

# ETSI TS 182 028 V3.3.1 (2009-10)

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*Technical Specification*

## **Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN integrated IPTV subsystem Architecture**

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# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Introduction .....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	8
2.2 Informative references .....	9
3 Definitions and abbreviations.....	9
3.1 Definitions .....	9
3.2 Abbreviations .....	9
4 NGN IPTV subsystem.....	11
4.1 Concept and Architectural Approach .....	11
4.2 High Level Architecture Overview .....	11
4.3 Functional groups .....	12
4.3.1 Application Functions.....	12
4.3.2 IPTV Service Control and Media Delivery Functions .....	12
4.3.3 Transport Functions .....	12
4.3.4 End User Functions.....	13
4.3.5 Management Functions .....	13
4.3.6 Content Provider Functions .....	13
4.4 IPTV services .....	13
5 NGN Integrated IPTV subsystem functional architecture .....	14
5.1 Functional entities .....	16
5.1.1 Core IPTV functions .....	16
5.1.2 Supporting IPTV functions .....	18
5.1.3 Transport functions .....	18
5.1.4 Customer Transport functions.....	19
5.2 Reference points .....	19
5.2.1 Tr - IPTV transactional .....	19
5.2.2 Ct2 - UE facing IPTV control.....	20
5.2.3 Sa - IPTV control and Media Control Function.....	20
5.2.4 Ss - Service selection .....	20
5.2.5 Xc - UE and IPTV Media Control Function .....	20
5.2.6 Xp - IPTV Media Control Function and IPTV Media Delivery Function .....	21
5.2.7 Xd - UE and IPTV Media Delivery Function .....	21
5.2.8 e2 - NASS access .....	21
5.2.9 e4 - NASS and RACS .....	21
5.2.10 Gq' - RACS .....	22
5.2.11 Ud - access to IPTV user data .....	22
5.2.12 Ug - access to NGN user data .....	22
5.2.13 Ss' - access to SD&S data .....	22
5.3 Generic IPTV Capabilities .....	23
5.3.1 Inter-destination media synchronization .....	23
5.3.1.1 Synchronization architecture .....	23
5.3.1.1.1 Functional entities MSAS and SC .....	23
5.3.1.1.2 Mapping onto the IPTV architecture .....	24
5.3.1.1.3 Modification and re-origination of media streams .....	24
5.3.1.2 Synchronization reference points .....	25
5.3.1.2.1 MSAS-SC reference point (Sync) .....	25
5.3.1.2.2 MSAS-SC' reference point (Sync') .....	25
5.4 Elementary functions.....	25
6 Operational framework.....	27

6.1	IPTV delivery modes.....	27
6.2	Operational modes.....	27
6.2.1	Coupled mode.....	28
6.2.2	Decoupled mode.....	29
6.2.3	Redirect mode.....	30
6.2.4	Proxy mode.....	30
6.3	Service initialization.....	31
6.3.1	Functional steps for UE start-up.....	31
6.3.2	Service discovery and selection.....	32
6.4	Nomadism.....	33
6.5	Support of Mobility Capabilities.....	33
7	Security.....	33
7.1	Content Protection.....	33
7.2	Service Protection.....	34
8	Management.....	34
9	User data.....	35
9.1	IPTV profiles.....	35
9.2	User data location.....	36
10	Charging.....	36
11	Procedures.....	37
11.1	Linear TV.....	37
11.2	Multimedia content on demand (CoD).....	38
11.2.1	Optimized bandwidth utilization during CoD.....	40
11.3	Media broadcast with trick modes.....	41
11.4	Near CoD.....	42
11.5	Push CoD.....	44
11.5.1	Push CoD procedures using notification.....	44
11.6	User generated content.....	45
11.6.1	Overview.....	45
11.6.2	UGC creation procedure.....	45
11.6.3	UGC watching procedure.....	47
11.7	Pay Per View.....	48
11.8	Messaging and notification services.....	49
11.8.1	Messaging procedures.....	49
11.8.2	Notification procedures.....	49
11.9	Recommendations.....	50
11.9.1	Recommendations overview.....	51
11.9.2	Recommendations procedures.....	51
11.10	Advertising.....	53
11.10.1	Advertising procedures.....	53
11.10.2	Network side unicast based advertisement.....	54
11.10.3	Advertising procedures using notification.....	56
11.11	Procedures for inter-destination media synchronization.....	56
11.11.1	Mapping 1: SC in UE.....	56
11.11.2	Mapping 2: SC in Transport.....	57
11.12	Service continuation.....	57
11.12.1	Procedure for unicast service continuation between NGN IPTV UEs.....	57
11.12.2	Service continuation between fixed NGN between fixed NGN Integrated IPTV UE and 3GPP mobile UE.....	59
11.13	Remote control of IPTV services.....	60
11.13.1	Procedure for Remote Mobile Control of IPTV (Provisioning).....	60
11.13.2	Procedure for Remote Mobile Control of IPTV (Operations).....	61
11.14	Personalized Channel.....	62
11.15	Time Shift TV.....	63
11.16	PVR service.....	63
11.17	Emergency alert.....	64
11.18	Content Bookmark.....	64
11.19	Interactive TV procedures.....	65

<b>Annex A (informative):</b>	<b>Interactions between other TISpan services and IPTV services.....</b>	<b>67</b>
A.1	Interactions based on an OSA/Parlay/Parlay X SCS.....	67
<b>Annex B (informative):</b>	<b>Interaction procedure between IPTV and other service level subsystems .....</b>	<b>69</b>
<b>Annex C (informative):</b>	<b>Presence attributes for IPTV .....</b>	<b>71</b>
<b>Annex D (informative):</b>	<b>Possible evolution path for NGN Integrated IPTV .....</b>	<b>72</b>
D.1	Evolution of IPTV architectures towards NGN .....	72
D.2	Possible migration and switch over scenarios .....	73
<b>Annex E (informative):</b>	<b>Mapping of elementary functions.....</b>	<b>74</b>
E.1	Mapping between elementary functions and generic capabilities .....	74
E.2	Mapping between elementary functions and functional entities .....	76
E.3	Mapping between elementary functions and IPTV services .....	77
<b>Annex F (informative):</b>	<b>NGN integrated IPTV mapping to other IPTV architectures .....</b>	<b>79</b>
F.1	Mapping between NGN integrated IPTV subsystem and ITU-T non-IMS IPTV architecture .....	79
<b>Annex G (informative):</b>	<b>Interconnection Models supporting Mobility Capabilities .....</b>	<b>81</b>
<b>Annex H (informative):</b>	<b>SCTE based targeted advertising architecture .....</b>	<b>82</b>
H.1	Definitions.....	82
H.2	SCTE-130 based Advertising Architecture.....	82
H.3	Reference points.....	83
H.3.1	IPTV Applications - SCTE-130 ADS (ADx).....	83
H.3.2	IPTV Media Function (MF) - SCTE-130 ADS (ADy).....	83
H.3.3	MF Ad Splicer - TISpan Ad MF (ADc).....	84
H.3.4	IPTV User Equipment (UE) - SCTE-130 ADS (ADz).....	84
H.4	Mapping between TISpan entities and SCTE-130 entities .....	84
<b>Annex I (informative):</b>	<b>NGN integrated IPTV support for hybrid services .....</b>	<b>85</b>
<b>Annex J (informative):</b>	<b>Bibliography.....</b>	<b>86</b>
<b>Annex K (informative):</b>	<b>Change history .....</b>	<b>87</b>
History .....		88

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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).

The present document defines the TISPAN NGN Release 3 IPTV architecture: Integrated subsystem for IPTV functions in NGN.

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## Introduction

The present document provides an architectural framework for the end-to-end Internet Protocol Television (IPTV) subsystem within the Next Generation Networks architecture. The IPTV framework is designed for interoperability with other NGN service subsystems and components.

The present document identifies functional entities and reference point, which needs to be exposed from IPTV subsystem.

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# 1 Scope

The present document describes the IPTV functional architecture and functions of an NGN Integrated IPTV system by integrating of IPTV functions into the NGN architecture. For example, interactions and information flows between the IPTV functional entities and other functional entities will be specified. The specification starts from outlining high-level IPTV functional architecture, functional groups and is further developed into the more detailed functional architecture, reference points and operational modes.

The architecture is intended to support requirements defined by the respective ETSI TISPAN requirement definitions [1] and allow integration new or existing IPTV solutions (such as those defined by DVB, ATIS IIF, ITU, etc.) within the NGN architecture.

The resulting architecture should, should rely as much as possible on common components and integrates, coexist with other TISPAN NGN services.

The following areas are covered:

- Authentication and authorization.
- Content Protection (including DRM).
- Capability exchange.
- Resource Management.
- Policy Management.
- Charging.
- User Profiles.

The architecture focuses on closer integration between IPTV services and NGN networks, migration scenarios from existing solutions (i.e. DVB-IPI, ATIS-IIF) into NGN and common components.

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# 2 References

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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 (Release 3): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Service Layer Requirements to integrate NGN services and IPTV".
- [2] ETSI TS 102 034: "Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks".
- [3] ETSI TS 122 240: "Universal Mobile Telecommunications System (UMTS); Service requirements for 3GPP Generic User Profile (GUP); Stage 1 (3GPP TS 22.240)".
- [4] ETSI TS 123 240: "Universal Mobile Telecommunications System (UMTS); 3GPP Generic User Profile (GUP) requirements; Architecture (Stage 2) (3GPP TS 23.240)".
- [5] ETSI ES 282 001 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".
- [6] ETSI TS 182 027 (Release 3): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; IPTV functions supported by the IMS subsystem".
- [7] IETF RFC 2782: "A DNS RR for specifying the location of services (DNS SRV)".
- [8] ETSI ES 282 007 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".
- [9] ETSI ES 282 004 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".
- [10] ETSI ES 282 003 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-system (RACS); Functional Architecture".
- [11] ETSI TS 187 003 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Security; Security Architecture".
- [12] ETSI ES 282 010 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Charging [Endorsement of 3GPP TS 32.240 v6.3.0, 3GPP TS 32.260 v6.3.0, 3GPP TS 32.297 v6.1.0, 3GPP TS 32.298 v6.1.0 and 3GPP TS 32.299 v6.4.0 modified]".
- [13] ETSI TS 132 240: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Charging management; Charging architecture and principles (3GPP TS 32.240)".
- [14] ETSI TS 183 064 (Release 2): "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Dedicated IPTV subsystem: stage 3 specification".



## 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] "An application-level QoS comparison of inter-destination synchronization schemes for continuous media multicasting", Toshiro Nunome; Shuji Tasaka, IEICE transactions on communications, ISSN 0916-8516, Vol. 87 (2004), No. 10, pp. 3057-3067 (11).
- [i.2] ETSI ES 204 915 (all parts): "Open Service Access (OSA); Application Programming Interface (API) (Parlay 6)".
- [i.3] ETSI ES 202 504 (all parts): " Open Service Access (OSA); Parlay X Web Services; (Parlay X 3)".
- [i.4] ETSI TR 187 013: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Feasibility study on IPTV security architecture".
- [i.5] SCTE-130 part 1: "Digital Program Insertion - Advertising Systems Interfaces; Part 1 Advertising Systems Overview".
- [i.6] SCTE-130 part 2: "Digital Program Insertion - Advertising Systems Interfaces; Part 2: Core Data Elements".
- [i.7] SCTE-130 part 3: "Digital Program Insertion - Advertising Systems Interfaces; Part 3: Ad Management Service (ADM) Interface".
- [i.8] SCTE-35: "Digital Program Insertion Cueing Message for Cable".
- [i.9] ETSI TS 182 028 (V2.0.0): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; Dedicated subsystem for IPTV functions".
- [i.10] ITU-T Recommendation Y.1910: "IPTV functional architecture".

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## 3 Definitions and abbreviations

### 3.1 Definitions

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

**IPTV content identifier:** super class of the identifiers that identify content in specific IPTV services

**media stream identifier:** identifier carried in a unicast or multicast media stream that identifies that specific media stream

### 3.2 Abbreviations

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

ADM	Ad Management Service
ADS	Ad Decision Service
A-RACF	Access Resource And Admission Control Function
AS	Application Server
ASF	Application Server Function
BC	Broadcast
BCG	Broadcast Content Guide
BPG	Broadcast Program Guide
BTV	Broadcast TV

CA	Conditional Access
CDR	Content Data Records
CF	Customer Facing
CFIA	Customer Facing IPTV Application
CIS	Content Information Service
CM	Content Marking
CoD	Content on Demand
CR	Content Recommendation
CRS	Content and Service Recommendation Service
CSCF	Call Setup Control Function
CSP	Content and Service Protection
DHCP	Dynamic Host Configuration Protocol
DNG	Delivery Network Gateway
DNS	Domain Name Server
DRM	Digital Rights Management
EPG	Electronic Program Guide
FE	Functional Entity
GUP	Generic User Profile
HD	High Definition
ID	IDentification
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPTV	IP Television
IPTVC	IPTV Control
IUDF	IP User Data Function
MCF	Media Control Function
MDF	Media Delivery Function
MF	Media Function
MSAS	Media Synchronization Application Server
NASS	Network Attachment SubSystem
NAT	Network Address Translation
nCoD	Near CoD
NGN	Next Generation Network
NPT	Normal Playout Time
nPVR	networked Personal Video Recorder
PCh	Personalized Channel
pCoD	Push CoD
PES	PSTN/ISDN Emulation Subsystem
POIS	Placement Opportunity Information Service
PPV	Pay Per View
PSS	Packet-switched Streaming Service
PVR	Personal Video Recorder
QOE	Quality of Experience
QoS	Quality of Service
RACS	Resource and Admission Control Subsystem
RTCP	Real Time Control Protocol
RTP	Real Time Protocol
SC	Synchronization Client
SCF	Service Control Function
SCP	Service & Content Protection
SCS	Service Capability Server
S-CSCF	Serving CSCF
SCTE	Society of Cable Telecommunications Engineers
SD	Standard Definition
SD&S	Service Discovery and Selection
SDF	Service Discovery Function
SIS	Subscriber Information Service
SKMF	Service Key Management Elementary Functions
SMF	Service Membership Elementary Functions
SP	Service Provider
SPD	Service Provider Discovery
SPF	Service Protection Elementary Functions

SRV	Service Record
SSF	Service Selection Function
TAI	Targeted Advertising
TPF	Transport Processing Function
iTV	Interactive TV
UCG	User Created Content
UDAF	User Data Access Function
UDF	User Data Function
UE	User Equipment
UGC	User Generated Content
UPSF	User Profile Server Function
URL	Uniform Resource Locator
XDMS	XML Document Management Server

## 4 NGN IPTV subsystem

This clause outlines architectural approach adopted in the present document. The approach is then applied to introduce high level IPTV architecture and functional groups in NGN architecture.

### 4.1 Concept and Architectural Approach

The document focuses on defining flexible functional architecture, which can:

- allow development of new IPTV subsystem in NGN;
- integrate existing IPTV subsystem in NGN;
- extend both to support other NGN services;

as defined in the service level requirements [1].

The support for other NGN services has a wide meaning, e.g. the functional architecture would allow coupling functionality of IPTV subsystem with functionality of PES or IMS subsystem, which in-turn may support some IPTV features as defined in [6].

In order to achieve high level of flexibility, the work is focused on identifying and standardizing functional entities and reference points, which needs to be exposed from IPTV subsystem to the rest of NGN. Internal IPTV functional entities and reference points are identified and described for the completeness of the end to end architecture without intend to standardize them.

The architectural approach considers IPTV subsystem as a functional area, which is integrated into NGN via standardized reference points and delivers service level requirements, while allowing internal flexibility and extensions for new service types.

The IPTV integrated subsystem is based upon IPTV domains defined in TS 181 016 [1], clause 4.1 IPTV Roles.

### 4.2 High Level Architecture Overview

Figure 1 presents high-level NGN IPTV functional overview and location of IPTV capabilities in the TISPAN NGN. The high level overview illustrates principal functional groups for NGN IPTV services. The functional groups map to IPTV roles as defined in clause 4.3.

The functional groups are used to derive more detailed functional architecture, however, allocation of functions across operational and organizational boundaries will vary between implementations.

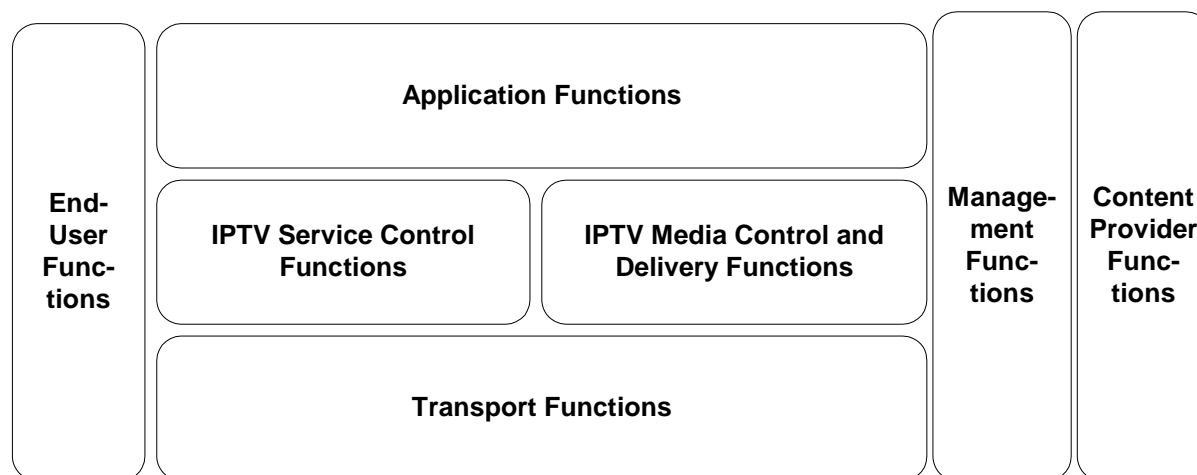


Figure 1: High-level NGN based IPTV functional architecture

## 4.3 Functional groups

In the context of the present document functional groups are used to describe several functional entities grouped together according to some condition, e.g. location in the certain functional layer.

### 4.3.1 Application Functions

Within the present document, the term "Application Functions" includes IPTV and NGN Application Functions.

**NGN Applications:** provides the user with rich multimedia applications distributed across multiple NGN subsystems. For example, session follow up or messaging exchange between fixed and mobile terminals, presentation of incoming calls and phone list management on TV, IPTV or gaming applications based on user presence. NGN applications also provide operators with centralized NGN management interface to multiple subsystems for content management, charging, interactions with IMS services, others. NGN applications may include application functions used across multiple service domains for applications interactions, e.g. IMS and IPTV interactions. NGN applications may include service mediation and coordination functionality.

**IPTV Applications:** customer facing and operator facing.

Customer facing IPTV applications provides the server side functions to enable customer facing IPTV applications, expose IPTV services to other NGN application and manage IPTV subsystem. Customer facing IPTV applications provide service provisioning, selection and authorization of IPTV services.

Operator facing IPTV applications provide operator control over IPTV subsystem in NGN, content preparation and media management, content licensing, subscriber management, offer creation, user profiles.

Server side IPTV applications expose IPTV services to NGN.

### 4.3.2 IPTV Service Control and Media Delivery Functions

Enables operation of IPTV services in NGN. The key functionality of this layer is to provide, but not limited to, media distribution, selection and allocation of media delivery units, IPTV session control and management, interactions with other NGN components for admission control and resource allocation, as well as collecting charging and QoS information.

### 4.3.3 Transport Functions

**Transport Control Functions:** contains common NGN components RACS and NASS, 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 layer definition includes definition from [5].

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

#### 4.3.4 End User Functions

**Customer transport:** provides connection to one or multiple access networks and one or multiple home network segments.

**UE:** provides user interactions and control over delivery of IPTV and other NGN services. IPTV terminal processes serviced multimedia and presents it in user acceptable format. User interactions may include service discovery, selection and authorization. Multimedia processing may include requesting multimedia asset in supported encoded format, decoding and presenting it to the user in acceptable format, trick mode operators, channel change.

#### 4.3.5 Management Functions

The IPTV Management Functions include:

**Service Fulfilment:** the functions required to fulfil the IPTV service to the End-User.

**Service Assurance:** the functions required to assure the IPTV service provided to the End-User.

**Service Billing:** the functions required to ensure proper billing to the end user of delivered IPTV services.

#### 4.3.6 Content Provider Functions

The functions provided by the entity that owns or is licensed to sell content or content assets. These are normally the sourcing of content, metadata and usage rights.

### 4.4 IPTV services

NGN integrated IPTV supports the following IPTV services [1]:

- Broadcast TV (with or without trick modes).
- Content on Demand (CoD).
- Personal Video Recording (cPVR, nPVR).
- Pay Per View (PPV).
- Interactive TV (iTV).
- near CoD (nCoD).
- push CoD (pCoD).
- User Generated Content (UGC).
- Profiling and personalization.
- Content Recommendations (CR).
- Advertising (Ad) and Targeted Advertising (TAI).
- Messaging services.
- Notification services.
- Personalized channel.
- Bookmarks or Content Marking (CM).

Table 1A provides list of services and feature supported by NGN integrated architecture.