

Copyright © Huawei Technologies Co., Ltd. 2020. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Huawei Technologies Co., Ltd.

Trademarks and Permissions



HUAWEI and other Huawei trademarks are trademarks of Huawei Technologies Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: <https://e.huawei.com>

Contents

| | |
|---|-----------|
| 1 Solution Positioning and Highlights..... | 1 |
| 2 Typical Networking..... | 4 |
| 3 Features and Functions..... | 6 |
| 3.1 Diverse Conference Convening Modes..... | 6 |
| 3.2 Anytime and Anywhere Access of Desktop and Mobile Soft Clients..... | 6 |
| 3.3 Numerous Conference Control Functions..... | 7 |
| 3.4 Powerful Encoding and Decoding..... | 11 |
| 3.5 Conference Multi-Channel Cascading..... | 12 |
| 3.6 Data Conference..... | 13 |
| 3.7 VDC-based Visualized Dispatching..... | 15 |
| 3.8 AI Services..... | 16 |
| 3.9 VC QoS..... | 18 |
| 4 Reliability..... | 21 |
| 5 Security..... | 22 |
| 6 Openness..... | 24 |
| 7 Operation and Maintenance..... | 25 |
| 7.1 Device Management..... | 25 |
| 7.2 Meeting Room and User Management..... | 27 |
| 7.3 Conference Management..... | 28 |
| 7.4 Routine Maintenance..... | 28 |
| 7.5 Fault Management..... | 29 |
| 8 Technical Specifications..... | 30 |
| 9 Protocols and Standards..... | 31 |

1 Solution Positioning and Highlights

CloudLink Edge 1000 is a small-scale video conferencing solution in which one server integrates functions such as meeting management, endpoint management, corporate directory, and media processing. The server can connect to endpoints complying with various standard protocols, enabling flexible communication between internal and external branches and between employees.



Table 1-1 NE introduction

| NE | Function |
|---------------------------------|--|
| Service Management Center (SMC) | A video conferencing service management system that manages resources and corporate directories, and implements conference scheduling, holding, scheduling, and control, to meet users' conference requirements. |
| SwitchCenter (SC) | A conference service call and registration system that provides H.323 and SIP registration and call control. |

| NE | Function |
|---|--|
| Unified Session Manager-corporate Directory (USM-EUA) | Provides corporate directory services through the Lightweight Directory Access Protocol (LDAP) and supports keyword-based search and level-based browsing in the corporate directory from terminals. |
| Cloud Multipoint Control Units (CloudMCU) | A media resource server that integrates audio, video, and data. |

All-in-One Design, Installation-Free, and Rapid Rollout

- A fully self-contained system that integrates the meeting management platform, media processing platform, address book, public-private network traversal server, and GK/SIP server
- Software preinstallation, with only simple configurations required

Flexible Networking, Openness, and Interoperability

- The system supports a maximum of 500 concurrent calls and 1000 registered users. It also allows you to expand VP9800 series MCUs and CloudRSE recording servers, as well as standalone SC in the DMZ scenario.
- The system complies with H.265, H.264, and H.263 mainstream video protocols as well as SIP and H.323 communication protocols.
- H.323/SIP-compliant mainstream video conferencing endpoints can be seamlessly interconnected. The system supports multi-vendor endpoint management.
- System integrators can use Huawei's open Application Programming Interfaces (API) and Software Development Kits (SDKs) to integrate conference scheduling and control capabilities.

Ultimate Experience, Intelligent, and Easy-to-Use

- Users can join a conference in multiple ways, including the multi-functional telepresence, HD conference room, desktop endpoint, and mobile terminal. The solution automatically performs appropriate encoding & decoding, bit rate adaptation, and bandwidth adaptation based on the audio and video capabilities of access devices to ensure the optimal conferencing.
- The solution supports Huawei's Super Error Concealment (SEC) 3.0 algorithm and core technologies such as Super Error Concealment (SEC), Intelligent Rate Control (IRC), Reconnect On Disconnect (ROD), and Automatic Repeat Request (ARQ). The system has the optimal network adaptability of 20% packet loss concealment (PLC) and provides users with the best experience based on IP networks.
- The TE Desktop/TE Mobile or TE WebClient can be used to join data conferences, providing rich data collaboration functions.
- The built-in MCU supports remote collaboration, writing using the stylus pen, multi-person writing/annotation, zooming in or out with gestures, erasing with gestures, and other functions.

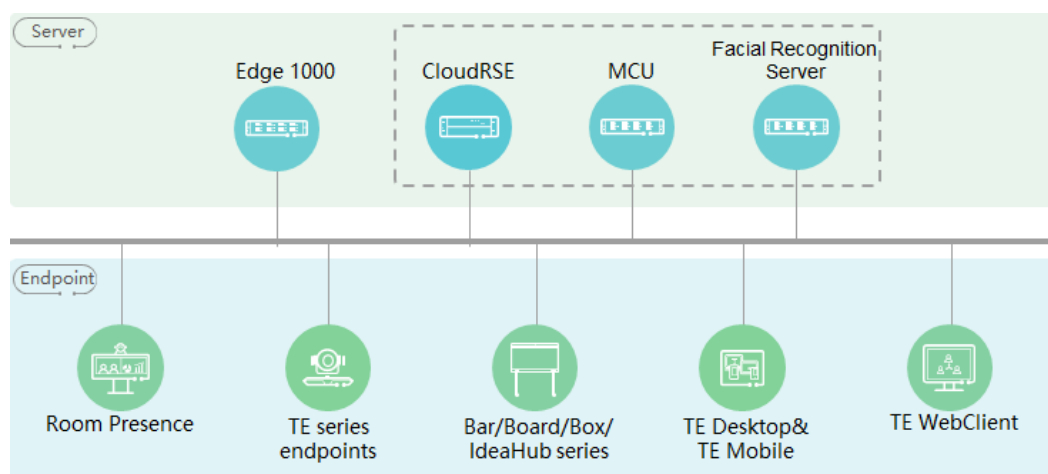
- Simplified O&M: supports remote device inspection, device information collection, and batch endpoint upgrade.

2 Typical Networking

The CloudLink Edge 1000 can be deployed on the intranet, or be connected to the extranet through the SC deployed on the intranet or in the DMZ.

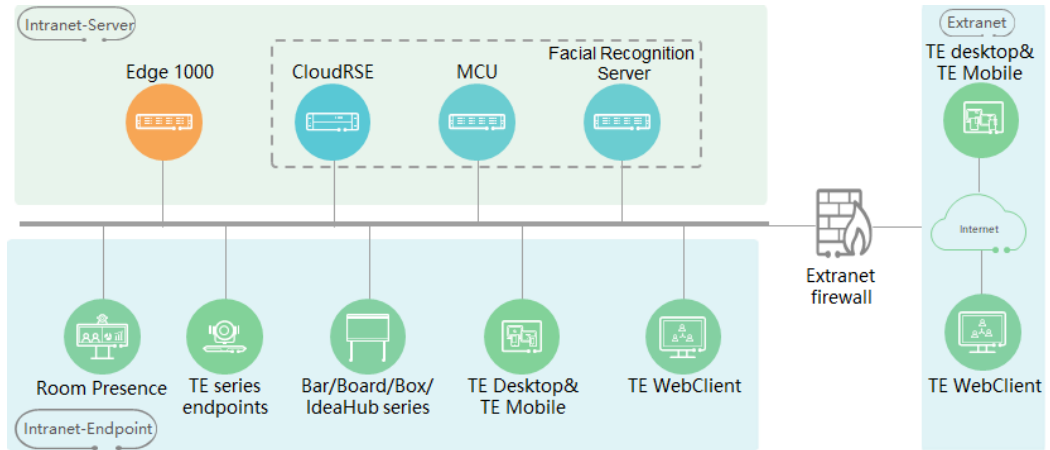
Intranet Deployment

The CloudLink Edge 1000 is deployed on an enterprise intranet to implement secure audio and video communication between enterprise terminals.



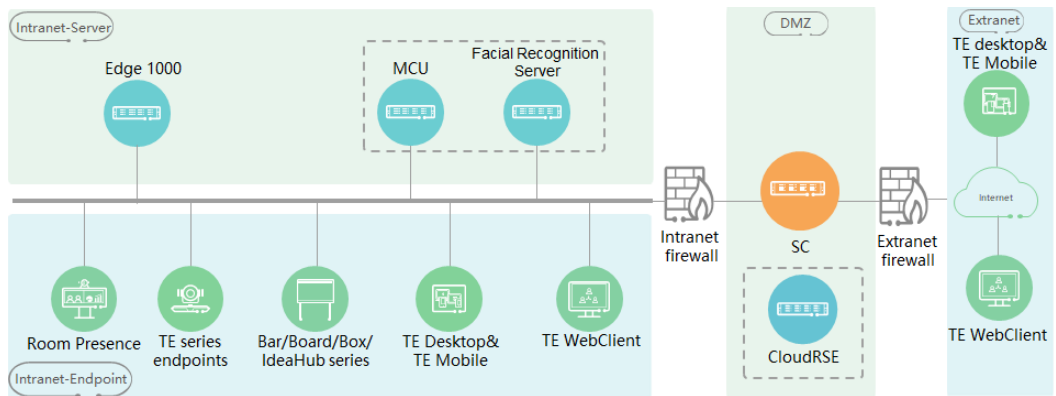
Deployment in the Non-DMZ Scenario

The CloudLink Edge 1000 works with the SC deployed on the intranet to implement audio and video communication between public network terminals and enterprise intranet terminals, saving costs.



Deployment in the DMZ Scenario

The CloudLink Edge 1000 allows you to deploy a standalone SC in the DMZ to implement audio and video communication between public network terminals and enterprise intranet terminals, achieving large-capacity deployment and high reliability.



3 Features and Functions

The video conferencing solution provides a rich portfolio of features and functions, delivering convenient, smooth, and streamlined conference experience.

3.1 Diverse Conference Convening Modes

The video conferencing solution allows users to convene conferences in diverse and flexible ways.

- Initiate a conference from the SMC web interface using a conference template or by creating a new conference.
- Use the SiteCall function of an endpoint to create a conference.
- Use a third-party interface to convene a conference.
- Use the Outlook to convene a conference.

3.2 Anytime and Anywhere Access of Desktop and Mobile Soft Clients

Pervasive Video is a development direction of video collaboration. It allows users to easily perform video collaboration using their personal computers, smart tablets, or mobile phones, when they are on business trips or in Small Office/Home Office (SOHO) scenarios.

TE Desktop and TE Mobile use the standard SIP protocol. The SC provides SIP registration and agent services. With accounts and passwords centrally distributed by the SC server administrator, users can use TE Desktop and TE Mobile to directly access a video conferencing system without extra configuration. Users can initiate calls through the contacts or call history, or dial the number to join conferences.

Basic functions of desktop and mobile soft clients include:

- TE Desktop and TE Mobile can run on Windows, Mac OS, iOS, and Android platforms.
- With the H.264 HD video compression algorithm and SEC3.0 network adaption technology, TE Desktop and TE Mobile ensure HD video quality even

when the packet loss reaches 20% in a wide range of network environments, such as 3G, 4G, Internet, and Wi-Fi.

- Users can hold a voice or video point-to-point conference through the local or corporate directory, call history, or by calling the number or IP address of a remote site.
- Users can add contacts from a local or corporate director to a multi-point conference. During a multi-point conference, TE Desktop enables the TE WebClient to hold a data conference.

Figure 3-1 Joining a video conference through TE Desktop and TE Mobile



3.3 Numerous Conference Control Functions

The video conferencing solution provides an impressive array of conference control functions through the SMC, video conferencing endpoints, TE Desktop, TE Mobile, TE WebClient and VDC Client.

Conference Control Functions Available on the SMC

Users can search conferences and view conference details. For active conferences, the SMC provides various conference controls.

Table 3-1 Conference control operation on the SMC

| Type | Operation |
|---------------------|--|
| Participant control | <ul style="list-style-type: none"> ● Site broadcasting ● Giving floor to a participant ● Setting/Canceling the chair ● Sharing presentation or canceling sharing ● Locking/Unlocking materials of a participant ● Selecting a participant pane ● Locking/Unlocking video sources ● Muting/Unmuting ● Muting/Unmuting a speaker ● Setting/Removing favorite participants ● Disconnecting a participant ● Deleting a participant ● Viewing meeting room details |
| Conference control | <ul style="list-style-type: none"> ● Participant invitation ● Participant calling ● Muting/unmuting a meeting ● Floor giving ● Free discussion mode ● Setting or broadcasting continuous presence ● Starting Recording ● Tracking mode ● Muting /Unmuting all speakers ● Enabling/Disabling voice activation ● Setting/Sending the conference banner ● Setting/Sending the conference caption ● Ending/Extending a conference ● Locking/Unlocking meeting materials ● Customizing the control bar |

Conference Control Functions on a Video Conferencing Endpoint

Table 3-2 Conference control functions on a video conferencing endpoint

| Type | Operation |
|-------------------|---|
| Chair control | <ul style="list-style-type: none"> ● Viewing a participant, refreshing the participant list ● Adding, deleting, calling, and disconnecting a participant ● Releasing chair rights ● Broadcasting a participant, stopping the broadcast ● Automatic browsing/broadcast ● Giving floor, free discussion, and voice activation ● Turning on/off a remote microphone or speaker ● Setting continuous presence ● Locking/Canceling the presentation sharing of a conference or a participant ● Ending/Extending a conference ● Locking/Unlocking a conference (supported only by RoomPresence, IdeaHub Pro/S, and Bar/Board/Box series endpoints) |
| Non-chair control | Viewing a participant, requesting the floor, and requesting the chairperson role |

Conference Control Functions on TE Desktop

Table 3-3 Conference control functions on TE Desktop

| Type | Operation |
|-------------------|--|
| Chair control | <ul style="list-style-type: none"> ● Viewing the participant list ● Adding/Deleting a participant, calling/disconnecting a participant ● Muting or unmuting the microphone of a participant ● Releasing chair rights ● Broadcasting participant video or continuous presence ● Ending/Extending a conference |
| Non-chair control | <ul style="list-style-type: none"> ● Viewing the participant list ● Turning on/off a local microphone, displaying/hiding local video ● Displaying the speaker, viewing the video about a selected participant, continuous presence ● Applying for the chair ● Leaving a conference |

Conference Control Functions on TE Mobile

Table 3-4 Conference control functions on TE Mobile

| Type | Operation |
|-------------------|---|
| Chair control | <ul style="list-style-type: none"> ● Extending a conference ● Inviting a contact to join a conference ● Viewing a specified site or continuous presence ● Broadcasting site videos ● Enabling all participants to view multiple panes at the same time ● Disconnecting or deleting a site ● Ending/Extending a conference ● Muting or unmuting the local microphone ● Requesting or releasing chair control rights |
| Non-chair control | <ul style="list-style-type: none"> ● Viewing the participant list ● Turning on/off a local microphone (imperceptible to the server), displaying/hiding local video ● Viewing videos ● Leaving a conference |

Conference Control Functions on TE WebClient

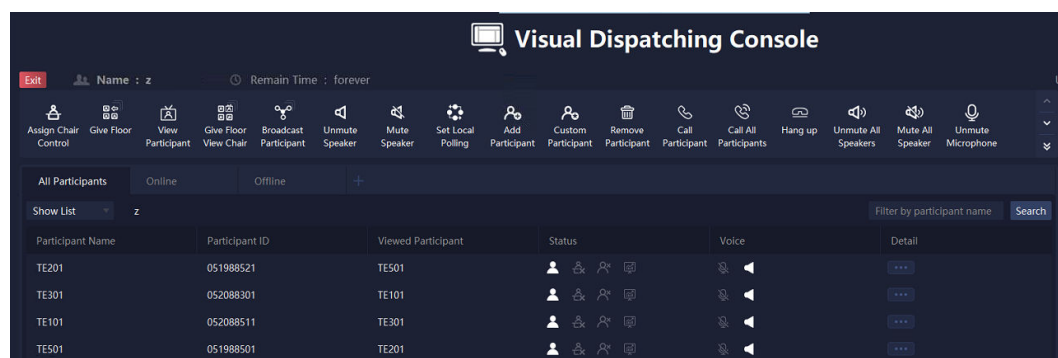
Table 3-5 Conference control functions on TE WebClient

| Type | Operation |
|---------------|---|
| Chair control | <ul style="list-style-type: none"> ● Viewing the participant list ● Releasing chair rights ● Inviting, removing, or disconnecting a participant ● Redial ● Setting the rights of a participant ● Muting or unmuting a local microphone or all microphones ● Displaying/Hiding local video ● Displaying the speakers (two participants) ● Canceling hand raising ● Extending, ending, or leaving a conference ● Selecting and viewing site videos ● Broadcasting site videos ● Locking/Unlocking a conference |

| Type | Operation |
|---------------------|---|
| Presenter control | <ul style="list-style-type: none"> Viewing the participant list Applying for the chair, releasing the presenter Muting/Unmuting a local microphone Displaying/Hiding local video Displaying the speakers (two participants) Leaving a conference Selecting and viewing site videos Sharing the desktop, document, whiteboard, program and media |
| Participant control | <ul style="list-style-type: none"> Viewing the participant list Applying for the chair or presenter Raising hands (applying for the talk right) Muting/Unmuting a local microphone Displaying/Hiding local video Displaying the speakers (two participants) Leaving a conference Selecting and viewing site videos Applying for the remote control right |

VDC Client Conference Control

In the video conferencing solution, one VDC is configured by default for conference control and monitoring. The conference administrator can log in to the VDC Client to perform conference control operations.



3.4 Powerful Encoding and Decoding

The MCU supports the universal transcoding mode and provides the best user experience for each participant through powerful codec capabilities.

The universal transcoding mode supports transcoding for each channel of video. 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.

- 1080p60 full encoding and decoding
 - Video at 1080p60 is crisper, smoother and more vivid video than that at other resolutions.
 - With the H.264 HP 1080p60 video encoding and decoding technology, it not only supports the 1080p60 HD video solution, but also saves 50% network bandwidth.
- Intelligent presentation adaptation

The primary participant shares the presentation. The MCU performs intelligent adaptation for the presentation based on the presentation capabilities of different participants. The intelligent presentation adaptation function allows endpoints with different presentation receiving capabilities to join a conference at the same time and view the conference presentation. In this way, each participant can share the presentation.

 - The MCU allows endpoints using H.323 and SIP to join the same conference.
 - With the processing of the MCU, even a site that does not support presentation sharing function can display the presentation shared by a remote site (when displaying the presentation, the site cannot display the video of the conference). Thus, the HUAWEI VP9610 helps to establish communication and information sharing between sites during a conference.
 - Thanks to transcoding for presentations, functions of presentation displayed 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.

3.5 Conference Multi-Channel Cascading

When bandwidth or line resources are sufficient, multiple channels (in flexible mode) can be set up between cascaded MCUs so that multiple media streams can be transmitted simultaneously between the MCUs, implementing conference continuous presence.

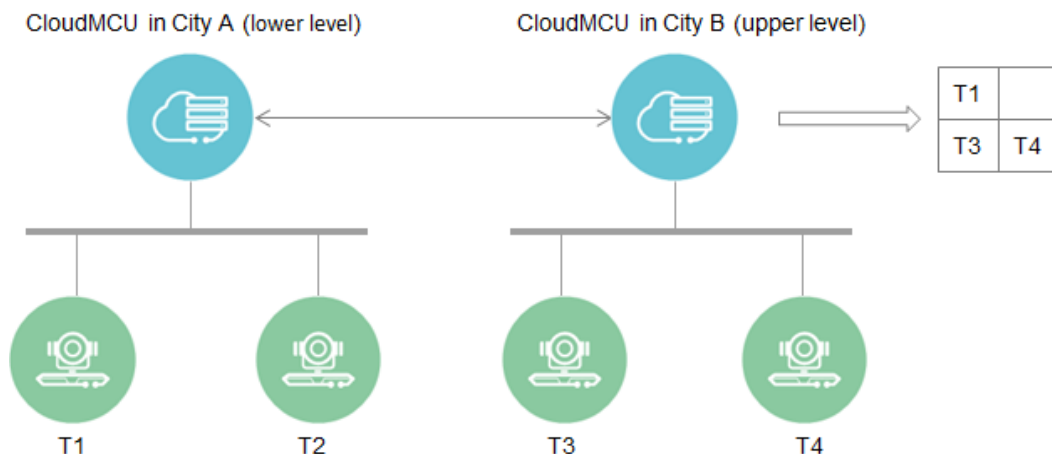
SIP Flexible Multi-Channel Cascading

Bank C sets up the videoconferencing system shown in [Figure 3-2](#). Cities A and B each have a CloudMCU deployed. The CloudMCU in city A is of the lower level, and the CloudMCU in city B is of the upper level. Because only one cascading channel can be set up between the CloudMCUs in cities A and B, the latter can only transmit one channel of video to the former. The following problems therefore arise:

- The CloudMCU in city B cannot add videos of T1 and T2 simultaneously into continuous presence.
- The two participants on CloudMCU B cannot view multiple participants on the lower-level CloudMCU in city A simultaneously. For example, T4 cannot view T2 while T3 is viewing T1.

- The two participants on the CloudMCU in city A cannot view multiple participants on the upper-level CloudMCU in city B simultaneously. For example, T2 cannot view T4 while T1 is viewing T3.

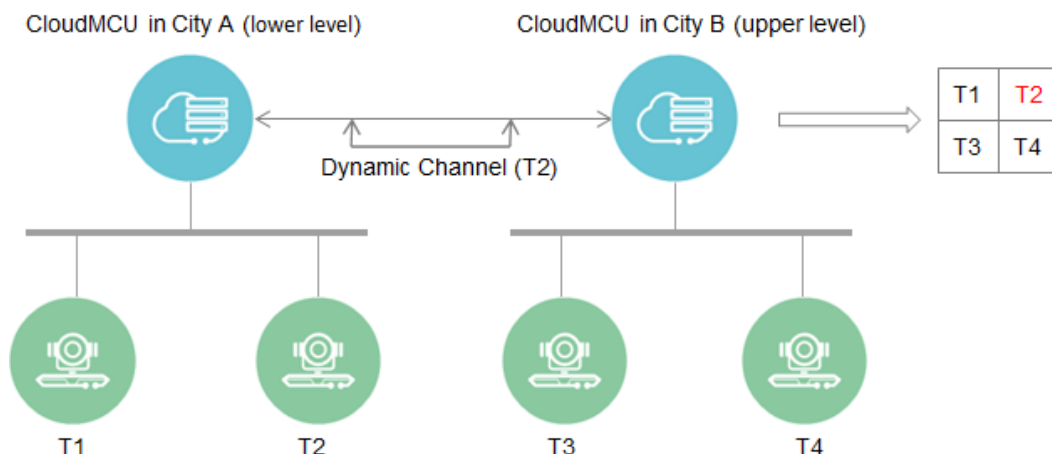
Figure 3-2 SIP single-channel cascading between CloudMCUs



To address the preceding problems, Huawei introduces the SIP flexible multi-channel cascading technology.

Flexible multi-channel cascading uses only one channel. The MCU dynamically applies for channel resources as required, and the resources are borne in the existing channel. In the scenario shown in [Figure 3-2](#), videos of T1 and T2 can be added to continuous presence, as shown in [Figure 3-3](#).

Figure 3-3 SIP flexible multi-channel cascading between CloudMCUs



3.6 Data Conference

The video conferencing solution provides the data conference service based on VP9800 series MCUs or the CloudMCU. During conferences, users can use functions such as desktop sharing, whiteboard, document sharing, file transfer, text communication, and questionnaire survey to achieve efficient communication and collaboration.

The video conferencing solution supports 4K resolution and H.265 SCC screen sharing which improves the compression performance and display effect in text-only, rendering, animation, and text+image scenarios.

Data Collaboration

Table 3-6 lists data collaboration functions for different roles in a conference.

Table 3-6 Data collaboration functions

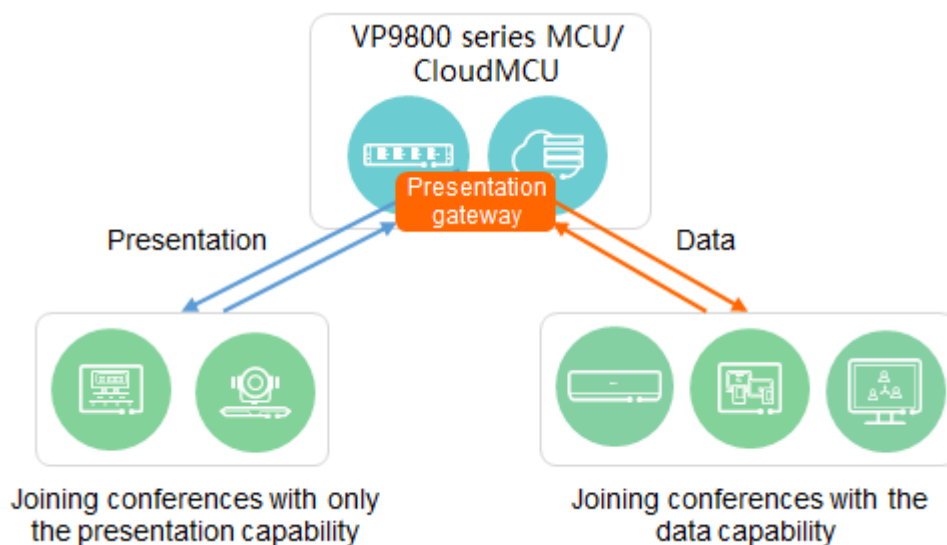
| Role | Function |
|-------------|--|
| Chair | <ul style="list-style-type: none"> Viewing participant video Broadcasting participant video Transferring to another number Sending a conference IM Sharing a document Taking notes, recording a conference, releasing a bulletin, and transferring a file |
| Presenter | <ul style="list-style-type: none"> Viewing participant video Transferring to another number Sending a conference IM Performing data collaboration operations, such as document sharing, whiteboard, desktop, program, and media Inviting a participant to share the desktop Taking notes, recording a conference, releasing a bulletin, and transferring a file Initiating a poll |
| Participant | <ul style="list-style-type: none"> Viewing participant video Transferring to another number Sending a conference IM Taking notes |

Interoperability Between Presentations and Data

The presentation gateway of the VP9800 series MCU/CloudMCU enables interoperability between presentations and data.

- Users can access data conferences using the Web Client, TE Desktop/TE Mobile, RoomPresence series, IdeaHub Pro/S, and Bar/Board/Box series. The VP9800 series MCU/CloudMCU and the preceding terminals support data sharing encoding and decoding to implement data conference functions.
- Traditional video conferencing endpoints, such as the RP100, RP200, TP series, and TE series endpoints, do not support data sharing encoding and decoding. These endpoints can use interoperability between presentations and data to join data conferences that support various types of endpoints.

Figure 3-4 Interoperability between presentations and data

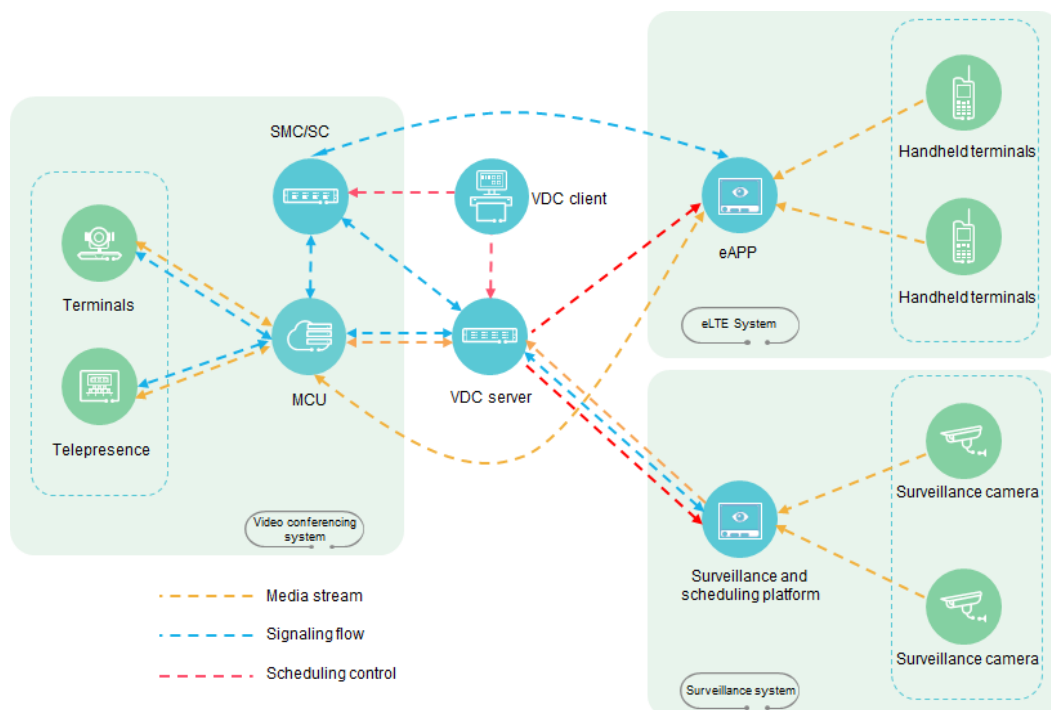


3.7 VDC-based Visualized Dispatching

The VDC visual dispatching solution interconnects with the video conference system and surveillance scheduling platform (that is IVS and eLTE). In a video conference, you can dispatches, previews, and distributes surveillance videos using the VSD, implementing the integration of video conferencing and video surveillance.

VDC servers have the convergent gateway selection feature, to implement the conversion between the monitoring stream (PS) and conference stream (ES), and between the monitoring protocol (GB/T 28181) and communications protocol (SIP call). Up to 300,000 cameras and 400 Mbit/s media forwarding traffic are supported.

Figure 3-5 VDC-based Visualized Dispatching



3.8 AI Services

The video conferencing solution applies AI technologies in the conference system to provide capabilities such as voice recognition and facial recognition, improving conference experience and work efficiency.

AI services, including voice commands, facial recognition sign-in, and on-screen name tag, are mainly implemented through RoomPresence series, IdeaHub Pro/S, and Bar/Board/Box series endpoints. The voice command service is only supported by RoomPresence 65T, Bar 500, Board, and Box 500/700/900.

Voice Commands

You can say "Hey, Scotty" to the connected microphone to wake up "Scotty", the intelligent voice assistant, and then operate the endpoint using voice commands.

For example, after the intelligent voice assistant on HUAWEI Board wakes up, you will see the screen shown in [Figure 3-6](#).

Figure 3-6 Intelligent voice assistant wakes up



You can then perform the following operations using voice commands:

- Initiating or canceling a call
- Creating a conference
- Joining a scheduled conference
- Extending a conference
- Adding participants to a conference
- Viewing participants or continuous presence
- Sharing or stopping content sharing over a cable
- Opening the whiteboard
- Adjusting the speaker volume at your site
- Muting or unmuting the microphones of other sites
- Starting intelligent diagnostics

Facial Recognition Sign-In

In a conference that requires sign-in, the endpoint can automatically record sign-in information of users through facial recognition.

When scheduling a conference on the SMC, a user can specify whether the conference requires sign-in. If the user selects sign-in, sign-in is required in the conference. When participants arrive at the conference site at the sign-in time, use an endpoint to recognize participants' face information for sign-in. The user can view face sign-in details on the endpoint screen. After the conference ends, the SMC will send the conference sign-in result to the user's email box.

Figure 3-7 Facial recognition sign-in



On-Screen Name Tag

After the facial recognition function is enabled, the endpoint performs face detection in tracking mode during a conference. When a new face is detected and correctly matched on the facial recognition server, the server returns a name accordingly and adds the name tag to the face image. In this way, participants can view each other's name tag so that they can know each other.

Figure 3-8 On-screen name tag



3.9 VC QoS

The video conferencing solution adopts the VC QoS technology to automatically address IP network issues, delivering a superb conference experience.

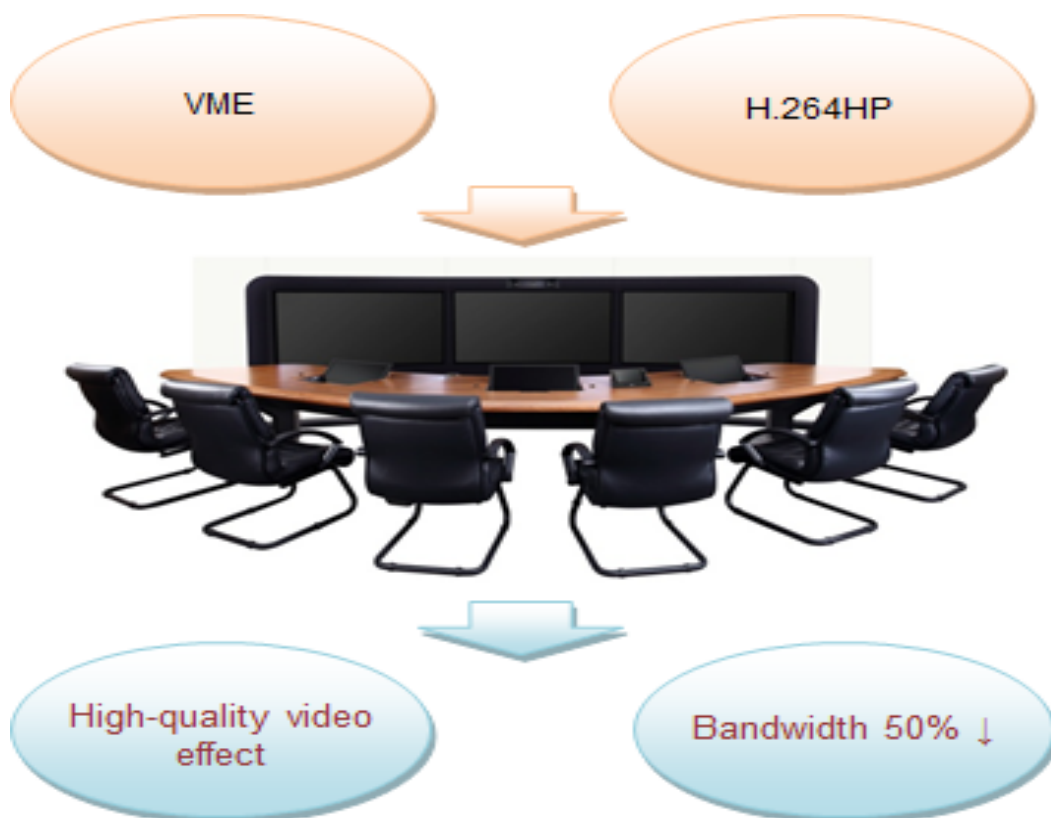
Core Technologies of Low-Bandwidth Network: VME + H.264 HP

Huawei's Video Motion Enhance (VME) is an algorithm that enhances video sharpness and makes video images pleasing to eyes. VME improves video quality through various measures including denoising, enhancing image edge effects, deblocking, increasing the sharpness, and adjusting the image mode. These measures fulfill users' requirements of face-to-face communication.

H.264 has four video quality levels, including Baseline Profile (BP), Extended Profile (EP), Main Profile (MP), and High Profile (HP). Compared to BP, HP supports B-slice, weighted prediction, field coding, context-adaptive binary arithmetic coding (CABAC), 8 x 8 conversion, and self-adaptive quantization matrix. With these technologies, HP surpasses BP a lot in the video compression ratio.

Devices using VME+H.264 HP "dual-core" technology are able to deliver videos of higher quality and more comfortable to view. With the bit rate savings of 50% or more, the technology can reach 720p when the bandwidth is as low as 384 kbit/s (per screen) and 1080p when the bandwidth is as low as 512 kbit/s (per screen).

Figure 3-9 Huawei VME+H.264 HP technology

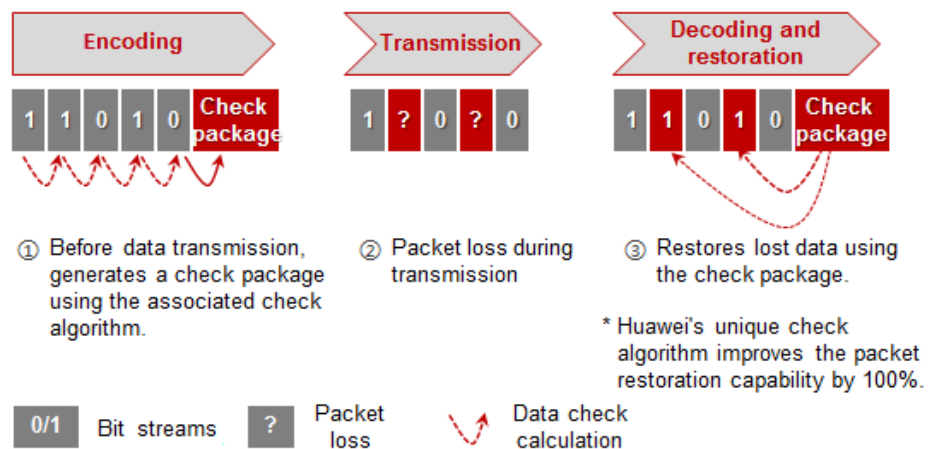


Core Technologies of Intelligent Network Adaptation: OPUS, SEC, ARQ, and IRC

The solution uses the industry-leading packet loss concealment (PLC) design to intelligently adapt to changing network environments, ensuring optimal conferencing experience.

- The industry-leading OPUS audio encoding technology is utilized to improve the audio packet loss concealment capability and deliver a superb audio experience.
- Self-adaptive PLC policies are implemented, including:
 - Monitor network status in real time and use appropriate PLC policies automatically without any manual intervention.
 - Automatically enable Automatic Repeat Request (ARQ) based on the network latency in the case of a low packet loss rate.
 - Use the SEC technology to ensure the quality of audios and videos as well as data conferences when the packet loss rate is less than or equal to 20%, as shown in **Figure2 SEC algorithm**.

Figure 3-10 SEC algorithm



- Automatically enable Intelligent Rate Control (IRC) in the case of a high packet loss rate to ensure optimal video call effects in unstable network conditions.
- Automatically allocate bandwidth video and presentation when they are sent at the same time to achieve best effects.
- Audio quality is given priority when PLC is used.

Voice and video call indicators such as the resolution and bandwidth are dynamically adjusted based on the network conditions to ensure a sound conference experience.

- When a conference encounters a low bandwidth, downgrade the conference performance gradually. Downgrade policy: reducing the video frame > reducing the video resolution > hiding video > reducing the presentation frame > hiding presentation > stopping presentation sharing. The lowest call mode supported is "audio + fixed video image."
- After the network bandwidth is recovered, the call with only audio and fixed video images changes to a normal video call.

4 Reliability

The video conferencing solution provides multiple backup mechanisms to ensure high reliability.

- **Resource Pool Backup**
The SMC supports backup of MCU and recording and streaming server resource pools. If the MCU or recording and streaming server that holds a meeting is faulty, the SMC automatically switches the meeting to another available MCU or recording and streaming server in the same or standby service area. This ensures meeting continuity.
- **Service Area Backup**
The SMC allows you to specify a standby service area for a service area. Specifically, if resources of the MCU or recording and streaming server (in the active service area) that holds the meeting are insufficient, the SMC automatically adds the meeting rooms that are not scheduled in the active service area to the standby one, ensuring meeting continuity.
- **Auto Recalling upon Abnormal Offline**
If an IP-based endpoint goes offline abnormally during a conference, the SMC automatically invites the offline endpoint to join the conference again.
- **Communication Link Reconnection**
After the SMC is disconnected from the MCU or recording and streaming server, the SMC can connect to them again and synchronize data.
- **Data Backup**
The SMC allows you to manually back up the current system configuration and service data. The backup data can be used to restore SMC data if necessary.
- **Server Hardware Backup**
Servers support multiple redundancy schemes for power supplies, fans, and hard disks.

5 Security

To ensure the video conferencing solution security, Huawei has worked out layer-based solutions by referring to its accrued experience in network and device security in the telecom carrier domain. These solutions conform to a wide range of Chinese and international standards, including TCSEC, ITSEC, ISO 17799, and ITU X.805.

Application Layer Security

The video conferencing solution provides the following security technologies at the application layer: authentication, password policies, access control and authorization, encryption, session management, log recording, data protection, and running security.

System Layer Security

The video conferencing solution provides system-layer hardening policies for the operating system and database to support software operations at the application layer.

Network Layer Security

The video conferencing solution has the following three zones.

- Untrust zone
Refers to the Internet. User requests from this zone are untrusted, and must be isolated by the extranet firewall.
- DMZ
Isolates the Untrust zone from internal service systems in an enterprise. TE Desktop and TE Mobile from extranet users must access the SC in the DMZ to interact with servers in the Trust zone.
- Trust zone
Independent from the DMZ and Untrust zones, and cannot be directly accessed by external users. Office machines and meeting rooms are deployed in this zone. The following specific devices in the video conferencing solution are deployed in this zone: endpoints, SMC, and MCUs.

Management Layer Security

Complete regulations, policies, procedures, and operation instructions are defined to prevent system weakness from being attacked.

- Each authorized user is granted only necessary rights. One account can be used by only one user.
- Full or incremental backup is regularly performed on the database to minimize the loss caused by security-related problems.

6 Openness

The videoconferencing solution provides the capability to integrate with third-party service management, corporate directory, and network management.

Figure 6-1 shows the external interfaces provided by the video conferencing solution.

Figure 6-1 External interfaces



Third-Party Service Management

The video conferencing solution uses the SMC to provide RESTful APIs for third-party applications, offering the following functions:

- Conference scheduling, scheduling, and control
- Simultaneous access of multiple accounts
- Encrypted HTTPS transmission

Third-Party Directory

The video conferencing solution uses the Light Directory Access Protocol (LDAP) to interoperate with the legacy corporate directory software in an enterprise, enabling endpoints to easily obtain contact data.

Third-Party Network Management System

The video conferencing solution uses the Simple Network Management Protocol (SNMP) to report alarms to NMS devices, and allows users to set and query parameters for managed devices.

7 Operation and Maintenance

With the SMC service management system, users can perform convenient system and device operation and maintenance (O&M) in the videoconferencing solution.

7.1 Device Management

The SMC allows connections from various devices and provides a web interface for managing and maintaining those devices.

The resources are shared and dispatched in a centralized manner.

Add service areas for the SMC and set a prefix for each service area. During conference scheduling, endpoints in a service area preferentially use resources that match the service area prefix to optimize resource configuration and use at the service area level.

- The SMC can divide a network into multiple service areas. Users can modify or delete service areas.
- A maximum of two SCs (intranet SC and extranet access SCs) can be specified for a service area. An SC can belong to multiple service areas. If no SC is specified for a service area, endpoint numbers provisioned to the service area will not be delivered to the SC.
- An MCU can be registered with only an SC in the same service area. Users can modify the service area to which an MCU belongs.
- An endpoint can register with only an SC in the same service area. (The system administrator binds an endpoint and configures the registration number when adding a conference room or user. The number prefix needs to match the service area rules.)

Managing the SC

SCs can be configured, monitored, and maintained intuitively using the SMC web interface. The services include:

- Basic information
- Region management

- Member rule
- Local management domain
- Called number change/Calling number change
- Search rule
- Bandwidth management
- Route restriction
- Predefined node
- Registration list
- Alarm

Managing the EUA

The SMC web interface allows you to configure the USM-EUA, including:

- Basic information
- Service address
- Shared organization
- Security registration configuration
- Ranking rule configuration
- Node name configuration
- Projection code configuration

Managing the MCU and Recording Server

The SMC manages MCUs and recording servers in resource management mode

The SMC supports the following types of MCUs:

- CloudMCU: media resource server that integrates audio, video, and data.
- VP9800 series MCU: Media resource server that integrates audio, video, and data.

Scheduling of MCUs and recording servers on the SMC: On the SMC web interface, you can add, modify, and delete MCUs and recording servers. On the SMC web interface, you can view details, alarms, logs, and usage of MCUs and recording servers.

Managing the Endpoint

The SMC provides a unified endpoint management system that allows you to activate manageable endpoints using activation codes. Additionally, you can deliver configurations to endpoints in batches, as well as manage endpoint alarms and logs.

With this system, you can:

- Connect a manageable endpoint with the SMC using an activation code. After the activation is successful, the SMC delivers the SC, USM-EUA, and endpoint registration accounts to the endpoint. The endpoint then automatically registers with the SMC.

- Add a configuration file for a manageable endpoint. After the endpoint is activated, you can deploy a configuration task to deliver the time and language information to the endpoint.
- Filter endpoints by IP address segment, device model, and SN, and manage user-defined groups.
- Upload the version file of the endpoint. Additionally, you can upgrade one or more endpoints using an upgrade task.
- Upload endpoint certificates on the SMC. You can centrally deliver certificates to endpoints for certificate application by using a certificate deployment task.
- Collect and export endpoint logs. An endpoint automatically reports its logs to the SMC.
- View and handle the alarms on the SMC. An endpoint can report alarms to the SMC.

7.2 Meeting Room and User Management

The rights-based management system of the SMC consists of organizations, areas, meeting rooms, and users. To provision a meeting room, you can set it to belong an area or an organization; to provision a user, a belonged organization must be selected. In this way, the structure and rights of meeting rooms and users are managed.

Organization: similar to a department. Users are managed based on the organization structure. When the SMC provisions meeting users, each user belongs to an organization.

Area: planned based on site requirements. You can select an area where the meeting room to be provisioned belongs.

Meeting Room: provisioned by the SMC. Each meeting room is bound to an endpoint that is used to join a meeting. Specifically, if a meeting room is invited to join the meeting, it is the endpoint in this meeting room that joins the meeting. When provisioning a meeting room, you can make it to share the organization tree with users or select a belonged area for it.

User: has three levels, including system administrator, meeting administrator, and common user. Default permissions cannot be modified or deleted. Meeting administrators and common users can choose whether to bind endpoints as needed. Users who have bound endpoints can use a corresponding endpoint to join conferences on the SMC.

- **System administrator:** has system management permissions authorized by the SMC, including device (endpoints, MCUs, SCs, as well as recording and streaming servers) management and system configuration. A system administrator cannot initiate or join a meeting, and does not belong to any organization.
- **Meeting administrator:** can manage and operate meetings under the organization and its sub-organizations.
- **Common user:** can operate conferences under the organization and its sub-organizations, such as creating meetings (instant, scheduled, or recurring conferences), creating meetings using templates, viewing scheduled and historical meetings, as well as configuring meeting policies and capabilities.

7.3 Conference Management

In the video conferencing solution, conference administrators and common users have different levels of conference management rights.

Conference administrator

- Creating a conference
- Managing conference templates
- Managing a conference that is being held
- Managing scheduled conferences to be started
- Managing historical conferences
- Setting default conference parameters
- Managing personal information
- Controlling a conference

Common User

- Creating a conference
- Managing conference templates
- Managing ongoing and upcoming conferences
- Managing historical conferences of a person
- Setting default conference parameters
- Managing personal information

7.4 Routine Maintenance

The system administrator can periodically perform system maintenance, including log management, license management, device inspection, upgrade, conference user bulletin management, certificate management, and key management.

- Log management
Logs are classified into operation logs, security logs, and debug logs based on the recorded objects. The system administrator can view and export logs.
- License management
The system administrator can periodically check the license usage. When a license is about to expire or changes, the system administrator can replace the license file on the SMC.
- Device inspection
The system administrator can periodically inspect devices (SMC, SC, MCU, recording server, and endpoint) to detect device faults in a timely manner and ensure that the devices run properly.
- System upgrade
The system administrator can view the current system version on the SMC web interface and periodically upgrade the system.

- Conference user bulletin management
The system administrator can set the subject and content of the bulletin on the SMC web interface. Conference users can view the notification information set by the system administrator on the home page of the conference management portal.
- Certificate management
The system administrator can replace the SMC security certificate to improve system security and reliability.
- Key management
Database keys are stored in files on disks. Periodically backing up the keys so that keys can be restored when they are damaged or lost.

7.5 Fault Management

Alarm Management

An alarm is a notification generated when the system detects unexpected status and requires user intervention. The alarm system consists of five key modules: front-end control platform, alarm configuration library, alarm storage platform, core alarm processing layer, as well as fault and time capture and alarm triggering layer.

- Front-end control platform: allows users to query and modify alarm configurations, query or clear current alarms, and query or delete historical alarms.
- Alarm configuration library: stores alarm configurations.
- Alarm storage platform: stores current and historical alarms.
- Core alarm processing layer: processes alarm events, queries and clears alarms, determines repeated alarms, sends alarm emails and SMS messages, as well as processes alarm configurations.
- Fault and time capture and alarm triggering layer: captures faults and events in service events and generates alarm events. The alarm management module listens to alarm events and generates alarms accordingly.

Data Backup and Restoration

- Data backup: On the SMC web interface, you can back up SMC data with one click. When the backup is complete, a message indicating that the backup is successful is displayed. Additionally, you can download the backup file to a local directory or a third-party server.
- Data restoration: To restore the backup data, reinstall the SMC and then import the backup file.

8 Technical Specifications

| Item | Specification |
|--|--|
| Max. number of registered devices | 1000 |
| Max. number of concurrent online ports | 500 |
| Number of built-in MCU ports | 25-channel 1080p30 |
| Public-private network traversal bandwidth (built-in function) | 60 Mbit/s |
| Other parameters | <ul style="list-style-type: none">• Supports expansion of standalone MCUs to support a maximum of 500 concurrent calls.• Supports expansion of standalone SC to implement public-private network traversal in the DMZ zone. A maximum of 600 Mbit/s network traversal bandwidth is supported.• Supports expansion of standalone CloudRSE to implement meeting recording.• Supports expansion of facial recognition server to implement facial recognition sign-in and name tag. |

9 Protocols and Standards

The video conferencing solution complies with communication framework, audio and video, and data conferencing protocols and standards.

| Type | Protocols and Standards |
|-------------------------|--|
| Communication Framework | ITU-T H.323, SIP, and H.460 |
| Video | H.264, H.264 HP, H.263, H.263+ |
| Audio | G.711, G.719, G.722, G.722.1, G.722.1C, G.728, G.729, iLBC, AAC_LD, HWA_LD, AAC_LC and Opus |
| Data Conference | Data Conference 1.0/2.0/3.0 |
| Dual Streams | H.239, BFCP |
| Transmission/Service | TCP/IP, FTP, FTPS, RTP, RTCP, HTTP, HTTPS, SNMP V2/V3, Telnet, SSH, SOAP, LDAP, and DNS/DDNS |
| Encryption | H.235, AES, and TLS/SRTP |