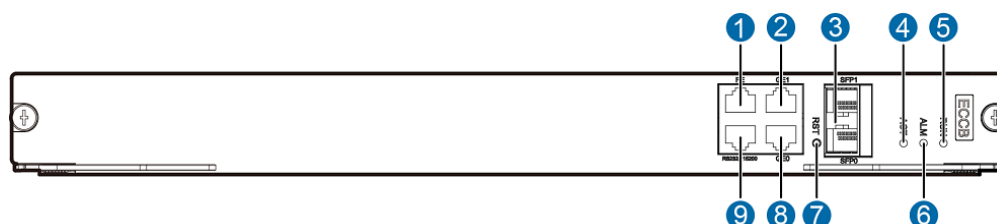


| 1 FE port | 2 GE1 port | 3 Optical ports: SFP1 (upper) and SFP0 (lower) |
|---|---|---|
| **NOTE**<br>FE is the abbreviation for fast Ethernet. The transmission rate on an FE port is 100 Mbit/s. | **NOTE**<br>GE is the abbreviation for gigabit Ethernet. The transmission rate on a GE port is 1000 Mbit/s. | |
| 4 ACT indicator | 5 RUN indicator | 6 ALM indicator |
| 7 RST button | 8 GE0 port | 9 RS-232 serial port |

⚠ CAUTION

● The IP addresses of the FE, GE0, and GE1 ports must be in different network segments. Otherwise, network errors will occur.

● GE0 port IP addresses of all boards must be in the same network segment. GE1 port IP addresses of all boards must be also in the same network segment.

● Ports

The HCCB board front panel provides one button and ports, as shown in Figure **Table 3-5** lists the button and ports.

**Table 3-5** Button and ports in the board front panel

| Component | Description |
|---|---|
| FE maintenance port | ● This port is used for internal debugging. The IP addresses of the FE port and the GE0 or GE1 port must be in different network segments.<br>● If you fail to use the GE0 port to log in to the MCU command-line interface (CLI), use the FE port. |
| GE0 port | This is a service network port used for signaling and media stream communications. |
| GE1 port | The GE0 and GE1 ports are backups for each other. If a network cable is removed from either of the ports, the MCU automatically switches the service on that port to another. |
| Optical port | ● This port supports the access of an optical fiber, and it functions like a GE port.<br>● Do not connect cables to both the GE and optical ports. If that happens, the optical port takes precedence. |
| RS-232 serial port | This port is used to execute serial port commands and internal debugging. |
| RST button | This button is used to reset the board. |

⚠ CAUTION

For service provision, connect the GE0 or GE1 network port to a gigabit switch.

● Board indicators

**Table 3-6** describes the indicators in the board front panel. The real time status of the board can be ascertained by viewing these indicators.

**Table 3-6** Board indicators

| Indicator | Status | Description |
|---|---|---|
| ACT | Steady green | The board is the active board. |
| | Off | The board is used as the standby board or not being used. |
| ALM | Off | The board is operating correctly. |

| Indicator | Status | Description |
|---|---|---|
| | Steady red | The board is malfunctioning. |
| RUN | Steady green | The board is powered on but is malfunctioning. |
| | Off | The board is not powered on or the board fails to start. |
| | Slow blinking (about 0.5 Hz, once every 2 seconds) | The board is operating correctly according to the configuration. |
| | Quick blinking (about 4 Hz, four times per second) | The board is loading programs. |
| GE/FE | Steady green | The network port connection is normal. |
| | Green off | No connection is established on the network port or the connection is faulty. |
| | Blinking orange | Data is being received or sent through the network port. |
| | Orange off | No data is being received or sent through the network port. |

☐**NOTE**

After the VP9660 starts properly, the RUN indicators on all the boards are supposed to be in the same state. If the states are different, the handshake between main control and service boards may fail. Check whether the version numbers for all boards. If the version numbers are different, update the boards to the latest version. If the version numbers are the same, remove and re-insert the boards.

## Media+ Board

The media+ board transcodes audio and video streams. You can choose whether to install media+ boards.slots 2 to 9 shown in **Figure 3-8**. You must install at least one media board in the VP9660.

☐**NOTE**

The media+ board does not provide the ACT indicator. The other indicators listed in **4.2-Boards** are the same as those on the HCCB board.

## RSE-M Board

The RSE-M board is an optional service board of the VP9660. This board can be inserted into any service board slots and offers the following functions: Allows conference recording, live broadcast, and video on demand (VoD). You are advised to insert it into slot 9. Allows users to manage programs, users, and the system and to control the recording process from the board web interface. Collaborates with a service management system, such as the HUAWEI Service Management Center (SMC) 2.0, to provide a complete videoconferencing recording solution.

**Table 3-7** describes the indicators in the RSE-M board front panel.

**NOTE**

The RSE-M board's front panel is the same as the HCCB board's except for the board name.

**Table 3-7** RSE-M board indicators

| Indicator | Status | Description |
|---|---|---|
| ACT | Steady green | There is power input, but the hard disk is not reading or writing data. |
| | Quick blinking (about 4 Hz, four times per second) | The hard disk is reading or writing data. |
| | Off | The board is loading programs. |
| ALM | Off | The board is operating correctly. |
| | Steady red or quick blinking | The board is malfunctioning. |
| RUN | Steady green | The board is powered on but is malfunctioning. |
| | Off | The board is not powered on or the board fails to start. |
| | Slow blinking (about 0.5 Hz, once every 2 seconds) | The board is operating correctly according to the configuration. |
| | Quick blinking (about 4 Hz, four times per second) | The board is loading programs. |
| GE/FE | Steady green | The network port connection is normal. |
| | Green off | No connection is established on the network port or the connection is faulty. |
| | Blinking orange | Data is being received or sent through the network port. |
| | Orange off | No data is being received or sent through the network port. |

# 4 Features and Benefits

## 4.1 Video Features

### Multiple Continuous Presence Modes

The VP9660 supports 48 continuous presence layouts, and up to 24 panes in one continuous presence layout. **Figure 4-1** shows the continuous presence modes.

**Figure 4-1** Continuous presence modes
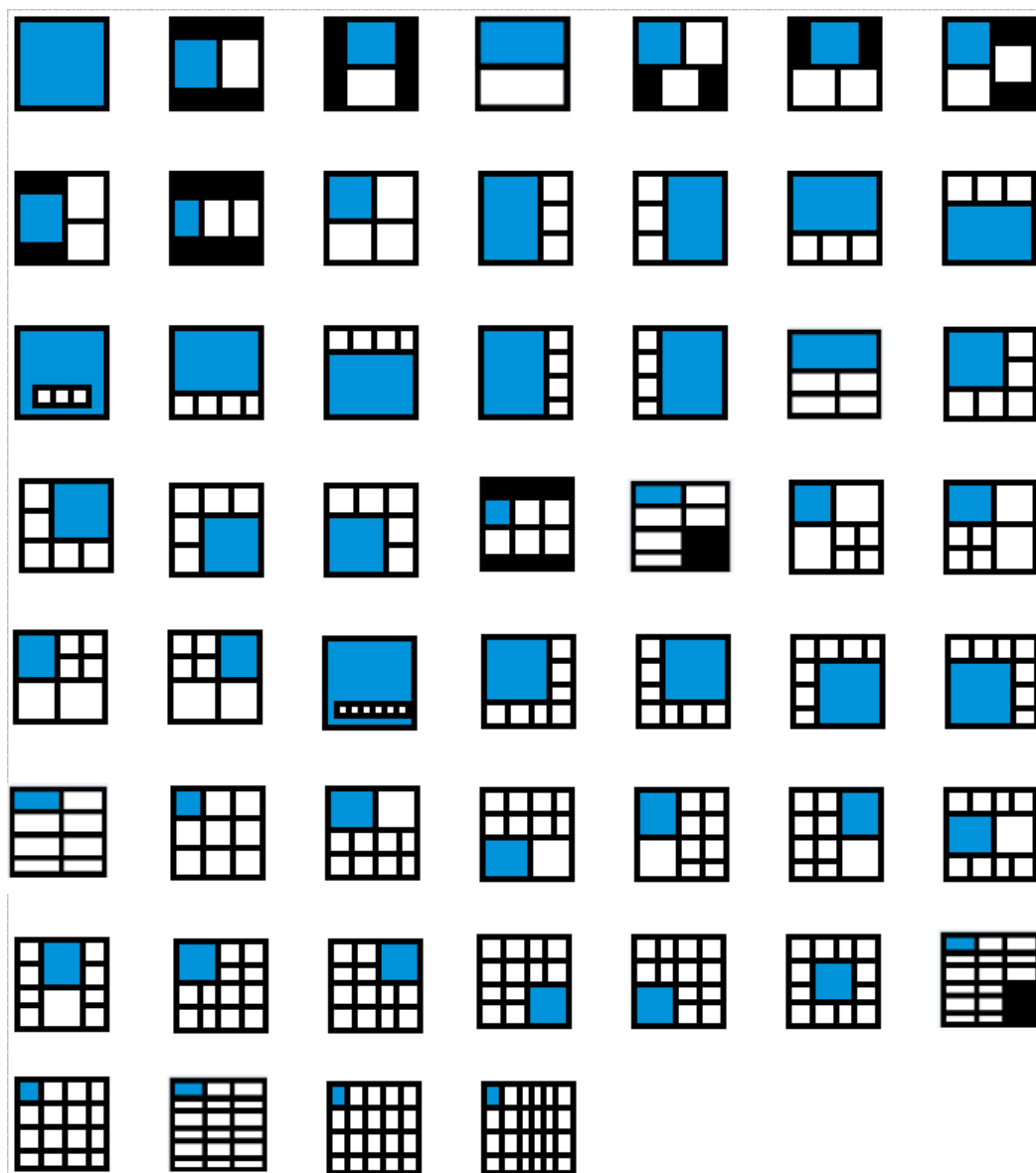


# 4.2 Universal Transcoding

The VP9660 provides the universal transcoding capability. With this capability, endpoints can join the same conference at any protocol and bandwidth, and each endpoint user can have the best possible experience available for their endpoint capability and bandwidth.

## 4K 30 fps Full Encoding and Decoding

The VP9660 supports independent encoding and decoding for each video channel. With the H.265 4K video encoding and decoding technology, the VP9660 supports 4K 30 fps full HD. The VP9660 supports 4K 30 fps full encoding and decoding for up to 32 video channels.

## Transcoding for Presentation Sharing

The VP9660 provides transcoding for presentation sharing, allowing endpoints with various presentation receiving capabilities to join the same conference and view the conference presentation.

- The VP9660 allows endpoints using H.323, and SIP to join the same conference.
- For single-stream sites that do not support presentations, the VP9660 implements transcoding to enable the presentation to be displayed as the video.
- Thanks to transcoding for presentation sharing, functions of displaying presentations in continuous presence and dynamic management of presentation bandwidth are available, enabling all participants to view the presentation and helping ensure the optimal conference experience.

# 4.3 Large Capacity

The VP9660 is a large-capacity MCU. It provides multiple ports and allows for multi-channel cascading.

## Multiple Ports

You can expand the capacity.

- The VP9660 supports smooth expansion through the purchase of port licenses or adding function extension modules. After the expansion, it provides up to 32 4K 30 fps ports that support universal transcoding.
- The number of VoIP audio ports is the same as that of 1080p 30 fps video ports.

## Common Multi-channel Cascading

Huawei leads the industry in introducing the multi-channel cascading technology. With multi-channel cascading adopted, all screen videos of a three-screen telepresence participant can be displayed to another telepresence participant, ensuring immersive experience. Participants on an upper-level MCU are able to view multiple participants on lower-level MCUs in the continuous presence. Additionally, participants on an upper-level MCU are able to view participants on any lower-level MCUs, enriching conference experience.

## Flexible Multi-Channel Cascading

Flexible multi-channel cascading is supported for cascading between the VP9660 and the CloudMCU and VP9660/VP9650/VP9630. In this case, one cascading channel can be used to view participants on upper-level and lower-level MCUs in the continuous presence. The flexible multi-channel is one channel in essence. When channel resources need to be added, channel resources are dynamically applied for in the conference and are added to the existing channel. If they are not required, channel resources are dynamically released.

# 4.4 Open and Convergent

The VP9660 adopts multiple network traversal technologies, supports mixed insertion with the NETRA media board, allows endpoints to join the same conference at different protocols, and integrates with the recording server, delivering an enriched conference experience.

## Compatible Mixed Insertion with the NETRA Media Board

VP9660 supports mixed insertion with the NETRA media board of the MCU V500R002C10 version, which ensures the consistency of user experience, facilitates onsite capacity expansion, and protects the ROI.

Key restrictions of the MCU that supports mixed insertion are as follows:

- Only the EC6.1 enterprise on-premises solution is matched.
- SIP flexible multi-channel cascading is not supported.
- The NETRA media board in the MCU that supports mixed insertion cannot be used as a signaling board but only supports H.265 forwarding. The NETRA media board does not support fault self-diagnosis.
- The network adaptation is consistent with that of MCU V500R002C10. The radio FEC is not supported. Only the OPUS supports RFC2198.
- The UI style such as the IVR UI style is consistent with that of MCU V600R006C10.
- All the restrictions of MCU V600R006C10 are inherited.

## Different Protocols for the Same Conference

- The VP9660 is compatible with H.323, and SIP allowing various endpoints complying with different protocols to join the same conference and achieving convergence of the Huawei telepresence, HD, SD, WebRTC client, mobile, and audio-only participants.
- The VP9660 can interwork with Huawei eSpace, Huawei Home Presence terminals, surveillance converged solution, and RSE6500, improving communication efficiency.

## Network Recording Solution

The recording server RSE6500 can exchange media streams with the MCU to can record conferences so that users can log in to the recording server and access the web page to view an ongoing live conference or a historical conference.

Huawei's network recording solution applies to the following scenarios:

- HD dual stream conferences

  When browsing dynamic computer screens and viewing HD images are required to help make decisions, for example, courseware used for online teaching, evidence presented to a remote court, X-ray images used for care at a distance, and meteorological pictures used in the weather consultation system. With Huawei's solution, users can view live video and read supporting materials at the same time.

- Telepresence conferences

  When tri-screen telepresence sites participate in a conference. With Huawei's solution, the images on the three screens can be incorporated into continuous presence, ensuring the image integrity and solving the problem that only the center screen can be recorded.

The recording server administrator can control user access to conference video on the recording server so that a given user can view only specified videos.

# 4.5 Ease of Use

The VP9660 provides an intuitive web interface to simplify conferencing operations and improve user experience.

## Web Interface

- A computer that has a browser installed is all you need to manage the MCU.
- The VP9660 provides a built-in web server. You can configure the VP9660 as you would on a network management system.

## SMC2.0-based Conference Control

The VP9660 can be managed by the SMC2.0. In this way, the VP9660 can be used in the enterprise on-premises solution to provide multipoint conferencing functions.

## Connection to eSight

The VP9660 can connect to eSight through the SNMP V3 protocol. Using eSight, the administrator uniformly manages NEs, for example, viewing basic information about the MCU and managing its alarms.

## Easy-to-Use Services

- Multiple conference joining modes and conference control functions
  - Huawei proposes an unattended MCU so that all conference operations can be performed from an endpoint. A user can initiate a multipoint conference using their video terminal's address book without the need for conference predefinition or interference by maintenance personnel.
  - VP9660 operations can be performed on the SMC2.0, which allows for centralized management of conferences.
  - The VP9660 supports various conference joining modes, including:
  - Ad hoc conference
  - Special service number
  - One click to join conference
  - A videoconferencing endpoint can also dial the H.323 ID, email address, or URL address, in addition to the IP address, to create or join a conference.
- Automatic continuous presence

  After a conference starts, the VP9660 automatically enables continuous presence if you have not set continuous presence parameters. If a site joins or exits a conference, the VP9660 automatically adjusts the continuous presence video feeds and changes the layout to maintain the best effect.
- DTMF conference control on endpoints

  VP9660 supports DTMF conference control performed with the number 2, 4, 6, 8 and arrow keys for far end camera control (FECC). From the videoconferencing endpoint, users can press the number 4 key to view the video of the other sites in the conference and press 6 to view the conference presentation. By pressing 2 and 8, users can switch between continuous presence layouts.

All the videoconferencing endpoints that have available number keys can perform conference control operations conveniently and flexibly, such as viewing a site.

- Audio-visual IVR

  VP9660 supports interactive voice response (IVR) access numbers. A videoconferencing endpoint can dial the IVR access number and follow the instructions from the audio-visual IVR of the system to create or join a conference.

- T.140 caption

  When a T.140 caption, banner, or instant message is set for a conference, the VP9660 will send the caption, banner, or instant message to all participants in the conference. When a participant is given the floor, broadcast, or viewed, the VP9660 will send a notification message to that participant.

### Connection to SessionInsight

VP9660 can save the recorded users' key information and status and generate Call History Records (CHRs). The media CHRs generated by the MCU can be collected, parsed, and stored to the database for visualized analysis of the media quality. The SessionInsight obtains CHRs from the MCU and analyzes them to assist in signaling and media fault locating and improving the locating efficiency.

# 4.6 High Network Adaptability and Reliability

The VP9660 has passed tests for network adaptability and operational reliability, to ensure the long-term stability of the device under different environments.

### Outstanding Network Adaptability

- Automatic speed adjustment

  The VP9660 uses Huawei Media Engine (HME) to constantly monitor the network status and automatically adjust the speed based on the network delay, packet loss rate, and jitter to ensure the best audiovisual experience.

- Enormous Packet Loss Concealment Capability

  The VP9660 uses Huawei's proprietary super error concealment (SEC) 3.0 to ensure uninterrupted video delivery even if the packet loss rate reaches 20%.

- Jitter tolerance capability

  The VP9660 supports AJB to implement dynamic adjustment based on jitter information, ensuring the best audio-visual experience.

### High Reliability

The VP9660 adopts multi-level backup mechanisms to achieve high reliability and ensure the smoothness of a video conference.

- Main control board backup

  Backed up by Huawei's mature active/standby switchover technology, the VP9660 can switch to the standby main control board in a millisecond if the active board fails — without affecting the video conference streams. Such stability meets the high demands of modern companies.

- Service board backup

VP9660 has multiple slots for service boards. Therefore, multiple service boards can be configured for backup of signaling or media processing. After the VP9660 is started, it selects a service board as the H.323 signaling processing board. If the signaling processing board is faulty, the MCU automatically switches services to another service board. When the current media processing board is removed, the MCU automatically switches services to another available media processing board.

● Network port backup

The GE0 and GE1 ports in the VP9660 can back each other up. If communication through the working network port is interrupted, the VP9660VP9650VP9630 automatically switches the communication service to the backup network port.

● Power supply backup

Four power modules can be inserted into the VP9660 to share the power load. The power modules work in backup mode, and twoone can meet power demands of the VP9660 at full load.

● Chipset backup

The chipsets in the VP9660 can back each other up. When one chipset is faulty, the VP9660 assigns an idle chipset to take over the workload without affecting the audio-visual quality. This ensures consistent video and audio quality for the video conference.

# 4.7 Unparalleled Security

The VP9660 was designed to protect conference information security to the highest level.

The VP9660 supports dual encryption, which helps to prevent account forgery and protect against the monitoring of conference messages during transmission.

● Signaling encryption: The VP9660 implements authentication and encryption for all calls initiated from it. If you fail to pass the authentication, you will be denied of conferencing services.

● Media stream encryption: Advanced Encryption Standard (AES) is used to encrypt media streams.

# 5 Operation and Maintenance

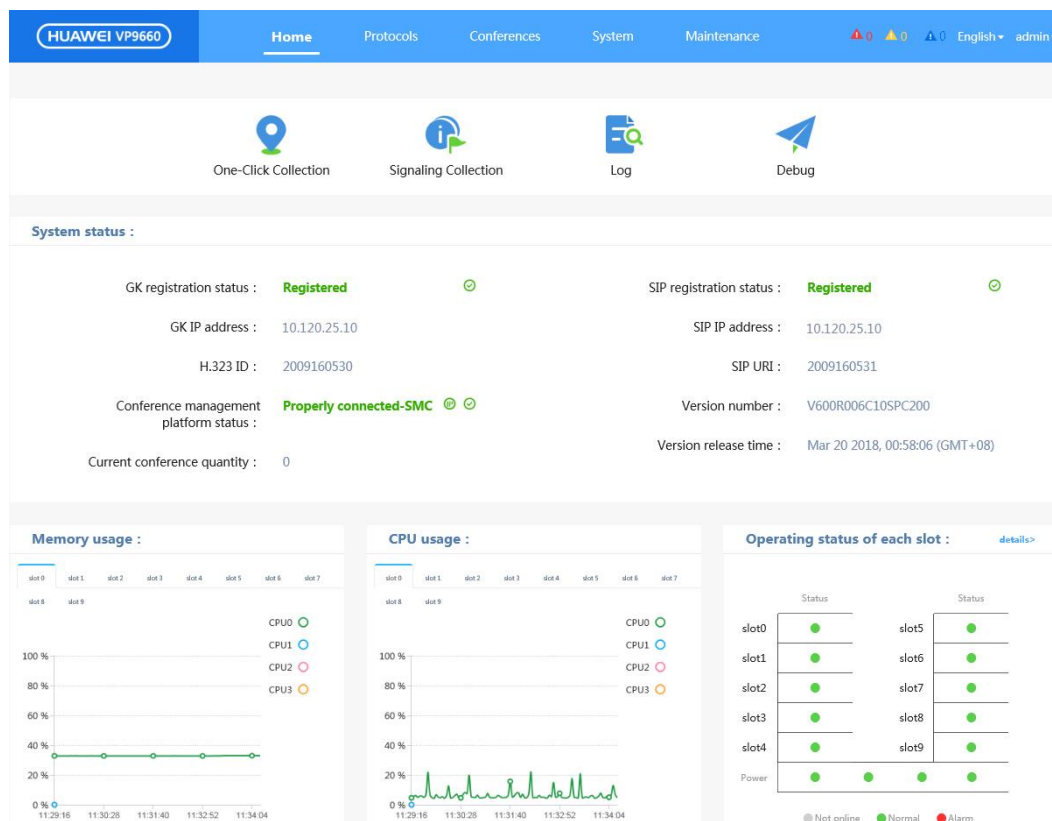## 5.1 Using theBuilt-in Web Interface

The VP9660 allows you to log in to the built-in web interface for operation and management anytime, as shown in **Figure 5-1**.

Using the built-in web interface, you can view resource statistics, set conference and system parameters, view abnormal status alarms, export logs, manage user accounts and passwords, and debug, maintain, and upgrade the system.

**Figure 5-1** Built-in web interface



## One-Click Information Collection

The MCU supports one-click information collection on the built-in web interface. You can obtain the configuration, black box, alarm, and log information required for troubleshooting with one-click, enabling quick fault locating.

You can view alarms on the web interface, including alarm details and alarm handling procedures.

You can also view and export logs on the web interface and change the log level to generate debug information as required. Logs include operation, run, debug, and security logs.

## Fault Self-Diagnosis

The MCU supports fault self-diagnosis on the built-in web interface. You can start system status self-check with one click and view MCU status information, including the key process status, software and hardware resources, OS and application versions, and network configurations.

## Preventive Maintenance Inspection

The MCU supports preventive maintenance inspection (PMI) using the VTS. You can inspect the MCU periodically to detect potential risks and process them in advance.

**Upgrade**

The MCU supports the following upgrade modes:

- Upgrade using the built-in web interface
- Upgrade using the CLI
- Automatic upgrade with the SMC2.0

Before the upgrade, you need to upload the version file to the SMC2.0.

# 5.2 Using the CLI

The MCU supports Telnet and SSH login. Telnet is an insecure protocol and disabled by default. SSH is a cybersecurity protocol for remote access in an insecure network environment using the encryption and certification mechanism. When you use SSH to log in to the MCU, all transmitted data are encrypted. For security purposes, SSH login is recommended.

After logging in to the MCU using the SSH, you can configure and debug the MCU in CLI mode. The following table describes the SSH management functions.

**Table 5-1** SSH management functions

| Management Function | Description | Sub-Function |
|---|---|---|
| Configuration management | Remote login, configuration, debugging, maintenance, and upgrades | ● Remotely log in to the MCU to view system status and set parameters.<br>● View alarms.<br>● Remotely upgrade the host software. |

# 6 Technical Specifications

## 6.1 Physical Parameters

Table 6-1 lists the VP9660 physical parameters.

**Table 6-1** VP9660 physical parameters

| Category | Item | Specifications |
|---|---|---|
| Physical specifications | Dimensions (H x W x D) | Device dimensions:<br>● Height: 886.2 mm (34.89 in.)<br>● Width: 436 mm (17.17 in.)<br>● Depth: 420 mm (16.54 in.)<br>Package dimensions:<br>● Height: 1125 mm (44.29 in.)<br>● Width: 720 mm (28.35 in.)<br>● Depth: 720 mm (28.35 in.) |

| Category | Item | Specifications |
|---|---|---|
|  | Weight | New weight: <100 kg (220.46 lb)<br><br>Gross weight: 107 kg (235.94 lb) |
|  | Number of slots | 10 |
| Environment adaptability | Ambient temperature range | 0°C to 45°C |
|  | Relative humidity range | 5% to 90% (non-condensing) |
|  | Atmospheric pressure range | 63 kPa to 106 kPa |
| Electricity supply requirements | Rated operating voltage | ● AC input: 100 V to 240 V 50/60 Hz<br>● DC input: -48 V to -60 V |
|  | Power consumption | <3000 W |
|  | Electromagnetic Comatablity | Class A |
|  | Grounding | <2.5v/2 lrating |

☐**NOTE**

If the device is used 1800 meters to 5000 meters above the sea level, the upper limit of the temperature must be decreased by 1°C for every 220 meters.

# 6.2 Performance and Capacity

Table 6-2 describes the VP9660's performance and capacity specifications.

Table 6-2 VP9660's performance and capacity specifications

| Item | Specification |
|---|---|
| Video | Maximum video resolution in universal transcoding mode:<br>● H.265: 32-channel 4K30 = 32-channel 1080p60 = 64-channel 1080p30 = 64-channel 720p60 = 128-channel 720p30<br>● H.264: 128-channel 1080p60 = 256-channel 1080p30 = 512-channel 720p30 |

| Item | Specification |
|---|---|
| Audio | <ul><li>Mixed wideband audio</li><li>1/2/3-channel audio for sound localization</li><li>The number of VoIP audio ports is the same as that of 1080p30 video ports.</li><li>Audio and video lip synchronization in universal transcoding mode</li></ul> |
| Video frame rate | 25 fps, 30 fps, 60 fps |
| Video resolution | QCIF, CIF, 4CIF, 288p, 360p, 720p, 1080p, 4K |
| HD performance | <ul><li>8 Mbit/s H.264 HP 1080p60</li><li>3Mbit/s H.265 4K30 (smooth mode)</li></ul> |
| Recording | <ul><li>30-channel 1080p60 recording</li><li>10-channel 720p single-stream live broadcast (RSE-M), 20-channel 720p single-stream live broadcast (RSE-L)</li><li>2000-channel web-based playing</li><li>2 TB hard disk (1 TB + 1 TB hot standby)</li></ul> |
| Maximum number of participants | H.264-only: A maximum of 512 participants are supported. The 512 participants can be all SIP participants, all H.323 participants, or SIP+H.323 participants.<br><br>H.265-only: A maximum of 128 participants are supported. The 128 participants can be all H.265 participants. |

# 6.3 Ports and Protocols

Table 6-3 lists the ports provided and protocols used by the VP9660.

Table 6-3 VP9660 ports and protocols

| Item | Specifications |
|---|---|
| GE network port | <ul><li>Physical port: RJ45 port</li><li>Bearer signal: 10/100/1000 Base-T</li><li>Bearer protocol: IEEE 802.3</li></ul> |
| Optical port | <ul><li>Physical port: multi-mode optical port</li><li>Bearer signal: 1000 Base-SX</li><li>Bearer protocol: IEEE 802.3</li></ul> |
| Primary Rate Interface (PRI) | <ul><li>Physical port: sub-miniature B (SMB)</li><li>Bearer signal: HDB3 code</li><li>Bearer protocol: G.703</li></ul> |

| Item | Specifications |
|---|---|
| FE network port | ● Physical port: RJ45 port<br>● Bearer signal: 10/100 Base-T<br>● Bearer protocol: IEEE 802.3 |
| Serial port | RJ45–RS-232 port (universal router cable) |

# 6.4 Standards Compliance

The VP9660complies with the standards listed in **Table 6-4**.

**Table 6-4** Standards compliance of the VP9660

| Item | Specifications |
|---|---|
| Communication framework protocol | ITU-T H.323, SIP |
| Video protocol | ITU-T H.265, H.264, H.264 HP, H.263, H.263+, H.263++ |
| Audio protocol | AAC-LD, AAC-LC, G.722.1, G.722.1C, G.711a/u, G.722, G.728, G.729A, G.729AB, G.719, iLBC, Opus |
| Dual stream protocol | H.239, BFCP |
| Transmission protocol | IPv4, TCP/IP, FTPS, RTP, RTCP, HTTP/HTTPS, SNMP V3, TELNET, SSH, DNS/DDNS |
| Encryption protocol | H.235, AES, and TLS/SRTP |

# 7 Acronyms and Abbreviations

| Acronym or Abbreviation | Full Name |
|---|---|
| AJB | Adaptive jitter buffer |
| AES | Advanced Encryption Standard |
| BFCP | Binary Floor Control Protocol |
| DTMF | Dual Tone Multiple Frequency |
| FE | Fast Ethernet |
| FTPS | File Transfer Protocol over SSL |
| GE | Gigabit Ethernet |
| GK | GateKeeper |
| HEVC | High Efficiency Video Coding |
| IP | Internet Protocol |
| ITU-T | International Telecommunications Union-Telecommunication |
| IVR | Interactive Voice Response |
| MCU | Multipoint Control Unit |
| NAT | Network Address Translation |
| RSE | Recording Streaming Engine |
| RTCP | Real-time Transfer Control Protocol |
| RTP | Real-time Transfer Protocol |
| SEC | Super Error Concealment |
| SIP | Session Initiation Protocol |
| SMC | Service Management Center |

| Acronym or Abbreviation | Full Name |
|---|---|
| SNMP | Simple Network Manager Protocol |
| SRTP | Security Real Time Protocol |
| SSH | Secure SHell |
| TLS | Transport Layer Security |
| URL | Uniform Resource Locator |