

# ETSI TS 185 006 V2.0.0 (2008-03)

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*Technical Specification*

## **Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Customer Devices architecture and Reference Points**

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**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
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## Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

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## Introduction

The present document describes the main type of Customer Devices that take part in Customer Premises Network in terms of general architecture and in terms of reference points with the NGN and CNG.

The present document gives a Customer Devices classification based on services and access technology supported.

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# 1 Scope

The present document defines the stage 2 Customer Network Devices (CND) specifications, including architectural building blocks to be included in the Customer Network Devices to support the interworking with control plane NGN architecture, both for the transport layers (NASS, RACS) and for the service layer. The present document will also define the reference points between the NGN architectural blocks involved and the corresponding CNDs functions here defined (for the cases in what the CNG will be transparent for the service and control planes point of view), as well as between the Customer Network Devices and the CNG when appropriate. The present document will perform, as first step, a categorization of the different user equipment with reference to the type of service supported and the different levels of implementation of the related functionalities.

Please note that in relation to the Customer Network Devices for IPTV usage the present document will cover only the classification step and will not provide any detail about the architecture and reference points. The IPTV CND are specified in TS 185 009 [20].

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## 2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI ES 282 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN Emulation Sub-system (PES); Functional architecture".
- [2] ETSI TS 183 043: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based PSTN/ISDN Emulation Stage 3 specification".
- [3] ETSI TS 182 012: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based PSTN/ISDN Emulation Subsystem; Functional architecture".

- [4] ETSI ES 283 003 "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229 (Release 7), modified]".
- [5] ETSI TS 185 005 "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Services requirements and capabilities for customer networks connected to TISPAN NGN".
- [6] ETSI TS 185 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Customer Network Gateway Architecture and Reference Points".
- [7] HGI - Home Gateway Technical Requirements.

NOTE: Available at <http://www.homegateway.org>.

- [8] DSL-Forum TR-069 Amendment 1: "CPE WAN Management Protocol".
- [9] DSL-Forum TR-104: "DSLHome Provisioning Parameters for VoIP CPE".
- [10] DSL Forum TR-106: "DSLHome™ Data Model Template for TR-069-Enabled Devices".

NOTE: Available at <http://www.dslforum.org>.

- [11] ETSI TS 183 023: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating NGN PSTN/ISDN Simulation Services".
- [12] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [13] ETSI ES 282 007 "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".
- [14] ETSI ES 282 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".
- [15] ETSI TS 183 019: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment; User-Network Interface Protocol Definitions".
- [16] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".
- [17] ETSI TS 131 103: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Characteristics of the IP Multimedia Services Identity Module (ISIM) application (3GPP TS 31.103 version 7.3.0 Release 7)".
- [18] IETF RFC 2131: "Dynamic Host Configuration Protocol".
- [19] ETSI TS 124 229: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (3GPP TS 24.229 version 8.2.0 Release 8)".

## 2.2 Informative references

- [20] ETSI TS 185 009: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN) Architecture and reference points of customer network devices for IPTV services".
- [21] ETSI TS 187 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN SECURITY (SEC); Requirements - Release 2".

- [22] ETSI TR 187 008: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NAT traversal feasibility study report".
- [23] ETSI TR 185 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Analysis of protocols for customer networks connected to TISPAN NGN".
- [24] ETSI TR 182 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Organization of user data".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following definitions are applied:

**CPN Device:** device that is physically installed in the CPN allowing user access to network services; this can be a Customer Network Gateway with gateway functionalities towards the NGN, or a Customer Network Device being the end user terminal

**Customer Network Device (CND):** CPN device enabling the final user to have direct access to services through a specific user interface

NOTE 1: CNDs can be dedicated to the internet, conversational and audio-video services. But they could be also Consumer Electronics equipment and other devices which may have nothing to do with these premium services (e.g. services performing a content sharing within a CPN, typically between a PC and a music system). CND classification is reported in clause 4.

NOTE 2: For CND classifications see clause 4.

**Customer Network Gateway (CNG):** CPN device acting as a gateway between the CPN and the NGN

NOTE: CNG is able to perform networking functions from physical connection to bridging and routing capabilities (L1-L3), but also possibly implementing functions related to the service support (up to L7).

**Customer Premises Network (CPN):** in-house network composed by customer network gateway, customer network devices, network segments, network adapters and nodes

NOTE: Network segments are physical wired or wireless connections between customer premises network elements); network adapters are elements performing a L1/L2 conversion between different network segments; nodes are network adapters with L3 routing capabilities.

**"Multiple" Play Services (can be: double, triple, quadruple, etc.):** delivery by a single service provider of different types of concurrent services to one or multiple users within the same CPN. Services can be categorized in the following way: data (e.g. Web browsing, best effort traffic etc.), person(s) to person(s) communication, entertainment

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACS	Auto Configuration Server
AKA	Authentication and Key Agreement
ALG	Application Layer Gateway
A-MGF	Access-Media Gateway Function
ARF	Access Relay Function
ARP	Address Resolution Protocol
ASF	Application Server Function
B2BUA	Back to Back User Agent
C-BGF	Core Border Gateway Function
CLF	Connectivity session Location and repository Function

CND	Customer Network Device
CND	Customer Network Devices
CND-A	CND-client Application
CND-AtF	CND-Attachment Function
CND-CMF	CND-Configuration and Maintenance Function
CND-CSMF	CND-Communication Services Media Function
CND-LAF	CND-Local Authentication Function
CND-NTF	CND-NAPT Traversal Function
CND-PPCF	CND-Plug and Play Function
CND-SC	CND-Self Configuration
CND-SF	Customer Network Devices - Service related Functional entities
CND-SIP UA	CND-SIP User Agent
CNG	Customer Network Gateway
CNG-ACF	CNG-Admission Control Function
CNG-AtF	CNG Attachment Function
CNG-AuF	CNG Authentication Function
CNGCF	Customer Network Gateway Configuration Function
CNG-CMF	CNG Configuration and Maintenance Function
CNG-CSMF	CNG Communication Services Media Function
CNG-LF	CNG Location Function
CNG-NFF	CNG NAPT and Firewall Function
CNG-PCF	CNG Policy Control Function
CNG-PPF	CNG Plug and Play Function
CNG-UIF	CNG User reference point Function
CPN	Customer Premises Network
DB	DataBase
DHCP	Dynamic Host Configuration Protocol
FXS	Foreign eXchange Subscriber
GUI	Graphic User Interface
HG	Home Gateway
IMS	IP Multimedia Subsystem
ISDN	Integrated Services Digital Network
ISIM	IP Multimedia Services Identity Module
LAN	Local Area Network
MG	Media Gateway
NACF	Network Access Configuration Function
NAPT	Network Address and Port Translation
NAS	Network Attached Storage
NASS	Network Attachment SubSystem
NAT	Network Address Translation
NBA	NASS Bundled Authentication
NTF	NAPT Traversal Function
P-CSCF	Proxy Call Session Control Function
PDA	Personal Digital Assistant
PES	PSTN/ISDN Emulation Sub-system
PLC	Power Line Communication
POTS	Plain Old Telephone Service
PSTN	Public Switched Telephone Network
RACS	Resource and Admission Control Sub-system
RM	Remote Management
SIP	Session Initiation Protocol
SSID	Service Set Identifier
STB	Set Top Box
UA	User Agent
UE	User Equipment
UICC	Universal Integrated Circuit Card
USIM	Universal Subscriber Identity Module
VGCF	Voice Gateway Control Function
WAN	Wide Area Network



## 4 Customer Network Device classification

The Customer Network Devices connected to the Customer Premises Network can be of different types. The services supported from each CND depends of the CND's type. In this clause a macro-classification is given. More in general, in a customer premises network End Devices used by end user, Network Devices to support the CPN infrastructure and Gateway Devices to connect the Customer Premises Network to the NGN are present.

### End Devices:

The end devices can be divided into two main categories: non-IMS capable and IMS capable.

#### 1) Non-IMS capable devices:

- **non-IP device:** It can be a POTS (Plain Old Telephone Service) phone that support traditional voice services and STS (Supplementary Telephone Services) services. It can be connected to the NGN through the CNG (e.g. in case of PSTN simulation services) or without the CNG (e.g. PSTN emulation services); it supports the Z interface.  
It can be a common ISDN phone supporting the S/T interfaces or also a DECT phone.
- **IP device:** It is a generic IP based device without any SIP stack. For example: PC, Personal Digital Assistant (PDA), network printer, Network Attached Storage (NAS), IP-PBX.  
In some cases IP devices, such as a PC or PDA, can evolve in a easy way to IMS capable devices.
- **SIP Device:**It is an IP device with a SIP stack not compliant with ES 283 003 [4] e.g. ietf based RFC 3261 [12]. For example Videophone, PDA, STB.
- **Consumer Electronics:** There are a number of consumer electronics equipment that can be connected to the CPN and they can be IP based or not. Some examples are the Set Top Box (STB), gaming console, Network Attached Storage (NAS). These devices in some cases do not need a connection with WAN side and are used for Intra-Customer Environment services.
- **Mobile Device:** It can be a 2G/3G mobile device that take part into CPN through a wireless local access (mobility enable) offered by CNG.

#### 2) IMS capable device:

An IMS capable device is able to register with the IM CN via exchange of SIP messages with the P-CSCF, and then create/accept/end multimedia IP sessions, in compliance with ES 283 003 [4]. The establishment of a trust relationship to the IM CN shall be by one of the 3 methods defined in ES 283 003 [4] (by ISIM, or if that is not present then by USIM, or if that is not present then by device-internal transmission of a private user identity, a public user identity and a home network domain name).

For authentication issues, see also clause 6.

- **Fixed device:** It can be a fixed corded phone, dual mode phone (equipped with 2G/3G and Wi-Fi/Bluetooth), PC, PDA (with IMS client soft phone), IP-PBX.  
The dual mode phone (mobile + wireless) is considered as a fixed device when it is attached by Wi-Fi/Bluetooth.
- **Mobile device:** It can be a mobile phone or a PC/PDA with 2G/3G interface.
- **Consumer Electronics:** They can be a STB, Media Servers or media players, etc.

### Network Device:

It is a device that can be connected to the CPN infrastructure (e.g. network adapter and nodes as defined in clause 3).

Gateway:

CNG: It is the Customer Network Gateway to access the NGN side, as specified in TS 185 003 [6].

Table 4.1 classifies the customer devices in order to support the use case define in TS 185 005 [5]. Moreover the CNDs are related to a number of possible local physical interfaces: FXS, Ethernet, Wireless (with or without mobility), where mobility is defined as service and session continuity independently from the location.

In case of wired local access, both analogue and digital access are considered. Wired digital includes Ethernet and other technologies.

In table 4.1 the "X" means that the CND may be able to support a service or that local physical interface.

**Table 4.1: Customer Network Devices classification**

Device Customer Network Device Type	Services						CPN interfaces			
	Communi- cation service	Data service	Video Streaming	Presence	Messaging	Intra- Customer Environment	Wired analogue	Wired digital	Wireless not enabling mobility	Wireless enabling mobility
<b>Non IMS capable</b>										
Non IP (e.g., POTS, ISDN phone)	X					X	X			
IP (e.g. PC, PDA, IP-PBX, NAS, Printer)		X				X		X	X	
SIP (e.g. VideoPhone, PDA, STB)	X	X	X			X		X	X	
Consumer Electronics (e.g. STB, gaming console, NAS)		X				X		X	X	
Mobile 2G/ 3G Phone	X	X								X
<b>IMS capable</b>										
Fixed (e.g. Fixed phone, multi mode phone, PC, PDA (with IMS client soft phone), IP-PBX)	X	X	X	X	X	X		X	X	X
Mobile (mobile phone, PC/PDA with 2G/3G itf	X	X	X	X	X	X				X
Consumer Electronics (e.g. STB, etc.)			X			X		X	X	

The CNDs related to IP-TV are specified in TS 185 009 [20].

## 4.1 Non IMS capable CNDs

### 4.2 Non-IP CNDs

The non-IP devices include the POTS phone and ISDN devices; these type of devices can be connected to the NGN through the CNG or directly. In any case, the architecture of these devices is out of scope of the present document. The voice services on POTS/ISDN devices can be done in emulation [1], [2] and [3] or simulation mode on NGN. In next clause the impact on customer premises network is analyzed for both modes.

#### 4.2.1 Non-IP CNDs connected to the NGN without a CNG

In this case the POTS and ISDN device is connected to the MG (Media Gateway) [3] via the Z interface for voice services, as shown in figure 4.1. In case of data services, for ISDN device, the S/T interface is needed.

The case of voice services for POTS/ISDN in PES scenario is shown in figure 4.1

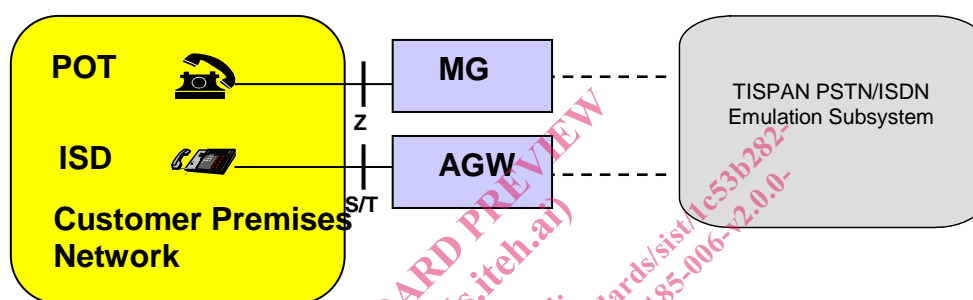


Figure 4.1: Non-IP CNDs connected to the NGN network without a CNG (PES scenario)

The case of voice services for POTS/ISDN supported in the Core IMS scenario is shown in figure 4.2

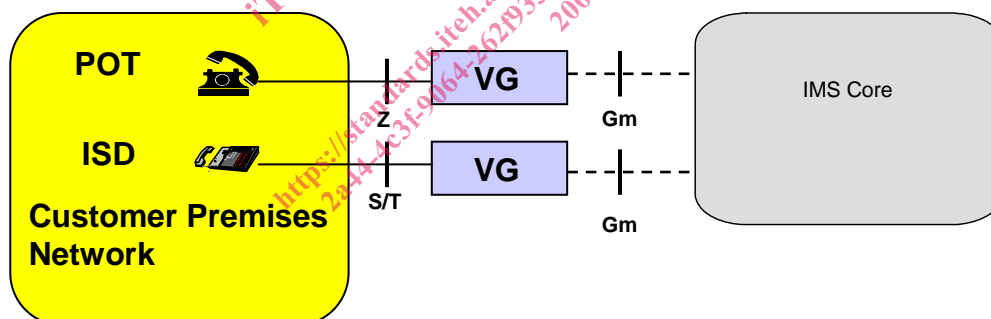


Figure 4.2: Non-IP CNDs connected to the NGN network without a CNG (Core IMS scenario)

#### 4.2.2 Non-IP CNDs connected to the NGN through a CNG

In this case, the CNG includes all the CPN functionalities necessary to fulfill a service between the analogue or ISDN phone and the NGN network. The voice services can be based on PES or Core IMS scenario. The details of CNG architecture are specified in TS 185 003 [6].