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Technical Specification

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

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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
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Contents

Intellectual Property Rights 5

Foreword 5

Introduction 5

1 Scope 6

2 References 6
2.1 Normative references 6
2.2 Informative references 7

3 Definitions and abbreviations 7
3.1 Definitions 7
3.2 Abbreviations 7

4 High level functional architecture for IPTV-CNDs 9
4.1 Architecture layers 9
4.1.1 Transport layer 9
4.1.2 Service layer 9
4.1.3 Application and User Experience layer 10
4.2 IPTV operating modes 10

5 IPTV Customer Network Device Architecture 10
5.1 IMS based IPTV compatible devices 11
5.1.1 Detailed Architecture 11
5.1.1.1 Transport Layer Functions 12
5.1.1.1.1 Network attachment functions 12
5.1.1.1.2 Transfer functions 12
5.1.1.1.3 Transport functions 12
5.1.1.2 Service layer functions 12
5.1.1.2.1 IPTV-CND-SIP UA: IPTV Customer Network Device SIP UA 12
5.1.1.2.2 IPTV-CND-SPM: IPTV Service Profile Management function 12
5.1.1.2.3 IPTV-CND-MDP: IPTV Customer Network Device MetaData Processing 12
5.1.1.2.4 IPTV-CND-MPC: IPTV Customer Network Device Media Player Control 13
5.1.1.2.5 IPTV-CND-MD: IPTV Customer Network Media Delivery 13
5.1.1.2.6 IPTV-CND-CMM: Configuration Management and Monitoring 13
5.1.1.2.7 IPTV-CND-PPF: IPTV Customer Network Device - Plug and Play Function 13
5.1.1.2.8 IPTV-CND-cPVR: IPTV client PVR Function 14
5.1.1.3 Applications and user experience layer functions 14
5.1.1.3.1 IPTV Applications 14
5.1.1.3.2 IPTV-CND-SPA: Service Profile Application 14
5.1.1.3.3 IPTV-CND-MDA: MetaData Application 14
5.1.1.3.4 IPTV-CND-BF: Browser Function 15

6 Reference points 15
6.1 Reference points for IMS based IPTV compatible devices 15
6.1.1 Transport layer Reference points 15
6.1.1.1 Transport Reference points 15
6.1.1.2 Network attachment Reference points 15
6.1.2 Service layer Reference points 15

7 The IPTV - CND Data Model 16

8 Deployment's scenarios 16
8.1 Option 1 16
8.2 Option 2 16

9 Information Flows 17
9.1 Information flows between IPTV-CND and NGN 17
9.1.1 Example message flows on X_a 17

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9.1.2 Example message flows on U_t 18
9.1.3 Example message flows on G_m 18
9.1.3.1 Registration 18
9.1.3.2 Session Initiation and Termination 18
9.1.3.3 IPTV Service Action Data Delivery 18
9.1.4 Example message flows on X_c and X_d 19
9.1.4.1 Message flows for CoD service 19
9.1.4.2 Message flows for BC service 19
9.1.5 Example message flows on e_3 20
9.1.6 Example message flows on e_1 20
9.2 Information flows between IPTV-CND and CNG 21
9.2.1 Example message flows on C 21
9.2.1.1 Message flows for device and service information exchange 21
9.2.1.2 Message flows for device control 22
9.2.2 Example message flows on $G_{m'}$ 23
9.2.2.1 Registration 23
9.2.2.2 IPTV Service Action Data Delivery 23
9.2.3 Example message flows on $e_{1'}$ 23
9.2.4 Example message flows on $e_{3'}$ 23
9.2.5 Example message flows on a_u 23

Annex A (informative): Bibliography 24

Annex B (informative): Change history 25

History 26

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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).

Introduction

The present document describes the main type of IMS based IPTV 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.

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1 Scope

The present document defines the stage 2 Customer Network Devices for IPTV services (IPTV-CND) specifications. It is therefore addressing the overall architecture of the customer network device (CND) enabling the IPTV service consumption. The architectural definition is covering both transport and service layer related functionalities. The reference points between the CND and the Customer Network Gateway (CNG) are also part of the specifications.

The 2 solutions elaborated specified in TS 182 027 [2] and TS 182 028 [4] are IMS based IPTV and IPTV Dedicated Subsystem solutions but only the IMS based IPTV solution is considered in the present document.

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.
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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 181 016: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Service Layer Requirements to integrate NGN services and IPTV".

[2] ETSI TS 182 027: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; IPTV functions supported by the IMS subsystem".

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

[4] ETSI TS 182 028: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; Dedicated subsystem for IPTV functions".

[5] ETSI TS 183 064: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Dedicated IPTV subsystem stage 3 specification".

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

[7] ETSI TS 185 006: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Customer Devices architecture and interfaces and Reference Points".

[8] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".

[9] ETSI TS 181 005: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Service and Capability Requirements".

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".

3 Definitions and abbreviations

3.1 Definitions

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

Customer Network Device (CND): physical device enabling service(s) usage

NOTE: 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, through the CNG).

Customer Network Gateway (CNG): gateway between the Customer Premises Network (CPN) and the Access Network able to perform networking functions from physical connection to bridging and routing capabilities, but also possibly implementing functions related to the service support

Customer Premises Network (CPN): in-house network composed by customer network gateway, customer network devices, network segments (physical wired or wireless connections between customer network elements), network adapters (performing a L1/L2 conversion between different network segments) and nodes (network adapters with L3 routing capabilities)

IPTV services Customer Network Device (IPTV-CND): physical device enabling consumption of IPTV service(s)

NOTE: IPTV-CNDs are dedicated to the TV like audio-visual services such as live TV or On demand.

3.2 Abbreviations

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

ACF	Access Configuration Function
AtF	Attachment Function
B2BUA	Back-to-Back User Agent
BC	BroadCast
BF	Browser Function
BTA	Broadcast TV Application
C-BGF	Core Border Gateway Function
CDA	CoD Application
CF	Configuration Function
CMF	Configuration and Maintenance Function

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CMM	Configuration Management and Monitoring
CND	Customer Network Device
CNG	Customer Network Gateway
CNGCF	Customer Network Gateway Configuration Function
COD	Content On Demand
CPA	Client PVR Application
CPN	Customer Premises Network
cPVR	client PVR
DHCP	Dynamic Host Configuration Protocol
DLNA	Digital Living Network Alliance
EPG	Electronic Programme Guide
ESG	Electronic Service Guide
IGMP	Internet Group Management Protocol
IMS	IP Multimedia Subsystem
IPTV	Internal Protocol TeleVision
IPTVF	IPTV Function
LAF	Local Authentication Function
MD	Media Delivery
MDA	MetaData Application
MDF	Media Delivery Function
MDP	MetaData Processing
MPC	Media Player Control
MPPF	Media Packet Processing Function
NACF	Network Access Configuration Function
NAPT	Network Address and Port Translation
NAT	Network Address Translation
NGN	Next Generation Network
NPA	N-PVR Application
NPVR	Network Personal Video recorder
NTF	NAPT Traversal Function
PCF	Policy Control Function
P-CSCF	Proxy Call Session Control Function
PPF	Plug and Play Function
PVR	Personal Video Recorder
QoE	Quality of Experience
QoS	Quality of Service
RTP	Real Time Protocol
RTSP	Real Time Streaming Protocol
SCF	Session Control Function
SDF	Service Discovery Function
SIP	Session Initiation Protocol
SPA	Service Profile Application
SPM	Service Profile Management
SSF	Service Selection Function
STB	Set Top Box
UA	User Agent
UE	User Equipment
UPnP	Universal Plug and Play
VOD	Video On Demand

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4 High level functional architecture for IPTV-CNDs

The high level functional architecture of IPTV-CND is composed of 3 layers as represented in figure 4.1.

4.1 Architecture layers

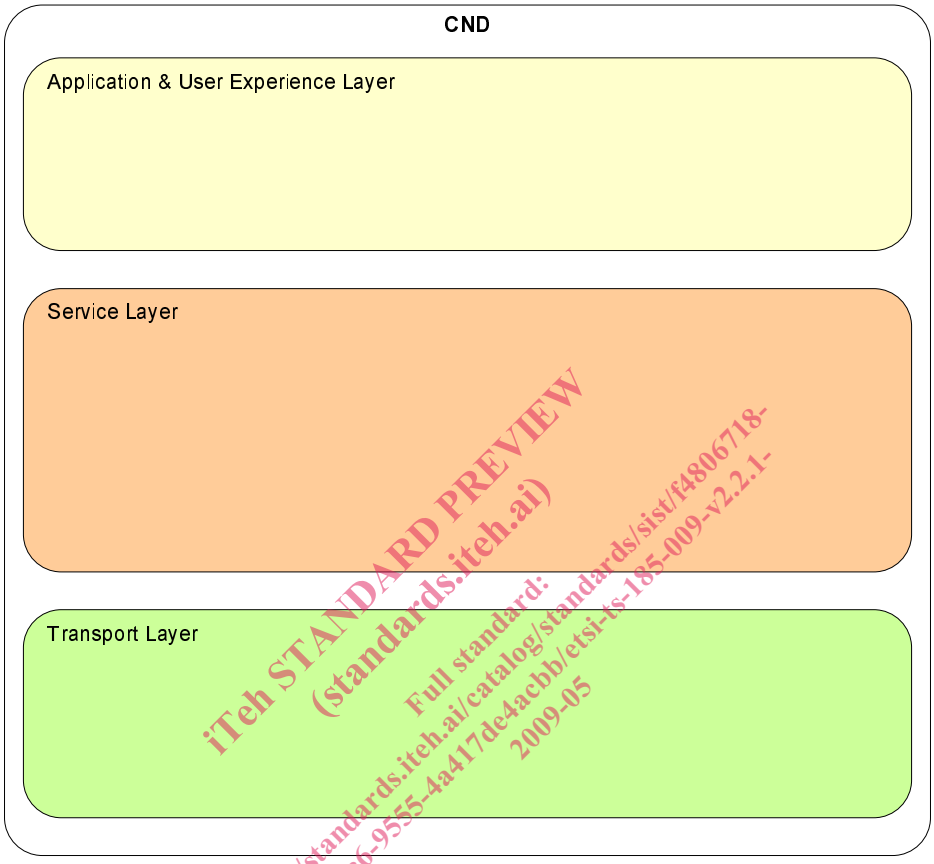

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Figure 4.1: Architecture layers

4.1.1 Transport layer

This layer comprises functional entities that provide relevant IPTV transport level functions such as network attachment and media processing and streaming functions.

4.1.2 Service layer

This layer comprises functional entities that provide relevant IPTV functionality to applications above and also include entities that are used for management and control of platform itself. Depending on the type of services, the service layer entity must communicate either with other devices in the customer network or the external network using the transport layer. Service layer entities do not have a direct user interface and may be controlled via appropriate applications layer entities.

Examples include:

- Media Management function.
- Service Discovery function.
- Platform security function.
- CA/DRM function.

- Configuration and Management function, etc.

4.1.3 Application and User Experience layer

This layer comprises IPTV applications that have user interface (user driven input and /or output) and use the services provided by the underlying Service Layer to drive end user experience.

Examples of applications include:

- VOD.
- Broadcast TV.
- IPTV Service Guide interface, etc.

The user may be a customer or a service operator.

For the service operator, these functions may include service specific functions such as measurement applications (e.g. user satisfaction).

4.2 IPTV operating modes

IPTV CNDs can be simple terminals connected to the NGN or be part of a CPN in connection with the CNG. Different configuration are discussed in TR 185 004 [i.1]. Consequently, the IPTV CND can work in different modes in relation with the CNG.

- **Bridged mode:** In this mode, the IPTV CND is working in compliance with TS 183 063 [3] 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 G_m 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 G_m. The CNG-PCF and CNG-NFF as defined in ETSI TS 185 003 [6] may perform functionality such as NAPT and CNG internal QoS.

  - CPN mode: IPTV CND connects to the NGN through CNG over $G_{m'}$. The CNG-SIP Proxy B2BUA, CNG-ACF, CNG-PCF as defined in TS 185 003 [6] may perform functionality such as NAT/FW traversal, CNG internal QoS or IETF SIP to IMS SIP conversion.

- **Intra CPN mode:** At service layer, the 2 devices interact with or without the support of the CNG.

NOTE: Specifications for the intra CPN mode are not part of the present document but in this case, for example, IPTV CND could follow DLNA (Digital Living Network Alliance) interoperability guidelines.

5 IPTV Customer Network Device Architecture

The present document categorizes IPTV-CNDs into two types depending on TISPAN IPTV solutions that have been developed by WG2. They are:

- Devices compatible with the IPTV dedicated subsystem solution.
- Devices compatible with the IMS based IPTV solution.

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