IAD104H
V300R002

Product Overview

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Huawei Technologies Co., Ltd.

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

Website: http://enterprise.huawei.com

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1 Product orientation and features

1.1 Product orientation

This product description is about IAD104H V300R001 version.

The IAD (Integrated Access Device) 104H (the IAD104H for short) is an important component of Huawei next generation network (NGN/IMS) solution. It provides small-capacity voice over IP (VoIP) or fax over IP (FoIP) solutions for enterprises and consumer users.

With different access capabilities (IAD104H: four ports) for enterprises, the IAD104H is well integrated into enterprise broadband networks and achieves cost-efficient access for remote enterprise users because of its comprehensive advantages (high quality, high benefits, and cost efficiency). Its flexible networking and QoS policies ensure high quality of delay-sensitive voice services and packet-loss-sensitive fax services for end users.Figure1-1 illustrates the networking of the IAD104H.

Figure 1-1 the location of IAD104H in the network
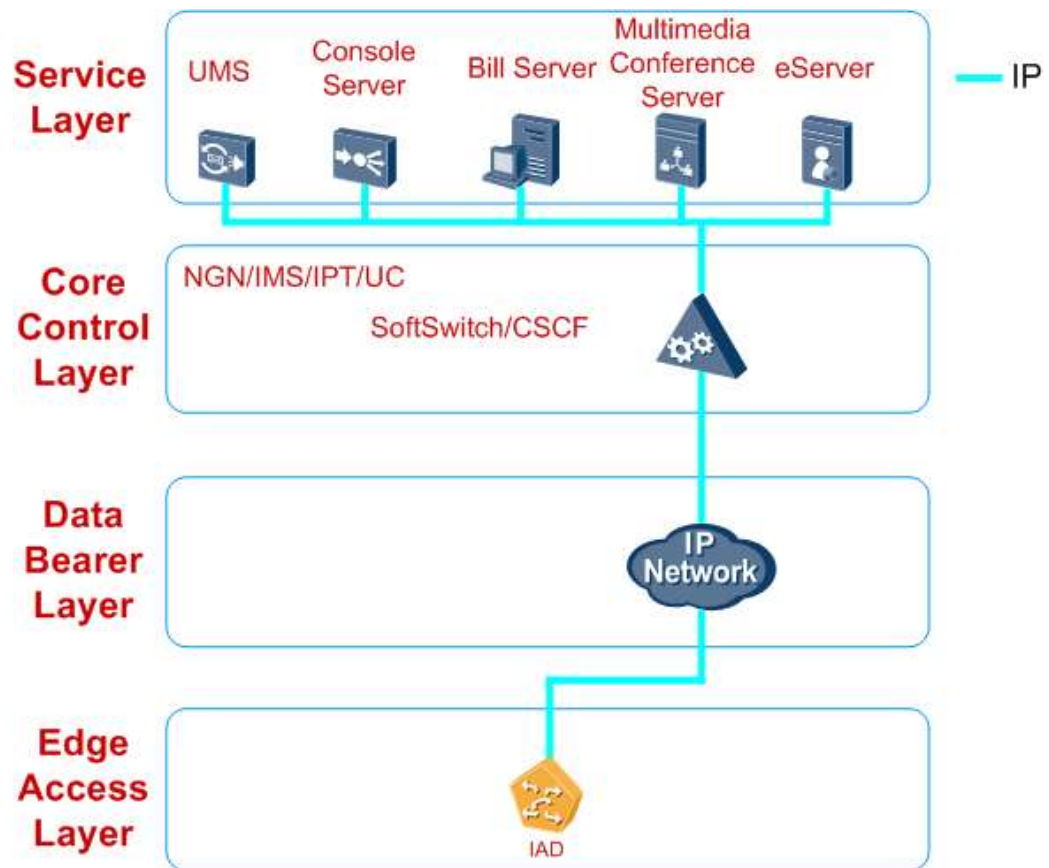
1.2 Product Features

The IAD104H features: high-quality voice, easy installation, convenient management and maintenance, high reliability and security.

High-Quality Voice

The IAD104H provides high-efficiency and high-quality IP-based voice service, by the following:

- Voice Activity Detection (VAD)
- Comfort Noise Generation (CNG)
- Echo cancellation
- Lost-packet compensation

Easy Installation

The IAD104H 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 104H 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 IAD104H for management.

Easy Maintenance

The IAD104H supports the following maintenance methods:

- Through network ports for maintenance, you can rapidly and easily set the IAD104H and detect its status.
- Besides the Basic Input/ Output System (BIOS) mode, you can load host software through network ports by File Transfer Protocol (FTP).
- The IAD104H enables device maintenance, fault detection and network management alarms.

High Reliability

The IAD104H ensures device reliability by the following:

- Watch dog timer(WDT) helps automatic recovery in case of software abnormality.
- Power supply and ports can be protected from over-current and over-voltage.

High Security

The IAD104H realizes high security by the following:

- UCEMS implements management on the IAD104H, and the SoftSwitch/IMS completes the control functions. Before provisioning services, the IAD104H needs to register in the SoftSwitch/IMS for management and service authentication.
- When an IAD104H device is put into service, the device ID, secret key, IP address or domain name of the UCEMS, and IP address or domain name of the SoftSwitch, will be assigned onto the IAD104H. The information will not get lost even if the IAD104H is powered off.
- The IAD104H management system authorizes and authenticates users to prevent unauthorized users from login to and operating the device. Users can be divided into common users, operators and managers. Authorities are subject to the user level. Even if users of different levels enter the same mode, they cannot run the same commands.
- The IAD104H offers various logs, such as operation, alarm and debugging logs, to record device operation and maintenance. Operation logs record user name, login time, login mode, IP address and operations. Alarm logs record major events during system running. Most of such events are alarms. Debugging logs collect debugging information.

2 Product structure

2.1 Overview

IAD104H designed in box structure, the whole system is constitute of main control board, power board and box. This system doesn't support online expand, the products we provide to user are fixed configuration.

2.2 Hardware structure

Figure 2-1 the appearance of the IAD104H

2.2.1 Front panel

The IAD104H provides indicators on its front panel. Table 1-1 lists names and meanings of the indicators.

Table 2-1 the indicators of IAD104H

Indicator	Color	Name	Status	Description
PWR	Green	Power supply indicator	On	On The device is being supplied with power
			Off	No power supply

WAN	Green	Upstream port indicator	Blinking	The connection is established and there are data being sent or received
			Off	The upstream link is not set up
LAN	Green	Downstream port indicator	Blinking	The connection is established and there are data being sent or received
			Off	The device is not connected to a LAN
				No data receiving
VoIP	Green	VoIP service indicator	On	The VoIP service is ready
			Off	The device is starting or the VoIP service is unready
			Blinking (0.25s/0.25s)	The data is being saved
PHONE	Green	Phone indicator	Blinking (0.25s/0.25s)	The phone connecting to this port is ringing
			Blinking (1.5s/0.5s)	The phone connecting to this port is switched to the PSTN and is being used
			On	The phone connecting to this port is off hook
			Off	The phone connecting to this port is on hook

2.2.2 Rear panel

Figure 2-2hows external ports on the IAD104H rear panel.

Figure 2-2 External ports of the IAD104H

PWR: Local power supply port	CONSOLE: Serial port	WAN: Upstream network port
LAN:Data user port	PHONE1~PHONE4: PHONE ports	

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

Table 2-2 External ports of the IAD104H

Item	Amount
RJ-11 PHONE port(FXS)	4
Local power supply port	1
RJ-45 10M/100Base-TX user port	1
RJ-45 upstream port	1
Console port	1

2.2.3 Software structure

The software structure of IAD104H is based on Vxworks, it is made of CSP board, CPU and DSP, as showing in Table 2-3.

Table 2-3 The software structure of IAD104H

Item	Function
CPU	Complete the call control, management and maintenance, transfering media flow of the whole system, it is the core of IAD104H.
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, IAD104H 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 1-4 shows the relationship of every module.

Table 1-5 shows the function of each module of IAD104H.

Table 2-4 Instruction of each module of IAD104H

Module	Function
manage and maintain, operating system module	Responsible for the whole system operating, management and maintenance of IAD104H.

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 IAD104H and different IAD104H.
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

It provides VoIP access for up to four POTS users, and offers one LAN port and one WAN port.

Services and Functions

The IAD104H provides abundant voice and data services, functions as listed below:

- Supporting POTS and enabling Ethernet users to access the 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)
- Enabling calling parties of the card service to redial numbers

- Supporting Point-to-Point Protocol over Ethernet (PPPoE)

- Supporting Network Address Translation(NAT)

- Supporting traditional PSTN services

- Supporting G.711 and G.729

- Supporting KC charging and polarity reversal charging controlled by the SoftSwitch (IAD of MGCP only)

- Supporting Differentiated Services Code point (DSCP)

- Supporting Comfort Noise Generation (CNG)

- Supporting VAD (Voice Activity Detection)

- Cooperating with the SoftSwitch to provide new intellectual and distinctive services, such as Call Transfer Call Waiting , Calling Line Identification Presentation, Designated pickup , Co-group pickup , Three-party call and Conference call (Note: the above services can be used only after you subscribe them from the operator. For details, contact the operator)

- Supporting Simple Network Management Protocol (SNMP)

- Supporting Simple Network Time Protocol (SNTP)

- Supporting Dynamic Host Configuration Protocol (DHCP) and DHCP Relay

- Supporting usage under execrable environments

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

- Supporting IAD authentication by SoftSwitch

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

- Supporting certifications such as Federal Communications Commission (FCC), Council of Europe (CE) and China Compulsion Certification (CCC)

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

3.2 Networking Applications

IAD104H can be applied in the below scene.

3.2.1 Multiple Upstream Modes
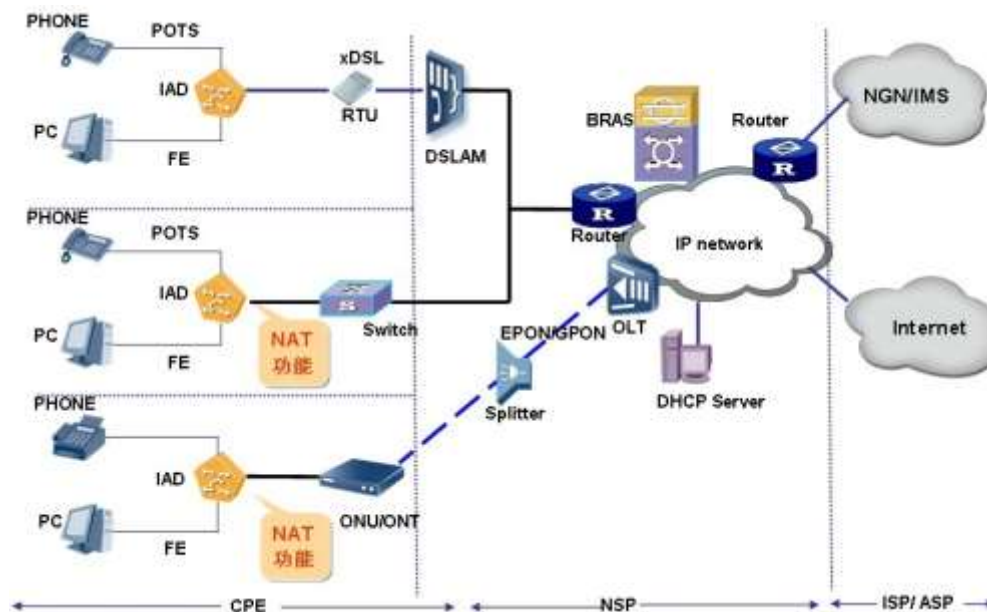
Figure 3-1 Upstream modes of IAD104H

Table 3-1 Noun explain

BRAS: Broadband Remote Access Server	PPPOE: Point-to-Point Protocol over Ethernet
DHCP: Dynamic Host Configuration Protocol	RTU: Remote Terminal Unit
DSLAM: Digital Subscriber Line	CPE: Customer Premises Equipment
NSP: Network Service Provider	ONU: Optical Network Unit
ASP: Application Service Provider	ISP: Internet Service Provider
ADSL access: IAD startup PPPOE to obtain IP address. PC authenticate and obtain IP address through PPPOE.	Ethernet access: IAD obtain IP address through DHCP, then turn on DHCP server, providing IP address for PC and realizing NAT function.
Fiber access: Carrier network is FTTC or FTTB, IAD is straight connect under ONU/ONT. PC connect under IAD or ONU.	

3.2.2 Shop access

Figure 3-2 Shop access of IAD104H
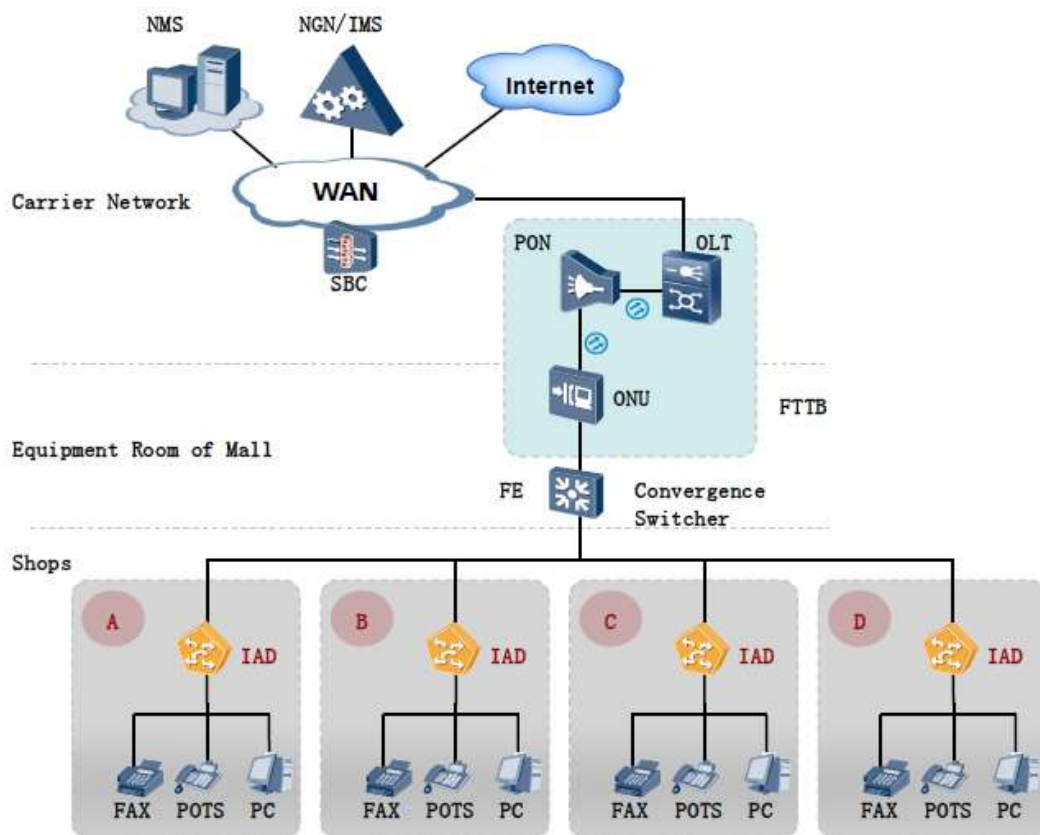
Description:

ONU realize Ethernet connect to equipment room of enterprise, IAD provide shop integrate service access.

Feature:

One-line access, simple Deployment. Each shop access by one line, while providing voice, fax and broadband Internet access, meets the requirement of business office.

Flexible service specification Networking. Providing 4 different configuration specification to satisfy diversiform data, voice and fax application request.

Supporting IP-Centrex. Support internal call by short number, improve work efficiency.

Supproting Number Portability. It's not necessary to apply to change number and modify IAD configuration when the relocation. Support plug and play, and fully protect the benefit of the merchants, such as telephone and fax number.

3.2.3 Home Access

Figure 3-3 Home access of IAD104H
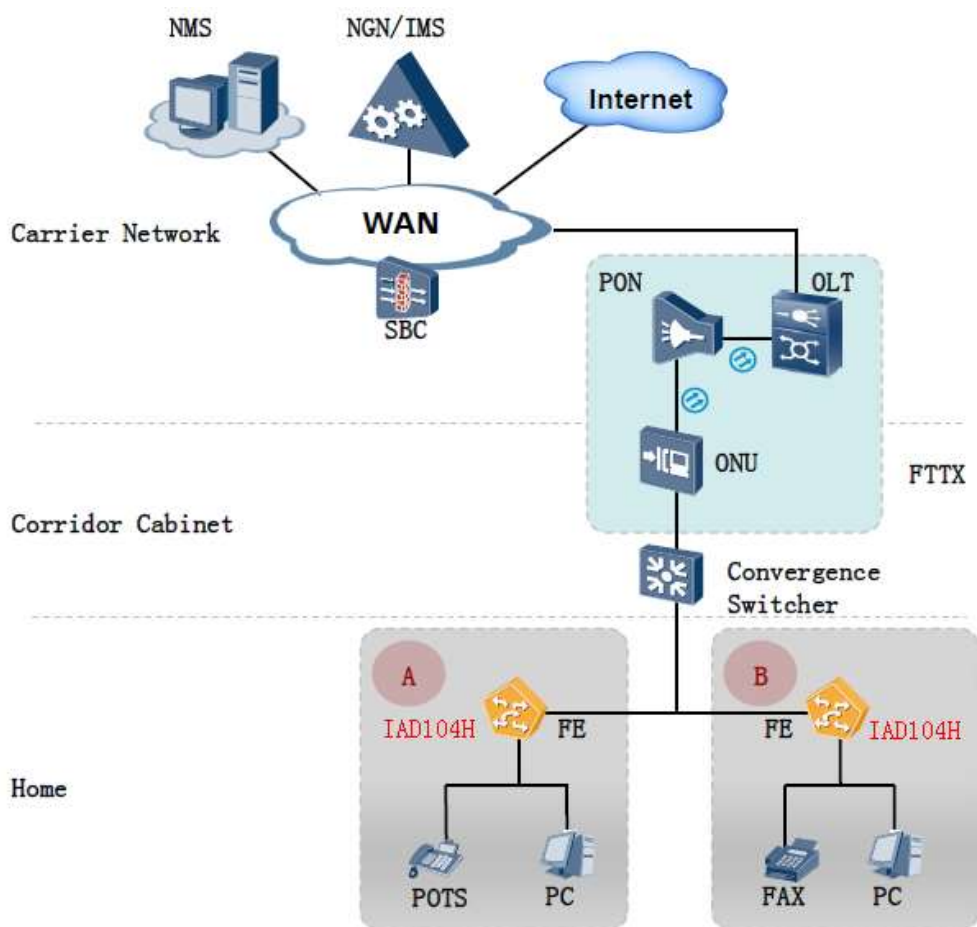
Description:

ONU is deployed in Residential districts, using the existing LAN SW to access to home.

Features:

One-line access, simple Deployment. ONU provide 8/16/24 port floor exchange, Each retail access by one line with IAD, no need line repeatly. At the same time to increase the customer satisfaction and reduce deploying cost.

PPPoE dial-up automatically. Through IAD's embedded PPPoE function, PC connected with it can access Internet network directly without any other operation, thus simply the process of dial-up.

Flexible Service Combination

Two solutions can be provided according to different family requirements:

a)   Provide standard telephone and internet service;

b)   Fax service is added on the basis of solution A in SOHO environment.

4 Technical Specifications

4.1 Technical Specifications

Table 4-1 IAD104H Technical Specifications

Parameter	Index
maximal user capability	providing 4 POTS user and 1 data user.
Dimensions	234(L) x 170(W) x 36(H) mm
weight	480g
Maximal power	Static:4.0,Full:7.4W
Running temperature	Long term: 0°C-55°C
Relative humidity	Long term: 5%-95%
Atmospheric pressure	70 kPa to 106kPa
Long-time call	>48h
Convergence ratio	1:1
Call connection capability	Call completion rate > 99% 1-hour call hold capacity > 99%
Switchover time of voice coding mode	<60ms
Device delay	Codec delay: Anti-jitter delay≥80ms

Voice quality	Objective estimation of voice quality: • When the network is in good conditions, the average value of perceptual speech quality measurement (PSQM)<1.5. • When the network condition is poor (packet loss rate = 1%, network jitter=20ms, delay=100ms), the average value of PSQM<1.8 • When the network condition is the worst (packet loss rate=5%, network jitter=60ms, delay=400ms), the average value of PSQM<2.0 • Subjective estimation of voice quality: • When the network is in good conditions, mean opinion scores (MOS)>4.0 • When the network condition is poor (packet loss rate = 1%, network jitter=20ms, delay=100ms), MOS>3.5 • When the network condition is the worst (packet loss rate=5%, network jitter=60ms, delay=400ms), MOS> 3.0
System reliability A=MTBF/(MTBF+M TTR)	>99.99%
Mean Time Between Failures (MTBF)	>10000h
Mean Time To Repair(MTTR)	<3min

4.2 Compliant Standards

The IAD104H is in compliance with the following standards and protocols.

Tone detection/generation

- Dual tone multi-frequency (DTMF), call tones (such as dialing tone, busy tone, ring back tone, and offhook prompt tone)
- V.17, V.21, V.27ter, V.29 standards
- Automatic identification of voice and fax services

Voice/Multimedia 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 protocol for call control

- Internet Engineering Task Force (IETF) MGCP (RFC3435)
- SIP (RFC3261)

Encapsulation and decapsulation protocols of voice packets

- RTP/Real-Time Control Protocol (RTCP) (RFC 1889)
-

Internet protocols

- 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
- Hypertext Transfer Protocol (HTTP) Web Server
- Domain Name Server (DNS) Client
- DHCP Client
- FTP (File Transfer Protocol)/TFTP (Trivial File Transfer Protocol) Client

IP address allocation

- Static
- DHCP
- PPPoE

IP fax

- Transparent transmission
- Transmission mode meets ITU-T T. 38 Real-Time IP G3 fax protocol, with the rate less than 14400 bit/s

A Glossary

Table 4-2 Abbreviations

Abbreviations	Full name
A	
ADSL	Asymmetric Digital Subscriber Line
ARP	Address Resolution Protocol
B	
BIOS	Basic Input/ Output System
C	
CNG	Comfort Noise Generation
CRTP	Compressed Real-Time Protocol
D	
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DSCP	Differentiated Services Code Point
DSLAM	Digital Subscriber Line Access Multiplexer
DTMF	Dual Tone Multi-Frequency
F	
FoIP	Fax over IP
FTP	File Transfer Protocol
H	

HFC	Hybrid Fiber-Coaxial
HTTP	Hyper Text Transport Protocol
I	
IAD	Integrated Access Device
UCEMS	Integrated Access Device Management System
ICMP	Internet Control Message Protocol
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
L	
LAN	Local Area Network
M	
MGCP	Media Gateway Control Protocol
MOS	Mean Opinion Scores
N	
NAT	Network Address Translation
NGN	Next Generation Network
P	
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	

SIP	Session Initiation Protocol
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
SoftSwitch	SoftSwitch
T	
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
U	
UDP	User Datagram Protocol
V	
VAD	Voice Activity Detection
VDSL	Very-high-data-rate Digital Subscriber Line
VLAN	Virtual Local Area Network
VoIP	Voice over IP
W	
WAN	Wide Area Network