

## **Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Services and Capabilities Requirements**

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**ETSI**

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

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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).

The present document describes the Service and Capabilities Requirements of TISPAN NGN Release 1.

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## Introduction

The present document specifies the requirements that need to be fulfilled by NGN technical specifications to provide services in an NGN.

The present document considers two service sets: IP Multimedia Services and PSTN/ISDN Emulation services. Each of these service sets has its own clause, which is further divided into clauses providing clear and precise requirements for each of these two service sets. Further clauses provide generic network requirements to support service deployment and interoperability.

The present document provides generic requirements on networks from a services point of view. Specific details of individual services and capabilities are provided in other documents.

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# 1 Scope

The present document specifies network requirements in terms of service-related capabilities for TISPAN NGN. The present document places requirements for all TISPAN NGN Release 1 subsystems.

The present document provides generic requirements for services and interoperability in TISPAN NGN in terms of the capabilities for a network or networks.

Requirements on service-related subsystems provide sufficient detail for architecture, networking requirements and protocols to be specified. Requirements on service independent subsystems are contained within the service-related subsystem requirements.

Specific service requirements may be contained in other documents, as identified in the present document, and by other documents referencing the present document.

The present document does not define services, only capabilities and requirements. The present document does not place requirements on terminals or other customer-owned equipment. The present document specifies the service-related requirements that are used to determine the network architecture, requirements and control protocols for a network interface to a customer environment.

NOTE: The present document uses the term "NGN" only in the context of TISPAN.

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# 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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NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

## 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 TR 180 000: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Terminology".
- [2] ETSI TS 122 340: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) messaging; Stage 1 (3GPP TS 22.340)".
- [3] ETSI TS 102 424: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements of the NGN network to support Emergency Communication from Citizen to Authority".

- [4] ETSI TS 188 003 (V1.y.z): "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); OSS requirements; OSS definition of requirements and priorities for further network management specifications for NGN".

NOTE: The latest version in the V1.y.z series applies.

- [5] ETSI TS 122 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Service requirements for the Internet Protocol (IP) multimedia core network subsystem (IMS); Stage 1 (3GPP TS 22.228 version 7.3.0 Release 7)".
- [6] ETSI TS 122 495: "Universal Mobile Telecommunications System (UMTS); TISPAN; Services and Capabilities Requirements (3GPP TS 22.495 version 7.0.0 Release 7)".
- [7] ETSI TS 187 005 (V1.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Release 2 Lawful Interception; Stage 1 and Stage 2 definition".

NOTE: The latest version in the V1.y.z series applies.

- [8] IETF RFC 2486: "The Network Access Identifier".

## 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.

Not applicable.

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 122 228 [5], TR 180 000 [1] and the following apply:

**IP multimedia application:** See TS 122 228 [5].

**IP multimedia service:** See TS 122 228 [5].

**IP multimedia session:** See TS 122 228 [5].

**IP Multimedia Core Network Subsystem (IM CN Subsystem):** See TS 122 228 [5].

**nomadism:** See TR 180 000 [1].

**portability:** See TR 180 000 [1].

### 3.2 Abbreviations

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

ACR	Anonymous Communications Rejection service requirements
AMR	Adaptive Multi-Rate
AN	Access Network
CN	Core Network
CS	Circuit Switched
DSL	Digital Subscriber Line
IM	IP Multimedia
IMS	IP Multimedia Subsystem

IP	Internet Protocol
IPCAN	IP-Connectivity Access Network
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network
MCID	Malicious Communication Identity service requirements
NAI	Network Access Identifier
NAT	Network Address Translation
NGN	Next Generation Network
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
QoS	Quality of Service
SLA	Service Level Agreements
TDM	Time Division Multiplexing
URI	Uniform Resource Identifier

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## 4 Capabilities for the support IP Multimedia Services

This clause covers the requirements of the IP Multimedia services supported by the NGN.

### 4.1 Business models

As specified in TS 122 495 [6].

### 4.2 Service requirements

As specified TS 122 495 [6].

#### 4.2.1 General services requirements

As specified in TS 122 495 [6].

#### 4.2.2 Handling of sessions

As specified in TS 122 495 [6].

#### 4.2.3 PSTN/ISDN Simulation Service

As specified in TS 122 495 [6].

#### 4.2.4 IMS messaging

As specified in TS 122 495 [6].

#### 4.2.5 Presence Service

As specified in TS 122 495 [6].

#### 4.2.6 Location Service

As specified in TS 122 495 [6].

#### 4.2.7 VideoTelephony Service

As specified in TS 122 495 [6].



## 4.3 Mobility

As specified in TS 122 495 [6].

## 4.4 Number, naming and addressing

As specified in TS 122 495 [6].

## 4.5 Terminal requirements

The present document does not specify terminal requirements. However, NGN terminals (not precluding network adaptors) that comply with the NGN IMS UNI interface offered by the network, shall be supported by the NGN.

The NGN IMS UNI interface is not required to support 3GPP mobile terminals in Release 1.

It is a service provider option to support a 3GPP IPCAN for a user to access the NGN IMS. The NGN IMS shall support 3GPP mobile terminals connected via the 3GPP IPCAN.

Terminal developers guidelines are provided in annex B.

## 4.6 Regulatory service requirements

As specified in TS 122 495 [6].

## 4.7 Access network requirements

Any access to the NGN core shall provide IP connectivity, i.e. allow transport of IP packets between end user equipment and the NGN core.

Solutions for access to the NGN core shall support the assignment of IP addresses to the end user equipment by the access network. These addresses may not be routable in the public Internet.

Solutions for access to the NGN core shall not require changes to existing access technology infrastructure. All solutions for access to the NGN core shall support the presence of NAT and firewalls in the access network environment. Impacts on access networks shall be minimized.

An NGN deployment shall not inhibit user access to the Internet and other IP networks through existing mechanisms, e.g. ISP offering of internet access to DSL users.

## 4.8 Customer Networks

### 4.8.1 General

Access from a customer network to the NGN core shall provide IP connectivity, i.e. allow for transport of IP packets from the end user equipment.

Solutions for access from a customer network to the NGN shall be able to cope with the assignment of IP addresses to the end user equipment by the customer network. These addresses may not be routable in the public Internet.

Solutions for access from a customer network to the NGN shall not require technological changes to existing customer network technologies.

Solutions for access from a customer network to the NGN shall have minimal impact on existing customer network deployments.

## 4.8.2 Home and Small Office Networks

Solutions for access from a Home and Small Office network to the NGN shall be able to cope with NAT and firewalls in the home/small office environment.

Solutions for access from a Home and Small Office network to the NGN shall support the following configurations:

- Direct connectivity and interaction between the individual terminals and the NGN.
- Indirect connectivity and interaction between the individual terminals and the NGN (e.g. via IP PBXs).

## 4.8.3 Corporate Networks

Solutions for access from a corporate network to the NGN shall be able to cope with NAT and firewalls in the corporate environment.

Solutions for access from a Corporate network to the NGN shall support the following configurations:

- Direct connectivity and interaction between the individual terminals and the NGN (e.g. to support Ipcentrex configurations).
- Indirect connectivity and interaction between the individual terminals and the NGN (e.g. via IP PBXs).

## 4.9 Interworking

As specified in TS 122 495 [6].

## 4.10 Quality of Service (QoS)

The NGN shall support the following:

- A wide range of QoS-enabled services.
- Dynamic negotiation of QoS parameters between service and access providers based on an SLA.
- Terminals that are not capable to indicate QoS requirements as part of the service request. Terminals that are capable shall also be supported.
- QoS provisioning within the access segment. QoS in the core transport network is considered to be achieved by other means that are out of the scope of NGN Release 1 (e.g. Overprovision).
- The provisioning of QoS for application traffic where upstream and downstream flows have specific QoS requirements.
- An architecture that supports bandwidth reservation.
- QoS mechanisms to allow efficient use of access resource.

## 4.11 Security Requirements

As specified in TS 122 495 [6].

### 4.11.1 General

As specified in TS 122 495 [6] except the following requirements:

- The Access Network shall provide access connectivity to a user entitled to use the resources of the Access Network.

- The NGN shall support independent verification by IMS and Access Network of the previous two requirements.

## 4.12 Charging and Accounting

As specified in TS 122 495 [6].

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# 5 PSTN/ISDN Emulation Service

## 5.1 Business Models

The business model envisaged for PSTN/ISDN Emulation Service is the replacement (in whole or part) of an existing PSTN/ISDN network based on TDM with an Emulation based on IP technology. An alternative business model is the provision of PSTN/ISDN service over connections derived from broadband service, which compete with the existing or Emulated PSTN. Both business models may co-exist in the same market place.

A NGN service provider shall be capable of connecting to other service provider via:

- an interconnect model where bi-lateral Service Level Agreements are established between two service providers;
- an interconnect model where intermediate network(s) can provide interconnect on behalf of multiple service providers (and may be based on a single Service Level Agreement between the SP and their intermediate service provider).

A single NGN service provider shall be able to choose to support either of the interconnect models, or both of the interconnect models simultaneously.

## 5.2 Service Requirements

The NGN shall support PSTN /ISDN emulation that provides the user with an identical experience to that of the existing PSTN/ISDN.

The NGN shall support the ability for a service operator to emulate one or more of their PSTN/ISDN services.

The NGN shall support service capability definitions inherited from existing PSTN/ISDN specification. The service descriptions of the existing services for any particular network are outside the scope of the present document.

It is an objective that the user shall be unaware of a change from legacy PSTN/ISDN to PSTN/ISDN emulation for those services that are emulated. For each emulated service, the service capability definitions are inherited from existing PSTN/ISDN specifications. Specific service requirements related to PSTN/ISDN Emulation are described in the following clauses.

## 5.3 Mobility

There is no requirement to support mobility or a nomadic capability for PSTN/ISDN Emulation. There are no additional mobility requirements.

This does not prevent the existence of user nomadism where it is implicit in the chosen business model nor does it require that nomadism be actively prevented.

## 5.4 Number, naming and addressing

The users of PSTN/ISDN Emulation will be allocated numbers (or number ranges) in the appropriate E.164 number space allocated by the national numbering authority. The nature of this E.164 number will vary from operator to operator and from country to country. The design shall permit the use of both geographical and non-geographical E.164 numbers.

There is no requirement to support the use of non-E.164 names within PSTN/ISDN Emulation but the use of non-E.164 names is not precluded.

PSTN/ISDN emulation places no new requirements to support number portability.

## 5.5 Terminal requirements

The NGN shall support terminals that use existing PSTN/ISDN interfaces.

Whilst the NGN has no role in standardizing terminals it is recognized that a key aspect of the PSTN/ISDN emulation subsystem is the ability to enable PSTN/ISDN replacement whilst maintaining all the existing services in the network.

**NOTE:** More advanced terminals may use the PSTN/ISDN emulation subsystem to provide identical PSTN/ISDN services to the user. Such advanced terminals may or may not be able to access additional services not related to PSTN/ISDN emulation but the functions of such terminals are not subject to standardization within the Release 1 of NGN.

## 5.6 Regulatory service requirements

### 5.6.1 Lawful Intercept service requirements

All implementations of PSTN/ISDN Emulation shall provide the ability to provide Lawful Interception in accordance with national requirements. Where possible the packet interception handover interfaces should be made available to authorities to avoid the ability of targets to maintain covert channels not monitored by TDM handover interfaces. Packet handover is most important for derived service where the packet stream is not under direct control of the provider of the Electronic Communication Network.

The capabilities to support Lawful Intercept for Emulation shall be as described in TS 187 005 [7].

### 5.6.2 Emergency service requirements

The capabilities to support the Emergency Service shall be as described in TS 102 424 [3].

### 5.6.3 Malicious Communication Identity service requirements (MCID)

MCID is a service which is expected to be provided in the context of the European Telecoms Privacy Directive or equivalent regulations in other jurisdictions. The service is required for all speech calls irrespective of which network originated the call. It is normally provided following a request from the customer concerned and may be subject to authorization.

### 5.6.4 Anonymous Communications Rejection service requirements (ACR)

The service capability definition for this service is inherited from existing PSTN/ISDN specifications and no new requirements are identified.

## 5.7 Access Networks

### 5.7.1 Wireline Access

The deployment of an NGN supporting PSTN/ISDN emulation may support existing access methods and access network technologies. The PSTN/ISDN User-Network Interface shall not be affected.

## 5.8 Customer Networks

### 5.8.1 Home and Small Office Networks

In the case of PSTN/ISDN Emulation used to replace an existing analogue or TDM network these are handled in the same way as the network which is being replaced or substituted.

Where the business model involves derived voice the customer will present lines to either an Access Gateway or a Residential Gateway as appropriate. In some cases there will be a terminal that offers service in an alternative manner but that is not within the scope of the present document.

A Residential Gateway may be situated within a Customer Access Gateway or on the customer network side of it. The Customer Access Gateway may use any suitable access technology.

In addition where existing Primary Rate ISDN or equivalent services are provided the PSTN/ISDN Emulation may support them. The actual signalling systems and methods of presentation supported are a national matter, supported by the list of designated standards published by the European Commission.

### 5.8.2 Corporate Networks

Within the context of the PSTN/ISDN Emulation Corporate Networks may continue to be supported. The actual signalling systems and methods of presentation supported are a national matter supported by the list of designated standards published by the European Commission. This support may extend to the provision of VPN services using signalling systems and methods of presentation which are provided on a national basis and those that rely on European Standards.

## 5.9 Interworking

### 5.9.1 Interworking with Legacy PSTN/ISDN

PSTN/ISDN emulation shall provide interfaces to PSTN/ISDN networks.

The NGN shall support the ability for the interconnection between two PSTN/ISDN and/or emulation networks to remain unchanged from the legacy case.

PSTN/ISDN Emulation shall provide a high level of interoperability with the services in the PSTN/ISDN being emulated. The degree to which service interoperability is provided is a matter for operators of Public Electronic Communications Networks and, in some cases, national regulators.

### 5.9.2 Interworking with PSTN/ISDN Emulation

PSTN/ISDN Emulation shall provide a high level of interoperability with the services in other Emulated PSTN/ISDN networks. The degree to which service interoperability is provided is a matter for operators of Public Electronic Communications Networks and, in some cases, national regulators.

## 5.9.3 Interworking with PLMN

### 5.9.3.1 Interworking with IMS based PLMN

Inter-working with the part of a PLMN that is based on an IMS shall be as described for inter-working with a IMS network.

### 5.9.3.2 Interworking with PLMN - CS Domain

Inter-working with the circuit switched part of a PLMN shall be as described above for Inter-working with a PSTN/ISDN network.

## 5.9.4 Interworking with Packet Cable network

Inter-working with the Packet Cable network shall be as described for Inter-working with a legacy PSTN/ISDN network or as described for Inter-working with an emulated PSTN/ISDN network.

The choice of method is at the discretion of the operators concerned or as directed by a regulatory authority.

## 5.9.5 Interworking with IMS network

Refer to clause 4.9.2.

## 5.9.6 Interworking with other networks

Inter-working with non-IMS and non-TDM network is the same as for inter-working with:

- i) A TDM based PSTN/ISDN as described above; or
- ii) Another PSTN/ISDN Emulation as described above.

The choice of method is at the discretion of the operators concerned or as directed by a regulatory authority.

## 5.10 Quality of Service (QoS)

The PSTN/ISDN Emulation shall provide QoS transmission facilities to enable the same end-to-end performance requirements of the PSTN to be met. This includes any reservation of bit rate through the Access transport and also includes any transcoding facilities that may be needed.

## 5.11 Security requirements

A PSTN/ISDN Emulation shall meet the security requirements placed on a national PSTN/ISDN network. Where appropriate, requirements and mechanisms may vary to take account of the underlying NGN and IP technology.

## 5.12 Charging and accounting

The requirements and mechanisms for charging are a national matter.

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## 6 Codecs services

The following requirements apply to audio and video codecs support within the network.

### 6.1 General

It is the responsibility of entities at the rim of the NGN (e.g. NGN-TE) and Network equipment originating and terminating the NGN IP media flows, to negotiate and select a common codec for each "end-to-end" media session. Therefore the NGN shall allow end-to-end negotiation of any codec between NGN entities (terminal, network elements).

### 6.2 Audio Codec

In order to enable interworking between the NGN and other networks (including the PSTN, mobile networks and other NGNs) the NGN must be capable of receiving and presenting G.711 coded speech when interconnected with another network. When a packetization size is not selected by codec negotiation between terminals and/or network elements or agreed by bilateral arrangement, a speech packetization size of 10 ms samples should be used for G.711 coded speech; this is recommended as an optimum value balancing end-to-end delay with network utilization. It is recognized that there may be network constraints which require that a higher value is agreed by bilateral arrangement; in such cases a value of 20 ms is recommended.

NOTE: Where a packetization size is selected by codec negotiation between terminals and/or network elements the present document places no requirements on the value to be selected.

The above does not put any requirement about the codecs to be supported by terminals nor does it mandate that NGN networks shall support audio transcoding between any arbitrary codec to G.711.

In addition, support for the following audio codecs is recommended:

- AMR: in order to support 3GPP terminals and to facilitate the interwork with 3GPP network.
- G.729A: in order to facilitate the interwork with existing VoIP networks and support existing VoIP terminals.

In order to provide voice service with a superior quality experience by the end-user it is recommended to provide also a Wide-band codec.

Audio transcoding may be performed to provide end-to-end service interoperability, but should be avoided wherever possible.

### 6.3 Video Codec

In order to enable the interworking for video communication services between an NGN Network and other Networks the support of the H.263 profile 0 and H.264 baseline profile codecs is recommended.

The above does not put any requirement about the codecs to be supported by terminals nor does it mandate that NGN networks shall support video transcoding between any arbitrary codec and H.263 or H.264.

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## 7 Network Attachment Requirements

The user network profile contains user access authentication data and information related to the required network access configuration.

The NGN shall support the re-configuration of services available to the user when the user is nomadic and accesses their services from a location other than the subscribed-to location. Services may be dependent on any or all of: the user device, the access network and arrangements (e.g. roaming agreements) between the Application provider and the access network provider. The access network shall allocate resources in accordance to the services to be provided.

In access roaming scenarios, those access networks that provide access to NGN services shall be able to authenticate/authorize access to the network based on information retrieved from the access networks where the user is subscribed to.

To guarantee the interoperability of roaming services, the NGN access network attachment procedures shall support access network authentication based on a standardized method for identifying users at access network level (e.g. the NAI mechanism specified in RFC 2486 [8]).

NAI based user authentication shall be supported.

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## 8 CPE Configuration

The NGN shall be able to provide configuration parameters and obtain operational status of the CPE. This includes the ability to provide SW upgrade, service configuration, collect operational status.

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## 9 Network Management

Network Management requirements shall be as described in TS 188 003 [4].

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## 10 Control of Processing Overload

The NGN shall have mechanisms available to control overload that:

- 1) automatically maximize effective throughput (i.e. admitted service requests/sec) at an overloaded resource.
- 2) achieve this throughout the duration of an overload event, and irrespective of the overloaded resource's capacity or of the number of sources of overload;
- 3) are configurable by the service provider so that, under processing overload, a high proportion of response times at overloaded resources are low enough so as not to cause customers to prematurely abandon service requests;
- 4) should be possible to be applied within a service provider's NGN, and between different service providers' NGNs;
- 5) should be possible to be applied within an NGN subsystem (e.g. IMS, PSTN/ISDN emulation) and between different NGN subsystems.

**NOTE:** As a general rule, an NGN's call, session and command processing resources can experience prolonged processing overload under the appropriate circumstances (e.g. partial, or full, server failure, high rates of incoming service requests). Consequently, it needs to be equipped with some form of overload detection and control (including expansive controls such as load balancing and resource replication), in order to keep response times just low enough under such processing overload to preclude customers abandoning their service requests prematurely.

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## 11 IP Addressing

The Operator of an NGN infrastructure may base the implementation on IPv4 only, IPv6 only or both. The choice is an operator option.

**NOTE 1:** It should be recognized that a mixture of IPv4 and IPv6 within a single operator domain can cause problems for service delivery.

NGN operators may support customer equipment using IPv4 only, IPv6 only or both at an IP-based User-Network Interface. The choice is an operator option.

**NOTE 2:** It is assumed that IPv6 based customer equipment can also support IPv4 at the User-Network Interface.



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## Annex A (informative): Basic communication cases for IMS networks

As specified in TS 122 495 [6].

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## Annex B (informative): Guidance for terminal implementation

As specified in TS 122 495 [6].

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## Annex C (informative): Bibliography

- ETSI TS 181 002: "Requirements for Multimedia Telephony with PSTN/ISDN Simulation Services".
- ETSI TS 181 001: "NGN Videotelephony; Stage 1 Service Description".
- ETSI TS 122 141 (V7.0.0): "Universal Mobile Telecommunications System (UMTS); Presence service; Stage 1 (3GPP TS 22.141 version 7.0.0 Release 7)".
- IETF RFC 3966: "The tel URI for Telephone Numbers".
- IETF RFC 3261: "SIP: Session Initiation Protocol".
- ETSI TS 187 001: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN SECURITY (SEC); Requirements".
- ETSI TS 122 115: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Service aspects; Charging and billing (3GPP TS 22.115)".

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## Annex D (normative): Rel-7 parts of Common IMS

Void.

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## Annex E (informative): Change history

Date	WG Doc.	CR	Rev	CAT	Title / Comment	Current Version	New Version
02-07-08	17bTD029r2	001		F	TS 181 005 split	1.1.1	1.1.2
27-01-09	19tTD067r1	002		F	Common IMS references	1.1.2	1.1.3
					CRs 001 and 002 TB approved	1.1.3	1.2.0
	21bTD21r1	003		F	Revision of notes that contain normative text	1.2.0	1.2.1
					CR 003 TB approved and publication		1.2.1

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## History

<b>Document history</b>		
V1.1.1	March 2006	Publication
V2.4.1	November 2007	Publication
V2.5.1	December 2009	Publication
V3.3.1	December 2009	Publication
V1.2.1	December 2009	Publication