

ETSI TS 182 027 V2.0.0 (2008-02)

Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; IPTV functions supported by the IMS subsystem

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ReferenceDTS/TISPAN-02048-NGN-R2

Keywordsarchitecture, IMS, IP, TV

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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 specifies the architecture and functions of an IPTV system that makes use of the NGN IMS architecture and its features.

The present document has taken IPTV solutions defined by other organizations (such as DVB, ATIS IIF etc) into account. It is based on an IMS based architecture and where appropriate the aforementioned solutions are referenced.

By relying on common components the resulting architecture can coexist with other TISPAN NGN services.

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 ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".
- [2] ETSI TS 182 006 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Stage 2 description (3GPP TS 23.228 v7.2.0, modified)".
- [3] ETSI ES 282 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".
- [4] ETSI TS 133 220: "Universal Mobile Telecommunications System (UMTS); Generic Authentication Architecture (GAA); Generic bootstrapping architecture (3GPP TS 33.220)".
- [5] ETSI TS 187 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Security; Security Architecture".

- [6] ETSI TS 102 034: "Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks".
- [7] ITU-T Recommendation P.10/G.100 "Vocabulary for performance and quality of service " - New Appendix I - Definition of Quality of Experience (QoE).
- [8] ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-system (RACS); Functional Architecture".
- [9] ETSI TS 183 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services: Communication Diversion (CDIV); Protocol specification".
- [10] ETSI TS 182 008: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Presence Service; Architecture and functional description (Endorsement of 3GPP TS 23.141 and OMA-AD-Presence-SIMPLE-V1-0)".
- [11] ETSI ES 282 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".
- [12] ETSI TS 123 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia Subsystem (IMS); Stage 2 (3GPP TS 23.228 version 7.9.0 Release 7)".
- [13] ETSI ES 283 030: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Presence Service Capability; Protocol Specification [3GPP TS 24.141 V7.0.0, modified and OMA-TS-Presence_SIMPLE-V1_0, modified]".

2.2 Informative references

- [14] DSL Forum Technical Report TR-126: "Triple-play Services Quality of Experience (QoE) Requirements".
- [15] ETSI TS 181 016: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Service Layer Requirements to integrate NGN services and IPTV".
- [16] ETSI ES 282 010: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Charging management Endorsement of 3GPP TS 32.240 Release 7, 3GPP TS 32.260 Release 7, 3GPP TS 32.297 Release 7, 3GPPTS 32.298 Release 7 and 3GPP TS 32.299 Release 7, modified".
- [17] 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 terms and definitions apply:

offset: value indicating the elapsed time between the beginning of content and the current reading position of the reading cursor in that same streamed content

park TV: feature that would enable a user (on a UE) make an impulsive request to record ongoing BC service/programme from a particular point in time

NOTE: This recording point is also referred to as a bookmark.

park and pickup TV: feature that would enable a user (on a UE) to Park TV and subsequently Pickup TV

pickup TV: feature that would enable a user (on a UE) retrieve or request BC service/programme that was recorded and bookmarked via an impulsive record request

NOTE: The IPTV content can be retrieved from the bookmarked location or recording point on same or different UE at a later point in time.

programme: entry in the Electronic Programme Guide

3.2 Abbreviations

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

BC	BroadCast
CoD	Content on Demand
CSF	Content Security Functions
ECF	Elementary Control Function
EF	Elementary Functions
EFF	Elementary Forwarding Function
EPG	Electronic Programme Guide
GAA	Generic Authentication Architecture
GBA	Generic Bootstrapping Architecture
HD	High Definition
IGMP	Internet Group Management Protocol
IMS	IP Multimedia Subsystem
MCF	Media Control Function
MCN	Media Channel Negotiation
MDF	Media Delivery Function
MF	Media Function
NASS	Network Attachment SubSystem
NGN	Next Generation Network
N-PVR	Network-Personal Video Recorder
PVR	Personal Video Recorder
QoE	Quality of Experience
QoS	Quality Of Service
RACS	Resource and Admission Control Subsystem
SCF	Service Control Function
SD	Standard Definition
SDF	Service Discovery Function
SIP	Session Initiation Protocol
SLF	Subscription Locator Function
SSF	Service Selection Function
TPF	Transport Processing Functions
UE	User Equipment
UPSF	User Profile Server Function
URI	Uniform Resource Identifier
XDMS	XML Document Management Server

4 High-level overview

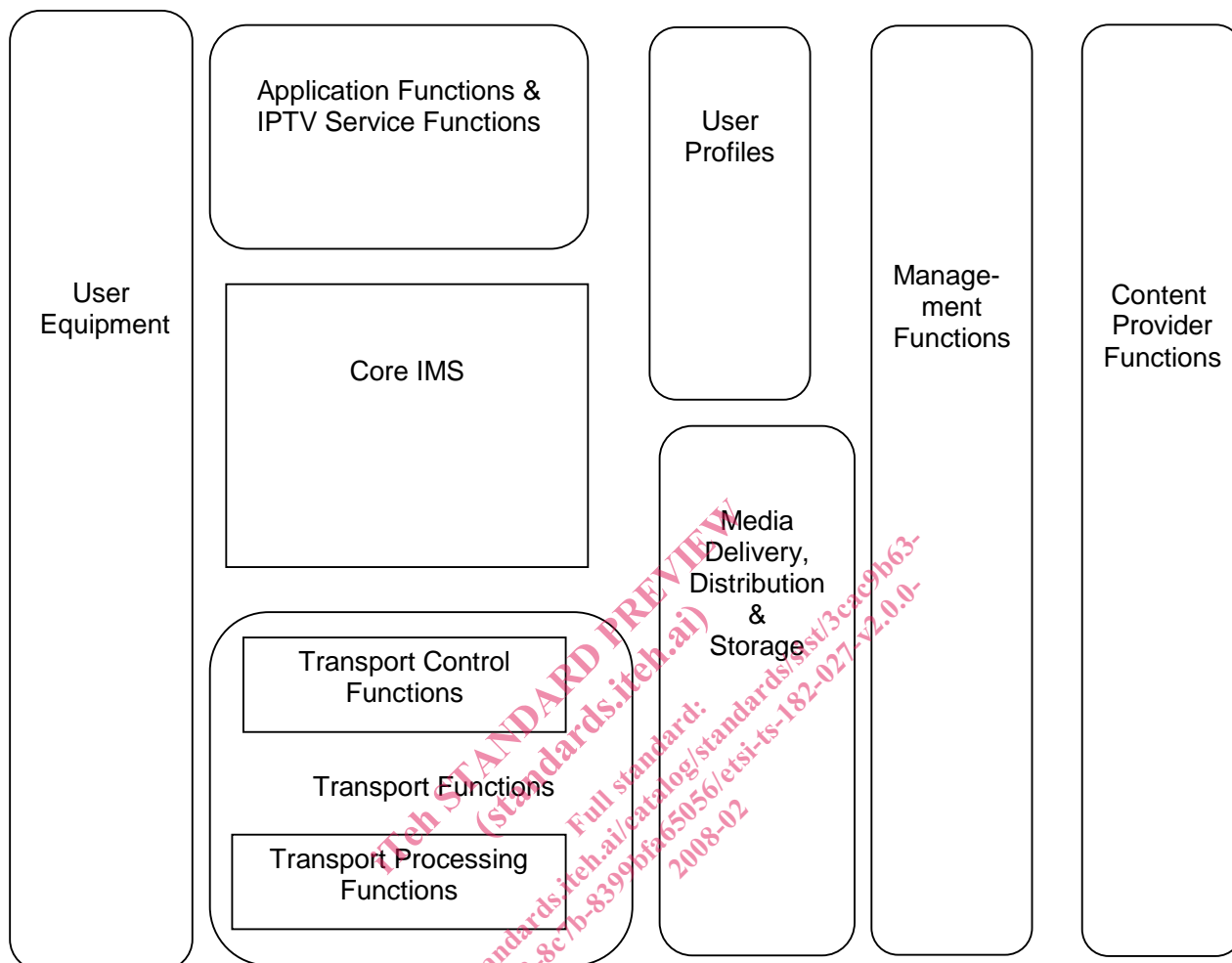


Figure 1: High level functional architecture for IMS-based IPTV

NOTE 1: The specification of management functions and content provider functions is considered out of scope of the present document

User equipment:

UE: The IPTV enabled UE terminates the IPTV control and media signals, and displays the corresponding information to the user. The UE interaction with the user allows selection of programme, content, and service descriptions, such as content guides for broadcast and VoD services.

Application functions & IPTV service functions:

Enables operation of or provides IPTV services. This includes IPTV Service Supporting Functions.

IPTV Service Supporting Function: The IPTV Service Supporting Function defined here are those common functions which could support or be used by other IPTV service or applications.

NOTE 2: Examples of IPTV service supporting functions may be Service Discovery and Selection functions.

User Profiles:

User Profiles includes user data that are involved in providing IPTV services.

Core IMS:

It provides functionality for authentication, authorization, and signalling for the setup of the service provisioning and content delivery. It routes signalling messages to the appropriate application server or triggers the applications based on settings maintained in the UPSF. For resource reservation and admission control this function interacts with the RACS.

Transport Functions:

Transport Control: contains functions from RACS and NASS. It provides policy control, resource reservation and admission control as well as IP address provisioning, network level user authentication and access network configuration as defined in TISPAN.

Transport Processing Functions: represents network access links and IP core. The IP core is in charge of data transmission with quality of service support.

Media Delivery, Distribution and Storage:

The Media Delivery, Distribution and storage function receives and stores live feeds and media streams coming into the IPTV System from Content Providers. It is mainly in charge of media processing, delivery, storing, trans-coding and relaying. This function performs all these tasks along with the control of - or feedback to the IPTV Service and Control. Content protection may also be performed here or already protected content could be delivered over these functionalities.

5 Overview of functional entities

5.1 Functional architecture for IPTV services

5.1.1 Functional architecture overview

The overall functional architecture for IPTV service is shown in figure 2.

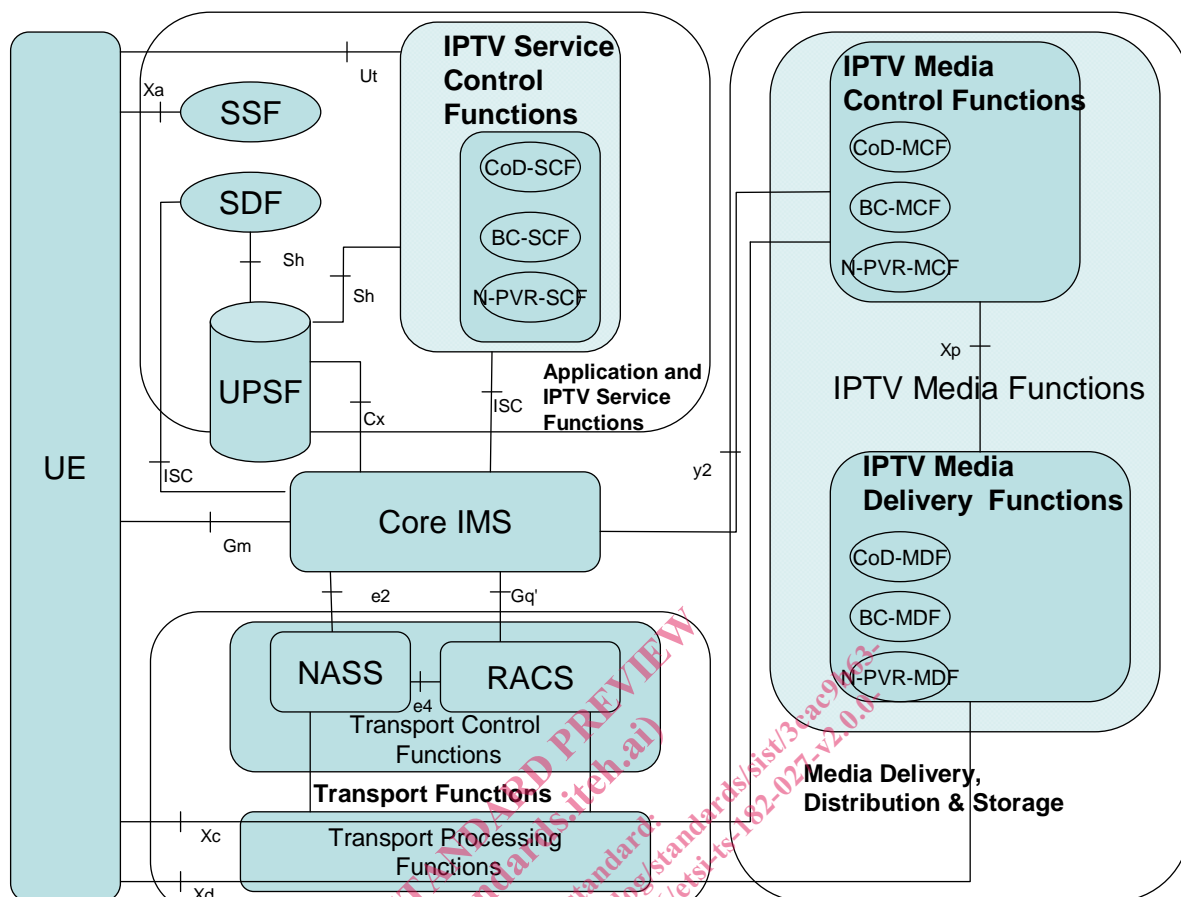


Figure 2: Functional architecture for IPTV services

NOTE 1: Only Xc and Xd are explicitly shown as traversing the Transport Processing Functions. For the sake of simplicity other reference points are only shown as end to end.

In figure 2, the IPTV Service Control Functions, the IPTV Media Functions, the Service Selection Function (SSF) and the Service Discovery Function (SDF) fit in the context of TISPAN NGN Functional Architecture Release 2 [1].

NOTE 2: To support the regionalized delivery of content and metadata in accordance with applicable regulations, at least one of the service layer entities involved in the IPTV service should query the UE location from the NASS and enforce the regionalization.

As stated in [2], the IMS architecture shall be based on the principle that the service control for Home subscribed services for a roaming subscriber is in the Home network. This principle shall be applied also in case the IPTV solution supports roaming.

5.1.2 IPTV services

5.1.2.1 Content on Demand (CoD)

The CoD (Content on Demand) is an IPTV service function which is split into a service control part (CoD-SCF), a media control part (CoD-MCF) and a media delivery function (CoD-MDF). The CoD-SCF exchanges messages with Core IMS. The service request/response messages between the UE and the CoD-SCF are transferred via the Core IMS. Media Control messages are exchanged between the UE and the CoD-MCF via the Xc reference point. Media Data is exchanged between UE and CoD-MDF via the Xd reference point.

5.1.2.2 Broadcast (BC)

The BC (Broadcast Serving Function) is a function which hosts Broadcast IPTV services and is split into a service control part (BC-SCF), a media control part (BC-MCF) and a media delivery function (BC-MDF). The BC-SCF exchanges messages with Core IMS. The service request / response messages between the UE and the BC-SCF are transferred via the Core IMS. Media Data is exchanged between UE and BC-MDF via the Xd reference point.

5.1.2.3 Network Personal Video Recorder (N-PVR)

The N-PVR (Network-Personal Video Recorder Function) is a function which hosts IPTV N-PVR services and is split into a service control part (N-PVR-SCF), a media control part (N-PVR-MCF) and a media delivery function (N-PVR-MDF). The N-PVR-SCF exchanges messages with Core IMS. The service request/response messages between the UE and the N-PVR-SCF are transferred via the Core IMS. Media Control messages are exchanged between the UE and the N-PVR-MCF via the Xc reference point. Media Data is exchanged between UE and N-PVR-MDF via the Xd reference point.

5.1.3 Functional entities

5.1.3.1 Service Discovery and Selection Functions (SDF and SSF)

The Service Discovery Function (SDF) and Service Selection Function (SSF) are functions which provide information necessary to the UE to select an IPTV service.

Tasks of the SDF:

- Generates and/or provides the service attachment information.
- Provides personalized service discovery.

The service attachment information consists of SSF addresses in the form of URIs and/or ip-addresses.

Tasks of the SSF:

- Provides the service selection information, e.g. a list of available services that the UE can then browse and select. The SSF may optionally generate this service selection information. It may also retrieve and forward the service selection information.
 - Provides personalized service selection information and/or information needed to personalize the service selection. This must be delivered via unicast mode. (See note 1 regarding multicast options.)
 - Provides non-personalized service selection data. This can be delivered via multicast or unicast mode.
- Optionally provides service selection presentation information. This presentation information may be personalized when it is delivered over unicast mode. Optionally receives selection request from UE, e.g. an N-PVR content capture request as described in clause 8.5.

NOTE 1: The way the service selection information might be personalized when it is delivered via multicast mode is out of scope for this release. However, specified below is a non exhaustive list of high-level options to achieve such personalization:

- Using the SDF: when processing a request from a particular user/UE, the SDF could redirect the user/UE to specific multicast addresses/SSFs corresponding to the category to which the user belongs. This would imply that users/UEs are classified into specific categories.
- Using the SCF: UE could fetch IPTV user profile information in the form of BC Service ID listings from the SCF. This may be encoded as XML document(s) via the Ut reference point using XCAP-like mechanism or as HTML document with possibly embedded scripts to filter this service selection data. This IPTV user profile information may then be used to locally filter the service selection data that was previously delivered via multicast mode.

NOTE 2: EPG is defined in TS 181 016 [15].