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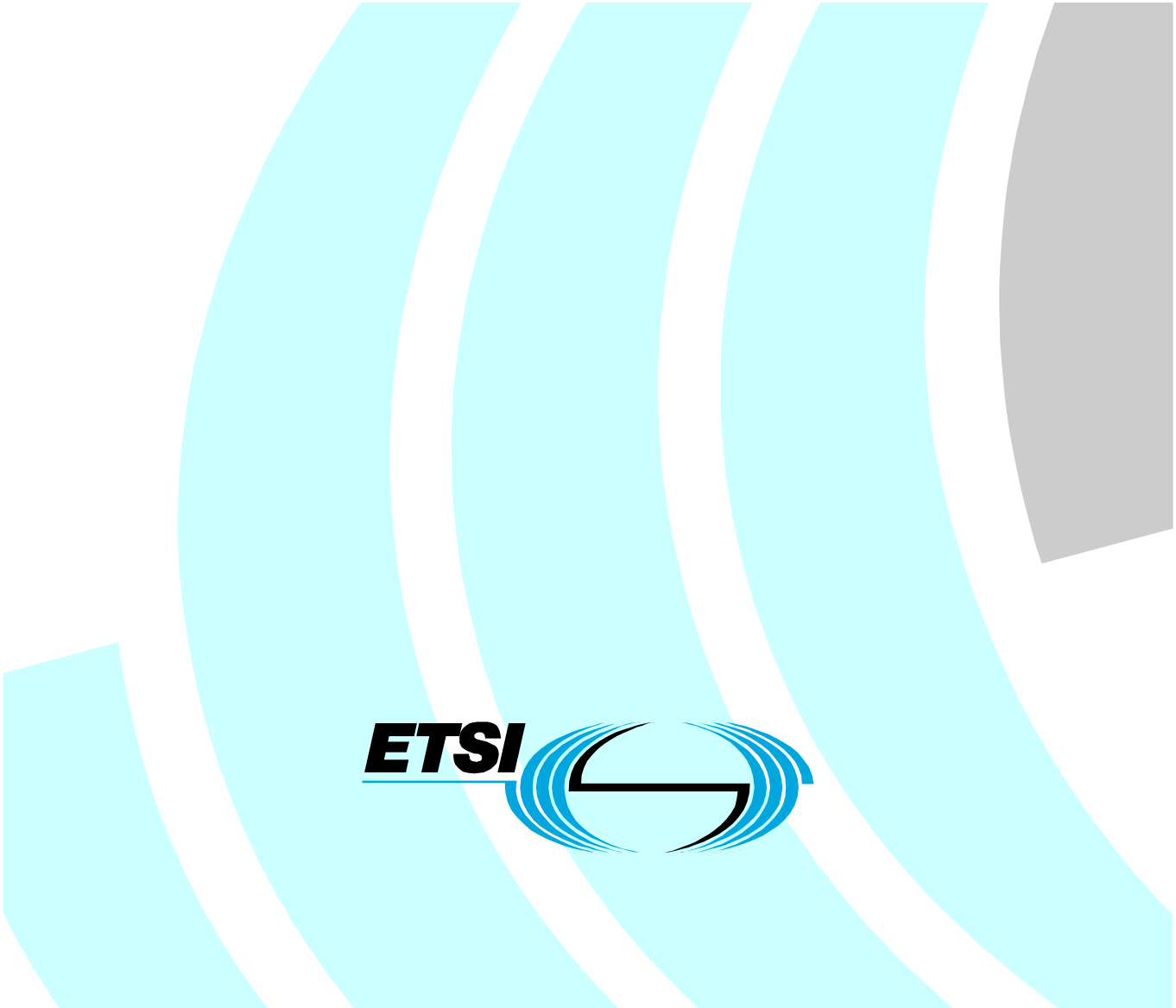
ETSI Standard

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Interworking; Trunking Gateway Control Procedures for interworking between NGN and external CS networks



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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

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Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN), and is now submitted for the ETSI standards Membership Approval Procedure.

1 Scope

The present document defines the control procedures for trunk gateways when PSTN/ISDN emulation and PSTN/ISDN simulation services in an NGN Network require interworking with a ETSI PSTN/ISDN services in a ISUP network. Interworking with BICC networks is not included in the scope of TISPAN R1.

Existing profiles will be evaluated, in order to determine if they can be re-used, with possible modifications, or if a completely new profile is to be defined.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- 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.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1] ETSI TS 129 163: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks (3GPP TS 29.163 version 6.6.0 Release 6)".

[2] ETSI TS 129 332: "Universal Mobile Telecommunications System (UMTS); Media Gateway Control Function (MGCF) - IM Media Gateway (IM-MGW) Mn interface; Stage 3 (3GPP TS 29.332 version 6.2.0 Release 6)".

[3] ITU-T Recommendation H.248.1 (2005): "Gateway control protocol: Version 3".

[4] IETF RFC 3261: "SIP: Session Initiation Protocol".

[5] IETF RFC 2833: "RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals".

[6] ITU-T Recommendation G.168: "Digital network echo cancellers".

[7] ITU-T Recommendation I.231.1: "Circuit-mode 64 kbit/s unrestricted, 8 kHz structured bearer service".

[8] IETF RFC 4040: "RTP Payload Format for a 64 kbit/s Transparent Call".

[9] ITU-T Recommendation G.703: "Physical/electrical characteristics of hierarchical digital interfaces".

[10] ITU-T Recommendation G.704: "Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels".

[11] ITU-T Recommendation G.707: "Network node interface for the synchronous digital hierarchy (SDH)".

[12] ITU-T Recommendation G.957: "Optical interfaces for equipments and systems relating to the synchronous digital hierarchy".

[13] ITU-T Recommendation Q.115.0: "Protocols for the control of signal processing network elements and functions".

[14] ITU-T Recommendation Q.115.1: "Logic for the control of echo control devices and functions".

[15] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

[16] ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".

3 Definitions and abbreviations

3.1 Definitions

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

Media Gateway: See ITU-T Recommendation H.248.1 [3], clause 3.3.

Media Gateway Controller: See ITU-T Recommendation H.248.1 [3], clause 3.4.

Trunking Media Gateway: H.248 Media Gateway that interworks with the PSTN network on basis of network node interfaces (NNI)

3.2 Abbreviations

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

3GPP	3rd Generation Partnership Project
CLASS	Custom Local Area Signalling Services
CS	Circuit-Switched
CN	Core Network
DTMF	Dual Tone Multi Frequency
ECD	Echo Control Device/function
IETF	Internet Engineering Task Force
IM	IP Multimedia
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Services Digital Network
MGC	Media Gateway Controller
MGCF	Media Gateway Control Function
OAM	Operation, Administration and Maintenance
OoS	Out-of-Service (see H.248.1)
PES	PSTN/ISDN Emulation Subsystem
PSTN	Public Switched Telecommunication Network
RFC	Request for Comment (IETF)
RTP	Real-time Transport Protocol
SIP	Session Initiation Protocol
SS	Silence Suppression
TDM	Time Division Multiplexing
TGW	Trunking GateWay
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TMGW	Trunking Media GateWay
TS	Technical Specification (3GPP, ETSI)
UP	User Plane
VAD	Voice Activity Detection
VBD	VoiceBand Data

4 Applicability

4.1 Architecture

Figure 1 illustrates the architecture assumed in the present document. It is assumed that call control signalling on the PSTN/ISDN side is ISUP, while the call/session control signalling on the IP side is SIP. The SIP is defined by RFC 3261 [4].

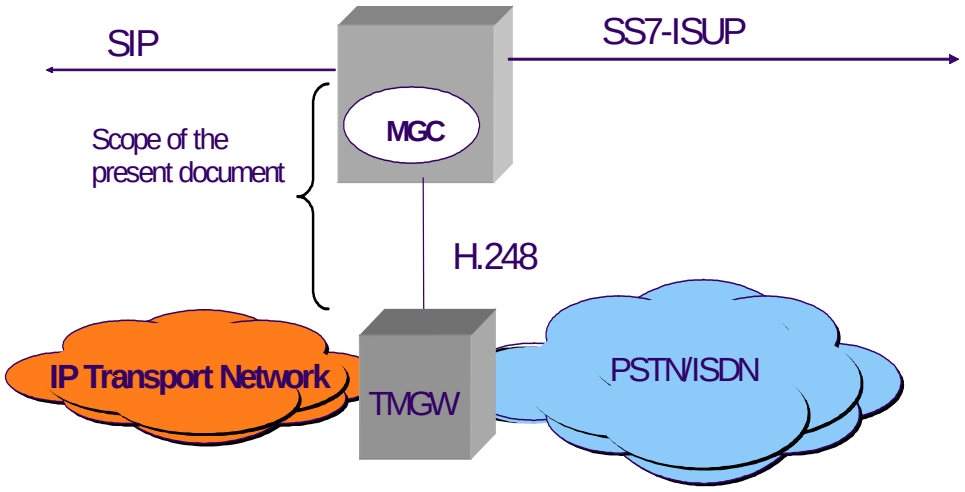

Figure 1: Reference Architecture

The reference architecture applies to both PSTN/ISDN Simulation (IMS Architecture) and Emulation Subsystem (TISPAN PES).

4.2 Functional Requirements

1) Trunking Media Gateways shall support the establishment and release of IMS/NGN (ephemeral) Terminations. H.248 IMS/NGN Terminations are based on IP. The IP version used by H248 IMS/NGN Terminations in TISPAN IMS domains is either IPv4 or IPv6.The default IP version is IPv4 for H.248 RTP Terminations for ETSI PES. IPv4 is still in use for H.248 IMS/NGN Terminations for VoIP NGNs, particularly in non-3GPP environments.

NOTE: The default IP version is IPv6 for H.248 IMS/NGN Terminations in 3GPP IMS domain.

2) Trunking Media Gateways shall support the establishment and release of TDM (physical) Terminations.

3) Trunking Media Gateways shall support the interworking of the associated User Plane (UP) protocol stacks for the networks to which the TMGW is inter-connecting. These details and further physical characteristics are described in clause 4.3.

4) Trunking Media Gateways shall provide support for G.711 A-law codecs and may support other codecs.

5) Trunking Media Gateways supporting other codecs than G.711 shall support autonomous transition to G.711-based VBD mode upon detection of voiceband data traffic (like fax/modem, data/modem, text/modem) according to V.152. This shall be upon a per-call-basis request from the MGC. Additionally, Trunking Media Gateways shall be fully compliant with ITU-T Recommendation G.168 [6] on detecting VBD.

6) Trunking Media Gateways supporting other codecs than G.711 shall also support the procedures defined in RFC 2833 [5] to detect, generate and forward DTMF digits. DTMF shall be identified by name, as opposed to their waveform properties.

7) Trunking Media Gateways may support the generation of fixed announcements and tones. See also clauses 4.5.2.4 and 4.5.2.5.

8) All properties of tones requested by the MGC shall be provisioned in the Media Gateway. The MGC is not required to send the physical characteristics of tones to Media Gateways.

9) Trunking Media Gateways shall support ISDN Bearer Service ITU-T Recommendation I.231.1 [7] for TDM-to-TDM bearer connections.

10) Trunking Media Gateways shall support ISDN Bearer Service ITU-T Recommendation I.231.1 [7] for TDM-to-RTP bearer interworking. This ISDN bearer service on TDM side shall be mapped onto RTP Clearmode according RFC 4040 [8] on IP side.

11) Trunking Media Gateways shall support testing of circuit-oriented bearer connections at circuit-switched network interfaces of the TMG. The bearer test may be either:

    a) performed via the corresponding H.248 TDM Termination by H.248 test procedures, or

    b) may be OAM driven without H.248 involvement.

    The reason behind test procedures (A) are tests which are associated to call control activities (e.g. SS7 Continuity Checks); whereas (B) are call independent test activities initiated be Element/Network Management systems.

12) Trunking Media Gateways shall support Echo Control Device/Function (ECD). An ECD shall be associated with H.248 TDM Termination on a call by call basis, if the G.168 cancelled end is located on PSTN/ISDN side.

13) Trunking Gateways shall support codec negotiation.

14) The Trunking Gateway shall support the indication of packetization time for appropriate codec types.

15) The Trunking Gateway shall support emergency call identification via context property toward the TMG.

4.3 User Plane Interworking and Physical Interface Requirements

1) The Trunking Media Gateway shall support the interworking of User Plane protocol stacks as defined in TS 129 163 [1], clause 8 with the exception of the Bearer Independent CS User Plane protocol stack.

2) Trunking Media Gateways shall support physical interfaces that conform to at least one of the following ITU-T Recommendations G.703 [9], G.704 [10], G.707 [11] and G.957 [12].

3) Trunking Gateways shall support IPv4 and may support IPv6.

4) Echo control activation/deactivation shall be supported.

Physical terminations are required to support echo cancellation. Echo cancellation is automatically activated on physical terminations by the TMGW and may be deactivated using the TDM Circuit package (see note 1).

NOTE 1: H.248 TDM Circuit Package Version 1 (see ITU-T Recommendation H.248.1 [3], clause E.13) is providing the basic control capabilities for ECDs in H.248 MGs. The SPNE Control Package (see ITU-T Recommendation Q.115.0 [13], clause 7.2) is extending the tdmc Version 1 Package by further ECD control possibilities. The SPNE Control Package is not required and is beyond the scope of Version 1 of this Profile.

Deactivation by the MGC occurs on TDM terminations in case of Unrestricted 64 kbit/s. Echo cancellation may also be deactivated by the TMGW when entering the VBD mode.

An Echo Control Device/Function (ECD; see ITU-T Recommendation Q.115.1 [14], clause 3.1) is therefore always associated with a physical H.248 Termination (see notes 2 and 3).

NOTE 2: A VoIP Media Gateway defined by this H.248 Profile is a so-called "type 1 exchange/node" from ECD point of view (see ITU-T Recommendation Q.115.1 [14], clause A.2.4.3.1).

NOTE 3: The configuration of the HECD (or ECD) in a Media Gateway is the "reverse associated" mode (see ITU-T Recommendation Q.115.1 [14], clause A.1.1, note 1 and figures A.2a, A.2b, A.3).

An ECD is responsible for a single echo path, therefore also known as half-way ECD (HECD) (see notes 4 and 5). The G.168 Digital Network ECD is required for the echo generated at "legacy terminal" side of the MGW. This is the echo path on which the HECD is intended to operate, called as G.168 Cancelled End (or formerly as Near End). The required ECD tail length capacity is given by the echo path at the cancelled end.

NOTE 4: A local call, resulting in a single H.248 Context with two physical H.248 Terminations (Phy-to-Phy bearer interworking) may result in the allocation of two HECDs, one per direction. Such two complementary HECDs representing a full-way ECD (called full ECD (FECD), see ITU-T Recommendation Q.115.1 [14], clause 3.7). A FECD configuration for Phy-to-Phy H.248 Context types is not required and supported in this Profile version. It is rather anticipated from TMGW side, that the MGC is disabling the ECD resources for such a Context type, due to the small end-to-end propagation delay here.

NOTE 5: More detailed ECD notation: In case of an outgoing call the ECD in the originating Media Gateway, responsible for the hybrid echo generated by the calling party, is playing the role of the outgoing ECD (OECD, see ITU-T Recommendation Q.115.1 [14], clause 3.12). In case of an incoming call the ECD in the terminating Media Gateway, responsible for the hybrid echo generated by the called party, is playing the role of the incoming ECD (IECD, see ITU-T Recommendation Q.115.1 [14], clause 3.11).

5) Voice codec types should support silence suppression (SS) mode, which includes voice activity detection (VAD), the generation/insertion of comfort noise (CN) and/or silence insertion descriptor. Silence suppression mode is only required for packet-switched bearers (H.248 IMS or RTP Termination), but not for circuit-switched network (H.248 TDM Termination).
Silence suppression mode is direction-independent and shall be supported call/bearer individually. Silence suppression mode must be explicitly enabled and disabled. Default shall be a disabled SS mode.

6) DTMF tone relay according to RFC 2833 [5] shall be supported. This does not exclude the usage of G.711 to carry DTMF tones.

7) Media Gateways shall discard packets with RTP payload types (PT) that do not match the Local Descriptor contents.

NOTE 6: Besides an incorrect RTP PT field might be also other reasons for discarding packets (invalid SSRC field, invalid CRC, etc.).

NOTE 7: The MG has the option to collate statistics on discarded packets.

8) When sending packets from a termination, Media Gateways shall use the address and port in the Local Descriptor as a source address and port and the address and port in the Remote Descriptor as a destination address and port.

4.4 Control Plane Signalling Flows

4.4.1 ISUP-ISUP call

4.4.1.1 Introduction

The deployment of VoIP NGNs like 3GPP IMS, or particularly ETSI PES does not happen "in a greenfield". Efficient interworking with the existing PSTN/ISDN is therefore very crucial to success. Interworking does not only focus on "breakout from VoIP domains to the PSTN/ISDN", it must consider also existing switching scenarios in PSTN/ISDNs.

Switching on TDM-to-TDM basis may occur on different network levels in PSTN/ISDN. The present document is solely scoping the requirement on transit exchange level (also known as CLASS 4). This is a type of NNI-to-NNI interworking, which relates to an ISUP-to-ISUP call (in case of ISUP/SS7 as used call control protocol).

The ISUP-to-ISUP use case is for instance required due to dedicated network topologies, call routing/numbering planes, realization restrictions of dedicated supplementary services (like local number portability in certain markets), or when simply missing crosscuts prohibiting switching on a lower network level.

The H.248 TGW must be able to takeover the role of a legacy transit exchange for such kind of scenarios.

4.4.1.2 Call Control Procedures

Dedicated control plane signalling flows are not given by the present document, because there is nothing new (i.e. it is not intended to define new PSTN/ISDN services) or specific with regards to the call control flows.

4.4.1.3 Gateway Control Procedures

TDM-to-TDM interworking on transit exchange level is basically a switching function without the general need of any signal processing network functions (definition see ITU-T Recommendation Q.115.0 [13], clause 3.2).

The default TGW control procedure for 2-Party (2PTY) calls is therefore the creation of a single H.248 Context for TDM-to-TDM interworking, which corresponds to "TDM bearer switching" (as in legacy TDM switching systems).

NOTE: The TMG may realize the "TDM bearer switching function" either by using MG-internally continuous circuit-switched transmission and switching resources ("native TDM switching"), or a circuit emulation approach via packet-switching technologies ("emulated TDM switching").

4.4.2 IMS-ISUP call

No additional call flows are foreseen over and above what is described for this interworking in TS 129 163 [1] for IMS-ISUP calls.

4.5 TGW Control Procedures

The identified stage 2 procedures for controlling the Trunking Media Gateway are described here. The procedures will either be identified in the requirements section or the control plane signalling flows.

This clause describes of logical signalling procedures (i.e. message identifiers are not part of the protocol) between the MGCF and TMGW. The procedures within this clause are intended to be implemented using the standard H.248 procedure as defined in ITU-T Recommendation H.248.1 [3] with appropriate parameter combinations.

4.5.1 Procedures related to terminations towards the IM CN Subsystem

A mapping of the procedures defined here to H.248 procedures and parameters is provided in TS 129 332 [2].

4.5.1.1 Reserve IMS connection point

This procedure is used to reserve local connection addresses and local resources. This is the same procedure as the one defined in the clause "Reserve IMS connection point" in TS 129 163 [1].

4.5.1.2 Configure IMS resources

This procedure is used to select multimedia-processing resources for an IMS/NGN Termination interface connection. This is the same procedure as the one defined in the clause "Configure IMS resources" in TS 129 163 [1].

4.5.1.3 Reserve IMS Connection point and configure remote resources

This procedure is used to reserve multimedia-processing resources for a IMS/NGN Terminationinterface connection. This is the same procedure as the one defined in the clause "Reserve IMS Connection point and configure remote resources" in TS 129 163 [1].

4.5.1.4 Release IMS/NGN Termination

This procedure is used by the MGCF to release a termination towards the IMS and free all related resources. This is the same procedure as the one defined in the clause "Release IMS termination" in TS 129 163 [1].

4.5.1.4.1 Statistics

Statistics may be requested during the release procedure in conjunction with the H.248 Subtract command.

The information collected could for instance be used to correlate bearer statistics to a call which could be used to determine how a call should be charged. Only statistics, defined by H.248 Packages and applicable for the H.248 Termination type (here "IMS"), may be used.

The MGCF may request statistics related to the RTP packet transmission process of the IMS bearer connection.

4.5.1.5 Termination Out-of-Service

This procedure is used by the TMGW to indicate towards the MGCF that one or several physical Termination(s) will go out of service. This is the same procedure as the one defined in the clause "Termination Out-of-Service" (OoS) in TS 129 163 [1].

4.5.2 Procedures related to a termination towards an ISUP network

A mapping of the procedures defined here to H.248 procedures and parameters is provided in TS 129 332 [2].

4.5.2.1 Reserve TDM circuit

This procedure is used by the MGCF to reserve a TDM circuit in the TMGW towards the preceding/succeeding CS network element. This is the same procedure as the one defined in the clause "Reserve TDM circuit" in TS 129 163 [1].

4.5.2.2 Change TDM through-connection

This procedure is used by the MGCF to modify the through-connection (forward, backward, both-way, inactive) of a TDM Termination at the TMGW towards the PSTN.

This is the same procedure as the one defined in the clause "Change TDM through-connection" in TS 129 163 [1].

4.5.2.3 Activate TDM voice-processing function

This procedure is used by the MGCF to activate or de-activate a voice processing function of a TDM Termination at the TMGW towards the PSTN. This voice processing function may include a cancellation for electrical echoes (as opposed to acoustical echoes).

This is the same procedure as the one defined in the clause "Activate TDM voice-processing function" in TS 129 163 [1].

4.5.2.4 Send TDM tone

This procedure is used by the MGCF to order the TMGW to generate a ringing tone at a TDM Termination towards the PSTN.

This is the same procedure as the one defined in the clause "Send TDM tone" in TS 129 163 [1].

4.5.2.5 Stop TDM tone

This procedure is used by the MGCF to order the TMGW to stop generating a ringing tone at a TDM termination towards the PSTN.

This is the same procedure as the one defined in the clause "Stop TDM tone" in TS 129 163 [1].

4.5.2.6 Play TDM announcement

This procedure is used by the MGCF to order the TMGW to generate an announcement at a TDM Termination towards the PSTN. The MGCF may request a notification that the announcement is completed. This is the same procedure as the one defined in the clause "Play TDM announcement" in TS 129 163 [1]. This procedure is optional.

4.5.2.7 TDM announcement completed

This procedure is used by the TMGW to notify the MGCF that an announcement at a TDM Termination towards the PSTN is completed. This is the same procedure as the one defined in the clause "TDM announcement completed" in TS 129 163 [1]. This procedure is optional.

4.5.2.8 Stop TDM announcement

This procedure is used by the MGCF to order the TMGW to stop generating an announcement at a TDM Termination towards the PSTN. This is the same procedure as the one defined in the clause "Stop TDM announcement" in TS 129 163 [1]. This procedure is optional.

4.5.2.9 Continuity check

This procedure is used by the MGCF to order the TMGW to generate a continuity check tone at a TDM Termination towards the PSTN and to inform the MGCF about the result of the continuity check as soon as the continuity check tone is received or a time-out occurs. This is the same procedure as the one defined in the clause "Continuity check" in TS 129 163 [1]. This procedure is optional.

4.5.2.10 Continuity check verify

This procedure is used by the TMGW to indicate towards the MGCF that the continuity check at a TDM Termination towards the PSTN has been completed and to return the result of the check: success or failure. This is the same procedure as the one defined in the clause "Continuity check verify" in TS 129 163 [1]. This procedure is optional.

4.5.2.11 Continuity check response

This procedure is used by the MGCF to order the TMGW to loop back an incoming continuity check tone at a TDM termination towards the PSTN. This is the same procedure as the one defined in the clause "Continuity check response" in TS 129 163 [1]. This procedure is optional.

4.5.2.12 Release TDM Termination

This procedure is used by the MGCF to release a TDM Termination at the TMGW towards the PSTN and free all related resources. This is the same procedure as the one defined in the clause "Release TDM Termination" in TS 129 163 [1].

4.5.2.13 Termination Out-of-Service

This procedure is used by the TMGW to indicate towards the MGCF that one or several physical Termination(s) will go out of service. This is the same procedure as the one defined in the clause "Termination Out-of-Service" in TS 129 163 [1].

4.5.3 Non-call related procedures

4.5.3.1 Procedures Inherited from 3GPP

Procedure defined in TS 129 332 [2]	Remarks
IM-MGW Out of service	
IM-MGW Communication Up	
IM-MGW Restoration	
IM-MGW Register	
IM-MGW Re-register	
MGCF Ordered Re-register	
MGCF Restoration	
MGCF Out of Service	
Termination Out-of-Service	The "Termination Out-of-Service procedure" is used as call-related H248 command as well
Termination Restoration	
Audit Value	
Audit Capability	
Command Rejected	The "Command Rejected" procedure may be used in response both to call-related and non-call-related H.248 Commands.
IM-MGW Capability Change	

4.5.3.2 Procedures Changed from 3GPP

Procedure defined in TS 129 332 [2]	Remarks
IM-MGW Resource Congestion Handling - Activate	TISPAN permit use of H248.11 in addition to H.248.10.
IM-MGW Resource Congestion Handling - Indication	TISPAN permit use of H248.11 in addition to H.248.10.

4.5.3.3 Monitoring the H.248 Control Association

See ITU-T Recommendation H.248.1 [3], clause 11.6.

4.5.3.4 TMGW Congestion Control

The MGW shall support a mechanism whereby it monitors its own load and is able to provide a notification to the MGCF in order to reduce offered load during periods of MGW overload.

4.5.3.5 MGCF Redundancy

The non-call related procedure, MGCF Redundancy, is a requirement for NGN Release 2.

There shall be full redundancy of the MGCF so that an outage of an MGCF shall not interrupt the TMGWs from being utilized for providing service.

Network availability is related to the H.248 concept of primary and secondary systems with the correspondent H.248 ServiceChange procedures. Dedicated support of these H.248 mechanisms may additionally also positively influence service availability performance.

The Trunking Gateway (here MGCF and TMGW) shall support at least one "secondary MGCF". There are two basic procedures for changeovers between primary MGCF and secondary MGCF. Either the MG initiates the changeover procedure (also known as "switchover" or "failover"), or the primary MGCF initiates the changeover procedure (also known as "handoff"). ITU-T Recommendation H.248.1 [3], clause F.3.6 provides more details for the correspondent failover procedure. ITU-T Recommendation H.248.1 [3], clause F.3.11 provides more details for the correspondent handoff procedure.

4.5.3.5.1 MGCF Changeover: Handoff Scenario

In case of a "handoff" procedure is the changeover between primary and secondary MGCF triggered by the primary entity. The correspondent ServiceChange procedure is based on ITU-T Recommendation H.248.1 [3], clause F.3.11.

Trigger points are for instance:

- planned outages of a primary MGCF (e.g. due to maintenance actions); or
- unplanned events like a partially failing primary MGCF, which is still capable in initiating the handoff procedure (see also ITU-T Recommendation H.248.1 [3], clause 11.5).

Annex A (informative): DTMF Handling

A.1 DTMF Digit Transfer

The function of "DTMF Digit transfer" is related to the handling of individual DTMF digits by the TMG. This does not cover any kind of DigitMap based MG functions.

There are basically following modes of operation for DTMF Digit transfer at MG level:

No.	Mode of Operation:	TMG Interface
1	**DTMF** Inband **(IB)** **= DTMF-over-G.711/TDM**	H.248 TDM Termination
2a	**DTMF** RTP Pass-Through **(PaTh)** **= DTMF-over-VoiceCodec (see note)/RTP**	H.248 RTP Termination
2b	**DTMF** RTP Packet Relay **(PaRe*)*** **= DTMF-over-RFC 2833 [**5**]/RTP** **Support of RTP Packet Relay submode:** **(i) "Named Telephone Events" (*see* RFC 2833 [**5**])** **(II) "Telephony Tones" (see RFC *2*833 [**5**], clause 4)**	H.248 RTP Termination Yes No
3	**DTMF** Out-of-Band **(OoB)** **= DTMF-over-H.248 Package**	H.248 Control Interface
NOTE: E.g. ITU-T Recommendations G.711 [15] and G.726 [16].		

There are different DTMF interworking scenarios, dependent on the type of MG interfaces involved in the digit forwarding process.

A.1.1 DTMF Interworking "TDM Inband" to "RTP Pass-Through"

When a G.711 codec is used, Media Gateways shall be able to generate, detect and forward DTMF tones inband.

A.1.2 DTMF Interworking "TDM Inband" to "RTP Packet Relay"

When other codec types as G.711 are used, the MGC should request the use of the procedures defined in RFC 2833 [5] to send and receive DTMF tones.

- If the Local Descriptor sent by the MGC includes the support for RFC 2833 [5], Media Gateways shall be prepared to receive DTMF tones in the form of named events (see RFC 2833 [5], clause 3.10) and relay the appropriate audio signal to the physical terminations (here: H.248 TDM Termination).
- If the Remote Descriptor indicates that RFC 2833 [5] is supported, Media Gateways shall be prepared to relay in the form of named events, any DTMF tone received from the physical terminations (here: H.248 TDM Termination).

A Dynamic Payload type shall be used to indicate support of IETF RFC 2833 [5] for DTMF packet relay.

EXAMPLE: When requesting such a dynamic payload, the MGC has two options:

i) MGC selects and passes a dynamic payload number to the MG, e.g.

```
v= 0
c= IN <address type> <connection address>
m= audio <port number> RTP/AVP 18 110
a= ptime: 10
a= rtpmap: 110 telephone-event/8000
a= fmtp: 110 0-15
```

ii) request the MG to choose the dynamic payload via the '$' notation, e.g.

```
v= 0
c= IN IP4 $
m= audio $ RTP/AVP 18 $
a= rtpmap: $ telephone-event/8000
a= ptime: 10
```

For TDM terminations the procedures are described in clause 16 of TS 129 332 [2].

A.1.3 DTMF Interworking at H.248 Interface

DTMF Digit relay via H.248 interface is not required for ETSI TISPAN NGN Release 1.

NOTE: This function may be required in future Profile versions, e.g. in case of interworking with BICC-controlled NGNs (e.g. 3GPP CS CN Release 4 and higher).

Annex B (informative): TDM Hairpinning

The term "TDM hairpinning" is often synonymously used for the designation of the TDM-to-TDM capability and support by H.248 MGWs, independent on the network level (e.g. UNI-to-UNI, NNI-to-NNI, etc).

The common understanding of **TDM Hairpinning** is:

> A scenario whereby a call is being made between two **TDM endpoints** on a **single** media **gateway**. The media comes in on one **TDM channel** (e.g. a DS0, a 1x64-kbit/s channel) and goes out on another **TDM channel** through the use of an **internal loop** in the media gateway.

NOTE 1: There are technically a variety of **TDM-to-TDM types** behind TDM hairpinning, dependent on required type of IWF.

NOTE 2: TDM Hairpinning from pure H.248 perspective results in a single H.248 Context with two H.248 TDM Terminations.

History

Document history			
V1.1.1	March 2006	Membership Approval Procedure	MV 20060519: 2006-03-21 to 2006-05-19