IAD132E(T)
V300R002

Product Description

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Contents

1 Product orientation and features

1.1 Product orientation

This product description is about IAD132E(T) V300R002 version.

As an important component in the Huawei Next Generation Network (NGN) and IP Multimedia Subsystem (IMS) solutions, and enterprise-oriented IPT/UC solutions, the IAD132E(T) provides a large-capacity Voice over IP (VoIP) solution for customers such as enterprises.

As the VoIP/FoIP media access gateway, the IAD132E(T) works at the user access layer of NGN/IMS. It carries out conversation between analog voice signals and internet protocol (IP) packets, and transmits data through the packet switching network.. When networking with the SoftSwitch/IMS through Media Gateway Control Protocol (MGCP)/Session Initiation Protocol (SIP), it can set up calls between calling and called parties under the control of the SoftSwitch/IMS. Figure 1-1 shows the location of IAD132E(T) in the network:

Table 1-1 Figure 1-1 the location of IAD132E(T) in the network
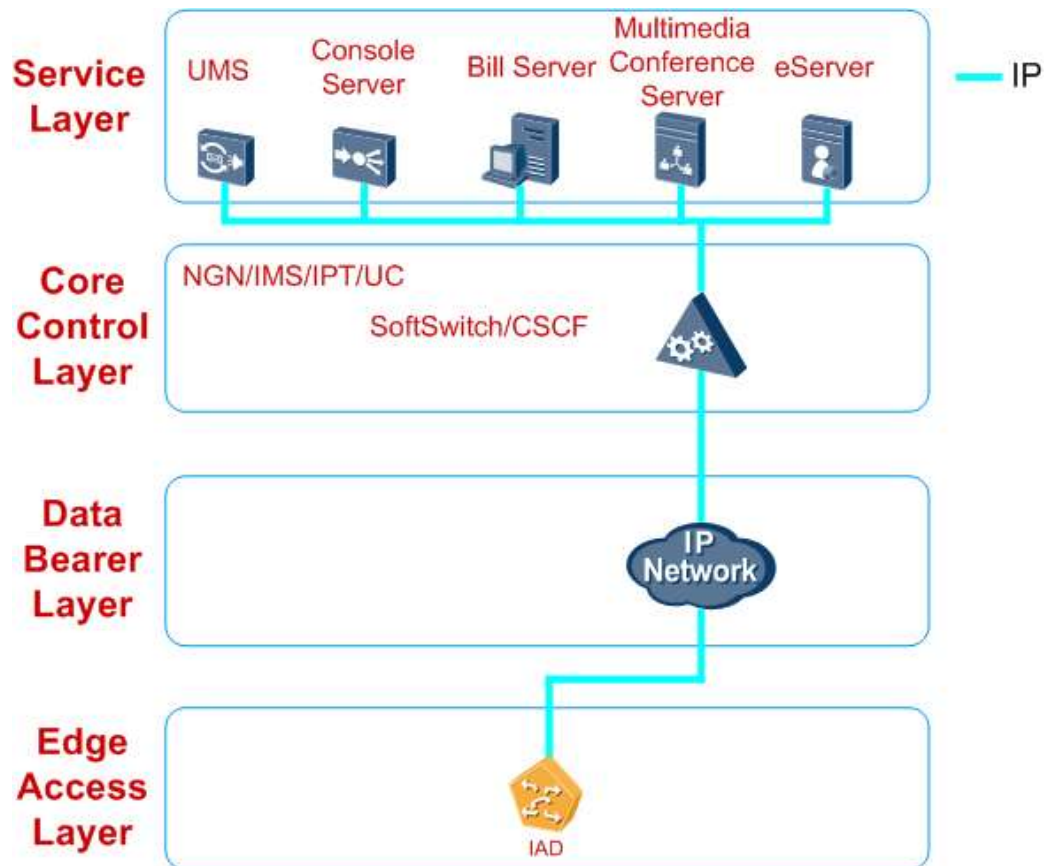
1.2 Product Features

The IAD132E(T) features: flexible configuration, high-quality voice, support multiple call mode, easy installation, convenient management and maintenance, high reliability and security.

Flexible Configuration

The IAD132E(T) provides two slots: Slot 1 and Slot 2. Such modular design enables the customer to choose different numbers of ASID（Analog Subscriber Interface）to realize 16 or 32 lines voice subscribers access. Table 1-1 shows the detail conformation of IAD132E(T).

Table 1-2 Table 1-1 the conformation of IAD132E(T)

IAD type	ASID quantity
IAD132E(T) -16S	1
IAD132E(T) -32S	2

High-Quality Voice

To ensure a high Quality of Service (QoS), the following functions and features have been enabled on the IAD132E(T):

● Voice Activation Detection (VAD)

- Comfortable Noise Generation (CNG)

- Dynamic adjustment of Jitter Buffer

- Echo cancellation in compliance with ITU-T G.165/G.168

- Lost-packet compensation

Easy Installation

The IAD132E(T) has a simple box structure and is installed on the desktop or in the corridor.

It provides standard external ports and clear marks to facilitate the installation and cable connection. It uses standard connectors and no special installation tools are needed.

It supports auto-configuration through DHCP, which frees end users from manual configuration on IAD.

Manageability

The IAD132E(T) can be managed in many ways.

- Local console manage

IAD104H can be managed by local console port, that means computer connect with IAD console port, using Windows 98, Windows NT, Windows 2000 or Windows XP super terminal software having by the operating system to manage.

- Telnet

You can telnet to the system by network ports of the IAD132E(T) for management.

- eSight Management

eSight can manage multiple IAD simultaneity, and support CORBA, SNMP, SOAP northbound interface. eSight is composed of server and client, client can be setted in different places flexibly.

In addition, eSight provides multiple management functions: including system management, Fault management, Configuration Management, Security management, Log Management, Maintenance Management, Northbound Interface etc.

- WEB Management

There is abundant configure function on the web interface.

Easy Maintenance

The IAD132E(T) provides maintenance operations for the equipment as follows.

- With the maintenance serial port, the setting and status detection of the equipment can be much quicker and simpler.

- Besides the serial port loading mode, the File Transfer Protocol over SSL (FTPS)/Trivial File Transfer Protocol (TFTP) mode is used for the loading through the network port.

- The equipment has excellent functions like the equipment maintenance, fault detection and alarm.

High Reliability

The IAD132E(T) provides the following methods to guarantee the reliability of the equipment.

- The device provides complete fault detection and alarm to monitor the power fault and equipment temperature, reducing the fault recovery time.

- Watch dog timer (WDT) helps the system recover in case of software abnormality.

- Power supply and interface parts have the protection functions against over-current and over-voltage.

- Data backup function is provided. The system data can be automatically backed up to the Flash memory. When the system becomes faulty, the data can be obtained from the flash memory.

High Security

The IAD132E(T) provides the following methods to guarantee the security of the equipment.

- eSight implements management on the IAD132E(T), and the SoftSwitch/IMS completes the control functions. Before provisioning services, the IAD132E(T) needs to register in the SoftSwitch/IMS for management and service authentication.

- When an IAD132E(T) device is put into service, the device ID, secret key, IP address or domain name of the eSight, and IP address or domain name of the SoftSwitch, will be assigned onto the IAD132E(T) . The information will not get lost even if the IAD132E(T) is powered off.

- The IAD132E(T) management system performs user authorization and authentication to prevent the unauthorized users from logging in and operating the equipment. The users can be divided into four levels as common user, operator, manager and super manager. The level varies in different authorities. Even if the users of different levels enter the same mode, the commands that can be executed are different.

- The IAD132E(T) offers multiple types of log information like operation, alarm and debugging, to record the operation and maintenance of the equipment. The operation log records the login information of the user, including the user name, login time, login mode, IP address and operation. The alarm log records the crucial events (mostly alarms) during the system operation. The debugging log is the collection of the debugging information.

2 Product structure

2.1 Overview

IAD 132E(T) desiged in Rack-type structure, can be insert slot and expand easily.

Figure 2-1 shows the working principle and the logical structure of IAD132E(T).

Table 2-1 Figure 2-1 Working principle of IAD132E(T)
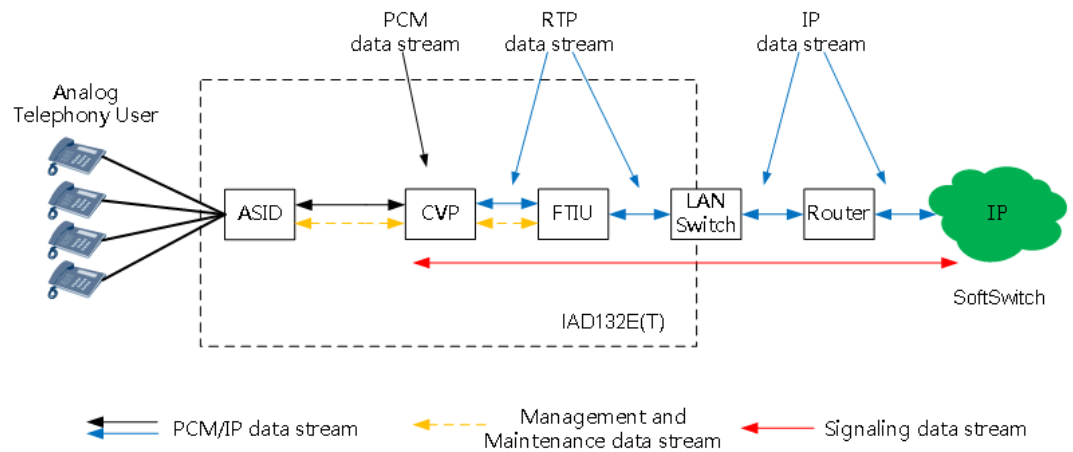
2.2 Hardware structure

Front panel

Table 2-2 Figure 2-2 the appearance of the IAD132E(T)

There are four 10/100 M Ethernet ports on the front panel of IAD132E(T). Any of them can work as the uplink network port of IAD132E(T).

The port labeled in red is a RS232 serial port for maintenance. A reset button and five indicators are at the right side of RS232. Indicators are labeled "PWR", "RUN", "ALM", "BSY1" and "BSY2" respectively. Table 2-1 describes the five indicators.

Table 2-3 Table 2-1 the indicators of IAD132E(T)

Indicator	Name	Color	Status	Description
PWR	Power supply indicator	Green	On	The power is on.
			Off	The power is off.
RUN	Running indicator	Green	Fast flash (on/0.5 s, off/0.5 s)	The device is loading.
			Normal flash (on/1 s, off/1 s)	The device is running normally.
ALM	Alarm indicator	Red	Flash	There is an alarm.
			Off	There is no alarm.
BSY1	Subscriber busy indicator 1	Green	On	Slot 1 is being used.
			Off	All subscribers in slot 1 are idle.
BSY2	Subscriber busy indicator 2	Green	On	Slot 2 is being used.
			Off	All subscribers in slot 2 are idle.

Rear panel

There are two sockets on the rear panel of IAD132E(T). From left to right, they are socket 1 and socket 2. You can insert Analog Subscriber Interface Board ASID. Each socket provides 16 lines POTS users.

Figure 2-3 shows the rear panel of IAD132E(T).

Table 2-4 Figure 2-3 Appearance of rear-access IAD132E(T)

Table 2-2 lists functions and amount of external ports.

Table 2-5 Table 2-2 External ports of the IAD132E(T)

Item	Amount
POTS Port	16 analog subscribers (1 ASI card)
WAN	4 10/100Base-TX Ethernet port
CONSOLE	1 maintenance serial port

The device is equipped with vents on left and right sides, which will help equipment cooling.

2.3 Software structure

The software structure of IAD132E(T) is based on Vxworks, it is made of CSP board, CPU and DSP, as showing in Table 2-3.

Table 2-6 Table 2-3 The software structure of IAD132E(T)

Item	Function
CPU	Complete the call control, management and maintenance, transfer media flow of the whole system, it is the core of IAD132E(T).
DSP	Complete voice codec, DTMF（Dual Tone Multi-Frequency）/FSK（Frequency Shift Keying）checking create, VAD, CNG etc voice processing function.

From the software structure, IAD132E(T) can be separated in: management and maintenance module, service interface module, semi-permanent service processing module, VoIP service processing module, protocol processing module, operating system module (VxWorks) and bottom drive processing module. Figure 2-4 shows the relationship of every module.

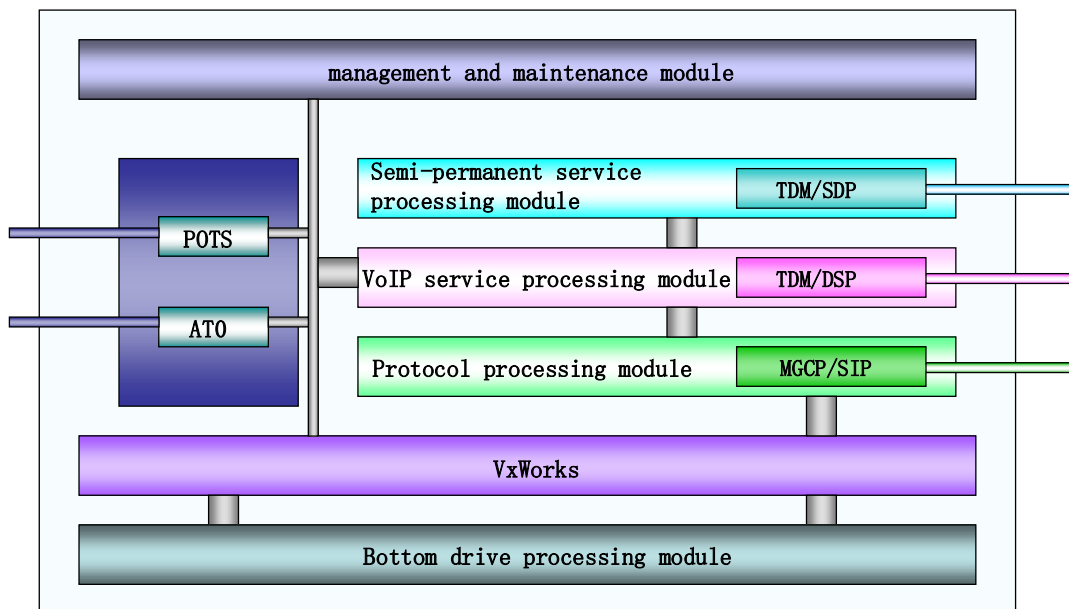**Table 2-7** Figure 2-4 The function module of IAD132E(T)

Table 2-4 shows the function of each module of IAD132E(T).

Table 2-8 Table 2-4 Instruction of each module of IAD132E(T)

Module	Function
management and maintenance, operating system module	Responsible for the whole system operating, management and maintenance of IAD132E(T).
service interface module	Complete analog, digital data user message selecting, concluding and reporting, meanwhile pass the down message of service module.
semi-permanent service processing module	Processing the semi-permanent joining setup and maintainace between different users in the same IAD132E(T) and different IAD132E(T).
VoIP service processing module	Implement controlling alternation of user signal, complete controlling of TDM（Time Division Multiplexing）/DSP（Data Signal Processor）user module, communicate with MGC.
protocol processing module	Mainly compete processing and adapting of MGCP/SIP protocol.
bottom drive processing module	Mainly realize driving of diversified function chip on CSP board.

3 Product and Networking Application

3.1 Overview

IAD132E(T) provides VOIP access for 8/16/32 POTS users, it offers 3 LAN ports and 1 WAN port, and supports 8/16 PSTN users access, meanwhile enables "one set with two numbers" in the Public Switched Telephone Network (PSTN).

3.2 Services and Functions

IAD132E(T) provides abundant voice services, including:

- Supporting POTS access to IP network.

- Supporting 802.1p/q.

- Supporting T.38 fax or transparent transmission of faxes

- Supporting Caller Identification Display

- Supporting Advice of Charge at the End of Conversation (the IAD of MGCP only)

- Supporting traditional PSTN services.

- Cooperating with the SoftSwitch to provide new intellectual and distinctive services. (Note: the above services can be used only after you subscribe them from the operator. For details, contact the operator)

- Cooperating with the IMS to provide traditional voice services, and unified Centrex, one number link your service, media ring sevice and so on. (Note: the above services can be used only after you subscribe them from the operator. For details, contact the operator)

- Supporting local number display, supporting ringing after displaying call number.

- Supporting ITU-T G.711, G.729 encoding mode.

- Supporting Differentiated Services Code point (DSCP)

- Supporting Jitter Buffer(JB)

- Supporting Comfort Noise Generation (CNG)

- Supporting Voice Activity Detection (VAD)

- Supporting Simple Network Management Protocol (SNMP) V2.

- Supporting Simple Network Time Protocol (SNTP)

- Supporting Dynamic Host Configuration Protocol (DHCP)

- Supporting end-to-end signaling tracing, and locating software/hardware faults inside devices.

- Supporting IAD authentication by SoftSwitch..

- Supporting IAD authentication by IMS.

- Supporting encryption of RFC2833 controlled by SoftSwitch (the IAD of SIP only)

- Supporting certifications such as Federal Communications Commission (FCC), Council of Europe (CE)

- Supoorting SIP hot line.

- Supoorting IP Precedence/DSCP tag

- Supoorting local exchange

- Supporting auto-configuration through DHCP, which frees end users from manual configuration on IAD.

3.3 Networking Applications

3.3.1 Number Retention, flow division

IAD132E(T) connects wih original tradition PBX as new access gateway through AT0, which retain subsciber's quondam habit and number, and access to the new NGN/IMS network through SIP to enjoy new IP service.

Figure 3-1 shows the network mode.

Table 3-1 Figure 3-1　number retention and flow division service
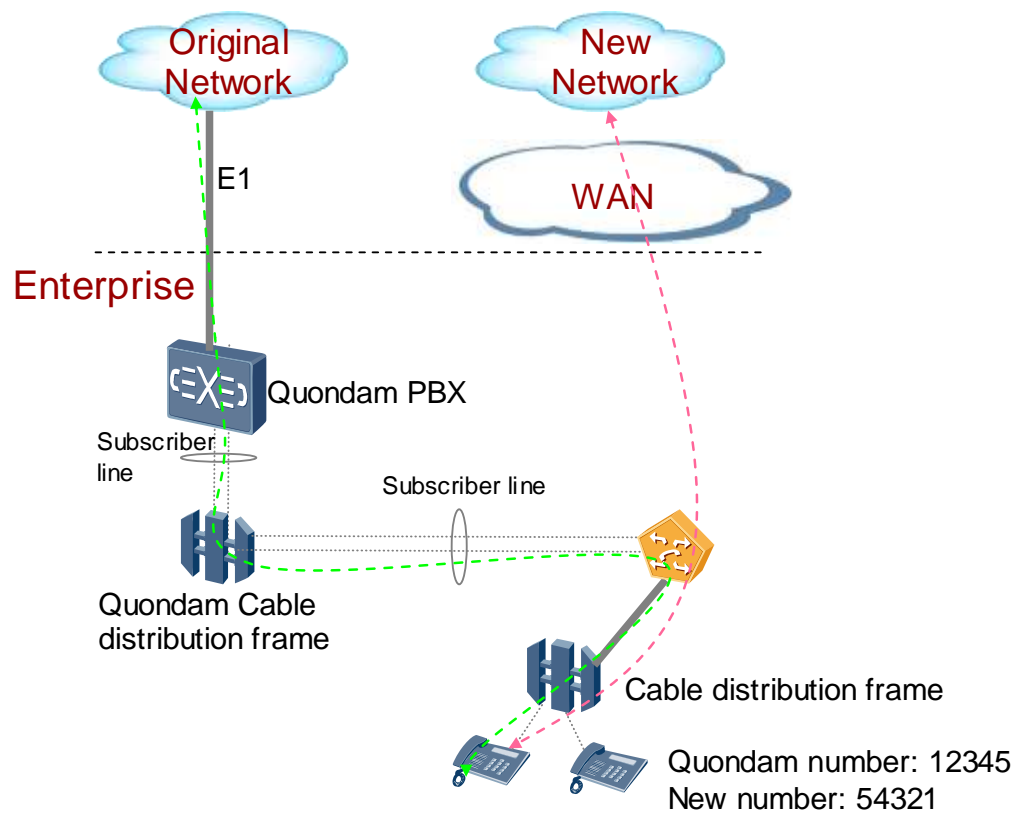
3.3.2 The network application with SoftCo/U1900

IAD132E(T) provide anolog relay to access PSTN with SoftCo/U1900.

SoftCos/U1900, some servers and IADs are deployed in the headquarter, connecting the PSTN by E1/AT0.

Figure 3-2 shows the typical network of IAD132E(T) and SoftCo/U1900.

Table 3-2 Figure 3-2 the typical network of IAD132E(T) and SoftCo

4 Technical Specifications

4.1 Technical Specifications

Table 4-1 Table 4-1 IAD132E(T) Technical Specifications
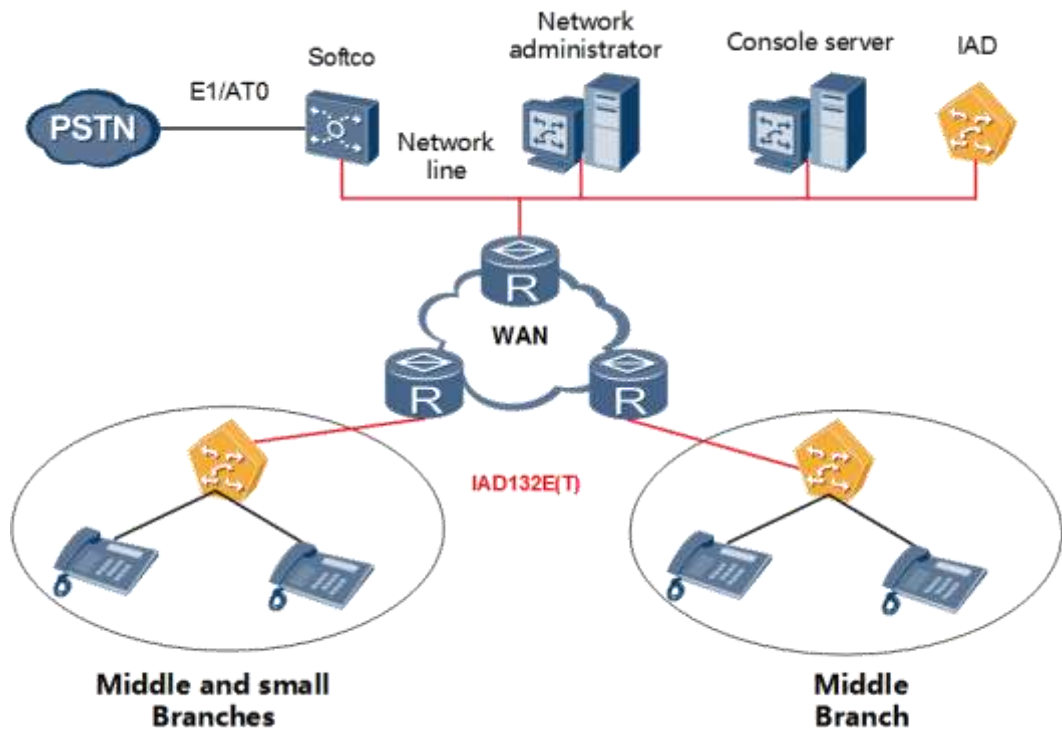
Parameter	Index
maximal user capability	16 analog subscribers (1 ASID card)
	32 analog subscribers (2 ASID cards)
Power supply	AC: 100~240V, 50~60Hz, Max. input current 2.0 A
Max. power consumption	IAD132E(T)-16S: 66W IAD132E(T)-32S: 86W
Dimensions Weight Temperature	436mm (L)×365mm (W)×42mm (H)
	<5 kg
	Long term: 0~+55°C Short term: -40 ~+85°C
Relative humidity	Long term: 5%~85% (non-coagulation) Short term: 0%~90%(non-coagulation)
Altitude	≤4000m
Atmospheric pressure	70~106kPa
Call processing ability	2,000 BHCAs (Busy Hour Call Attempts)
Simultaneous calls	Can be configged, the max configuration is no convergence.
DSP convergence ratio	1:1

Parameter	Index
Call connection capability	Call completion rate >99% 1-hour call hold capacity >99%
Switchover time of voice coding mode	<60ms
Delay	CODEC delay: Anti-jitter delay≥80ms
Voice quality	Objective voice assessment: • Perceptual Speech Quality Measurement (PSQM) average <1.5 in high-quality network • PSQM average <1.8 with poor-quality network (packet loss ratio =1%, network jittering =20ms, delay =100ms) • PSQM average <2.0 with worst-quality network (packet loss ratio =5%, network jittering =60ms, delay =400ms) Subjective voice assessment: • Mean Opinion Score (MOS) >4.0 with high-quality network • MOS >3.5 with poor-quality network (packet loss ratio =1%, network jittering =20ms, delay =100ms) • MOS >3.0 with worst-quality network (packet loss ratio =5%, network jittering =60ms, delay =400ms)
Reliability = MTBF/ (MTBF+MTTR)	>99.99%
Mean Time Between Failures (MTBF)	>30000h
Mean Time To Repair (MTTR)	<30min

4.2 Compliant Standards

The IAD132E(T) is in compliance with the following standards and protocols.

Tone generation and detection

- Dual-Tone MultiFrequency (DTMF) and calling tones (dialing tone, busy tone, ringback tone, off-hook tone and so on).

- V.17, V.21, V.27ter and V.29, voice/fax automatic identification.

Voice/multi-media data signal CODEC

- ITU-T G.711 μ-Law（64kbit/s）
- ITU-T G.711 A-Law（64kbit/s）
- ITU-T G.729

Call signal (call control)

- IETF MGCP（RFC3435）
- SIP（RFC3261）

Voice packet encapsulation/decapsulation

- RTP/RTCP（Real Time Control Protocol）（RFC1889）

Internet protocal

- Transfer Control Protocol (TCP)/IP
- User Datagram Protocol (UDP)/IP
- Address Resolution Protocol (ARP)/Reverse Address Resolution Protocol (RARP)
- Internet Control Message Protocol (ICMP)
- Telnet
- Domain Name Server (DNS) Client
- Dynamic Host Configuration Protocol (DHCP) Client
- FTPS/TFTP Client.

IP address allocation

- Static
- DHCP
- PPPoE（Point-to-Point Protocol over Ethernet）

A Acronyms and Abbreviations

Table 4-2 Table 4-2 Abbreviations

Abbreviations	Full name
3rd Party Server	Third Party Server
A	
AAA	Authentication Authorization Accounting
AMG	Access Media Gateway
ARP	Address Resolution Protocol
ASI	Analog Subscriber Interface
ATI	Analog Trunk Interface
ATU	Analog Trunk Interface Unit
B	
BGCF	Breakout Gateway Control Function
BHCA	Busy Hour Call Attempts
C	
CNG	Comfort Noise Generation
CRTP	Compressed Real-Time Protocol
CSCF	Call Session Control Function
D	
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DSCP	Differentiated Services Code point
DSLAM	Digital Subscriber Line Access Multiplexer
DSP	Data Signal Processor

DTMF	Dual Tone Multi-Frequency
E	
ETG	Edge Trunk Gateway
F	
FMIU	100Base-FX Multi-Mode Fast Ethernet Interface Unit
FSIU	100Base-FX Single Mode Fast Ethernet Interface Unit
FTIU	100Base-TX Fast Ethernet Electrical Interface Unit
FoIP	Fax over IP
FSK	Frequency Shift Keying
FTP	File Transfer Protocol
FXS	Foreign Exchange Subscriber
G	
GGSN	Gateway GPRS Support Node
H	
HSS	Home Subscriber Server
HTTP	Hyper Text Transport Protocol
I	
IAD	Integrated Access Device
ICMP	Internet Control Message Protocol
IGMP	Internet Group Management Protocol
IMS	IP Multimedia Subsystem
iOSS	integrated Operation Support System
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
J	
JB	Jitter Buffer
M	
MGCP	Media Gateway Control Protocol
MGCF	Media Gateway Control Function
MGW	Media Gateway
MOS	Mean Opinion Scores
MRF	Media Resource Function

MRS	Multimedia Resource Server
N	
NGN	Next Generation Network
NTP	Network Time Protocol
P	
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
POTS	Plain Old Telephone Service
PPPoE	Point-to-Point Protocol over Ethernet
PSQM	Perceptual Speech Quality Measurement
PSTN	Public Switched Telephone Network
Q	
QoS	Quality of Service
R	
RARP	Reverse Address Resolution Protocol
RTP	Real-time Transport Protocol
RTCP	Real Time Control Protocol
S	
SGW	Service GateWay
SCP	Service Control Point
SG	Signaling Gateway
SGSN	Serving GPRS Support Node
SIP	Session Initiation Protocol
SNMP	Simple Network Management Protocol
SoftSwitch	SoftSwitch
T	
TCP	Transmission Control Protocol
TDM	Time Division Multiplexing
TFTP	Trivial File Transfer Protocol
TMG	Trunk Media Gateway
U	
UDP	User Datagram Protocol

V	
VAD	Voice Activity Detection
VBD	Voice Band Data
VDSL	Very-high-data-rate Digital Subscriber Line
VDU	Very high rate DSL Interface Unit
VLAN	Virtual Local Area Network
VoIP	Voice over IP