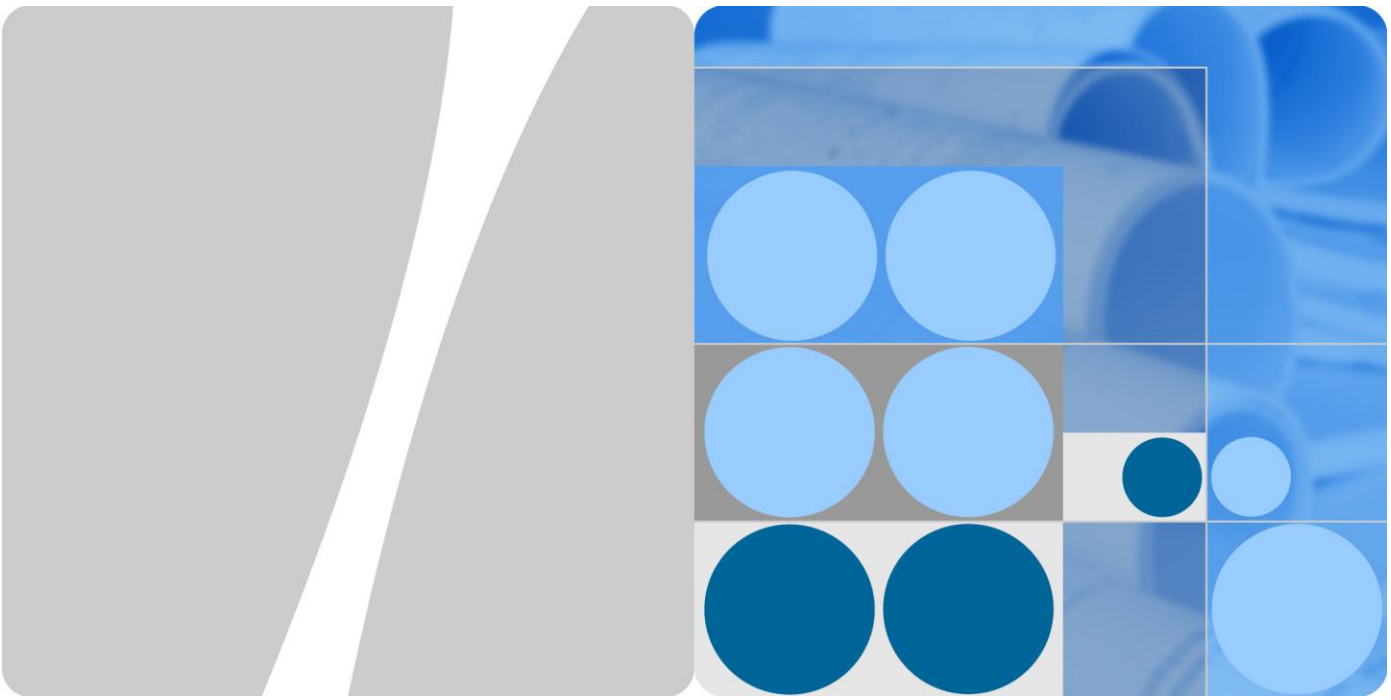

eSpace U2990 Unified Gateway V200R001C01

Product Description

Issue	**01**
Date	**2012-07-10**

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About This Document

Overview

This document describes the eSpace U2990 in the following aspects: the product orientation, product features, system structure, interfaces, signaling and protocols, service capabilities, networking and applications, reliability and security, performance indicators, and requirements on environments.

Product Version

The following table lists the product versions related to this document.

Product Name	Product Version
eSpace U2990	V200R001C01

Intended Audience

This document is intended for:

- System engineers
- Network engineers

Change History

Issue 01 (2012-07-10)

Initial release.

Contents

1 Product Positioning

This topic describes the application scenarios and network positions of the eSpace U2990 in enterprise solutions.

The eSpace U2990 adopts a Huawei N68E-22 cabinet with standard industry structure. This cabinet is composed of power distribution frames (PDFs), fan trays, service subracks, cabling troughs, filler panels, racks, and guide rails. The cabinet adopts -48 V DC power supply, meeting the IEC297 standard and requirements for flexibly module configuration.

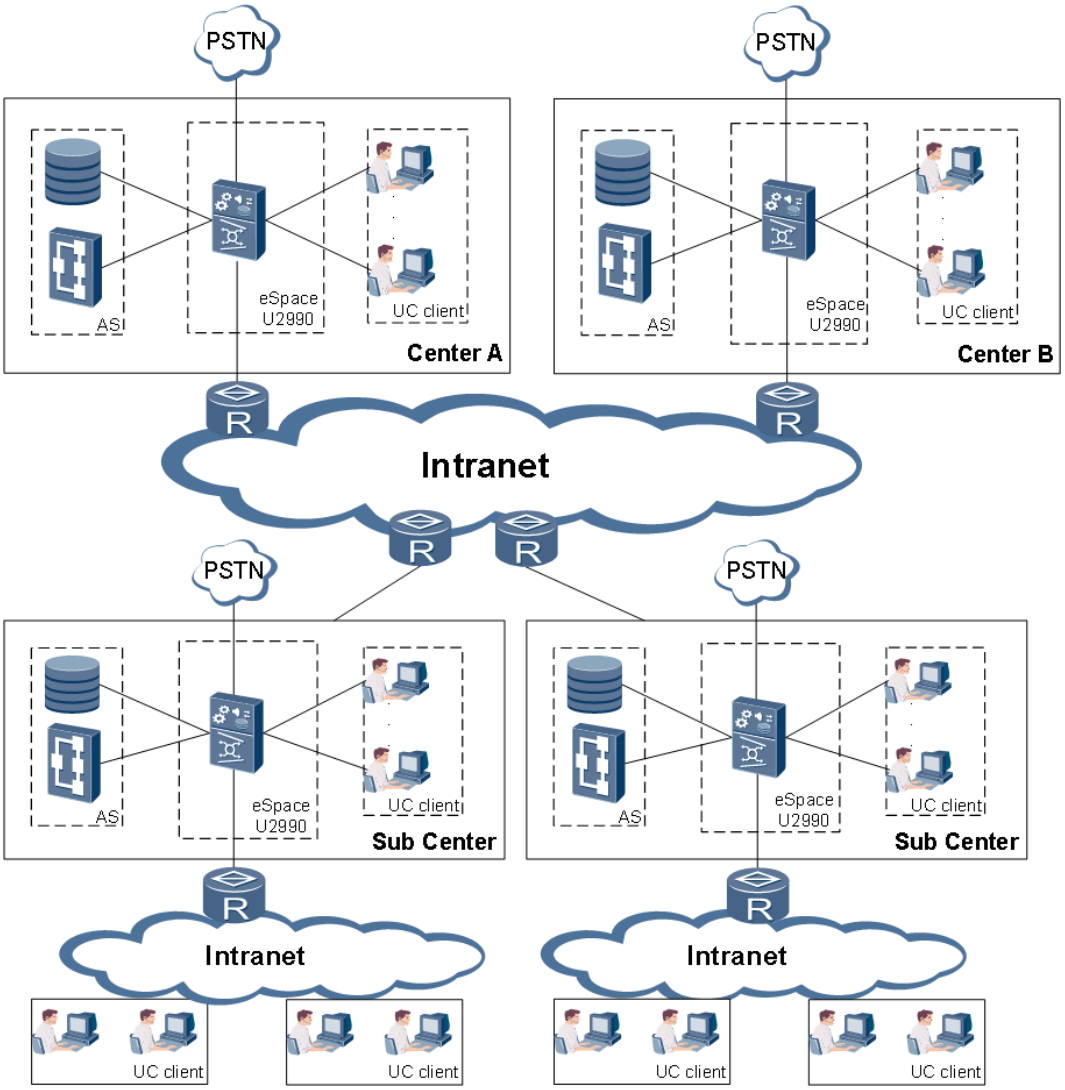
UC Application

Functioning as a unified gateway, the eSpace U2990 is the core device of the UC solution. With a professional hardware and software structure, the eSpace U2990 provides services with high performance and reliability for enterprises. The eSpace U2990 has the following functions:

- Enables UC subscribers to manage subscriber registration and triggering services.
- Provides UC subscribers with voice conference resources, which can be deployed in distributed mode.
- Offers gateways to connect UC subscriber calls to the current voice system. The gateways can be deployed in distributed mode.

The eSpace U2990 is a flagship platform in Huawei voice communication domain. This platform enables broadband and narrowband integration access and provides powerful and flexible networking capabilities. The eSpace U2990 is designed based on the MicroTCA architecture. Compared with universal servers, the eSpace U2990 provides a larger capacity and higher security and reliability. A fully configured system (seven subrack cascading) supports a maximum of 300,000 subscribers. Figure 1-1 shows the position of the eSpace U2990 on the UC solution network.

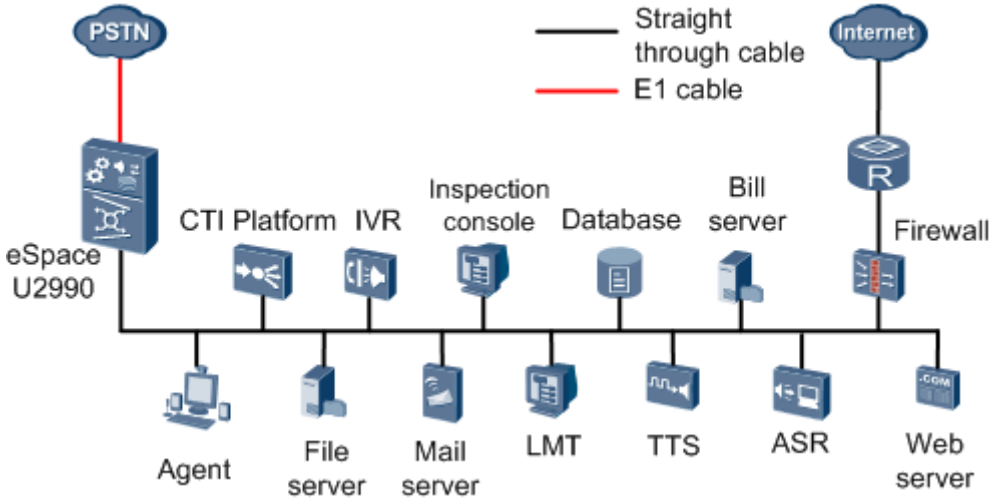
Figure 1-1 Position of the eSpace U2990 on the UC solution network



CC Application

The eSpace U2990 is a broadband and narrowband integration access platform developed by Huawei and also a next-generation access platform oriented to the NGN. The eSpace U2990 supports powerful networking capabilities, enables call center access, and provides agents and media resources for enterprises. Figure 1-2 shows the position of the eSpace U2990 on the CC solution network.

Figure 1-2 Position of the eSpace U2990 on the CC solution network



2 Product Features

The eSpace U2990 provides unified service access capabilities, supports call center services, and has powerful media resource functions. These features enable the eSpace U2990 to provide high-reliability services in flexible networking.

Service Access Capabilities

Table 2-1 describes the service access capabilities provided by the eSpace U2990.

Table 2-1 Service access capabilities provided by the eSpace U2990

Service Access Capability	Description
Unified service access platform	Functioning as a unified service access platform, the eSpace U2990 improves solution integration, facilitates service management, and reduces costs for enterprises.
IVR services	The eSpace U2990 provides an interactive voice response (IVR) system to load automatic service flows based on subscribers' service requirements. During call connections, the IVR system plays voices and collects digits to provide guidance for subscribers to complete services.
ACD services	Based on the rules of "First idle, first distributed with calls" and "First come, first served", the automatic call distributor (ACD) of the eSpace U2990 evenly allocates calls to agents for each service. The ACD also routes calls to the most appropriate agents based on customer information in the user database. This improves service personalization.

Media Resource Capabilities

Table 2-2 shows the media resource capabilities provided by the eSpace U2990.

Table 2-2 Media resource capabilities provided by the eSpace U2990

Media Resource Capability	Description
Voice playing	The eSpace U2990 provides powerful voice playing functions and supports OKI24k (VOX), OKI32k (VOX), PCMA/G711A, PCMU/G711U, G723.1, AMR, and AMR2. In addition, the eSpace U2990 can play variable voices. Service logic specifies the type and the value of the variable voice to be played. Then the eSpace U2990 plays the variable voice to a subscriber based on the specified format. Voice files can be loaded on a board or stored on a file server. The number of voice files that can be stored on a file server is determined by the storage capacity of the file server.
Digit collection	The eSpace U2990 supports the function of dual tone multiple frequency (DTMF) digit collection. The eSpace U2990 can collect single-digit numbers and multi-digit numbers. In addition, the eSpace U2990 supports the functions such as reporting the first digit, reporting a single digit, detecting timeout of the first digit, and detecting timeout between digits. The eSpace U2990 can receive subscriber type information using the special functional keys delivered by the service logic, and interact with a subscriber based on the definition of the functional keys.
Voice recording	The eSpace U2990 can play a notification of voice recording to a subscriber by using a specified voice encoding format. The following voice formats are supported: OKI24k (VOX), OKI32k (VOX), PCMA/G711A, PCMU/G711U, G723.1, AMR, and AMR2.
Video	• The eSpace U2990 can play files in AVI and 3GP formats. • The eSpace U2990 supports video coding and decoding in H.263 and MPEG4 formats, and CIF and QCIF image formats. In addition, it supports video rates ranging from 64 kbit/s to 384 kbit/s. • The eSpace U2990 supports video recording, playing, pausing, resumption, and fast-forwarding.
Fax	The eSpace U2990 can send or receive a single-page fax and multiple-page fax. Currently, the eSpace U2990 supports the Tagged Image File Format (TIFF) file format. The encoding of the faxed data conforms to the T.4 standard, fax process conforms to the T.30 standard, fax over the network conforms to G.711 and T.38 standard.
Text To Speech (TTS) voice playing	The eSpace U2990 supports TTS voice playing. A service provider does not need to record service voices in advance but provides texts only. The TTS function is used for playing voices for subscribers by converting texts into voices directly, meeting the requirements of dynamic and real-time delivery of information. The voice synthesized by the TTS is in linear WAV or A law

Media Resource Capability	Description
	WAV format.
Automatic Speech Recognition (ASR)	The eSpace U2990 supports the Automatic Speech Recognition (ASR) function. The function is used for automatically recognizing subscribers' voices and triggering corresponding service flow based on the recognition result. The typing mode is replaced by the man-machine voice interaction.
Conference function	• Supports interactive voice response (IVR) conferences. • Creates and deletes conferences. • Provides the conference media operation interfaces (for conference voice and recording, TTS playing, Stream playing, and volume adjustment for background music and voices) for the application platform of the upper-layer service. • Provides the interfaces for modifying the conference channel attribute for the application platform of the upper-layer service. • Provides the interfaces for dynamically modifying the conference capacity and the interfaces of detecting the conference speaker for the application platform of the upper-layer service. • Provides interfaces for redirection and offset playing so that the playing points of files can change dynamically. The redirection function enables you to fast-forward or rewind voice playing from the start, current, or end playing point. The offset playing function enables you to fast-forward voice playing from the start playing point.
Multi-language voice playing	The eSpace U2990 supports a maximum of 256 languages and can concurrently play voices in a maximum of eight languages. Languages are configurable.
Multi-currency voice playing	The eSpace U2990 supports the playing of multi-currency voices in a language. It supports a maximum of 256 currency types and eight currency types can be customized.

Powerful and Flexible Networking Capabilities

The eSpace U2990 provides powerful and flexible networking capabilities by supporting narrowband signaling such as TUP and ISUP, broadband signaling such as PRA(QSIG,Q.921,etc.), SIP, and SIGTRAN. Specifically, the eSpace U2990 supports the following:

- Supports the MTP, TUP, and ISUP protocols, and connections to devices including SP and STP devices on the SS7 signaling network and PSTN/PLMN switches.
- Supports the SIGTRAN protocol, and the connection to the PSTN and NGN/3G networks at the same time.
- Supports the SIP/SIP-T protocol and connection to SIP terminals (functioning as IP agents). On the NGN, it can be interconnected with the SoftSwitch.

- Supports the BICC protocol and the interconnection between the eSpace U2990 and the MSC/SoftSwitch is more flexible.
- Supports signaling adaptation.
- Supports the INtess protocol, and the interconnection with the computer telephony integration (CTI) platform that also supports the INtess protocol.
- Supports the external domain name service (DNS), including DNS server and DNS link configuration.

The eSpace U2990 supports distributed networking and network call service applications to improve resource distribution flexibility. Subscribers can obtain resources from adjacent nodes, reducing trunk bandwidth.

NOTE

5 Networking Applications shows a typical networking application of the eSpace U2990.

High Reliability

The availability of the eSpace U2990 is 99.999%. To ensure high reliability, the eSpace U2990 adopts various measures in aspects such as hardware and software design and system overload control. For details, see Table 2-3.

Table 2-3 Reliability design measures

Item	Measure
Hardware reliability	To ensure the reliability of the hardware system, the eSpace U2990 adopts the reliability design measures such as adopting a distributed hardware structure, active and standby boards, and load sharing, and adopts strictly-selected components that have passed burn-in tests. • Distributed processing: The eSpace U2990 supports distributed processing by modularizing functions. The function modules are independent of each other, and are controlled by different processors. The failure of one processor does not affect the running of the entire system. • Board-level hot backup: This method is the most frequently used method for improving the reliability of telecom products. In general, boards work in active and standby mode for hot backup. The board-level hot backup method mainly applies to service processing, device management, and resource management. • Mutual-aid working mode: Mutual-aid working is also called load sharing, that is, two or more boards bear the same functions during normal running. When one board is faulty, other boards undertake the tasks of the faulty board while guaranteeing system performance.
Software reliability	By adopting a hierarchical and modularized structure, the eSpace U2990 provides the functions such as protection performance, error tolerance, and fault detection and handling in software design. • Protection performance: At the development stages such as requirement analysis, system design, and software test, the eSpace U2990 strictly complies with the specifications of the

Item	Measure
	Capability Maturity Model (CMM). The software reliability of the eSpace U2990 is improved through various quality guarantee stages. • Error tolerance: By means of timing inspection, real-time task monitoring, storage protection, and data verification, the eSpace U2990 can effectively prevent a software fault from severely affecting the system running, improving the error tolerance capability. • Fault detection and handling: The eSpace U2990 can automatically detect and diagnose both software and hardware faults. When a component is faulty, the eSpace U2990 can automatically perform the operations such as switchover, restart, or reloading on the component to prevent service interruption.
Clock reliability	The eSpace U2990 is configured with stratum-2 and stratum-3 clocks, and provides standard clock interfaces. The eSpace U2990 can be configured with the Building Integrated Timing Supply (BITS) and E1 line clock as the clock reference to ensure the reliability of the clock system.
System overload control	The eSpace U2990 provides the overload control mechanisms such as 4-level overload restriction, dynamic adjustment of code modes, and traffic control to ensure system reliability. • With the 4-level overload restriction function, the eSpace U2990 enables the traffic control mechanism when the CPU load reaches the threshold. Each level restricts 25% of subscribers. When the CPU load increases, the service level is degraded by one. Restoration of the service level is also conducted based on the four levels. • The eSpace U2990 allows you to reserve or immediately execute traffic control using MML commands based on the analysis of traffic statistics results and device running status. • The eSpace U2990 supports the signaling congestion control mechanism specified in the ITU MTP2 and ITU MTP3. When congestion occurs on a link, a certain percentage of new calls is rejected, reducing the load of the link. In addition, by changing the priority of messages, the eSpace U2990 can maximally ensure the processing of ongoing calls.
Protocol processing and sharing	• SCTP: The eSpace U2990 supports the multi-homing function. One SCTP connection can use two local end addresses and two peer end addresses to implement backup of end-point addresses. When the IP address of the active end point is unreachable, the IP address of the standby end point is used. In this way, the SCTP connection is not interrupted. • SIP/H.248: The sending of packets can be implemented on different modules. Load balancing is implemented between modules. When a module is completely faulty, other modules undertake the tasks of the faulty module.

Item	Measure
	• M3UA: The eSpace U2990 can communicate with the same destination node through multiple SCTP connections. The SCTP connections can work either in active and standby mode or load-sharing mode, which is determined by the data configuration of the application layer. When one SCTP link is faulty, the signaling can be switched to other SCTP links.
Storage of host data	The configuration data of the eSpace U2990 can be backed up on the Flash memory of a board. After loading data successfully, the basic input output system (BIOS) of a board backs up the data to the Flash memory of the board. When the system is powered on, you can choose to load the data from the OMU or read the data from the Flash memory based on the OMU soft switch. When the subscriber data of an OMU is changed, the backup module of the active board synchronizes the change of static data to the Flash memory of the active board and the memory database of the standby board. Then on the standby board, the backup module synchronizes the data in the memory database to the Flash memory.
Storage of OMU data	The OMU data is stored in an Oracle database. The eSpace U2990 supports hierarchical management for the data operation authority of operators using OMU programs. The eSpace U2990 can back up the OMU data automatically and regularly. You can also back up the data manually after a significant modification. During the running of data-related MML commands, the eSpace U2990 checks the consistency and dependency of the data between tables to ensure that the data is valid. When the database is started, the eSpace U2990 performs consistency checks on the data area size, and the structure defined by the host database to ensure that the OMU data and the host data are consistent.

Local Call AS Failure:

Call AS is the main voice server for Huawei UC solution. Call AS can support active-standby backup to provide high reliability for voice, audio conference, video call and other features. with two independent Call AS servers, if one of the Call AS server breaks down, another Call AS server will continue to provide the same service automatically and transparently, all the ongoing service will be not affected.

High Security

With an excellent security design, the eSpace U2990 can protect the network and all the valid subscribers from the illegal operations such as malicious network attacks, illegal registration, anonymous calls, wiretap, and account embezzlement. For information about the specific measures, see Table 2-4.

Table 2-4 Security design measures

Item	Measure
Networking application security	In the protocol interfaces that are provided for external systems, the system disables unnecessary network services such as Hypertext Transfer Protocol (HTTP) services to prevent unauthorized users from accessing the eSpace U2990.
Data security	The eSpace U2990 provides strict data protection mechanisms, including: • Backing up data between active boards and standby boards in real time. When an active board is down, the corresponding standby board automatically becomes an active one. All the programs and data on this board take effect immediately. • Automatically backing up the database of the active processor to a Flash memory. The active processor can restart quickly by reading data from the Flash memory. • Enabling the OMU to initiate the Cyclic Redundancy Check (CRC) on the host data regularly. If detecting that the host data is inconsistent with the OMU data, the OMU initiates a process of setting the host data. If setting the host data fails for several attempts, an alarm will be generated to inform the operator of restoring the OMU data as soon as possible.
O&M security	• The eSpace U2990 supports login security management based on dual-verification (account and workstation's IP address). This helps to effectively prevent security problems caused by account disclosure. • The eSpace U2990 supports hierarchical user authority management. This helps to prevent unauthorized users from accessing the system. • All operations performed by maintenance operators are recorded in logs. This is to ensure that the history operations can be located and traced. • The eSpace U2990 supports the functions for prompting and warning to prevent operators from incorrectly operating the system. • The eSpace U2990 supports checking on the configuration operations performed by an operator. Invalid configurations are not allowed. • The maintenance and operating system has a protection for subscriber names and passwords. If the subscriber does not perform any operation for a long time, the system will automatically log off against unauthorized access.
Protocol and call security	Supports the security features of protocols and encrypts packets of protocols.
Attack Defense	The field programmable gate array (FPGA) on the media distribution unit (MDU) supports attack defense feature including DoS :

Item	Measure
	SYN Flood UDPFlood Ping Flood ICMP Flood Teardrop attack Smurf attack Finger of Death attack Fraggle attack Overlap attack Fragmentation attack

Smooth Expansion

The requirement for capacity expansion has been taken into account in designing the hardware and system processing capability of the eSpace U2990. In this way, the eSpace U2990 features a capability of smooth capacity expansion.

NTP Server Support

The Network Time Protocol (NTP) defines the time synchronization mechanism. It synchronizes the time between the distributed time server and the client.

U2990 supports to manage parameters of NTP time synchronization. You can add, remove, display NTP server and make configuration for NTP time synchronization parameters.

Excellent Performance Measurement Functions

The eSpace U2990 provides excellent traffic statistics (service statistics and media resource statistics) functions, and supports various measurement indexes and flexible measurement tasks. The eSpace U2990 shows the performance data in real time by the means such as lists and graphics. This helps to fully indicate information about the service load and running status of the system. To be specific:

- The eSpace U2990 supports a complete function of collecting statistics on media resources, which helps to precisely indicate the quality of call service, call traffic, and media resource usage.
- A traffic measurement item can be scheduled and the measurement time can be set. In this way, the measurement item can be automatically started and stopped at the specified date and time. The scheduled measurement item can also be canceled.
- Several traffic measurement items can be combined based on the actual requirements. One or more items can be measured at a time.

Convenient Operation and Maintenance

The eSpace U2990 provides convenient and practical operation and maintenance (O&M) functions as follows:

- Flexible and diversified management modes

  By adopting a client/server-based distributed structure, the eSpace U2990 provides various maintenance modes such as graphical user interface (GUI) and MML. In addition, the eSpace U2990 supports simultaneous access by multiple clients locally or remotely. The related network management network can be constructed flexibly depending on the factors such as the network structure, management requirements, and investment scale. The eSpace U2990 supports the online software patching, online commissioning, remote maintenance, and dynamic data setting.

- Visualized GUI

  The eSpace U2990 provides O&M interfaces that adopt a unique navigation tree technology. In this way, the MML features such as easy-to-use, and easy to access the NMS, and the GUI advantages such as visualized and easy-to-memorize are retained. In addition, the eSpace U2990 provides equipment panel views, allowing visualized operations.

- Powerful fault analysis and location capability

  The eSpace U2990 provides optimal functions such as call tracing, signaling tracing, interface tracing, and message interpretation. In addition, the eSpace U2990 is built in with a software tool of signaling analysis, which is independently developed by Huawei, to help engineers in system operation and maintenance.

- Real-time fault management capability

  The eSpace U2990 can receive and display network equipment fault reports in real time. In this way, maintenance engineers can diagnose the fault source rapidly and precisely, and take proper measures to recover services.

Voice Processing and Codec

eSpace U2990 supports type of service (TOS) and differentiated services code point (DSCP) to make voice streams be transmitted preferentially, supports Real-Time Transport Control Protocol (RTCP), and provides statistical items including the number of received and sent RTP packets, number of received and sent bytes, time delay, jitter, and packet loss raten.

3 System Structure

About This Chapter

Based on the Multimedia Telecommunication Application Environment (MTAE) hardware structure, the eSpace U2990 provides functions by module on the Linux/VxWorks+DOPRA software platform. The eSpace U2990 supports centralized and distributed networking modes, and provides customers with satisfactory solutions and easy-to-use operation and maintenance terminals.

3.1 System Component

The eSpace U2990 system is composed of the media gateway controller (MGC), media gateway (MGW), and media resource platform (MRP). These components can be flexibly combined to meet various networking and interconnection requirements.

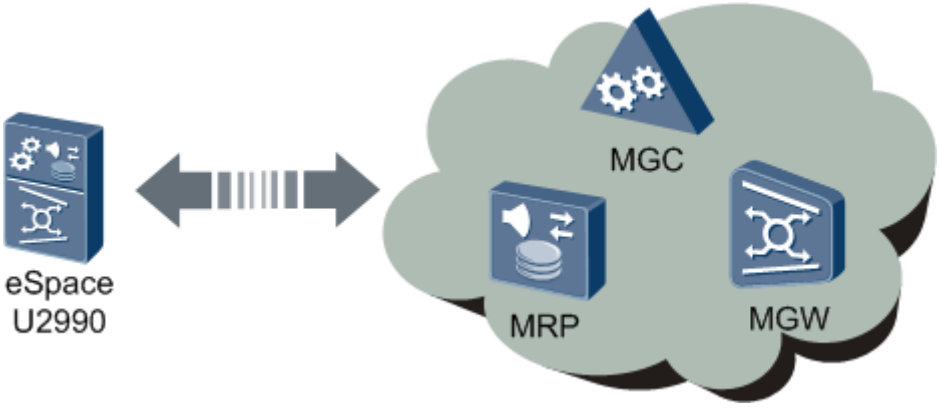
The eSpace U2990 is developed based on the Multimedia Telecommunication Application Environment (MTAE) embedded hardware platform and the Distributed Object-oriented Programmable Real-time Architecture (DOPRA) software development platform.

The eSpace U2990 system functions are divided into the following:

- MGC functions: Implement system control and service processing.
- MGW functions: Implement bearer switching and provides media gateway functions.
- MRP functions: Implement resource playing.

These functions are implemented on the same hardware and software platforms. Figure 3-1 shows the logical composition of the eSpace U2990.

Figure 3-1 Logical composition of the eSpace U2990



The MGC, MGW, and MRP functions of the eSpace U2990 can be combined or separated.

- Centralized networking: In this mode, an independent set of device is used to implement these functions.
- Distributed networking: In this mode, the MRP and MGW functions are integrated and provided by one set of device, and the MGC functions are provided by another set of device. This mode meets the distributed application requirement.

3.2 Hardware Structure

The eSpace U2990 adopts the Multimedia Telecommunications Application Environment (MTAE) hardware structure and provides highly integrated hardware resources. This enables the eSpace U2990 to better help implement integrated solutions.

The eSpace U2990 uses Huawei N68E-22 cabinets and subracks that adopt the MTAE platform. The MEAE platform has a BASE bus switching plane and provides good universality and high reliability, which enable this platform to exchange and transfer variable length data packets for communication equipment. In addition, the eSpace U2990 provides Intelligent Platform Management Interfaces (IPMIs) and the clock private bus to manage boards and obtain clock signals in subracks.

Physically, a eSpace U2990 is composed of an MTAE subrack and operation and maintenance units (OMUs). The MTAE subrack functions as the host of the eSpace U2990 and implements service processing and resource management. The OMUs implement the functions of operation, maintenance, and management.

Standard AMC boards can be inserted from the front and rear of the MTAE subrack. In this way, the MTAE subrack improves the system integrity, and supports an integrated solution for service access, resources, BAM, and FS.

Figure 3-2 shows the front view of the MTAE subrack.

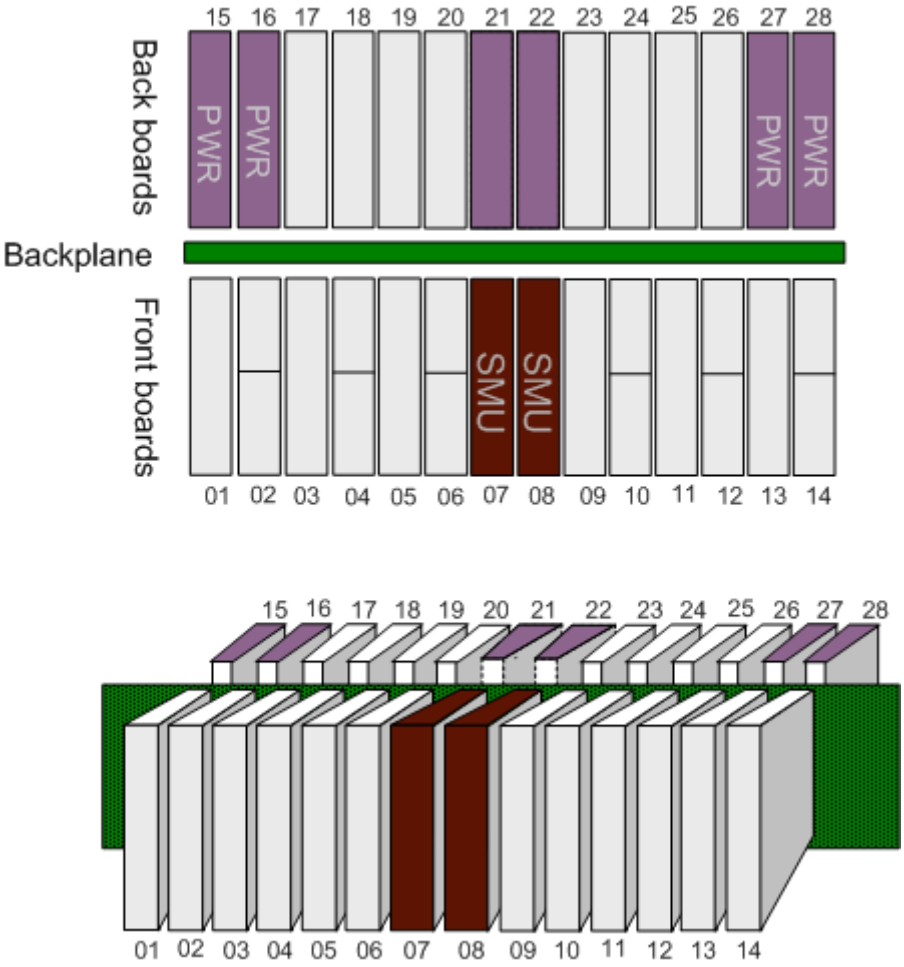
Figure 3-2 Front view of an MTAE subrack

Figure 3-3 shows the rear view of the MTAE subrack.

Figure 3-3 Rear view of an MTAE subrack

Each MTAE subrack adopts a backplane that can be installed between front boards and rear boards. The boards can be installed from the front and back of each MTAE subrack. There are 14 slots (including front and back) in total. For details, see Figure 3-4.

Figure 3-4 Slot distribution



SMU	System management board
PWR	Power board

The advantages of this board installation mode are as follows:

- Improving the subrack integrity
- Improving the subrack universality and enhancing the flexibility of system configuration

A pair of front and rear boards can be installed in different slots.

NOTE
For hardware details, see Hardware Description.

3.3 Software Structure

The software system of the eSpace U2990 is composed of host software, operation and maintenance unit (OMU) software, and client software. Layered functions enable the system to provide high expansion compatibility and easy-to-use GUI.

Host Software

Host software runs on the main processor of the eSpace U2990. The host software implements functions such as signaling and protocol adaptation, call processing, service control, media resource management, and media resource processing. Working with the operation, administration and maintenance (OAM) software installed on a client, the host software following instructions of maintenance personnel to complete operations such as managing data, equipment, and alarms, collecting statistics on traffic, and tracing signaling on hosts.

The host software adopts the program design ideas of from-top-to-bottom and hierarchical modularized structure, as shown in Figure 3-5. Table 3-1 describes the functions of the host software modules.

Figure 3-5 Overall structure of the host software

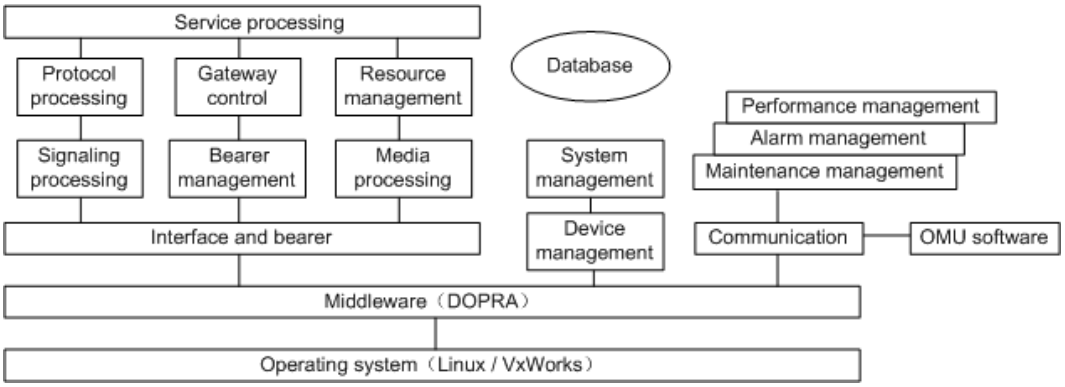


Table 3-1 Modules of the host software

Module	Functions
Operating system	The operating systems are Linux and VxWorks.
Middleware	The eSpace U2990 adopts the Distributed Object-oriented Programmable Real-time Architecture (DOPRA) technology between the operating system and application software. In this way, the upper-layer service software is not related to the lower-layer operating system and the platform.
Signaling processing software	It is deployed on a GPU board to support the access of channel associated signaling, common channel signaling, and control signaling, and process lower-layer protocols.
Protocol processing software	The protocol processing software works with the gateway control subsystem, operation and maintenance subsystem, and TDM access and switching subsystem to adapt, process, and forward channel associated signaling and common channel signaling.
Bearer management software	• It supports TDM access and switching functions, and processes TDM bearer services under the control of the gateway control subsystem. • In addition, this software supports packet access and packet switch functions, provides various physical IP interfaces based on the actual networking, and processes packet bearer services under

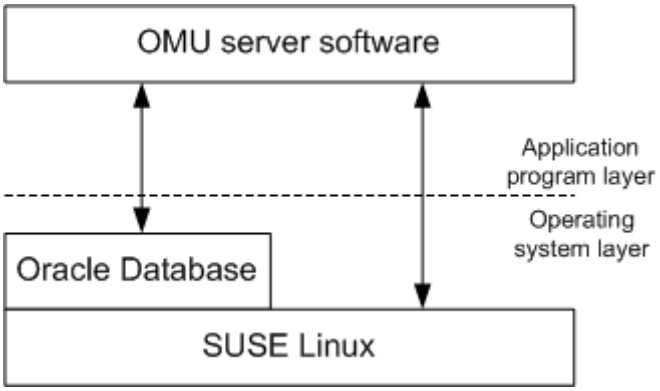
Module	Functions
	the control of the gateway control subsystem.
Gateway control software	It receives control messages from the eSpace U2990, and invokes and manages internal service resources of the system.
Media resource processing software	It processes the formats of service streams, including voice coding/decoding and echo cancellation.
Resource management software	It manages the global resources of the system, and implements reasonable allocation of the resources and mutual assistance between the resources.
Service processing software	It is deployed on the SGU or GPU board to implement the functions such as signaling processing and call processing.
System support software	It is deployed on the SMU board to implement system management and interconnection between devices.
Operation and maintenance software	It is deployed on the SMU board and some other boards to receive the operation commands from the OMU and return operation results.

OMU Software

The OMU software runs on the OMU board to forward the operation and maintenance commands from workstations to the host, and return the responses or operation results from the host to the corresponding workstations.

The OMU software runs on an SuSE Linux operating system and adopts an Oracle database. The software provides the OAM functions through multiple parallel service processes. Figure 3-6 shows the relationship between the OMU software, the operating system, and the database.

Figure 3-6 OMU software structure



Client Software

The client software runs on a Windows operating system and provides GUIs for management. You can log in to a workstation locally or remotely to perform the maintenance operations such as data maintenance, equipment management, alarm management, traffic statistics collection, and call and signaling tracing.

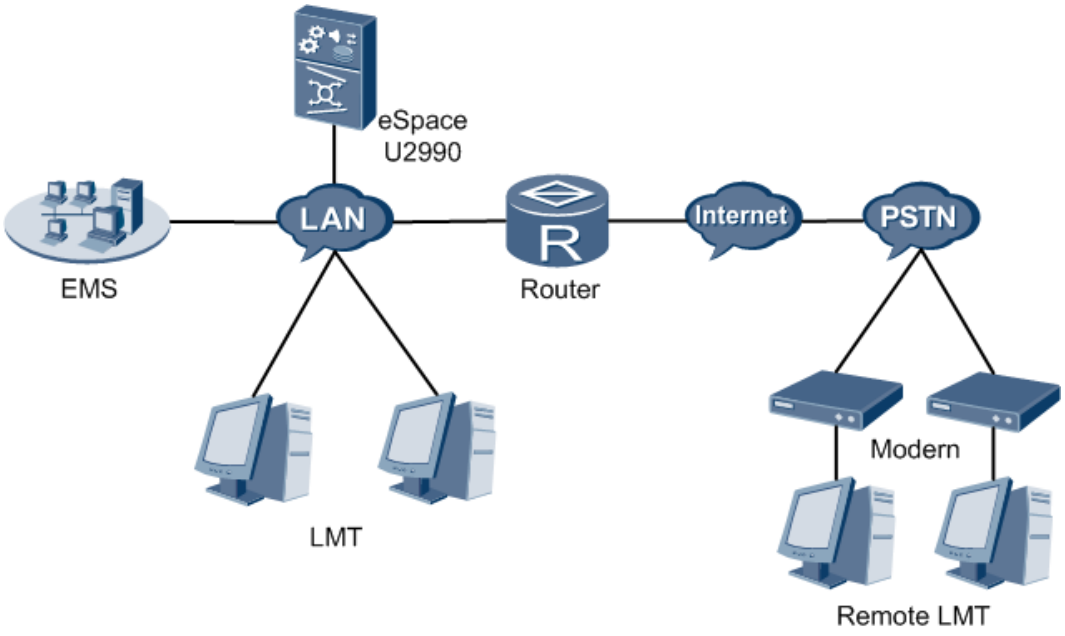
3.4 OAM System

The OAM system is independent of the eSpace U2990 host. Based on the C/S structure, the OAM system configures, maintains, and monitors devices.

Overall Structure

The OAM system of the eSpace U2990 works in client/server mode. An operator can manage and maintain the server, namely, the host, through an OAM client locally or remotely. Figure 3-7 shows the overall structure of the OAM system.

Figure 3-7 Overall structure of the OAM system



NOTE

In the preceding figure, the LMTs function as OAM clients, and the eSpace U2990 functions as the OAM server.

- The Enterprise Management System (EMS) communicates with the OAM system through SOAP and SNMP interfaces, and implements the functions such as traffic statistics, alarm management, and configuration management (including device resource management, operation, and maintenance) for hosts.
- The LMTs communicate with the OAM system through MML interfaces. The MML interfaces indicate a set of man-machine interaction interfaces defined according to the ITU Z.301-Z.341 recommendations. The MML interfaces provide users with a set of

query and operation commands. By running these commands, users can monitor and manage hosts.

Major Functions

The OAM system of the eSpace U2990 supports the GUI and MML operation modes, and provides the following functions. See Table 3-2.

Table 3-2 Major functions of the OAM system

Function	Description
Device management	Provides GUIs and MML commands, facilitating operations such as query, display, switchover, reset, isolation, block, and activation. In this way, you can effectively manage and maintain the hardware, system resources, signaling links, clock links, and physical ports of a host.
Data management	Provides database operation methods such as addition, deletion, modification, query, storage, backup, and restoration. By using these methods, you can effectively manage and maintain various data running on a host such as equipment data, signaling data, routing data, and subscriber data.
Security management	Supports the management on user accounts and system security policies (such as, locking an LMT if it is not operated for a long period, and querying security logs).
Alarm management	Receives and processes the alarms generated by a host, enables alarm terminals (such as alarm boxes) to generate audible and visual signals by alarm type and alarm severity, and sends the interpreted alarm messages to the I2000 through a network management interface. In addition, the OAM system supports the functions of storing alarm information, querying historical alarms, and setting the alarm processing mode.
Tracing management	Provides the tracing functions such as service tracing, signaling tracing, interface tracing, and message interpretation. By using these functions, you can dynamically trace the connection process, state transition, resource usage, and control information streams of various service resources and interface protocols in real time. The tracing information can be saved for future reference. In this way, the OAM system provides powerful functions of fault analysis and location for users.
Signaling analysis	Provides a built-in signaling analysis tool (developed by Huawei) for analyzing the signaling interaction processes online or offline, while using the trace management functions. In addition, the OAM system provides powerful maintenance approaches to quickly locating the cause of a fault and also to optimizing the configuration of signaling links.
Traffic statistics	Provides the traffic statistics function, also called the performance measurement (PM) function, which is used to collect statistics on various services and objects. By analyzing the statistics, you can have a better understanding of the running conditions of devices and networks. This helps to provide basic statistics for the planning, design, operation, management, and maintenance of telecom networks.
Environment and power	Supports remote monitoring and control upon the running environments, power supply devices, and other intelligent devices in both central and

Function	Description
supply monitoring	remote equipment rooms. This helps to implement remote monitoring and centralized management upon the devices in unattended equipment rooms.

4 Interfaces, Signaling, and Protocols

About This Chapter

This chapter describes the interfaces, signaling, and protocols supported by the eSpace U2990 and their functions.

4.1 Supported Interfaces

This topic describes the interfaces supported by the eSpace U2990.

4.2 Supported Signaling and Protocols

This topic describes the signaling and protocols supported by the eSpace U2990.

4.1 Supported Interfaces

This topic describes the interfaces supported by the eSpace U2990.

Table 4-1 describes the interfaces supported by the eSpace U2990 and their functions.

Table 4-1 Interfaces supported by the eSpace U2990 and their functions

Type	Function
E1/R2/T1 interface	E1/R2/T1 interfaces are classified into optical interfaces and electrical interfaces. When the eSpace U2990 interconnects with public switched telephone network (PSTN) or public land mobile network (PLMN) switches, these interfaces provide bearer channels, such as SS7 trunk circuits and message transfer part (MTP) links, for service and signaling.
GE/FE interface	GE interfaces are classified into optical interfaces and electrical interfaces. All FE interfaces are electrical interfaces. When the eSpace U2990 interconnects with devices such as SoftSwitches, MSC servers, computer telephony integration (CTI) platforms, and application servers (ASs), these interfaces provide bearer channels for IP-based service signaling. When a media resource platform (MRP) interconnects with media gateway controllers (MGCs) or file servers, these interfaces provide bearer channels for IP-based media streams.

Type	Function
Clock interface	This type of interface accesses the clock signals provided by an E1 cable or a BITS device.
COM	Serial port, complying with the RS232 specifications and supporting the automatic switchover with the device management serial port.

4.2 Supported Signaling and Protocols

This topic describes the signaling and protocols supported by the eSpace U2990.

Table 4-2 describes the major signaling and protocols supported by the eSpace U2990.

Table 4-2 Supported Signaling and Protocol

Signaling and Protocol	Description
SS7	SS7 signaling is defined by the International Telegraph and Telephone Consultative Committee (CCITT) and is a common channel signaling system complying with international standards. This signaling features high-speed transmission, large-capacity signaling, powerful functions, and flexible and reliable applications, and meets the signaling requirements of the public switched telephone network (PSTN), public land mobile network (PLMN), and intelligent network (IN).
H.248	H.248, also called the MeGaCo protocol, is a new standard defined by ITU-T and IETF together. It is used for media gateway control.
SIP	Session Initiation Protocol (SIP) is used for the connection between the eSpace U2990 and the devices such as SoftSwitches and agents.
SIGTRAN	SIGTRAN is a signaling transmission protocol, which is defined by the SIGTRAN work group of IETF and is a rule for the interconnection between PSTN signaling and IP signaling. SIGTRAN is a protocol stack. In terms of functions, SIGTRAN is classified into two types: • Common signaling transmission protocol: adopts the Stream Control Transmission Protocol (SCTP) defined by IETF to adapt protocols for the

Signaling and Protocol	Description
	switched circuit network (SCN) signaling transmitted based on IP addresses, and to provide reliable data packet transmission services. • PSTN signaling adaptation protocol: M3UA.
NFS	The network file system (NFS) is used for file transfer between the media resource boards of the eSpace U2990 and file servers.
HTTP	The Hypertext Transfer Protocol (HTTP) is used for file access between the media resource boards of the eSpace U2990 and file servers.
RTP	The Real-Time Transport Protocol (RTP) is used for the transmission of broadband multimedia streams.
RTCP	RTCP is used for the transmission control of broadband multimedia streams.
SFTP	SFTP is used for the CDR access which support SSH encryption
BICC	BICC belongs to the control protocol of application layer and is used for the establishment, modification, and ending of calls. BICC is the evolution and development of ISUP. BICC features that call controls separate from bearer controls; therefore, calling service is independent of bearer controls. In the eSpace U2990, BICC is used for the interconnection between the eSpace U2990 and MSC/SoftSwitch.
PRA	The Primary Rate Access (PRA) protocol is applicable to non-ISDN core-network devices that connect to the integrated services digital network (ISDN) core network, which enlarges the service range of the ISDN core network, enhances device compatibility, and ensures communication between the devices and the ISDN core network. The network elements that can be directly connected to ISDN core-network devices include miniswitches and servers accessed from the ISDN.
IPv4 and IPv6	Support IPv4 and IPv6 dual stack.

5 Networking Applications

About This Chapter

This chapter describes common network elements (NEs) and typical networking applications.

5.1 NE Introduction

This topic describes the names and functions of the network elements (NEs) in typical networking applications.

5.2 DR Networking

This topic describes the application scenarios and processes of disaster recovery (DR).

5.3 PGM Application Networking

This topic describes Presence Group Message (PGM) application networking and service flows in different application scenarios.

5.4 AS Service Application Networking

This topic describes the application scenarios and networking of the Call AS and Meeting Server.

5.5 Networking of eSpace U2990s Working in Load Balancing Mode

This topic describes the networking and service flow of eSpace U2990s that work in load balancing mode.

5.6 Application Networking of a Centralized Call Center

This topic describes the application networking of a centralized call center and related service flows.

5.7 Networking of a Distributed Call Center

This topic describes the networking of a distributed call center and related service flows.

5.8 Network Call Center

This topic describes the networking and service flows of a network call center.

5.9 File Server Networking

This topic describes the file server networking and related service flow.

5.1 NE Introduction

This topic describes the names and functions of the network elements (NEs) in typical networking applications.

Table 5-1 shows the common NEs in unified communication (UC) and call center (CC) application networking that involves the eSpace U2990.

Table 5-1 Common NEs in UC and CC application networking

NE	Description
eSpace U2990	Connects subscriber calls.
Call AS	Manages terminal registration and processes call service flows.
Meeting Server	Provides conference functions such as conference creation, reservation, invitation, and control.
PGM (Presence Group Message)	Provides functions such as managing online subscribers and groups and transferring messages.
Computer telephony integration (CTI) platform	Centrally processes calls and routes various media calls.
Interactive voice response (IVR)	Runs automatic service flows.
Operation and maintenance terminal	Implements operations, such as data configuration, status monitoring, alarm management, and signaling tracing, for the eSpace U2990.
Database	Functions as the database of the service system and stores service data.
File server	Stores resource files required for storage system running. Resource files include voice files and multimedia files.
Email server	Sends and receives emails related to email and fax call services.
Report server	Generates reports for service analysis and statistics.
Network intelligent routing center (NIRC)	Associates multiple local call centers to form one network call center.
TTS server	Converts texts into voices.
ASR server	Automatically recognizes subscriber voices and triggers service flows based on recognition results.

5.2 DR Networking

This topic describes the application scenarios and processes of disaster recovery (DR).

In the unified communication (UC) application scenario, the eSpace U2990 implements the enterprise-level DR function and properly processes calls. After being disconnected from Call AS on the active node, the eSpace U2990 uses the stored remote DR policy to connect to Call AS on a standby node. In this way, calls can be connected to the Call AS on the standby node to ensure proper user call connection. When Call AS on the active node resumes connecting to the eSpace U2990, the eSpace U2990 uses the stored remote DR switchback policy to connect to Call AS on the active node.

Figure 5-1 DR application networking

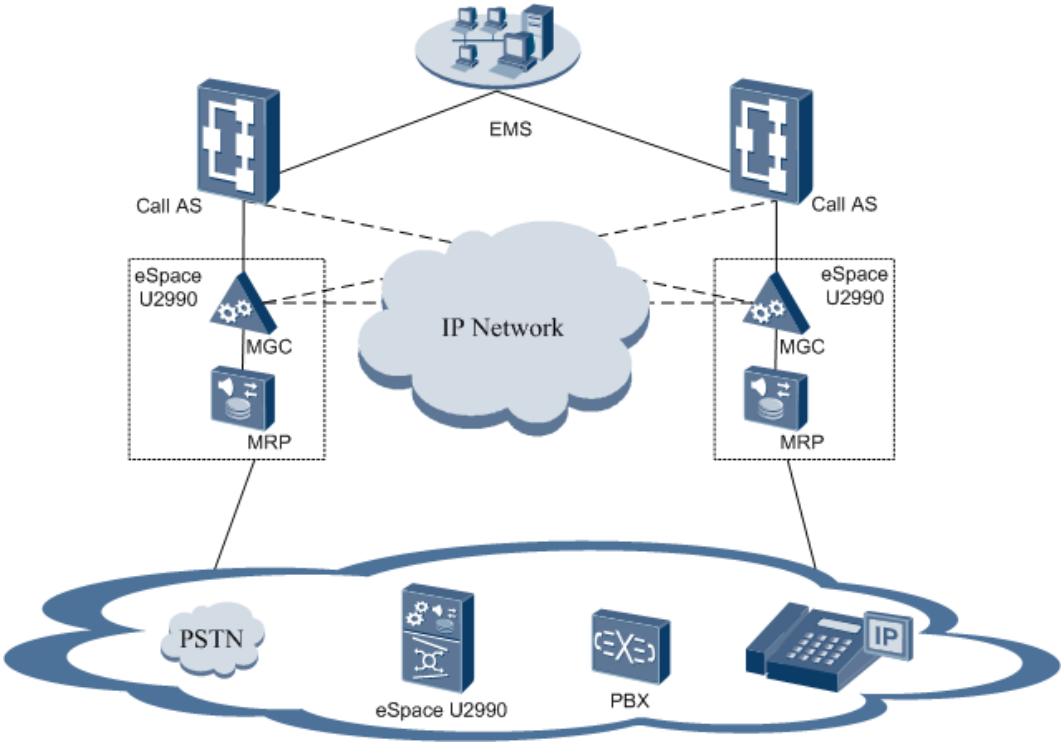


Table 5-2 shows the DR process.

Table 5-2 DR process

Step	Description
1	The eSpace U2990 sends SIP messages to Call AS on the active node and Call AS on the standby nodes for heartbeat detection. If they all respond, the eSpace U2990 and Call AS on the active and standby nodes are properly connected.
2	The eSpace U2990 regularly initiates heartbeat detection when the heartbeat period ends. If the number of times that the eSpace U2990 fails to receive heartbeat responses from Call AS on a node reaches the threshold configured by the system administrator, the eSpace U2990 and Call AS on the node are disconnected.
3	If the eSpace U2990 detects disconnection from Call AS on the active node (the network is faulty or the active node is down), the eSpace U2990 selects Call AS on a standby node whose priority is the highest in the Call AS priority list as the service processing server

Step	Description
	and routes subsequent calls to Call AS on the standby node.
4	The eSpace U2990 regularly sends SIP messages to Call AS on the active node to check whether the connection is resumed. If the eSpace U2990 receives a response from Call AS on the active node, the connection between the eSpace U2990 and Call AS is resumed.
5	The eSpace U2990 switches over Call AS on the active and standby nodes based on the switchover policy configured by the system administrator. • If the switchover policy specifies regular switchover, Call AS on the active node takes over services from Call AS on the standby node when the configured time arrives. Then, the eSpace U2990 routes calls to Call AS on the active node. • If the switchover policy specifies manual switchover, only the system administrator can manually switch over the active and standby nodes. • If the switchover policy specifies switchover in idle duration, the eSpace U2990 switches over the active and standby nodes when traffic is light.

5.3 PGM Application Networking

This topic describes Presence Group Message (PGM) application networking and service flows in different application scenarios.

The PGM server is a core component for managing online subscribers and groups and transferring messages. It stores source information including subscriber IM status, phone status, conference status, and position information. Based on this information, the PGM server implements online intelligent enterprise communication. The PGM application scenarios associated with the eSpace U2990 are as follows:

- eSpace U2990 reporting terminal status to the PGM server

  The eSpace U2990 reports status of the terminals that do not have the status report capability to the PGM server.
- eSpace U2990 transferring terminal status to the PGM server

  The eSpace U2990 transparently transmits terminal status reported by terminals to the PGM server.
- Terminal subscribing to status of other terminals

  A terminal can subscribe to status of another terminal or status of all the terminals in a terminal list.
- Instant messages

  Based on initial filter criteria (iFC) triggering rules, the eSpace U2990 can transfer instant messages sent between terminals.
- Large message transmission

  Terminals can transmit messages whose sizes exceed specified thresholds.

- File transfer
  Terminals can transfer files.

Figure 5-2 PGM application networking

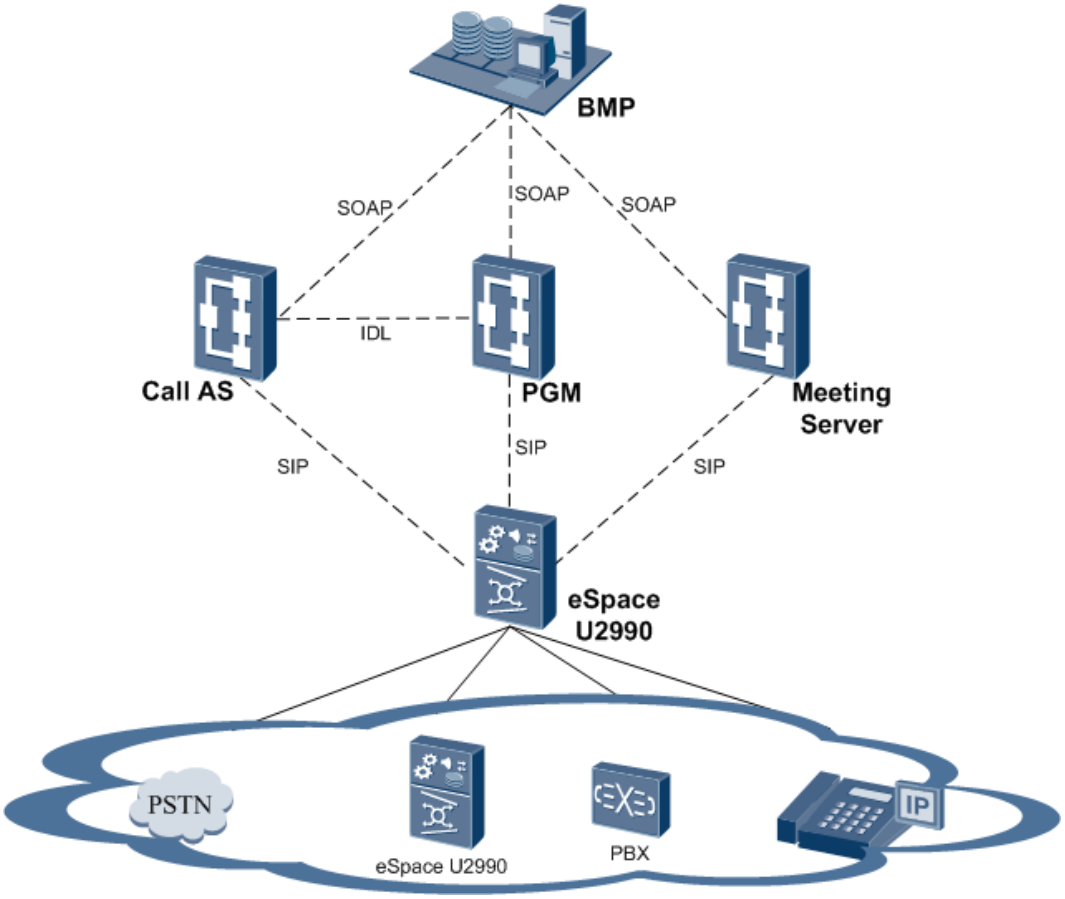


Table 5-3 describes PGM service processes.

Table 5-3 PGM service processes

Application Scenario	Service Process
eSpace U2990 reporting or transferring terminal status to the PGM server	1. A terminal registers with the eSpace U2990. The eSpace U2990 authenticates the terminal. 2. The eSpace U2990 initiates third-party registration to the PGM server for the terminal. After authentication, the PGM server sends a response to the eSpace U2990. The processes of taking a terminal offline and changing terminal status are the same as the preceding process.
Terminal subscribing to status of other terminals	1. A terminal sends a request to the eSpace U2990 to subscribe to status of subscribers or groups. The eSpace U2990 transfers the request to the PGM server. 2. The PGM requires terminal authentication and sends a message to the eSpace U2990. The eSpace U2990 transfers the message to the

Application Scenario	Service Process
	terminal. 3. The terminal sends another request carrying authentication information. The eSpace U2990 transfers the request to the PGM server. The PGM server authenticates the terminal. The PGM server will send status of subscribed subscribers or groups to the terminal through the eSpace U2990.
Instant message	1. Terminal A needs to send an instant message to terminal B. After terminal A sends the message to the eSpace U2990, the eSpace U2990 transfers the message to the PGM server. 2. The PGM server processes the message and sends the message to the eSpace U2990. The eSpace U2990 then sends the message to terminal B.
Large message transmission	1. Terminal A determines that the size of a message exceeds a specified threshold and sends a request for large message transmission to the eSpace U2990. The eSpace U2990 sends the request to the PGM server. 2. The PGM server processes the message and sends a response to the eSpace U2990. 3. The eSpace U2990 locates the called party and negotiates with terminals A and B to set up a channel for transmitting the large message.
File transfer	1. Terminal A sends a request for file transfer to the eSpace U2990. The eSpace U2990 transfers the request to the PGM server based on specified rules. 2. The PGM server processes the message and sends a response to the eSpace U2990. 3. The eSpace U2990 locates the called party and sends the message to terminal B. 4. Terminal B processes the message and allows file transfer. Terminal A negotiates with terminal B to set up a channel and transfers the file.

5.4 AS Service Application Networking

This topic describes the application scenarios and networking of the Call AS and Meeting Server.

Functioning as a gateway in the unified communication (UC) solution, the eSpace U2990 provides switching capabilities and triggers services to application servers to implement unified communication. Application servers include the Call AS, Meeting Server, and Presence Group Message (PGM).

Figure 5-3 Application networking of AS services

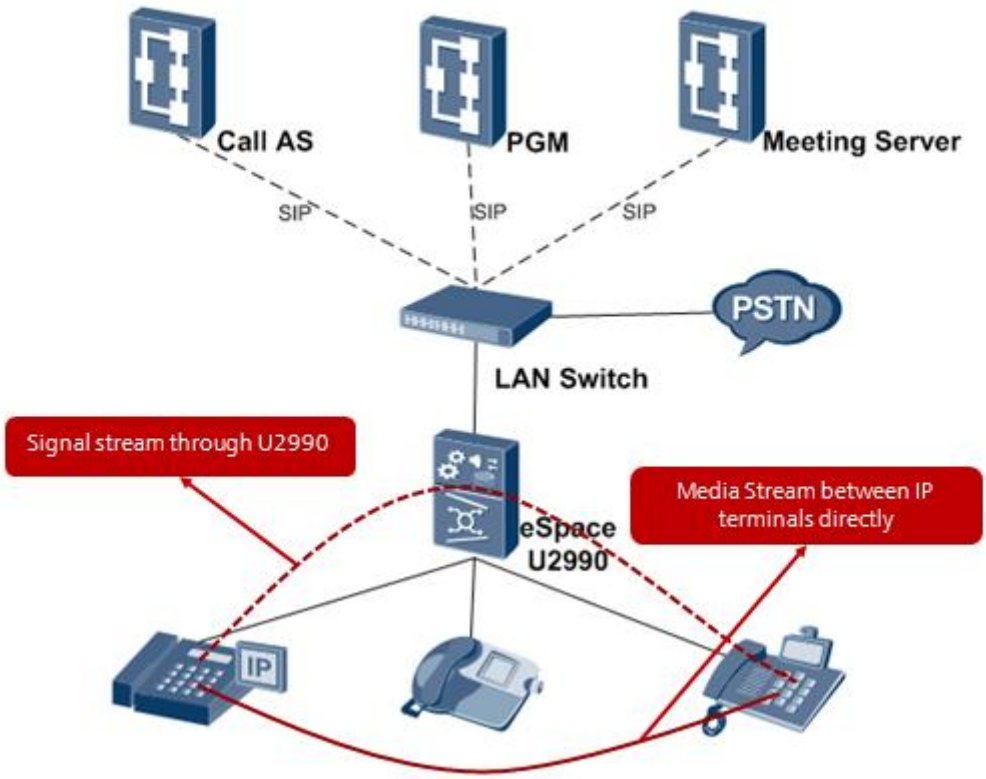


Table 5-4 describes the service application scenarios of the Call AS and Meeting Server.

Table 5-4 AS service application scenarios

Application Server	Scenario	Description
Call AS	Terminal registration	Functioning as a gateway, the eSpace U2990 registers terminals. Terminal registration accounts are in the format of *Number@Domain name*.
	Basic Call AS service for two terminals in the same eSpace U2990	The eSpace U2990 triggers a calling service flow and a called service flow to the Call AS, and works with the Call AS to implement a basic call service. The signal stream will be set up through U2990 and Call AS for the two IP terminals. The media stream will be set up directly between two IP terminals.
	Basic Call AS services for terminals in different eSpace U2990s	The eSpace U2990 on the calling party side triggers a calling service to the Call AS and routes the call to the eSpace U2990 on the called party side. The eSpace U2990 on the called party side triggers a called service to the Call AS and works with the Call AS to implement a basic call service.

Application Server	Scenario	Description
		The signal stream will be set up through U2990 and Call AS for the two IP terminals. The media stream will be set up directly between two IP terminals.
	Call AS outbound call service in the eSpace U2990	A subscriber of the eSpace U2990 calls a public switched telephone network (PSTN) subscriber. The PSTN subscriber's phone bears the call service using E1 trunks of the eSpace U2990.
	Multicall service implemented by the eSpace U2990 working with the Call AS	A subscriber with required permission can hold multiple calls and keep only one call.
	Call transfer service implemented by the eSpace U2990 working with the Call AS	Subscriber A calls subscriber B, and subscriber B transfers the call to subscriber C. The eSpace U2990 works with the Call AS to provide a call transfer service.
	Audio protocol adaption	According to the priority list of audio protocols set in Call AS, U2990 will automatically adapt different audio protocol to renegotiate.
	Signal protocol adaption	Call AS and U2990 support different signal protocols to work with each other.
Meeting Server	Instant conference	The chairperson of an instant conference can invite other subscribers to join the conference without specifying start time for the conference. A subscriber can create an instant conference using either of the following methods: • Interactive voice response (IVR): A conference created in the IVR system starts immediately. A conference creator does not need to specify conference duration. The conference ends after the conference creator exits the conference. • Web: A conference creator must specify duration for a conference created in web mode. The conference ends when the end time is reached.
	Scheduled conference	A scheduled conference must be created in web mode. When creating a scheduled conference, a subscriber must specify start time, end time, maximum number of participants, and a participant list. The conference automatically starts when the start time is reached, and the system invites participants to join the conference. Participants can also actively join the conference. The conference

Application Server	Scenario	Description
		ends when the end time is reached.
	Conference controlled by a moderator	A voice conference is controlled by the voice component on a PC client. The moderator joins the conference using the voice component and invokes the interface definition language (IDL) interface of the Meeting Server to control the conference after authentication. During the conference, the moderator can perform operations such as inviting participants to join the conference, asking participants to exit the conference, granting or canceling speak permission, ending the conference, and muting the conference.

NOTE
eSpace U2990support the ALL IN ONE feature that mean Call AS, PGM, Meeting server and CTI all installed on GSUs in one subrack.

5.5 Networking of eSpace U2990s Working in Load Balancing Mode

This topic describes the networking and service flow of eSpace U2990s that work in load balancing mode.

When eSpace U2990s work in load balancing mode, calls access a eSpace U2990 that functions as a uniform load balancer and services are processed by other eSpace U2990s. This ensures that resources of the eSpace U2990s are shared and are transparent for external entities.

eSpace U2990s support the load balancing function based on Bearer Independent Call Control (BICC) and Session Initiation Protocol (SIP) access, and distribute bearer-independent calls. Figure 5-4 shows the networking.

Figure 5-4 Networking of eSpace U2990s working in load balancing mode

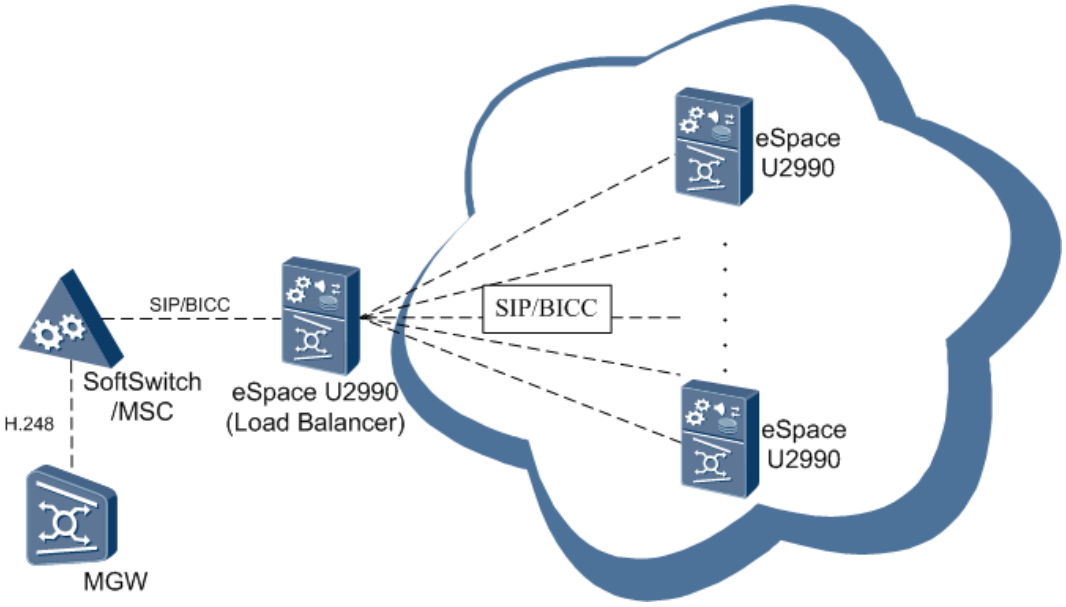


Table 5-5 describes the service flow of eSpace U2990s that work in load balancing mode.

Table 5-5 Service flow of eSpace U2990s that work in load balancing mode

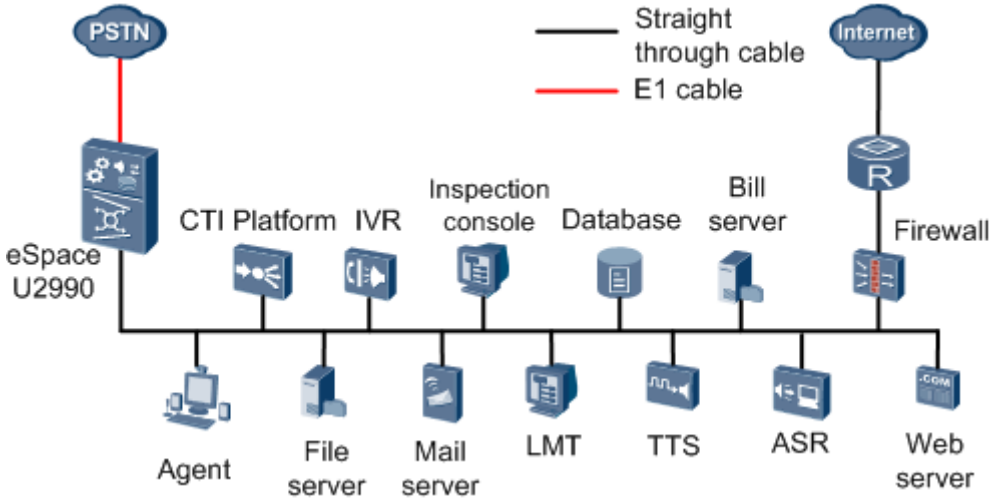
Procedure	Description
1	A eSpace U2990 that functions as the uniform load balancer receives an inbound call and analyzes the called party information.
2	The eSpace U2990 (load balancer) analyzes routing information, determine the bearer model and call type, and sends a response that carries a call flag to the eSpace U2990 on the calling party side.
3	After determining that the call does not require any bearer operations based on the call flag, the eSpace U2990 on the calling party side sends a Setup message carrying the call flag and forwards the call to the eSpace U2990 on the called party side.

5.6 Application Networking of a Centralized Call Center

This topic describes the application networking of a centralized call center and related service flows.

Figure 5-5 shows the application networking of a centralized call center.

Figure 5-5 Application networking of a centralized call center



In centralized networking mode, the resources of a call center are aggregated and separated from external networks. The resources include trunk access, CTI platforms, interactive voice responses (IVRs), resource consoles, agents, databases, and file servers. This reduces network attack risks and operation and maintenance costs.

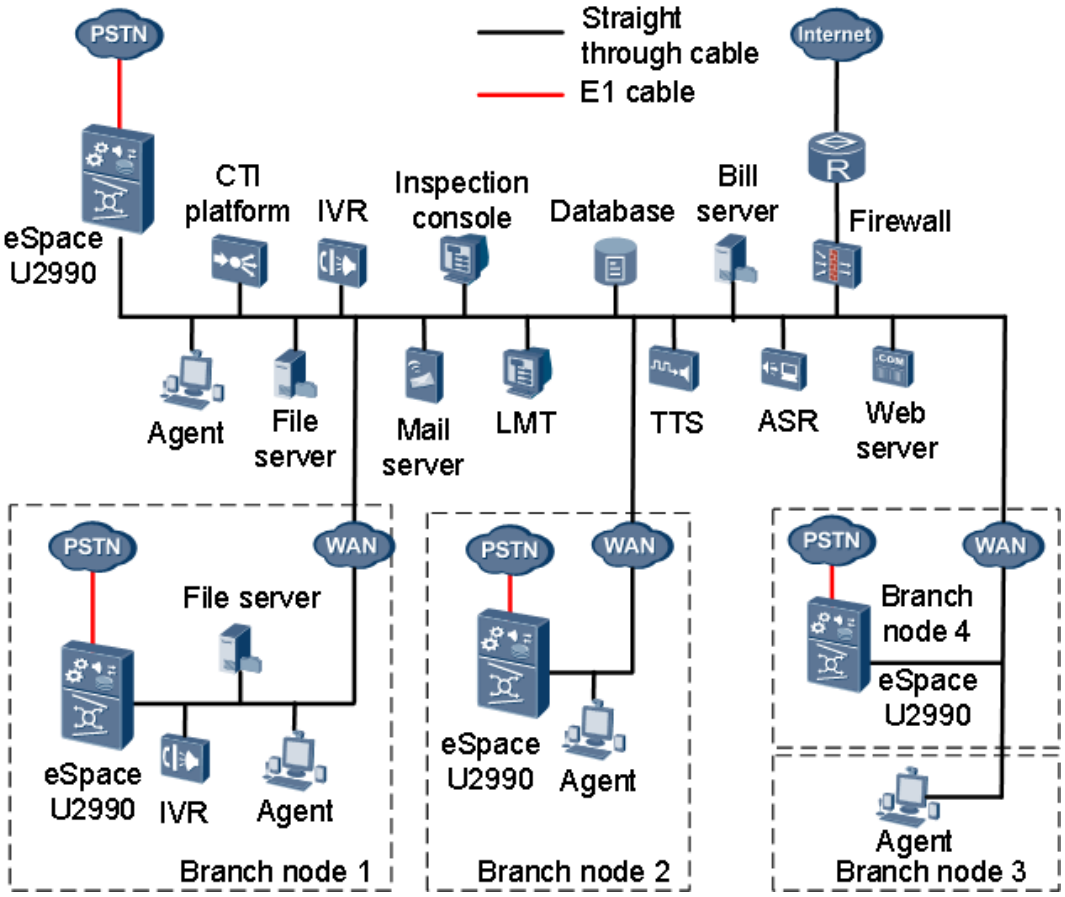
The centralized networking mode is applicable to call centers that do not have branches.

5.7 Networking of a Distributed Call Center

This topic describes the networking of a distributed call center and related service flows.

Figure 5-6 shows the networking of a distributed call center.

Figure 5-6 Networking of a distributed call center



A distributed call center enables local subscriber access. In distributed networking mode, the system supports distributed interactive voice responses (IVRs), voice recording, and agents.

In distributed mode, all call connections of distributed nodes must be processed by the central computer telephony integration (CTI) platform, and the devices on distributed nodes are centrally managed by a management terminal. Each node provides a local regeneration function. This function ensures that the basic services on a node can run properly when the node disconnects from the IP network of the central CTI platform.

The eSpace U2990 supports four types of distributed nodes, which correspond to distributed nodes 1, 2, 3, and 4 shown in Figure 5-6.

- Distributed node 1 is used for local subscriber access and provides distributed agents, IVRs, and voice recording.

  This node works in local voice recording mode to ensure voice recording quality. Calls are processed by agents and IVRs. This reduces dependency on bandwidth, provides more bandwidth for services, and offers sufficient bandwidth to voice services when agents in different cities are required to handle calls.
- Distributed node 2 is used for local subscriber access and provides distributed agents.

  This networking mode can be used when the number of agents is small, traffic is low, and bandwidth between the central node and the distributed node is less than 2 Mbit/s.
- Distributed node 3 is used for non-local agent access. This networking mode requires low costs.

- Distributed node 4 is used for remote subscriber access. In this networking mode, the eSpace U2990 functions as a gateway for remote call access.

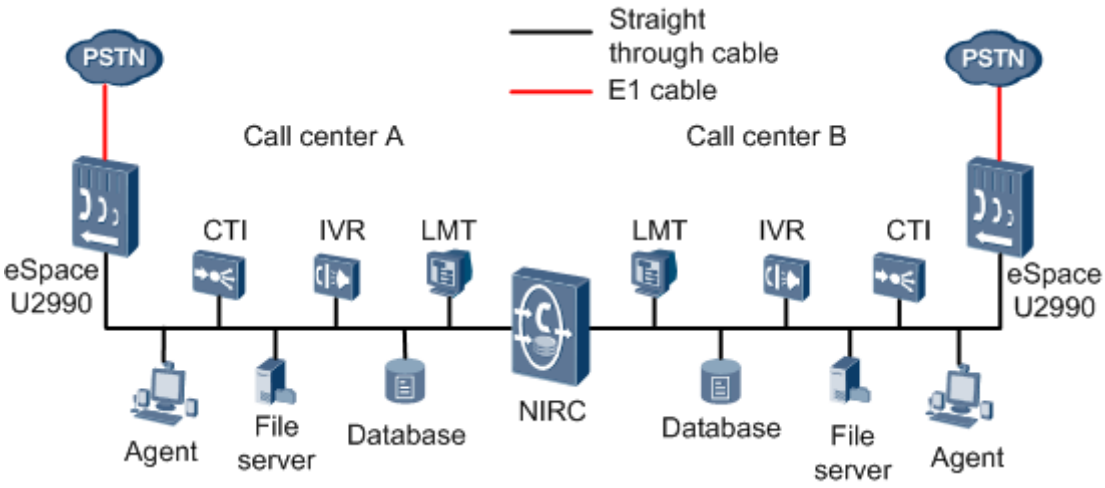
5.8 Network Call Center

This topic describes the networking and service flows of a network call center.

If there are multiple call centers on the live network, they can be connected to form a network call center to implement mutual request and access, ensuring good use of existing resources. Services related to a network call center are called network call services.

Figure 5-7 shows the networking of a network call center in a broadband scenario (non-IMS).

Figure 5-7 Networking of a network call center



Two or more call centers form a network call center where calls are allocated in a unified mode, resources are shared, and loads are balanced.

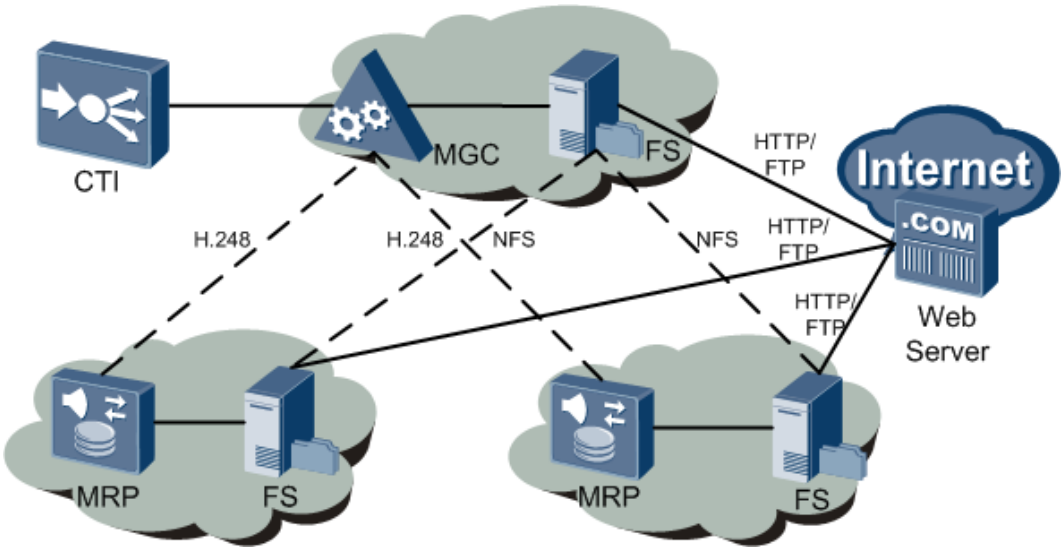
Huawei multimedia network call center uses a network intelligent routing center (NIRC) to strengthen relationships between call centers. The NIRC coordinates resource allocation among local call centers and tightens resource control among local call centers to improve resource usage. The NIRC routes calls among local call centers, implementing communication among these local call centers.

5.9 File Server Networking

This topic describes the file server networking and related service flow.

Figure 5-8 shows the file server networking.

Figure 5-8 File server networking



NOTE

In Figure 5-8, the eSpace U2990 functions as the media gateway controller (MGC) or media resource platform (MRP) on the network.

Table 5-6 shows the service flow of file servers.

Table 5-6 Service flow of file servers

Procedure	Description
1	When applying for resources, the CTI platform sends the file download message to the MGC, and specifies the drive. The details about file operations are encapsulated in the message, which is parsed and processed by the agent tool of the file server.
2	The MGC forwards the message to the MRP where the requested resources are located.
3	The MRP analyzes the drive information carried in the message, sends the message to the active file server corresponding to the drive, and buffers the message.
4	After receiving the message, the agent tool of the active file server sends a response message to the MRP and parses the received message.
5	After performing related file operations, the agent tool of the active file server returns the processing result to the MRP.
6	The MRP returns the processing result to the MGC.
7	The MGC returns the processing result to the CTI platform.

NOTE

The eSpace U2990 supports the networking of built-in file servers. In this type of networking, file servers function as the internal boards of the eSpace U2990, and files can be accessed by using the internal bus of the eSpace U2990.

6 Technical Specifications

About This Chapter

This topic describes the service processing capability specifications, hardware specifications, and operating environment specifications of the eSpace U2990 system.

6.1 Service Processing Capability

This topic describes system capability specifications in terms of system reliability, switching capability, protocol processing, media resource processing, latency probability and supported languages or currencies.

6.2 Technical Specifications of the Integrated Equipment

This section describes the physical parameters of the N68E-22 cabinet and the power consumption of each function unit.

6.3 EMC Specifications

This topic describes the electromagnetic compatibility (EMC) specifications and related indexes.

6.4 System Capacity

This topic describes the system capacity in terms of bearing performance.

6.1 Service Processing Capability

This topic describes system capability specifications in terms of system reliability, switching capability, protocol processing, media resource processing, latency probability, number analysis, flexible route configuration, intelligent routing and supported languages or currencies.

Reliability Specifications

Table 6-1 describes the system reliability specifications of the eSpace U2990.

Table 6-1 Reliability specifications

Item	Specification
Usability	99.999%
Mean time between failures (MTBF)	10 years
Mean time to repair (MTTR)	30 minutes
Pause time	5 minutes a year

Switching Capability

Table 6-2 describes the switching capabilities of the eSpace U2990.

Table 6-2 Switching capabilities

Item	Specification
Maximum number of trunks	100000 (in centralized mode) 800000 (in distributed mode)
Switching capability	256
Max. broadband trunk connections (SIP trunk)	2000(in centralized mode)
Maximum number of BHCA	12000k
Maximum number of registered UC users	300000
Maximum number of online calling UC users	60000

Protocol Processing Capability

Table 6-3 describes the protocol processing capabilities of the eSpace U2990.

Table 6-3 Protocol processing capability

Item	Specification
Maximum number of 64 kbit/s MTP links	1280
Maximum number of 2 Mbit/s MTP links	80
Number of SCTP connections	2048
Number of M3UA links	1024

Media Resource Processing Capability

Table 6-4 describes the capabilities of processing broadband media resources.

Table 6-4 Media resource processing capability (seven-subrack cascading)

Item	Specification
Maximum number of audio resources	50000 (in centralized mode) 400000 (in distributed mode)
Maximum number of video resources	11760 (CIF) 35280 (QCIF)
Maximum number of agents	50000 (in centralized mode) 400000 (in distributed mode)
Audio codec for playing and recording	• G.711 (A-law and μ-law) • G.723.1 • AMR • AMR2
Format of an audio recording/announcement playing file	• WAV files of A-law and μ-law • Linear WAV files • 24k/32 VOX files
Video codec for playing and recording	• H.263 • MPEG4
File access mode	NFS/HTTP access mode
File server operating system type	Linux

Latency Probability

The duration between the time when the eSpace U2990 receives a request message and the time when the request message is processed, that is, between the receipt of a request and the request be executed. When the eSpace U2990 is busy:

- 95% of the requested messages are provided within 0.5 seconds.
- 99.9% of the requested messages are provided within 2 seconds.
- 99.99% of the requested messages are provided within 5 seconds.

Number Analysis

The eSpace U2990 can analyze inbound call numbers and outbound call numbers delivered by the computer telephony integration (CTI) platform. The analysis result of a call number

directly determines the subsequent call direction. The configuration and analysis results of each call prefix are mapped to a call processing scheme.

The eSpace U2990 provides a flexible call prefix configuration capability. It supports number analysis of a maximum of 32 digits. That is, the eSpace U2990 can analyze the first 32 digits of the called number of an incoming call.

Number analysis is the beginning of a call. After analyzing the call source (local DN and call prefix), the system can find the called number analysis table. The called number analysis table lists the information related to the call, such as service type and service attributes. For example, if the service type of the call is a supplementary service, the system processes the call using the supplementary service according to the service attributes in the called number analysis table. For an outgoing call whose service type is a basic service (the service attribute can be local call, local toll call, national toll call, international toll call), the route selection code is an item in the route analysis.

- Service Prefix Configuration.

  Call prefixes are the core of number analysis. Call prefixes can be of the following types:

  - Supplementary service prefix
  - Basic service prefix (including prefixes of intra-office calls, local calls, local toll calls, national toll calls, and international toll calls)
  - Prefix for test
  - Intelligent service prefix
  - Special access code

  All types of call prefixes can be configured using the related commands (ADD, MOD and RMV). Different types of call prefixes are distinguished by service attributes.

- Prefix Processing.

  Generally, the system does not need to perform special processing on calling numbers and called numbers before number analysis and call connection. In the following cases, you must use related commands to process calling numbers or called numbers before number analysis and call connection:

  - A call prefix is an access code.
  - A call prefix is used only for announcements of the local office, such as time announcements and number change announcements.
  - In the hybrid application of the public network and private network, the global dialed number set of called numbers must be changed.
  - Actual calling numbers will be masked according to certain prefixes.
  - The local office performs failure processing on calls automatically because of certain prefixes.

  When you have defined multiple prefix processing modes, the local office selects only one of them. The priority from high to low is as follows:

  - Called number change flag or Caller number change flag, when one of them is set Yes
  - Method of sending tone, when it is set to Send tone or Inter-digit send tone

- Failure processing flag, when it is set to Yes
- Reanalysis, when it is set to Yes

The local office can use the first, third and fourth methods together.

- Failure Processing.
- Caller Codec Configuration.
- Service Prefix Priority.
- Release Control Mode.

The call release modes are as follows:

- First-party release: A call is released when either party hangs up.
- Calling-party release: A call is released only when the calling party hangs up.
- Called-party release: A call is released only when the called party hangs up.
- Last-party release: A call is released only when both parties hang up.

First-party release is generally used for common calls. Calling-party release is used for toll calls. Called-party release is used to special services, such as fire emergency calls.

- Release Cause Code Conversion.
- Preselected Access Code.
- Country or Region Code Segment Configuration.
- Special Called Number Change.
- Caller Number Analysis.
- Auxiliary Signaling.

Flexible Route Configuration

The route configuration function of the eSpace U2990 covers the following:

- Routes to the same office direction can be configured on different modules.
- A maximum of five subroutes can be configured for a route.
- Direct routes and alternative routes are supported.

Customer Value

The route configuration function improves network reliability from the following aspects:

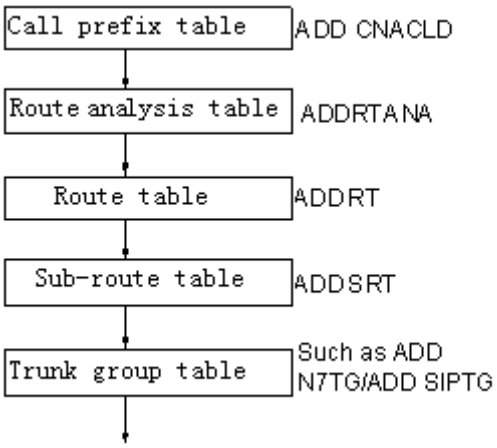
- Voice channels of the same office direction are configured on different modules. This ensures load balancing between modules and improves reliability of the entire system.
- If all direct routes from the eSpace U2990 to an office direction are unavailable, an alternative route can be used to locate a transition office for transferring the corresponding calls to destination offices. This also improves system serviceability and reliability.

After number analysis, the eSpace U2990 can determine route information and the destination office of a call. To enhance network reliability, there must be multiple channels, including direct channels and alternative channels, between the local office and a destination office. In this case, one route must contain multiple sub-routes.

A sub-route is a set of trunk groups to the same office direction. A sub-route contains information about all trunks of an office direction.

The eSpace U2990 analyzes routes by querying and analyzing the data tables in host databases. Figure 1 shows the route analysis process of the eSpace U2990.

Figure 1 Route analysis process of the eSpace U2990



Using an outbound call of a user in the local office for example, the basic route analysis process is described as follows:

When defining an outbound call prefix, the user must specify a route selection code. The route selection code is used to instruct the system to obtain a route selection policy for the current outbound call.

The system queries the related route analysis table based on the route selection code. Based on information such as the route selection source code, calling party type, address indicator, transmission capability, and time, the system determines whether a route can be used for the current call. If a route can be used, the system obtains a route number.

The system queries a route table based on the route number. Based on the subroute selection policy (subroute selection by sequence or by percentage) defined in the table, the system determines a subroute for the call and obtains a subroute number.

The system queries a subroute table based on the subroute number. Based on the trunk group selection policy (circular or random selection) defined in the table, the system determines a trunk group for the call and obtains a trunk group number.

The system queries related trunks and signaling data tables to determine a trunk circuit and a signaling link for the call.

Intelligent Routing

The eSpace U2990 provides the following intelligent routing functions:

- Routing by time segment
- Selecting subroutes based on configured policies
- Rerouting upon failures

- Routing by time segment:

  Figure 1 shows the networking between the eSpace U2990 and end office B.

The off-peak time segments for tandem offices C and D are different. To improve usage of idle routes between the eSpace U2990 and end office B, different alternative routes can be used between the eSpace U2990 and end office B during peak hours and off-peak hours.

Figure 1 Networking between the eSpace U2990 and end office B

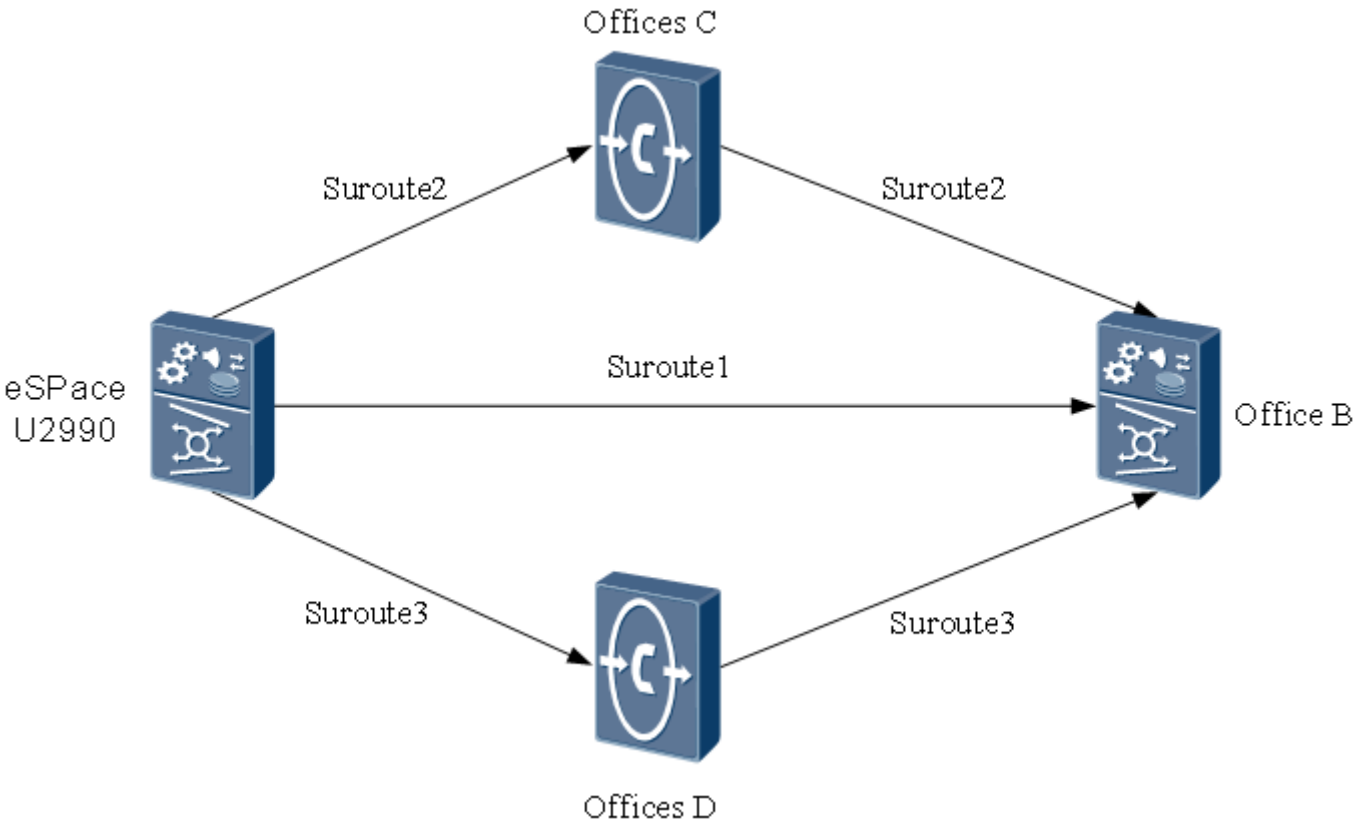


Table 1 Routing by time segment

Time Segment	Direct Route	Alternative Route
00:00-11:59	eSpace U2990->B	eSpace U2990->C->B
12:00-23:59	eSpace U2990->B	eSpace U2990->D->B

- Selecting subroutes based on configured policies:

  As shown in Figure 2, the ID of the route between the eSpace U2990 and carrier A is 1. The route contains the following subroutes:

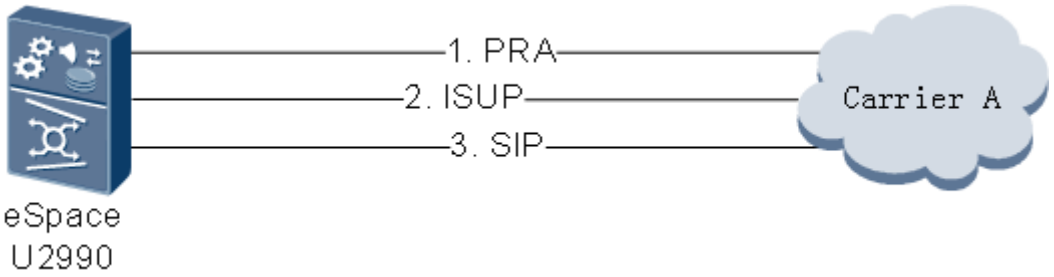
  - Subroute interconnected by using Primary Rate Adaptation (PRA), numbered 1
  - Subroute interconnected by using integrated services digital network user part (ISUP), numbered 2
  - Subroute interconnected by using Session Initiation Protocol (SIP), numbered 3

Table 2 describes the methods for selecting subroutes.

Table 2 Subroute selection methods

Subroutine Selection Method	Description
By sequence	The eSpace U2990 selects PRA trunks for outbound calls. If no circuit is available in these PRA trunks, the eSpace U2990 selects ISUP trunks. If no circuit is available in these ISUP trunks, the eSpace U2990 selects SIP trunks.
By percentage	Trunks that are used for outbound calls are selected by load sharing percentage. For example: The percentage configured for subroute 1 (PRA trunks) is 40%, for subroute 2 (ISUP trunks) is 60%, and for subroute 3 (SIP trunks) is 100%. PRA trunks and ISUP trunks must work in load sharing mode at the 4:6 rate. If no circuit is available in PRA trunks and ISUP trunks, the eSpace U2990 selects SIP trunks for outbound calls.
By call cost	Outbound call costs are configured for trunks. The eSpace U2990 selects subroutes in descending order by call cost. If no subroute with low call costs is available, the eSpace U2990 selects a subroute with higher call costs.

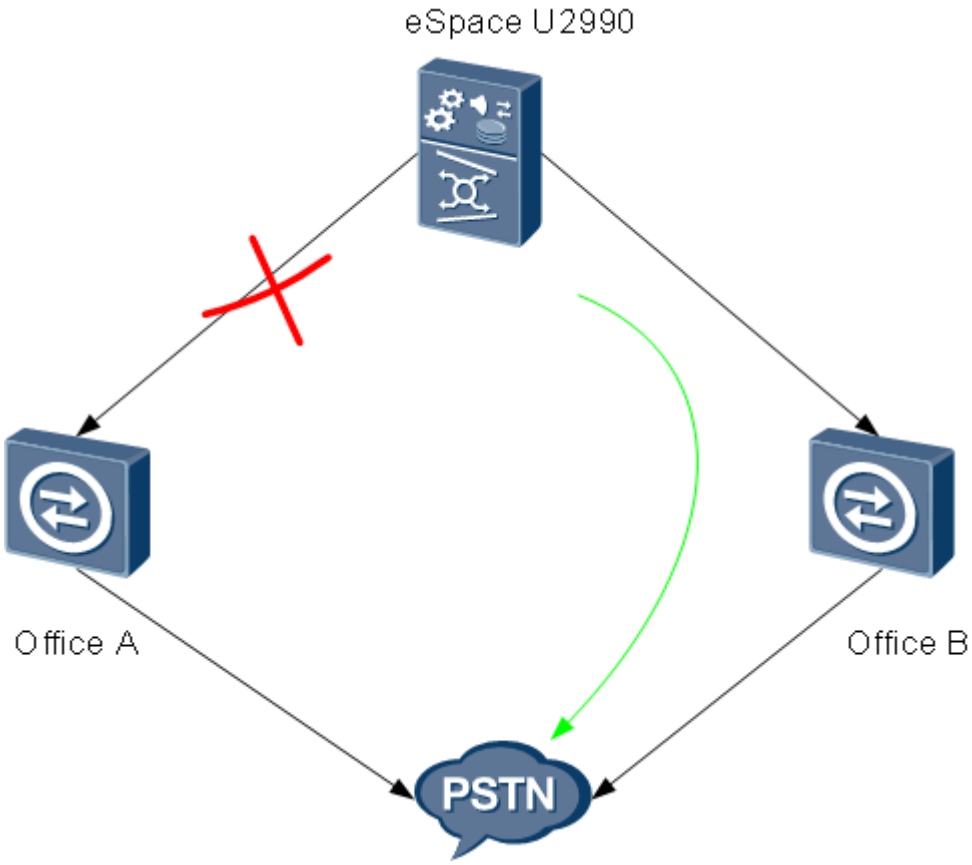
Figure 2 Subroute between the eSpace U2990 and devices of carrier A



- Rerouting upon failures:

If a subscriber who registers with the eSpace U2990 dials a public switched telephone network (PSTN) number, the eSpace U2990 first selects a trunk of end office A for the outbound call. If the network of end office A fails, the eSpace U2990 selects a trunk of end office B for the outbound call. The function for rerouting upon failures ensures call reliability. See Figure 3.

Figure 3 Rerouting upon failures



Language and Currency

Each value-added service can provide 256 languages or currencies. In each Play Announcement (PA) or Prompt And Collect Digits (PC) operation, eight languages or currencies are supported at a time. The syntax of the languages and currencies can be customized.

6.2 Technical Specifications of the Integrated Equipment

This section describes the physical parameters of the N68E-22 cabinet and the power consumption of each function unit.

Physical Parameters

Table 6-5 describes the physical parameters of the N68E-22 cabinet.

Table 6-5 Physical parameters

Item	Parameter or Model
Model	N68E-22 cabinet (conforming to IEC297)

Item	Parameter or Model
Dimension (W x D x H)	600 mm x 800 mm x 2200 mm (19inch standard network rack)
Height of available space in cabinet	46 U (1U = 44.45 mm)
Maximum weight(subrack)	35 kg
Maximum weight(cabinet)	355 kg

Power Supply and Power Consumption

The cabinet adopts -48 V DC power supply, and the working voltage ranges from -72 V to -40 V. The following ground types are supported: device working ground, protection ground, and surge protection ground. The cabinet adopts double-load-sharing mode. Table 6-6 shows the power consumption of each function unit in the cabinet.

CAUTION

Power distribution requirement: Each cabinet requires four power inputs of at least 63 A.

Table 6-6 Power consumption features

Function Unit	Power Consumption (W)
Fully-configured basic cabinet (three subracks + storage and switch devices)	4800
Fully-configured subrack	1250
PDF	20
PWR	50
SMU	45
GPU	42
GSU0	44
GSU2	45
SGU	45
CIU	15
MSU	50

Function Unit	Power Consumption (W)
STL	22.5
MDU	50
OMU	45
HDU	9
CKU	12
Single fan (four fans are configured by default.)	25

6.3 EMC Specifications

This topic describes the electromagnetic compatibility (EMC) specifications and related indexes.

Noise Specifications

European Telecommunication Standards (ETS): The sound power level of the noise cannot exceed 65 dBA.

EMI Specifications

NOTE

The measure point is 10 meters away from the eSpace U2990.

The specifications of the Electro Magnetic Interference (EMI) include:

- Conducted emission (CE)

  The CE specifications are defined to measure the interference signals conducted by a product using a cable port. Table 6-7 and Table 6-8 shows the CE specifications.
- Radiated emission (RE)

  The RE specifications are defined to show the interference signals radiated by a product using shell ports. Table 6-9 shows the RE specifications.

Table 6-7 CE specifications using a -48 V power supply port

Frequency (MHz)	Average Value (dBμV)	Quasi-Peak Value (dBμV)
0.02-0.15	-	79
0.15-0.50	66	79
0.50-30	60	73

Table 6-8 CE specifications using a signal transmission port

Frequency (MHz)	Quasi-Peak Value of Voltage (dBμV)	Average Value of Voltage (dBμV)	Quasi-Peak Value of Current (dBμV)	Average Value of Current (dBμV)
0.5-5	97-87	84-74	53-48	40-30
5-30	87	74	43	30

Table 6-9 RE specifications

Frequency Band (MHz)	Measure Distance (m)	Quasi-Peak Value (dBμV/m)	Average Value	Peak Limit
30-230	10	40	-	-
230-1000	10	47	-	-
1000-3000	3	-	56	76
3000-6000	3	-	60	80

EMS Specifications

The specifications of the electromagnetic susceptibility (EMS) include:

- Conducted susceptibility (CS)

  The CS specifications are defined to show the endurance of a product upon the external interference using cable port coupling. The CS specifications apply to the –48 V DC power cable port and certain signal cable ports (when the cable connecting two ports exceeds 3 meters). Table 6-10 shows the CS specifications.
- Radiated susceptibility (RS)

  The RS specifications are defined to show the endurance of a product upon the external interference using shell port coupling. Table 6-11 shows the RS specifications.
- Electrostatic discharge (ESD)

  The ESD specifications are defined to show the endurance of a product upon electrostatic interference. There are two discharge modes, namely, contact discharge and air discharge. The ESD specifications apply to human hands or other ESD sources which may damage the components of a product, such as boards, subracks, and cabinet shell. Table 6-12 shows the ESD specifications.
- Electrical fast transient (EFT)

  The EFT specifications are defined to show the impact of a small energy pulse of high frequency caused by an inductive load changeover on a product. The EFT specifications apply to the DC side and certain signal side (when the connection distance between two ports exceeds 3 meters). Table 6-13 shows the EFT specifications.
- Surge

The surge specifications apply to the DC power cable port and certain signal ports (such as indoor signal cable ports or E1 ports). Table 6-14 shows the surge specifications.

NOTE

- Performance grade A: The eSpace U2990 can pass specific tests without any damage and can work normally within a specified range. During the tests, the software data or the data related to the tested switching device (all the data in the memory or the data being processed) does not change, and the communication performance does not degrade.
- Performance grade B: The eSpace U2990 can bear specific tests without any damage. During the tests, the software data or the data in the storage device does not change, the communication performance degrades a little but within the allowable range (as defined by the product), and the established communication links are not interrupted. After the tests, the eSpace U2990 can automatically recover the normal communication performance without manual intervention.
- Performance grade C: Certain functions of the eSpace U2990 become unavailable during specific tests. Nevertheless, these functions can be automatically restored after the tests, generally after the minimum time required for a system restart. In addition, no physical damage or downgrade occurs in system operation software.
- Performance grade R: After specific tests, no physical damage or fault (software fault) occurs. A damage of protective components that is caused by external interference signals is allowed. After the damaged protective components are replaced and the related operation parameters are configured, the eSpace U2990 can work normally.

Table 6-10 CS specifications

Port	Frequency Range (Hz)	Voltage Class (V)	Performance Grade
DC side	150 kHz-230 MHz	10	A
Signal side	150 kHz-230 MHz	10	A

Table 6-11 RS specifications

Frequency (MHz)	Voltage Class (V/m)	Performance Grade
80-1000	10	A

Table 6-12 ESD specifications

Discharge Mode	Voltage Class (kV)	Performance Grade
Air discharge	8	B
	15	R
Contact discharge	6	B
	8	R

Table 6-13 EFT specifications

Port	Voltage Class (kV)	Performance Grade
AC side	2	B
DC side	2	B
Signal side	1	B

Table 6-14 Surge specifications

Port	Voltage Class (kV)	Performance Grade
DC side	1 (differential mode), 2 (common mode)	B
Signal side (Indoor, cabling inside the system)	1	B

6.4 System Capacity

This topic describes the system capacity in terms of bearing performance.

Table 6-15 lists the system capacity in terms of bearing performance.

Table 6-15 System capacity

Item	Specification
Maximum number of subracks	7
Maximum number of distributed nodes	127
Maximum number of local signaling point codes	16

7 Environment Requirements

About This Chapter

This topic describes the requirements for the storage environment, transmission environment, and operating environment.

Environment requirements comply with the following standards:

- GB 4798 Application environment conditions of electrician and electronic products
- ETS 300019 Equipment Engineering (EE), Environmental conditions and environmental tests for telecommunications equipment
- IEC 60721 Classification of environmental conditions

7.1 Storage Environment

This section describes the environment requirements for device storage in terms of climate, waterproof, biology, air, and mechanism.

The storage environment refers to the environment for storing devices before the devices are installed and used.

Climate Requirements

Table 7-1 lists the climate requirements for device storage.

Table 7-1 Climate requirements

Item	Scope
Altitude	≤ 4000 m
Air pressure	70 kPa to 106 kPa
Temperature	-40°C to +70°C
Temperature change rate	≤ 1°C/min
Relative humidity	10% to 100%
Solar radiation	≤ 1120 W/m^2
Heat radiation	≤ 600 W/m^2
Wind speed	≤ 30 m/s

Requirements for Waterproofing Equipment Room

The devices should be stored in a room. Make sure that no water accumulates on the ground or drops onto the package boxes. The devices should be placed away from water sources such as hydrant and air-conditioner.

If the devices need to be placed outside equipment room, the following four requirements should be met:

- Keep the package boxes intact.
- Use waterproof measures to prevent rain from entering the package boxes.
- Make sure that no water is on the ground where the package boxes are placed and no water flows into the package boxes.
- The package boxes are not exposed directly to the sunlight.

Biology Requirements

Ensure that the devices are not damaged by the biology during device storage. The detailed requirements are as follows:

- Prevent propagation of microorganisms such as fungi or mildew.
- Protect the devices from rodent animals such as mice.

Air Requirements

The dust and chemical substances in the air may damage the devices and even cause accidents. The following describes the requirements for the air purity.

- Ensure that there is no explosive, conductive, magnetoconductive, or erosive dust.
- Ensure that the concentration of mechanically active substances complies with the requirements listed in Table 7-2.
- Ensure that the concentration of chemically active substances complies with the requirements listed in Table 7-3.

Table 7-2 Concentration of mechanically active substances

Mechanically Active Substance	Unit	Content	Diameter
Floating dust	mg/m^3	≤ 5.00	≤ 75 μm
Precipitable dust	mg/m^2h	≤ 20.0	75 μm to 150 μm
Grit	mg/m^3	≤ 300	150 μm to 1000 μm

Table 7-3 Concentration of chemically active substances

Chemically Active Substance	Unit	Content
SO_2	mg/m^3	0.30 to 1.00
H_2S	mg/m^3	0.10 to 0.50
NO_2	mg/m^3	0.50 to 1.00
NH_3	mg/m^3	1.00 to 3.00
Cl_2	mg/m^3	0.10 to 0.30
HCL	mg/m^3	0.10 to 0.50
HF	mg/m^3	0.01 to 0.03
O_3	mg/m^3	0.05 to 0.10

Mechanical Stress Requirements

Table 7-4 lists the mechanical stress requirements.

Table 7-4 Mechanical stress requirements

Item	Subitem	Scope	
Sinusoidal vibration	Offset	≤ 7.0 mm	
	Acceleration	≤ 20.0 m/s^2	
	Frequency range	2 Hz to 9 Hz	9 Hz to 200 Hz
Unsteady impact	Impact response spectrum II	≤ 250 m/s^2	
	Static payload	≤ 5 kPa	

Item	Subitem	Scope
NOTE Impact response spectrum: indicates the maximum acceleration response curve generated by the devices under specified impact excitation. Impact response spectrum II: indicates that the duration of semi-sine impact response spectrum is 6 ms. Static payload: indicates the capability of the equipment to bear the pressure from the top in normal pile-up method during packing.		

7.2 Transportation Environment

This section describes the requirements for device transportation.

Climate Requirements

Table 7-5 lists the climate requirements during device transportation.

Table 7-5 Climate requirements during device transportation

Item	Scope
Altitude	≤ 4000 m
Air pressure	70 kPa to 106 kPa
Temperature	-40°C to +70°C
Temperature change rate	≤ 3°C/min
Relative humidity	10% to 100%
Solar radiation	≤ 1120W/m^2
Heat radiation	≤ 600W/m^2
Wind speed	≤ 30 m/s
Rainfall	≤ 6 mm/min

Biology Requirements

Ensure that the devices are not damaged by the biology during device storage. The detailed requirements are as follows:

- Prevent propagation of microorganisms such as fungi or mildew.
- Protect the devices from rodent animals such as mice.

Air Requirements

The air requirements for device transportation are as follows:

- Ensure that there is no explosive, conductive, magnetoconductive, or erosive dust.
- Ensure that the concentration of mechanically active substances complies with the requirements listed in Table 7-6.
- Ensure that the concentration of chemically active substances complies with the requirements listed in Table 7-7.

Table 7-6 Concentration of mechanically active substances

Mechanically Active Substance	Unit	Content
Floating dust	mg/m^3	No requirement
Precipitable dust	mg/m^2h	≤ 3.0
Grit	mg/m^3	≤ 100

Table 7-7 Concentration of chemically active substances

Chemically Active Substance	Unit	Content
SO_2	mg/m^3	≤ 1.00
H_2S	mg/m^3	≤ 0.50
NO_2	mg/m^3	≤ 1.00
NH_3	mg/m^3	≤ 3.00
Cl_2	mg/m^3	≤ 0.30
HCL	mg/m^3	≤ 0.05
HF	mg/m^3	≤ 0.03
O3	mg/m^3	≤ 0.10

Mechanical Stress Requirements

Table 7-8 lists the mechanical stress requirements for device transportation.

Table 7-8 Mechanical stress requirements

Item	Subitem	Scope		
Sinusoidal vibration	Offset	≤ 7.5 mm		
	Acceleration	≤ 20.0 m/s^2		≤ 40.0 m/s^2
	Frequency range	2 Hz to 9 Hz	9 Hz to 200 Hz	200 Hz to 500 Hz
Random	Spectrum	10 m^2/s^3	3 m^2/s^3	1 m^2/s^3

Item	Subitem	Scope		
vibration	density of accelerated speed			
	Frequency range	2 Hz to 9 Hz	9 Hz to 200 Hz	200 Hz to 500 Hz
Unsteady impact	Impact response spectrum II	≤ 300 m/s^2		
	Static payload	≤ 10 kPa		

7.3 Operating Environment

This topic describes the requirements for the operating environment of the eSpace U2990 in terms of climate, biology, air, and mechanism.

Climate Requirements

Table 7-9 and Table 7-10 list the climate requirements.

Table 7-9 Specifications for temperature and humidity

Temperature		Relative Humidity	
Long-term operation	Short-term operation	Long-term operation	Short-term operation
5°C - 40°C	-5°C to +50°C	5% to 85%	5% to 95%

NOTE

You must measure the temperature and humidity 1.5 meters above the floor and 0.4 meters in front of the cabinet without protection boards around the cabinet.

Short term means that the successive working duration is not more than 48 hours and that the total working duration in a year is not more than 15 days.

Table 7-10 Other climate environment requirements

Item	Scope
Altitude	≤ 4000 m
Atmospheric pressure	70 kPa to 106 kPa
Temperature change rate	≤ 5°C/h
Solar radiation	≤ 700 W/m^2
Heat radiation	≤ 600 W/m^2
Wind speed	≤ 1 m/s

Item	Scope
IP grade	IP20
Withstand earthquakes	7~9

Biology Requirements

Ensure that devices are not damaged by the biology during device running. The detailed requirements are as follows:

- Prevent propagation of microorganisms such as fungi or mildew.
- Protect the devices from rodent animals such as mice.

Air Requirements

The requirements for the air purity in the operating environment are as follows:

- No explosive, conducive, magnetic-conductive, or erosive dust particles exist in equipment rooms.
- The concentration of mechanically active substances complies with the requirements listed in Table 7-11.
- The concentration of chemically active substances complies with the requirements listed in Table 7-12.

Table 7-11 Concentration of mechanically active substances

Mechanically Active Substance	Unit	Content
Dust particle	Grain/m^3	≤ 3 x 105
Floating dust	mg/m^3	≤ 0.2
Precipitable dust	mg/m^2h	≤ 1.5
Grit	mg/m^3	≤ 30
NOTE Dust grains: Diameter ≥ 5 μm		

Table 7-12 Concentration of chemically active substances

Chemically Active Substance	Unit	Content
SO_2	mg/m^3	≤ 0.3 (The devices must be kept away from the pollution sources, such as sewers, and coal-consumption plants, for example, power plants.)
H_2S	mg/m^3	≤ 0.1 (The devices must be kept away from the pollution

Chemically Active Substance	Unit	Content
		sources, such as sewers, and coal-consumption plants, for example, power plants.)
NH_3	mg/m^3	≤ 1.0 (The devices must be kept away from fertilizer plants.)
Cl_2	mg/m^3	≤ 0.1 (The devices must be kept away from paper mills and the plants that produce commodities.)

Mechanical Stress Requirements

The operating environment has more strict requirements for the mechanical stress than the storage environment, as shown in Table 7-13.

Table 7-13 Mechanical stress requirements

Item	Subitem	Scope	
Sinusoidal vibration	Offset	≤ 5.0 mm	
	Acceleration	≤ 2.0 m/s_2	
	Frequency range	5 Hz to 62 Hz	62 Hz to 200 Hz
Unsteady impact	Impact response spectrum II	≤ 50 m/s^2	
	Static payload	0	

A Standard Compliance

This chapter describes the international standards that the eSpace U2990 complies with.

A.1 Chinese Standards

This topic describes the Chinese standards that the eSpace U2990 complies with.

A.2 International Standards

This topic describes the international standards that the eSpace U2990 complies with.

A.1 Chinese Standards

This topic describes the Chinese standards that the eSpace U2990 complies with.

Table A-1 Chinese standards

Standard	Description	Issued by
YDN 034-1997	ISDN User - Network Interface Specification	Ministry of Information Industry
YDN-038-1997	National No.7 Signaling System Technical Specification - ISDN User Part (ISUP)	Ministry of Information Industry
GF001-9001	National Telephone Network No.7 Signaling System Technical Specification	Ministry of Information Industry
YDN 065-1997	Ministry of Posts and Telecommunications Telephone Switching Equipment Specification	Ministry of Information Industry
YD/T 1011-1999	Technology Requirement and Test Method of Stand Alone Synchronization Network	Ministry of Information Industry
YD/T 1012-1999	Node Clock Set of Digital Synchronization Network and Timing Feature	Ministry of Information Industry

Standard	Description	Issued by
YD/T 1044-2000	General Technical Requirement of IP Telephony and IP Fax Services	Ministry of Information Industry
YD/T 1046-2000	Interoperability Specification for IP Telephony Gateway	Ministry of Information Industry
YDC 003-2001	General Technical Requirements for SoftSwitch	Ministry of Information Industry
YD/T 1123-2001	Technical Specification for Integrated Switch Equipment	Ministry of Information Industry
YD/T 1127-2001	Technical Specification of No.7 Signaling Interworking with IP	Ministry of Information Industry
YD/T 1142-2001	Technical Requirements and Testing Method for IP Telephony Gatekeeper	Ministry of Information Industry
YD/T 1194-2002	Technical specification of Stream Control Transmission Protocol (SCTP)	Ministry of Information Industry
YD/T 1243.1-2002	Technical Specification for IP Trunk Media Gateway	Ministry of Information Industry
YD/T 1243.2-2002	Technical Specification for Media Gateway-ATM Trunk Equipment	Ministry of Information Industry
YD/T 1243.3-2002	Technical Specification For Media Gateway Equipment - Integrated Access Media Gateway	Ministry of Information Industry
GF010-95	National No.7 Signaling System Technical Specifications - Signaling Connection Control Part (SCCP)	Ministry of Information Industry
GF011-95	National No.7 Signaling System Technical Specifications Transaction Capability Application Part (TCAP)	Ministry of Information Industry
YDN 038-1997	National No.7 Signaling System Technical Specifications - ISUP	Ministry of Information Industry
GF 017-95	Intelligent Network Application Part (INAP)	Ministry of Information Industry

Standard	Description	Issued by
YDN 098-1999	Technical Specification of China Intelligent Network Equipment - Intelligent Peripheral (IP)	Ministry of Information Industry
YDT/XXX-200X	Supplementary Criteria of Intelligent Network Application Part (INAP) Capability Set 1 (CS-1) (Draft)	Ministry of Information Industry
YDT/1202-2002	Technical Specification of Interaction Between Intelligent Network Capability Set 1 (CS-1) INAP and No.7 Signaling ISUP	Ministry of Information Industry
YDT/XXX-200X	CS-2 Intelligent Network Application Part (Draft)	Ministry of Information Industry
YD/T XXX-xxxx	800 MHz CDMA Cellular Mobile Telecommunications System Wireless Intelligent Network Phase 1: Interface Technology Requirements (To Be Approved)	Ministry of Information Industry
YD/T-1031-1999	Technical Specification of 800 MHz CDMA Digital Cellular Mobile Telecommunication Network Mobile Application Part (MAP)	Ministry of Information Industry
2001.1	Technical Requirements for Open Intelligent Peripherals in China Telecommunication Intelligent Network	Ministry of Information Industry
2000.11	Technical Specification of China Mobile Intelligent Network Management	China Mobile
2001.9	Specifications for Testing the Compatibility Between Independent IP Devices on the Mobile Intelligent Network (V1.1)	China Mobile
2000.3	GSM System Intelligent Peripheral (IP) Device Technical Specification (Draft)	China Mobile
2000.10	GSM System Intelligent Peripheral (IP) Device Test Specifications	China Mobile
2001.1	Technical Specifications for China Telecommunication Intelligent Network Equipment - Intelligent Peripheral (IP) (Second Draft)	China Telecommunications Corporation Limited
2001.3	Test Specifications for China Telecommunication Intelligent Network Equipment - Intelligent Peripheral (IP) (Second Draft)	China Telecommunications Corporation Limited
2001.3	800 MHz CDMA Prepaid Service Technical Specification (Draft)	China Unicom New

Standard	Description	Issued by
		Space-Time Mobile Communication Co., Ltd.
2001	China Unicom Prepaid Service (PPC) Supplementary Criteria (Parts 1-5)	China Unicom
YDT/XXX-200X	Technical Specification of SoftSwitch-based Media Servers (Draft)	Ministry of Information Industry
YDT/XXX-200X	General Technical Requirements for Media Servers	Ministry of Information Industry
Huawei Internal Protocol	INtess	Huawei Technologies Co., Ltd.
Huawei Internal Protocol	MML	Huawei Technologies Co., Ltd.

A.2 International Standards

This topic describes the international standards that the eSpace U2990 complies with.

Table A-2 International standards

Standard	Description	Issued by
G.703	Physical/Electrical characteristics of hierarchical digital interfaces	ITU-T
G.704	Synchronous frame structures used at primary and secondary hierarchical levels	ITU-T
G.812	Timing requirements of slave clocks suitable for user as node clocks in synchronization networks	ITU-T
H.225.0	Call signaling protocols and media stream packetization for packet-based multimedia communication systems	ITU-T
H.245	Control protocol for multimedia communication	ITU-T
H.248	Media Gateway Control Protocol	ITU-T
H.323	(Including H.225.0, H.245, H.450) Packet-based multimedia communications systems	ITU-T
H.450	Supplementary services for multimedia	ITU-T
Q.1218	Interface Recommendation for intelligent network CS-1	ITU-T

Standard	Description	Issued by
Q.701	Functional description of the message transfer part (MTP) of Signaling System No.7	ITU-T
Q.702	Signaling Data Link	ITU-T
Q.703	Message Transfer Part Signaling Link	ITU-T
Q.704	Message Transfer Part - Signaling network functions and messages	ITU-T
Q.705	Signaling network structure	ITU-T
Q.706	Message Transfer Part - Signaling performance	ITU-T
Q.707	Message Transfer Part - Testing and maintenance	ITU-T
Q.711	Functional description of the Signaling Connection Control Part (SCCP)	ITU-T
Q.712	Definition and function of SCCP messages	ITU-T
Q.713	SCCP formats and codes	ITU-T
Q.714	Signaling Connection Control Part Procedures	ITU-T
Q.715	Signaling Connection Control Part User Guide	ITU-T
Q.716	Signaling Connection Control Part (SCCP) Performance	ITU-T
Q.730	ISDN user part supplementary services	ITU-T
Q.761	Functional description of the ISDN user part of Signaling System No.7	ITU-T
Q.762	General function of messages and Signals of ISUP	ITU-T
Q.763	Formats and codes of ISUP	ITU-T
Q.764	Signaling procedures of ISUP	ITU-T
Q.767	Application of the ISDN user part of CCITT Signaling System No.7 for international ISDN interconnections	ITU-T
Q.771	Specifications of Signaling System No.7; Functional description of transaction capabilities (TC)	ITU-T
Q.772	Specifications of Signaling System No.7; Transaction capabilities information element definitions	ITU-T
Q.773	Specifications of Signaling System No.7; Transaction capabilities formats and encoding	ITU-T
Q.774	Specifications of Signaling System No.7; Transaction capabilities procedures	ITU-T
Q.775	Table of Contents and Summary of Recommendation	ITU-T
Q.921	ISDN user-network interface - Data link layer specification	ITU-T

Standard	Description	Issued by
Q.931	ISDN user-network interface layer 3 specification for basic call control	ITU-T
X.208	Specification of Abstract Syntax Notation One (ASN.1)	ITU-T
X.209	Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)	ITU-T
draft-ietf-enum-rfc2916bis-03	E.164 to URI DDDS Application (ENUM)	IETF
draft-ietf-midcom-stun-02	Simple Traversal of UDP Through Network Address Translators (STUN)	IETF
RFC0768	User Datagram Protocol (UDP)	IETF
RFC0791	Internet Protocol (IP)	IETF
RFC0792	Internet Control Message Protocol (ICMP)	IETF
RFC0793	Transfer Control Protocol (TCP)	IETF
RFC0959	File Transfer Protocol (FTP)	IETF
RFC4217	Securing FTP with TLS	IETF
RFC1035	Domain Names Implementation and Specification	IETF
RFC2327	SDP: Session Description Protocol	IETF
RFC2396	Uniform Resource Identifiers (URI): Generic Syntax	IETF
RFC2543	SIP: Session Initiation Protocol	IETF
RFC2705	Media Gateway Control Protocol (MGCP) Version 1.2	IETF
RFC2719	Framework Architecture for Signaling Transport	IETF
RFC2871	Framework for Telephony Routing over IP	IETF
RFC2897	Proposal for an MGCP Advanced Audio Package	IETF
RFC2916	E.164 number and DNS (Domain Name Server)	IETF
RFC2960	Stream Control Transmission Protocol (SCTP)	IETF
RFC3015	Megaco Protocol Version 1.0 (H.248)	IETF
RFC3057	ISDN Q.921-User Adaptation Layer (IUA)	IETF
RFC3064	MGCP CAS Packages	IETF
RFC3219	Telephony Routing over IP (TRIP)	IETF
RFC3234	Middle boxes: Taxonomy and Issues	IETF
RFC3261	Session Initiation Protocol (SIP)	IETF
RFC3309	Stream Control Transmission Protocol (SCTP) Checksum Change	IETF

Standard	Description	Issued by
RFC3331	SS7 MTP2 User Adaptation Layer (M2UA)	IETF
RFC3332	SS7 MTP3-User Adaptation Layer (M3UA)	IETF
RFC3372	Session Initiation Protocol for Telephones (SIP-T)	IETF
ansi+t1[1].111 -1996	Signaling System No.7 (SS7)-Message Transfer Part(MTP)	ANSI
ansi+t1[1].112 -1996	Signaling System Number 7 (SS7)-Signaling Connection Control Part (SCCP)	ANSI
GSM 03.78	CAMEL Phase 2 (GSM 03.78 version 6.1.1 Release 1997)	ETSI
N.S0005-TIAEIA-41-D	Cellular Radio telecommunications Intersystem Operations	TIA/EIA
N.S0013/TIA/EIA/IS771	Wireless Intelligent Network	TIA/EIA
T.30	Procedures for document facsimile transmission in the general switched telephone network - Corrigendum 1	ITU-T
G.711 (a/m)	Pulse code modulation (PCM) of voice frequencies	ITU-T
G.723.1	Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s	ITU-T
G.729 (a)	Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear-prediction	ITU-T
RFC1889	RTP: A Transport Protocol for Real-Time Applications	IETF
RFC1890	RTP Profile for Audio and Video Conferences with Minimal Control	IETF
RFC2833	RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals	IETF
RFC1904	NFS: Network File System Protocol Specification	IETF
RFC959	File Transfer Protocol	IETF
RFC4240	SIP Media Services	IETF
SNMP	SNMP v2, v2c and SNMP v3	IETF
SSH	The Secure Shell (SSH) protocol is used to authenticate user login	IETF

A.3 IP PBX functions supported by the eSpace U2990

Function	Description
Subscriber service permission control	Operators can add or cancel service permission for subscribers in the operation and maintenance system or service management system.
Local phone number query	A local subscriber can dial a special service prefix such as *125 to query the local phone number.
Calling line identification presentation (CLIP)	If calling parties allow their own numbers to be displayed on phones and called parties enable this function, the calling numbers are displayed on the phones of the called parties.
CLIP restriction	If a calling party enables this function, the calling number is not displayed on called parties' phones.
CLIP overstep	If a called party enables this function, calling numbers are displayed on the called party's phone regardless of whether the calling parties enable the CLIP restriction function or not.
Call forwarding - unconditional	All calls to a subscriber who enables this function are automatically transferred to the number preset for the subscriber regardless of subscriber status.
Call forwarding - busy	All calls to a subscriber who enables this function are automatically transferred to the number preset for the subscriber when the subscriber is busy.
Call forwarding - no reply	All calls to a subscriber who enables this function are automatically transferred to the number preset for the subscriber if the subscriber does not answer the calls within a period. The period is configurable.
Call forwarding - offline	All calls to a subscriber who enables this function are automatically transferred to the number preset for the subscriber when the subscriber is offline.
Call transfer	A subscriber can transfer an ongoing call to a third party and then quit the conversation.
Call hold	A subscriber can hold the current call and then resume the call when necessary. When the call is held, the other party can hear call waiting music.
Call waiting	If a subscriber who enables this function is in a conversation when another subscriber calls the subscriber, the subscriber is notified of the incoming call. The called subscriber can accept, reject, or ignore the incoming call.
Abbreviated dialing	If a subscriber enables this function, other subscribers can call the subscriber by dialing a two-digit number configured by the subscriber instead of the subscriber number.
Outgoing call barring	A subscriber can dial a number on a phone to restrict permission to make outgoing calls on the phone, for example, to restrict permission to make toll calls.
Direct dialing in (DDI)	An outbound subscriber can directly call an inbound subscriber who enables this function by dialing the long number of the inbound subscriber.

Function	Description
Do not disturb	If a subscriber does not want to be disturbed by incoming calls, the subscriber can enable this function. The subscribers who call this subscriber hear do-not-disturb announcements.
Alarm clock	After a subscriber enables this function, the subscriber' phone can ring at preset time.
Absent subscriber	A subscriber can enable this function when unavailable to answer calls. Other subscribers who call the subscriber hear an announcement indicating that the subscriber is unavailable.
Registered service cancellation	A subscriber can cancel all services registered by the subscriber.