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Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Specification of Protocols for Customer Network Devices enabling the IMS-based IPTV service usage

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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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1 Scope

The present document describes the protocols used on the reference points defined for the Customer Network Device (CND) enabling the IMS-based IPTV service usage.

This description is based on the architecture and stage 2 information flows contained in TS 185 009 [4], the architectural specifications of the Customer Network Gateway (CNG) described in TS 185 003 [3] as well as the protocol suites defined for the reference points between the CPN itself and the NGN in TR 185 007 [i.3]. The present document is to be regarded in close conjunction with TS 185 010 [5] as it covers only the IP TV related specifics.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
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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 TS 182 027 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; IPTV functions supported by the IMS subsystem".

NOTE: The latest version in the V2.y.z series applies.

[2] ETSI TS 183 063 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based IPTV stage 3 specification".

NOTE: The latest version in the V2.y.z series applies.

[3] ETSI TS 185 003 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Customer Network Gateway Architecture and Reference Points".

NOTE: The latest version in the V2.y.z series applies.

[4] ETSI TS 185 009 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Architecture and reference points of a customer network device for IMS based IPTV services".

NOTE: The latest version in the V2.y.z series applies.

[5] ETSI TS 185 010 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Customer Premises Networks: Protocol Specification (Stage 3)".

NOTE: The latest version in the V2.y.z series applies.

[6] UPnP™ AV 1.0 Specifications, UPnP Forum.

NOTE: Available at http://www.upnp.org/standardizeddcps/mediaserver.asp.

[7] DLNA Networked Device Interoperability Guidelines v 1.5 expanded Oct 2006.

NOTE: Available at http://www.dlna.org/members/guidelines/.

[8] ETSI TS 182 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Organization of user data".

[9] ETSI ES 283 003 (V2.y.z): "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".

NOTE: The latest version in the V2.y.z series applies.

[10] ETSI TS 129 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents".

[11] ETSI TS 183 065 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networks (TISPAN); Customer Network Gateway Configuration Function; e3 Interface based upon CWMP".

NOTE: The latest version in the V2.y.z series applies.

[12] ETSI TS 183 019 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment; User-Network Interface Protocol Definitions".

NOTE: The latest version in the V2.y.z series applies.

[13] ETSI TS 123 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia Subsystem (IMS); Stage 2".

[14] ETSI ES 282 003 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-System (RACS): Functional Architecture".

NOTE: The latest version in the V2.y.z series applies.

[15] IETF RFC 2131: "Dynamic Host Configuration Protocol".

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2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ETSI TR 185 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); High level customer network architectures".

[i.2] ETSI TR 185 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Services requirements and capabilities for customer networks connected to TISPAN NGN".

[i.3] 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".

[i.4] TR-135 specifications: "Broadband Forum TR-135 "Data model for TR-069 enabled Set-Top Box".

[i.5] TR-069 specification Annex G: "Broadband Forum TR-069 amendment 2 "CPE WAN Management Protocol v1.1".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

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

NOTE 1: See TR 185 004 [i.1].

NOTE 2: 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.

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

NOTE: See TR 185 005 [i.2].

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

NOTE 1: See TR 185 004 [i.1].

NOTE 2: 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 Network Device (CND): CPN device enabling the final user to have direct access to services through a specific user interface

NOTE 1: See TR 185 004 [i.1].

NOTE 2: 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).

3.2 Abbreviations

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

ALG	Application Layer Gateway
B2BUA	Back-to-Back User Agent
BC	BroadCast
CDS	Content Directory Service
CND PPF	CND Plug and Play Function
CND	Customer Network Device
CND-AtF	CND Attachment Function
CNG	Customer Network Gateway
CNG-ACF	CNG-Admission Control Function

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CNGCF	Customer Network Gateway Configuration Function
CNG-NFF	CNG NAPT and Firewall Function
CNG-PCF	CNG Policy Control Function
CoD	Content on Demand
CPN	Customer Premises Network
CWMP	CPE (Customer Premises Equipment) WAN Management Protocol
DHCP	Dynamic Host Configuration Protocol
DNS SRV	Domain Name Server Service
FW	Firewall
IETF	Internet Engineering Task Force
IGMP	Internet Group Management Protocol
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPTV	IP Television
NAPT	Network Address and Port Translation
NAT	Network Address Translation
NGN	Next Generation Network
NPVR	Networked Personal Video Recorder
P-CSCF	Proxy-Call Session Control Function
PSI	Public Service Identifier
QoS	Quality of Service
RTP	Real-time Transport Protocol
SDF	Service Discovery Function
SIP	Session Initiation Protocol
STB	Set Top Box
UPnP	Universal Plug and Play
URI	Uniform Resource Identifier
WAN	Wide Area Network

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4 Overview

The clause briefly describes applicability of the protocols discussed further in the present document to the Reference Points and Functional Entities defined in TS 185 003 [3] and TS 185 009 [4].

NOTE: The IPTV CND functions are described within the specification document reference TS 185 009 [4].

4.1 Overview of IPTV CND Operating Modes and Reference Points

There are 3 operating modes defined in TS 185 009 [4] and to be considered here.

- **Bridged mode**: In this mode, the IPTV CND is working in compliance with TS 183 063 [2] and is connected to the NGN network or connects to the NGN via a CNG operating in bridged mode. In bridged mode of operation, the CNG provides only L1-L2 functionality. The CND connects over Gm to the NGN.

- **Routed mode**: In this mode, the IPTV CND connects to the NGN via a CNG operating in routed mode and is capable to interact with other devices in the CPN with other protocols above L3. In routed mode of operation, the CNG includes routing and service layer functionality as well (L3 and above). The routed mode shall be related to an authentication session. A session operating in one of the following routed modes can only operate in one of them at the same time:

  - NGN mode: IPTV CND connects directly to the NGN through the CNG over Gm. The CNG-PCF and CNG-NFF as defined in TS 185 003 [3] may perform functionality such as NAPT and CNG internal QoS.

  - CPN mode: IPTV CND connects to the NGN through CNG over Gm'. The CNG-SIP Proxy B2BUA, CNG-ACF, CNG-PCF as defined in TS 185 003 [3] may perform functionality such as NAT/FW traversal, CNG internal QoS or IETF SIP to IMS SIP conversion.

In the routed mode, e1' and e3' are sharing a similar procedure for routed NGN and routed CPN modes; e1' and e3' are therefore described in a common section for these two modes.

On the other hand, interface C will have different procedures for these two modes and are therefore described in separate clauses.

4.1.1 Bridged mode

Reference points Gm, Xc, Xd, Ut, Xa all conforms to TS 183 063 [2].

Reference point e1 conforms to TS 183 019 [12].

Reference point e3 conforms to TS 183 065 [11].

4.1.2 Routed mode

Reference points Xc, Xd, Ut, Xa conforms to TS 183 063 [2].

The e1 reference point is described in clause 5.

The e3 reference point is described in clause 6.

4.1.2.1 Routed NGN mode

The C reference point is described in clause 14.1.

The Gm reference point is described in clause 7.2.

4.1.2.2 Routed CPN mode

The C reference point is described in clause 14.2.

The Gm' reference point is described in clause 15.1.

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4.2 Data model information

Table 1 summarizes parameters to be provisioned in the CND, thanks to the CNGCF (reference point e3), through DHCP options (reference point e1') or by pre-configuration. Some kinds of data are grouped together, according to the SIP message types in which they are used:

The table describes the data to be provisioned and some related information:

- **Entity responsible for the provisioning:** the entity which is responsible for the provisioning in the TISPAN IMS network. In specific cases an entity can be responsible for the provisioning as a relay. This means that such an entity has been provisioned by another equipment during a previous phase (e.g. provisioning of the SDF Address through DHCP option 125 by the CNG in a routed NGN mode to the IPTV CND, while the CNG has been provisioned with this parameter by the CNGCF).
- **Requirement level:** gives the level of the required parameter as it is mentioned in TISPAN specifications. This means that the table informs whether the parameter must or may be provisioned in the CND.

Table 1

Data	Description (ref)	Entity responsible for the provisioning	Parameters manageable by TR-069/TR-104	Requirement level
IMPI	Authentication Username for IMS authentication	CNGCF	Yes	Mandatory
IMPU	SIP URI	CNGCF	Yes	Mandatory
P-CSCF Address	Host name or IP address of the SIP Proxy	CNGCF or DHCP server	Yes	Mandatory