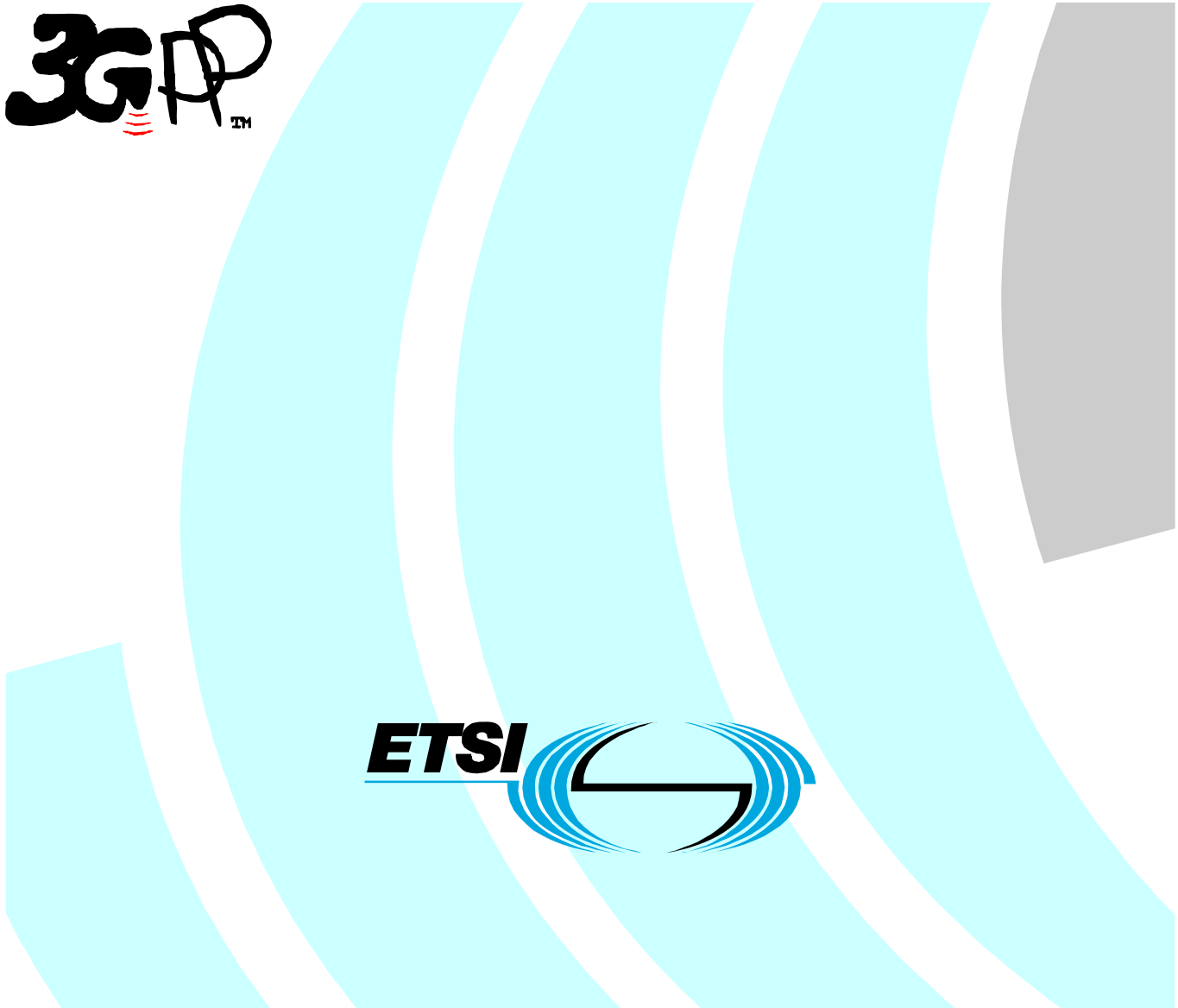
ETSI TS 129 332 V7.12.0 (2010-01)

Technical Specification

Universal Mobile Telecommunications System (UMTS);
Media Gateway Control Function (MGCF)
- IM Media Gateway (IM-MGW);
Mn interface
(3GPP TS 29.332 version 7.12.0 Release 7)



Reference
RTS/TSGC-0429332v7c0

Keywords
UMTS

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
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document describes the protocol to be used on the Media Gateway Control Function (MGCF) – IM Media Gateway (IM-MGW) interface. The basis for this protocol is the H.248 protocol as specified in ITU-T. The IMS architecture is described in 23.228. The interaction of the MGCF-IM MGW interface signalling procedures in relation to the SIP, and BICC/ISUP signalling at the MGCF are described in 29.163[4].

This specification describes the application of H.248 on the Mn interface. Required extensions use the H.248 standard extension mechanism. In addition certain aspects of the base protocol H.248 are not needed for this interface and thus excluded by this profile.

In addition this profile provides support for PSTN/ISDN Emulation as required by ETSI TISPAN.

The specification contains a normative Annex defining the H.248.1 Profile in accordance with ITU-T recommendations for H.248.1 applications. Where there exists any contradiction between the Normative Annex A and the rest of the specification, the Nornative Annex shall take precidence. The main body of the specification provides an introduction to the use of the profile for the Mn interface and introduces any specific functionality (e.g. new packages) associated to the Mn.

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[2] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[3] 3GPP TS 29.205: "Application of Q.1900 series to Bearer Independent CS Network architecture; Stage 3"

[4] 3GPP TS 29.163: "Interworking between the IM CN subsystem and CS networks – Stage 3".

[5] 3GPP TS 29.232: "Media Gateway Controller (MGC); Media Gateway (MGW) interface; Stage 3".

[6] 3GPP TS 26.226: "Cellular Text Telephone Modem; General Description".

[7] 3GPP TS 26.103: "Speech codec list for GSM and UMTS".

[8] 3GPP TS 29.202: "Application of Q.1900 series to Bearer Independent CS Network architecture; Stage 3".

[9] ITU-T Recommendation H.248.1 (05/2002): "Gateway Control Protocol: Version 2" including the Corrigendum1 for Version 2 (03/04).

[10] ITU-T Recommendation H.248.8 (09/2005): "Error Codes and Service Change Reason Description".

[11] ITU-T Recommendation H.248.2 (01/2005): "Facsimile, text conversation and call discrimination packages".

[12] ITU-T Recommendation H.248.10 (07/2001): "Media Gateway Resource Congestion Handling Package".

[13] ITU-T Recommendation T.140 (02/1998): "Text conversation protocol for multimedia application".

[14] ITU-T Recommendation Q.1950 (12/2002) "Call Bearer Control Protocol".

[15] IETF RFC 2960: "Stream Control Transmission Protocol".

[16] IETF RFC 3267: "Real-Time Transport Protocol (RTP) Payload Format and File Storage Format for the Adaptive Multi-Rate (AMR) and Adaptive Multi-Rate Wideband (AMR-WB) Audio Codecs".

[17] IETF RFC 4566: "SDP: Session Description Protocol".

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

[20] 3GPP TS 26.236: "Packet switched conversational multimedia applications; Transport protocols".

[21] 3GPP TS 29.415: "Core Network Nb Interface User Plane Protocols".

[22] 3GPP TS 23.153: "Out of band transcoder control".

[23] IETF RFC 768: "User Datagram Protocol".

[24] IETF RFC 3332: "Signaling System 7 (SS7) Message Transfer Part 3 (MTP3) - User Adaptation Layer (M3UA)".

[25] 3GPP TS 29.202: "SS7 Signalling Transport in Core Network".

[26] ITU-T Recommendation H.248.7 (03/2004): "Generic Announcement Package".

[27] ITU-T Recommendation H.248.36 (09/2005): " Hanging Termination Detection Package ".

[28] ITU-T Recommendation H.248.11 (11/2002):"Media gateway overload control package".

[29] ITU-T Recommendation H.248.14 (03/2002):"Inactivity timer package".

[30] ITU-T Recommendation H.248.45 (05/2006):"MGC Information Package". See section A.17.1

[31] ETSI ES 283 024 V1.0.14 (2005-12);TISPAN NGN Release 1; PS

[32] IETF RFC 3555: "MIME Type Registration of RTP Payload Formats".

[33] IETF RFC 3551: "RTP Profile for Audio and Video Conferences with Minimal Control"..

[34] ETSI ES 283 012 V1.1.1 (2006-03): "TISPAN; Trunking Gateway Control Procedures for interworking between NGN and external CS networks".

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

[36] IETF RFC 3389: "Real-time Transport Protocol (RTP) Payload for Comfort Noise (CN)".

[37] ITU-T Recommendation V.152 (01/2005): "Procedures for supporting voice-band data over IP networks". including Corrigendum 1.

[38] ITU-T Recommendation H.248.4 (11/2000): "Gateway control protocol: Transport over Stream Control Transmission Protocol (SCTP)" including the Corrigendum 1 (03/2004).

[39] IETF RFC 3556: " Session Description Protocol (SDP) Bandwidth Modifiers for RTP Control Protocol (RTCP) Bandwidth".

[40] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"

[41] ITU-T Recommendation H.248.12 (07/2001): "Gateway control protocol: H.248.1 packages for H.323 and H.324 interworking".

[42] ITU-T Recommendation H.248.12a2 (03/2007): "Gateway control protocol: H.248.1 packages for H.323 and H.324 interworking Ammendment 2: Transport Mechanism (draft work in progress)"at http://ftp3.itu.int/av-arch/avc-site/2005-2008/0703_She/TD-72.zip.

[43] RFC 3309: "Stream Control Transmission Protocol (SCTP) Checksum Change"

[44] ITU-T Recommendation H.248.41 (05/2006): " IP Domain Connection package ".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.

Context (H.248): A context is an association between a number of Terminations. The context describes the topology (who hears/sees whom) and the media mixing and/or switching parameters if more than two terminations are involved in the association.

Package (H.248): Different types of gateways may implement terminations which have differing characteristics. Variations in terminations are accommodated in the protocol by allowing terminations to have optional properties. Such options are grouped into packages, and a termination may realise a set of such packages.

Termination (H.248): A termination is a logical entity on an MGW which is the source and/or sink of media and/or control streams. A termination is described by a number of characterising properties, which are grouped in a set of descriptors which are included in commands. Each termination has a unique identity (TerminationID).

Termination Property (H.248): Termination properties are used to describe terminations. Related properties are grouped into descriptors. Each termination property has a unique identity (PropertyID).

3.2 Symbols

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

Mn Interface between the media gateway control function and the IMS media gateway.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations given in TR 21.905 [40] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [40].

AMR	Adaptive MultiRate
BICC	Bearer Independent Call Control
CN	Core Network
CS	Circuit-Switched
DTMF	Dual Tone Multi Frequency
FFS	For further study
GSM	Global System for Mobile communications
IETF	Internet Engineering Task Force
IM	IP Multimedia
IM-MGW	IP Multimedia Media Gateway
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
MG/MGW	Media GateWay

MGC	Media Gateway Controller
MGCF	Media Gateway Control Function
MIME	Multipurpose Internet Mail Extensions
n.a.	not applicable
PDH	Plesiochronous Digital Hierarchy
PES	PSTN/ISDN Emulation Subsystem
PSTN	Public Switched Telephone Network
PT	Payload Type
R2	(ETSI TISPAN NGN) Release 2
RFC	Request For Comment; this includes both discussion documents and specifications in the IETF domain
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
SCTP	Stream Control Transmission Protocol
SDH	Synchronous Digital Hierarchy
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SONET	Synchronous Optical NETwork
SS	Silence Suppression
SS7	Signalling System No. 7
TDM	Time Division Multiplexing
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TMGW	Trunking MGW
TS	Technical Specification (3GPP, ETSI)
VBD	VoiceBand Data

4 UMTS capability set

The support of the Mn interface capability set shall be identified by the Mn profile and support of this profile shall be indicated in ServiceChange procedure.

The mandatory parts of this capability set shall be used in their entirety whenever it is used within the H.248 profile. Failure to do so will result in a non-standard implementation.

ITU-T Recommendation H.248.1 (05/02) [9] is the basis for this Capability Set. The compatibility rules for packages, signals, events, properties and statistics and the H.248 protocol are defined in ITU-T Recommendation H.248.1 [9]. Their use or exclusion for this interface is clarified in clause 12.

4.1 Void

5 Naming conventions

5.1 MGCF/IM-MGW naming conventions

The MGCF shall be named according to the naming structure of the underlying transport protocol which carries the H.248 protocol.

For further definition of the Termination Names see Annex A.6.

5.2 Void

6 Topology descriptor

No special behaviour, for definition of use see Annex A. 5.

7 Transaction timers

No special behaviour, for definition of timers see Annex A.10.

8 Transport

Each implementation of the Mn interface should provide SCTP (as defined in IETF RFC2960 [15] and as updated by RFC3309 [43]) , however other options are permitted within the profile. For further definition see Annex A12.

9 Multiple Virtual MG.

The support of multiple virtual MGW outlined in the subclause "Multiple virtual MGW" in ITU-T Recommendation H.248.1 [9] is optional.

10 Formats and codes

10.1 Signalling Objects

Table 10.1 shows the parameters which are required.

The coding rules applied in ITU-T Recommendation H.248.1 [9] for the applicable coding technique shall be followed for the UMTS capability set.

Table 10.1: required parameters

Signalling Object	H.248 Descriptor	Coding
Codec List	Local Descriptor or Remote Descriptor	<fmt list> in a single SDP m-line. For a static RTP payload type, the codec type should be implied by the RTP payload type, if not then each codec type shall be provided in a separate SDP "a=rtpmap"-line and possibly additional SDP "a=fmtp"-line(s). See Clause 10.2. For a dynamic RTP payload type, for each codec information on the codec type shall be provided in a separate SDP "a=rtpmap"-line and possibly additional SDP "a=fmtp"-line(s). See Clause 10.2.
Bearer Service Characteristics	Local Descriptor or Remote Descriptor	As per Q.1950 [14]. For TMR, only values "3.1 kHz audio" or "speech" are required.
Context ID	NA	Binary Encoding: As per ITU-T Recommendation H.248.1 [9] Annex A. Textual Encoding: As per ITU-T Recommendation H.248.1 [9] Annex B.
IP Address	Local Descriptor or Remote Descriptor	<connection address> in SDP "c-line"
Port	Local Descriptor or Remote Descriptor	<port> in SDP m-line. <transport> in SDP m-line shall be set to value "RTP/AVP" for voice or video service, and set to value "UDPTL" or "TCPTL"for T.38 service.
mediatype	Local Descriptor or Remote Descriptor	<media> in sdp m-line "audio" for voice service, "video" for video service and "image" for T.38 service.
Reserve_Value	Local Control	ITU-T Recommendation H.248.1 [9] Mode property. Binary Encoding: Encoding as per ITU-T Recommendation H.248.1 Annex A "reserveValue" Textual Encoding: Encoding as per ITU-T Recommendation H.248.1 Annex B "reservedValueMode".
RtcpbwRS	Local Descriptor or Remote Descriptor	<bandwidth> in SDP "b:RS"-lineas per IETF RFC 3556 [39].
RtcpbwRR	Local Descriptor or Remote Descriptor	<bandwidth> in SDP "b:RR"-line as per IETF RFC 3556 [39].
RTPpayload	Local Descriptor or Remote Descriptor	<fmt list> in SDP m-line
Termination ID	NA	Binary Encoding: As per ITU-T Recommendation H.248.1 [9] Annex A. Textual Encoding: As per ITU-T Recommendation H.248.1 [9] Annex B.
Transaction ID	NA	Binary Encoding: As per ITU-T Recommendation H.248.1 [9] Annex A. Textual Encoding: As per ITU-T Recommendation H.248.1 [9] Annex B.
Stream ID	Stream Descriptor	Binary Encoding: As per ITU-T Recommendation H.248.1 [9] Annex A. Textual Encoding: As per ITU-T Recommendation H.248.1 [9] Annex B.
Muxdescriptor	Multiplex Descriptor	Binary Encoding: As per ITU-T Recommendation H.248.1 [9] Annex A. Textual Encoding: As per ITU-T Recommendation H.248.1 [9] Annex B.
Highest Multiplex Level	Termination state	As for property "Highest multiplexing Level" in subclause 4.1.2/H.248.12 [41]
Remote H223 capability	Local Control	As for property "Remote H.223 capability" in subclause 4.1.4/H.248.12 [41]
Incoming Multiplex table	Local Control	As for property "Incoming Multiplex Table" in subclause 4.1.5/H.248.12 [41]
Outgoing multiplex table	Local Control	As for property "Outgoing Multiplex Table" in subclause 4.1.6/H.248.12 [41]
Incoming H245 message	Event descriptor	As for the EventDescriptor in subclause A.8.2.1/H.248.12a2 [42] "Incoming H.245 message"
H245 message content	ObservedEvent descriptor	As for the ObservedEventDescriptor in subclause A.8.2.1.2/H.248.12a2 [42] "Contents of H.245 message".

Outgoing H245 message	Signal descriptor	As for the signal "Outgoing H.245 Message " in subclause A.8.3.1/H.248.12a2 [42]
Outgoing H245 message content	Signal descriptor	As for the additional parameter of the signal "Outgoing H.245 Message " in subclause A.8.3.1.1/H.248.12a2 [42]
IP realm identifier	Local control	As for the property "IP realm identifier " in subclause 5.1.1/H.248.41[44]
Inactivity timeout	EventDescriptor	As for the EventsDescriptor in subclause 5.2/H.248.14 "Inactivity Timeout"
Inactivity timeout	ObservedEvent descriptor	As for the ObserverdEventDescriptor in subclause 5.2/H.248.14 " Inactivity Timeout "
BNC Release	EventDescriptor	As for the EventsDescriptor in subclause E.1.2.1/H.248.1 "Cause"
BNC Release	ObservedEvent descriptor	As for the ObservedEventsDescriptor in subclause E.1.2.1/H.248.1 "Cause"
NOTE: For binary encoding, the SDP equivalents "SDP_V", "SDP_M", "SDP_C", "SDP_A", and SDP_B" in ITU-T Recommendation H.248.1 [9], Annex C.11, shall be used to encode the corresponding SDP lines. Other SDP equivalents may be used, for details see Annex A. The SDP equivalents shall be used in the order specified for the corresponding SDP lines in IETF RFC 2327 [17]. Rules for the usage of SDP in ITU-T Recommendation H.248.1 [9] shall also be applied to the SDP equivalents. SDP description types (v= , m=, a= etc.) are not encoded. CR/LF are not encoded.		

10.2 Codec Parameters

10.2.1 AMR and AMR-WB Codecs

On IMS terminations, the AMR and AMR-WB codecs are transported according to the IETF AMR RTP profile, IETF RFC 3267 [16]. 3GPP TS 26.236 [20] selects options applicable within 3GPP.

IETF RFC 3267[16] contains the MIME registration of the IETF AMR RTP profile with media type "audio" and media subtype of "AMR" and "AMR-WB". The AMR and AMR-WB codecs shall be signaled accordingly in the SDP "a=rtpmap"-line and a dynamic RTP payload type shall be used.

The selected options are expressed as MIME parameters in SDP "a=fmtp"-line. The following MIME parameters shall be supported on the Mn interface:

- "mode-set"
- "mode-change-period"

In addition the following MIME parameters may be supported on the Mn interface:

- "octet-align"
- "mode-change-neighbor" (for IMS this parameter shall be included and set to 1)
- "maxptime"
- "ptime"

For compatibility with GSM peers, the IM-MGW shall perform mode changes only in every second sent package.

Example of encoding of AMR codec

ABNF:

```
Local {
        v=0
        c=IN IP4 $
        m=audio $ RTP/AVP 96
        a=rtpmap:96 AMR/8000
        a=fmtp:96 mode-set=0,2,5,7;mode-change-period=2;mode-change-neighbor=1
a=maxptime:20
        }
```

ASN.1:

```
LocalDescriptor{
    PropertyParams{
        PkgdName=0x000B001              /*SDP_V  * /
            value= "0"
        PkgdName=0x000B008              /*SDP_C * /
            value= "IN IP4 $"
        PkgdName=0x000B00F              /*SDP_M * /
            value= "audio $ RTP/AVP 96"
        PkgdName=0x000B00C              /*SDP_A * /
            value= "rtpmap:96 AMR/8000"
        PkgdName=0x000B00C              /*SDP_A * /
            value= "fmtp:96 mode-set=0,2,5,7;mode-change-period=2;mode-change-neighbor=1"
        PkgdName=0x000B00C              /*SDP_A * /
            value= "maxptime:20"
                }}
```

NOTE: The c-line may be provided after m-line.

10.2.2 DTMF Codec

On IMS terminations, DTMF is transported according to the IETF RFC 2833 [18] "telephone event" format.

IETF RFC 2833[18] contains the MIME registration with media type "audio" and media subtype "telephone-event". DTMF shall be signaled accordingly in the SDP "a=rtpmap"-line and a dynamic RTP payload type shall be used.

An IM-MGW supporting DTMF shall support the default options of the IETF RFC 2833 [18] "telephone event" format. Therefore, a support of optional MIME parameters of "telephone-event" is not required at the Mn interface.

10.2.3 Other Codecs

On IMS terminations, other codecs such as ITU-T codecs are transported according to the RTP payload formats in IETF RFC 3555[32]. 3GPP TS 29.163[4], clause B.2.5.4, specifies the options applicable within 3GPP.

IETF RFC 3555[32] contains the MIME registration with media type "audio" and corresponding media subtype.

For dynamic payload type being used the ITU-T codecs shall be signaled accordingly in the SDP "a=rtpmap"-line, where the selected options are expressed as MIME parameters in SDP "a=fmtp"-line.

For static payloads type being used ITU-T codecs shall be allowed to be signaled accordingly in the SDP "a=rtpmap"-line,when the selected options are expressed as MIME parameters in SDP "a=fmtp"-line. Otherwise the codec type is implied by the RTP payload type.

10.2.3.1 G.711 Codec

On IMS terminations, G.711 codec is transported according to IETF RFC 3551[33].

10.2.3.2 Clearmode codec

The procedures for use of Clearmode Codec are specified in ETSI ES 283 012 [34].

On IMS terminations, Clearmode codec is transported according to IETF RFC 4040[35].

When the MGC determines that a 64 kbit/s unrestricted bearer service is requested, the clearmode codec shall be used. A Dynamic Payload type with CLEARMODE as encoding name shall be included in both the local and remote descriptor.

The behaviour of the MGW shall then conform to IETF RFC 4040[35]. All voice and signal processing functions such as silence suppression, comfort noise insertion and gain adjustment shall be automatically turned off. The MG shall inherit the same QoS objectives as the ISDN bearer service.

10.2.3.3 Silence suppression and comfort noise

The procedures for use of Silence suppression and comfort noise are specified in ETSI ES 283 012 [34].

Silence Suppression (SS) 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.

If a codec has built-in support for silence suppression and comfort noise insertion, and an a=line has been defined in IETF RFC3551[33] or IETF RFC 3555 [32] to activate or de-activate these features, the activation or deactivation of these features shall be indicated using the a= line according to IETF RFC 3551[33]and IETF RFC 3555[32]. If the selected codec does not have built in support for silence suppression and comfort noise (CN) insertion, the CN payload code defined in RFC 3389[36] may be included in the media description.

E.g (for ITU-T Recommendation G.711 A-law codec):

```
v=0
c=IN <address type> <connection address>
m=audio <port number> RTP/AVP 8 13
a=ptime: 10
```

If the CN payload is included in the Local Descriptor, the MGW shall be prepared to receive CN packets during silence periods. This action corresponds to an implicit enabling of the SS mode in receiving direction.

If the CN payload is included in the Remote Descriptor, the MGW shall send CN packets during silence periods. This action corresponds to an implicit enabling of the SS mode in sending direction.

Comfort noise generation, voice activity detection and discontinuous transmission algorithms are outside the scope of the present document.

10.2.3.4 VBD codec

The procedures for use of Voiceband data are specified in ETSI ES 283 012 [34].

Voiceband data refers to traffic from facsimile, modem or text telephony applications.

On IMS terminations, voiceband data traffic is transported according to ITU-T Recommendation V.152 [37] and its Corrigendum 1. ITU-T Recommendation G.711 must be used as VBD codec. The RTP Payload Type (PT) codepoint, "0" or "8" or a value from the dynamic PT range , is used in the MG.

NOTE 1: Use of "0" or "8" is indicating to the MG that only inband-based VBD stimuli must be detected. Both peering MGs are consequently not directly synchronized in their state transitions between "voice" and "VBD" modes.

NOTE 2: Use of "a value from the dynamic PT range" is indicating a VBD RTP packet according to ITU-T Recommendation V.152 [37]. The MGW may offer then an enhanced VBD service.

Upon detection of voiceband data traffic, the Media Gateway shall autonomously switch from Audio mode to VBD mode with VBD codec.

Transitioning between Audio mode and VBD mode is possible in both directions. The procedures for transitioning between these two operation modes are described in ITU-T Recommendation V.152 clause 10/V.152 [37]. Any state transition requires the detection of a "VBD stimuli" (see ITU-T Recommendation V.152 clause 9/V.152 [37]).

11 Mandatory Support of SDP and H.248 Annex C information elements

See Annex A.15.

12 General on packages and Transactions

The use of "Overspecified" (e.g. range of values) and "Underspecifed" (e.g. "?") parameter specification shall not be permitted except where explicitly indicated in or referenced by the Mn interface specification.

Commands on ROOT Termination shall only use the NULL Context.

12.1 Profile Details

VOID.

NOTE: Profile now defined in Normative Annex A.

13 Void

14 Call independent H.248 transactions

See section A.17.1

15 Transactions towards IM CN Subsystem

15.1 Procedures related to a termination towards IM CN SubsystemFor Transactions towards IM CN Subsystem see A.17.2.

15.2 IMS packages

None

16 Transactions towards ISUP

16.1 Procedures relating to a termination towards ISUP

See section A.17.3.

16.2 ISUP packages

None

17 Transactions towards BICC

17.1 Procedures related to a termination towards BICC

See section A.17.4

17.2 BICC packages

This Clause is only applicable for terminations towards BICC Networks. The support of terminations towards BICC networks is optional.

No new packages for terminations towards BICC Networks are defined in the present specification. See Clause 12.1.14 for reused packages from other specifications.

If the Nb framing protocol (see 3GPP TS 29.415 [21]) is applied at the termination towards the BICC network, the following package shall be applied:

3GUP package (see subclause 15.1.1 of 3GPP TS 29.232 [5]);To enable bearer modification at OoBTC capable networks on Nb interface (see 3GPP TS 23.153 [22]) at the termination towards the BICC network, the following package shall be applied:

Modification of Link Characteristics Bearer Capability (see subclause 15.1.5 of 3GPP TS 29.232 [5]);

Annex A (Normative): Profile Description

A.1 Profile Identification

Table A.1/1: Profile version

Profile name:	threegimscsiw
Version:	2

A.2 Summary

This Profile describes the minimum mandatory settings and procedures required to fulfil the Media Gateway control requirements for a) the interworking scenario between 3GPP IMS and 3GPP CS or PSTN/ISDN and b) the interworking scenario between NGN and PSTN/ISDN (i.e ETSI IMS-PSTN/ISDN, ETSI PES-PSTN/ISDN).

In addition optional settings and procedures are described which fulfil optional features and where supported, the minimum mandatory settings within the optional procedures and packages are identified that must be supported in order to support that feature.

"Optional" or "O" means that it is optional for either the sender or the receiver to implement an element. If the receiving entity receives an optional element that it has not implemented it should send an Error Code (e.g. 445 "Unsupported or Unknown Property", 501"Not Implemented", etc.). "Mandatory" or "M" means that it is mandatory for the receiver to implement an element. Whether it is mandatory for the sender to implement depends on specific functions; detail of whether elements of the core protocol are manadatory to be sent are defined in the stage 2 procedures, stage 3 procedures and/or the descriptions of individual packages.

The setting or modification of elements described in the profile under the heading "Used in Command" has the meaning that the property can be set/modified with that command. The property may be present in other commands (in order to preserve its value in accordance with ITU-T H.248.1[9]) when those commands are used for other procedures that affect the same descriptor.A.3 Gateway Control Protocol Version

A.3 Gateway Control Protocol Version

ITU Recommendation H.248.1 Version 2 [9] shall be the version supported.

A.4 Connection Model

Table A.4/1: Connection Model

Maximum number of contexts:	No restriction
Maximum number of terminations per context:	2 (NOTE 1) 32 (NOTE 2)
Allowed terminations type combinations in a Context	All (NOTE 3)

NOTE 1: Support of 2 terminations per context is required for TISPAN. Support of more than two terminations per context (e.g. for monitoring) is optional.
NOTE 2: Support of 32 termination per context is required for 3GPP
NOTE 3: For TISPAN NGN R2 only the following is required:

- Context[a](IMS, TDM),
- Context[b](TDM, TDM),
- Context [c] (TDM),
- Context [d] (IMS).

A.5 Context Attributes

Table A.5/1: Context attributes

Context Attribute	Supported	Values Supported
Topology	Optional	All
Priority Indicator	Optional	0-15
Emergency Indicator	Yes	Not Applicable
NOTE: The "Topology" attribute is optional for example support of monitoring. If requested and not supported error code 444 shall be returned		

A.6 Terminations

A.6.1 Termination Names

A.6.1.1 General

The Termination ID structure is provisioned in the MGC and MG and is known by the MG and the MGC at or before start up.

With ephemeral ATM/AAL2 and IP endpoint bearer types the internal structure of Termination ID is irrelevant for MGW and MGC and therefore Termination ID is only a numeric identifier for the termination. When bearer type is a physical timeslot within TDM circuit the Termination ID structure shall follow the Termination naming convention for TDM circuit bearer.

Ephemeral terminations are further denoted in the profile by the following:

- BICC (meaning applies to terminations towards BICC)
- BICC ATM (meaning applies to terminations towards BICC with ATM transport)
- BICC IP (meaning applies to terminations towards BICC with IP transport)
- IMS (meaning applies to terminations toward IMS)
- Multiplex (meaning applies to terminations performing multiplexing)

A.6.1.2 ASN.1 Encoding

A.6.1.2.1 General Structure

The following general structure of TerminationID shall be used:

4 octets shall be used for the termination ID. The following defines the general structure for the termination ID:

Termination type	X

Termination type:

Length 3 bits

Values:

000 Reserved

001 Ephemeral termination

010 TDM termination

011 - 110 Reserved

111 Reserved for ROOT termination Id (ROOT Termination Id = 0xFFFFFFFF)

X:

Length 29 bits.

Usage dependent on Termination type. TDM terminations specified below in subclause 5.2.2. Other usage unspecified.

The use of wildcarding for the Termination Id shall be performed using 1 octet only.

A.6.1.2.2 Termination naming convention for TDM terminations

Table C.6.1.2.2/1 ASN.1 coding

Termination type (=010)	PCM system	Individual

PCM system:

Length 24 bits

Usage unspecified. Uniquely identifies PCM interface in MGW

Individual:

Length: 5 bits

Max. of 32 individuals (timeslots) per PCM system (max. 24 for a 24 channel system)

A.6.1.3 ABNF coding:

A.6.1.3.1 General Structure

The following general structure of termination ID shall be used:

TerminationID = "ROOT" / pathName / "$" / "*" ; according to ITU-T H.248.1 [9] Annex B.

A.6.1.3.2 Termination Naming Convention for TDM Terminations

A.6.1.3.1.1 Naming Structure

A hierarchical naming structure is recommended for physical Terminations.

The PCMsystem is recommended to follow the following physical and digital signal hierarchy:

PCMsytem = <unit-type1>_<unit #>/<unit-type2>_<unit #>/...

The <unit-type> identifies the particular hierarchy level.

Some example values of <unit-type> are:

"s", "su", "stm4", "stm1", "oc3", "ds3", "e3", "ds2", "e2", "ds1", "e1" where "s" indicates a slot number and "su" indicates a sub-unit within a slot.

Leading zeroes MUST NOT be used in any of the numbers ("#") above.

The <unit #> is a decimal number which is used to reference a particular instance of a <unit-type> at that level of the hierarchy. Value ranges always starting with one.

The number of levels and naming of those levels is based on the physical hierarchy within the Media Gateway.

Here are some examples of the Termination structure:

1. TDM Terminations at SDH STM-1 ports:
   tdm/s_<Card ID>/stm1_<STM1 ID>/e1_<E1 ID>/<channel #>

   e.g., tdm/s_2/stm1_3/e1_17/25

2. TDM Terminations at PDH E1 ports (e.g., for "PCM system" only applications):
   tdm/s_<Card ID>/e1_<E1 ID>/<channel #>

   e.g., tdm/s_2/e1_17/25

   NOTE 1: This Termination naming convention may be used to align with ASN.1 TDM Termination names as defined in A.6.1.2.2. The alignment must take into account the numbering scheme of "<E1 ID>" with the"PCM system" field, and the upper level(s) are regarded as prefix ("tdm/s-<Card ID>" versus "3-bit codepoint for 'TDM' ").

   NOTE 2: See also clause 3/H.248.33 concerning "PCM system" definition.

3. TDM Terminations at SONET OC-3 ports:
   tdm/s_<Card ID>/oc3_<OC3 ID>/ds1_<DS1 ID>/<channel #>

   e.g., tdm/s_2/oc3_3/ds1_17/22

A.6.1.3.1.2 Syntactical Specification

The syntax specification may be used for the population of valid TDM TerminationID structures for.

ABNF (IETF RFC 4234) is used for the syntax specification.

pathName = TDMToken SLASH (PCMsystem / "*")

TDMToken = "tdm"

PCMsystem = 0*(HierarchyLevelHIGHToken SLASH) HierarchyLevelLOWToken

HierarchyLevelHIGHToken = (UnitTypeToken "_" UnitNumber)

HierarchyLevelLOWToken = (UnitTypeToken "_" Wildcard) / Channel / Wildcard

UnitTypeToken = "ChassisToken" / "SDHToken" / "SONETToken" / "PDHToken"

ChassisToken = "s" / "su" ; slot, sub-unit within slot

SDHToken = "stm4" / "stm1" ; relevant is capacity, but not
electrical or optical interface type

SONETToken = "oc12" / "oc3"

PDHToken = "ds3" / "e3" / "ds2" / "e2" /"ds1" / "e1" ; ANSI & ETSI

UnitNumber = 1*DIGIT

Channel = %d0-31 / %d0-23 ; value range E1/T1 system

Wildcard = "*"

A.6.1.3.1.3 Wildcarding

Wildcarding (CHOOSE, ALL) is allowed for number fields ("<unit #>").

Examples for wildcarding:

1. TDM Terminations at SDH STM-1 ports:

   e.g., wildcarding on top level: `tdm/*`

   e.g., wildcarding on slot level: `tdm/s_3/*`

   e.g., wildcarding on STM-1 level: `tdm/s_3/stm1_4/*`

   e.g., wildcarding on E1 level: `tdm/s_2/stm1_4/e1_49/*`

2. TDM Terminations at PDH E1 ports:

   e.g., wildcarding on E1 level: `tdm/s_1/e1_2/*`

A.6.1.3.1.4 Heterogeneous TDM Port Configurations

An homogeneous TDM port configuration relates to a MGW with a single port type for physical Terminations. There is therefore a single TDM Termination name structure in use.

Heterogeneous TDM configurations means different port types, either by different signal hierarchies, like SDH/STM-1 and SDH/STM-4, and/or a mix of SDH and PDH interfaces. The number of port types in use is determining the number of TDM Termination name structures. With heterogeneous configurations the TDM Termination name structure may be aligned, for instance, by using the "highest common digital signal hierarchy" as highest Termination name hierarchical level. There is consequently a single TDM Termination name structure with a "flattened" hierarchy.

Example:

MGW with SDH/STM-1 and PDH/E1 ports. Common denominator is "e1", a selected TDM Termination name might be therefore a common two-level structure with "**`tdm/e1_<E1 ID>/<channel #>`**". The unit types "s", "su" or "stm1" are not used here.

NOTE: This concept is followed in A.6.1.2.2, ASN.1 for TDM Terminations.

A.6.1.3.2 Termination Naming Convention for Ephemeral Terminations

A.6.1.3.2.1 Naming Structure

An alphanumeric pathname structure is recommended for Ephemeral terminations:

ephemeral/<string of alphanumeric characters or "/">

e.g., Ephemeral/1/0/40000

A.6.1.3.2.2 Syntactical Specification

The syntax rules may be used for the population of valid ephemeral TerminationID structures for.
ABNF (IETF RFC 4234) is used for the syntax specification.

ABNF coding:

pathName = EphToken SLASH EPHsystem

EphToken = "Ephemeral" ; so called prefix

; The maximum length of 'pathname' is defined in Annex B.2/H.248.1.

EPHsystem = 0*(HierarchyLevelHIGHToken SLASH) HierarchyLevelLOWToken

HierarchyLevelHIGHToken = 1*alphanum

HierarchyLevelLOWToken = Individual / Wildcard

alphanum = ALPHA / DIGIT

Individual = 1*DIGIT

Wildcard = "$" / "*"

A.6.2 Multiplexed terminations

Table A.6.2/1: Multiplexed terminations

MultiplexTerminations Supported	Yes (NOTE)
NOTE : Yes for multimedia interworking and No for voice interworking.	

Table A.6.2/2: Multiplex Types Supported

Multiplex types supported:	H.223
Maximum number of terminations connected to multiplex:	TBD (NOTE)
NOTE: It is not clear what is the exact purpose of this parameter; further clarification within H.248.1 core protocol is required before this property shall be used.	

A.7 Descriptors

A.7.1 Stream Descriptor

Table A.7.1/1: Stream descriptors

Maximum number of streams per termination type	2 (NOTE)
NOTE : Value 2 for multimedia interworking and value 1 for voice interworking.	

A.7.1.1 Local Control Descriptor

Table A.7.1.1/1: Local Control Descriptor

		Termination Type	**Stream Type**
Reserve group used:	No		
Reserve value used:	Yes (NOTE 1)	Terminations Toward IMS	Not Applicable
NOTE 1: The "Reserve value" parameter is, inter alia, required for negotiation of multiple payload types, ie ITU-T Rec. G.711, comfort noise (according ITU-T Rec. G.711 Appendix II), DTMF tone relay (see RFC2833 [18]).			

Table A.7.1.1/2: Allowed Stream Modes

Termination Type	**Stream Type**	**Allowed StreamMode Values**
TDM	Not Applicable	SendOnly, RecvOnly, SendRecv, Inactive
IMS	Audio, Video (NOTE 1)	SendOnly, RecvOnly, SendRecv, Inactive
BICC IP	Not Applicable	SendOnly, RecvOnly, SendRecv, Inactive
BICC ATM	Not Applicable	SendOnly, RecvOnly, SendRecv, Inactive
Multiplex (NOTE 2)	Audio, Video	SendOnly, RecvOnly, SendRecv, Inactive
NOTE 1: Audio and Video for multimedia interworking, and Not applicable for voice interworking. NOTE 2: Specific for multimedia interworking.		

A.7.2 Events Descriptor

Table A.7.2/1: Events Descriptor

Events settable on termination types and stream types:	Yes		
	Event ID	**Termination Type**	**Stream Type**
	Detect_Digit(Digit) (d0 to dd, inclusive)	ALL except ROOT	Not Applicable
	BNC Established	Terminations towards BICC network	Not Applicable
	BNC Modification Failed	Terminations towards BICC network	Not Applicable
	BNC Modified	Terminations towards BICC network	Not Applicable
	Tunnel	Terminations towards BICC network with IP transport	Not Applicable
	g/cause	ALL except ROOT	Not Applicable
	g/sc	ALL except ROOT	Not Applicable
	ct/cmp	TDM	Not Applicable
	chp/mgcon	ROOT	Not Applicable
	Hangterm/thb	ALL except ROOT	Not Applicable
	ocp/mg_overload	ROOT	Not Applicable
	it/ito	ROOT	Not Applicable
	Start tone detected (tonedet/std)	IMS, TDM, BICC	Only applicable to audio stream
	End Tone detected (tonedet/etd)	IMS	TDM, BICC Only applicable to audio stream
	Optimal Codec Event (threegtfoc/codec_modify)	TDM, BICC	Not Applicable
	Codec List Event (threegtfoc/ distant codec_list)	TDM, BICC	Not Applicable
	TFO Status Event (threegtfoc/TFO_status)	TDM, BICC	Not Applicable
	Incoming H.245 message (h245transport/h245msgin, 0x00 b4/0x0001)	Multiplex	Not Applicable
NOTE: Events for Terminations towards BICC network dependent on option to support such interworking, e.g. not required for TISPAN NGN R2 TMGW. NOTE1: BNC Release event is defined in formats and codes table 10.1 and refers to the g/cause event.			

Table A.7.2/2: Event Buffer Control

Event Buffer Control used:	No

Table A.7.2/3: Keep active

Keepactive used on events:	Conditional (NOTE 1)
NOTE 1: Required for 3GPP, not required by TISPAN NGN R2 TMGW.	

Table A.7.2/4: Embedded events

Embedded events in an event descriptor:	No

Table A.7.2/5: Embedded signals

Embedded signals in an event descriptor:	No

A.7.3 EventBuffer Descriptor

Table A.7.3/1: Event Buffer Descriptor

Event Buffer descriptor used:	No

A.7.4 Signals Descriptor

Table A.7.4/1: Signals Descriptor

Signals settable dependant on termination or streams types:		Yes NOTE: "Yes" means any signal not listed below may be played on any termination or stream, except Signals on ROOT termination shall not be supported.	
If yes	**Signal ID**	**Termination Type**	**Stream Type / ID**
	ct/*	TDM	Not Applicable
	gb/*	BICC	Not Applicable
	bt/*	BICC IP	Not Applicable
	cg/rt cg/bt cg/ct	TDM	Not Applicable
	an/apf	ALL except ROOT and Multiplex	Not Applicable
	Outgoing H.245 Message (h245transport/h245msgout, 0x00??/0x0001)	Multiplex	Not Applicable

Table A.7.4/2: Signal Lists

Signals Lists supported:		Conditional (NOTE 1)
If yes	**Termination Type Supporting Lists:**	ALL except ROOT
	Stream Type Supporting lists:	ALL
	Maximum number of signals to a signal list:	FFS<integer>
	Intersignal delay parameter supported:	No
NOTE 1: Required for 3GPP, not required for TISPAN NGN R2 TMGW. NOTE 2: This field requires at least version 3 of the H.248.1 protocol		

Table A.7.4/3: Overriding Signal type and duration

Signal type and duration supported:	Optional
NOTE: Not required for TISPAN NGN R2 TMGW.	

Table A.7.4/4: Notify completion

Notify completion supported:		Yes
If yes	**SignalID**	**Type of completion supported**
	All Tones and Announcements	TO, EV, SD and NC
RequestID Parameter Supported:	NO	
NOTE: This field requires at least version 3 of the H.248.1 protocol.		

Table A.7.4/5: Signals played simultaneously

Signals played simultaneously:	No

Table A.7.6/6: Keep active

Keepactive used on signals:	Conditional (NOTE 1)
NOTE 1: Required for 3GPP, not required for TISPAN NGN R2 TMGW.	

A.7.5 DigitMap Descriptor

Table A.7.5/1: DigitMap Descriptor

Digit Maps supported:	No

A.7.6 Statistics Descriptor

Table A.7.6/1: Statistics Descriptor

Statistics reported on subtract:	No (for TDM Terminations)
	Optional For Ephemeral Terminations (NOTE 1)
NOTE 1: This is required for TISPAN NGN R2 TMGW	

A.7.7 ObservedEvents Descriptor

Table A.7.7/1: Observed Events Descriptor

Event detection time supported:	No

A.7.8 Topology Descriptor

Table A.7.8/1: Topology Descriptor

Allowed triples:	Optional (NOTE 1) : (T1, T2, isolate) (T1, T2, oneway) (T1, T2, bothway)
NOTE 1: If not supported then error code 444 shall be returned.	

A.7.9 Error Descriptor

Table A.7.9/1: Error Codes Sent by MGCF

Supported H.248.8 Error Codes:	FFS < list of individual numbers>
Supported Error Codes defined in packages:	All error codes defined in supported packages shall be supported.

Table A.7.9/2: Error Codes Sent by MGW:

Supported H.248.8 Error Codes:	FFS< list of individual numbers>
Supported Error Codes defined in packages:	All error codes defined in supported packages shall be supported.

A.7.10 TerminationState Descriptor

Table A.7.10/1: TerminationState Descriptor

TerminationState: ServiceStates:	InService/OutofService
TerminationState: EventBufferControl:	OFF

A.8 Command API

A.8.1 Add

Table A.8.1/1: Descriptors used by Command Add Request

Descriptors used by Add Request:	Events, Signals, Media (LocalControl, Local And Remote), Audit

Table A.8.1/2: Descriptors used by Command Add Reply

Descriptors used by Add Reply:	Events, Signals, Media (LocalControl, Local And Remote), Error, Audit When command request excludes an Audit Descriptor, the MGW response shall only include descriptors which contained underspecified or overspecified properties in the command request. Furthermore, only those properties that were underspecified or overspecified in the request shall be sent in the reply. Exceptions to this rule are: - The Error Descriptor - SDP properties returned in "Reserve IMS Connection Point" and "Reserve IMS Connection Point and Configure Remote Resources" procedures, as specified in A.17.2.2 and A.17.2.4

A.8.2 Modify

Table A.8.2/1: Descriptors used by Command Modify Request

Descriptors used by Modify Request:	Events, Signals, Media (LocalControl, Local And Remote), Audit

Table A.8.2/2: Descriptors used by Command Modify Reply

Descriptors used by Modify Reply:	Events, Signals, Media (LocalControl, Local And Remote), Error, Audit When command request excludes an Audit Descriptor, the MGW response shall only include descriptors which contained underspecified or overspecified properties in the command reques. Furthermore, only those properties that were underspecified or overspecified in the request shall be sent in the reply. Exceptions to this rule are: - The Error Descriptor - SDP properties returned in "Configure IMS Resources" procedure as specified in A.17.2.3.

A.8.3 Subtract

Table A.8.3/1: Descriptor used by Command Subtract Request

Descriptors used by Subtract Request:	AUDIT (empty) or NONE

Table A.8.3/2: Descriptor used by Command Subtract Reply

Descriptors used by Subtract Reply:	None or Statistics When command request contains "Audit(empty)", then no statistics are returned. Otherwise, connection statistics are returned in the Subtract reply dependent on the supported packages (see clause A.14).

A.8.4 Move

Table A.8.4/1: Command Move

Move command used:	Optional(NOTE)
NOTE: If not supported then error code 443 shall be returned.	

Table A.8.4/2: Descriptors used by Move Request

Descriptors used by Move Request:	Events, Signals, Media (LocalControl, Local And Remote), Audit

Table A.8.4/3: Descriptors used by Move Reply

Descriptors used by Move Reply	Events, Signals, Media (LocalControl, Local And Remote), Error, Audit. When command request excludes an Audit Descriptor, the MGW response shall only include descriptors which contained underspecified or overspecified properties in the command request, with the exception of the Error Descriptor. Furthermore, only those properties that were underspecified or overspecified in the request shall be sent in the reply.

A.8.5 Auditvalue

Table A.8.5/1: Auditvalue

Audited Properties:	Property Name and Identity	Descriptor
Termination ID	TerminationState: - TDM: ALL (indicating 1 TDM group NOTE3), individual termination (NOTE 4) - ATM/IP: individual termination - Root (MGW Audit)	TerminationState Descriptor
Termination ID	MGC information (mgcinfo) TDM: Individual Termination	LocalControl Descriptor
Termination ID	For Packages: - Root - TDM/ATM/IP: individual termination (NOTE1)	Packages Descriptor (NOTE2)
Termination ID	None (MGW Audit) : - Root	Audit (empty) Descriptor
Audited Statistics:	None	
Audited Signals:	None	
Audited Events:	None	
Packages Audit Possible	Yes	

NOTE1: The purpose to audit an individual Termination is to retrieve MGC Information if supported or to determine whether the Hanging Termination Detection package is supported.
NOTE2: Support of this capability is optional.
NOTE3: TDM Group equates to an E1 or T1 PCM System.
NOTE 4: Auditing a single termination of a TDM group is an alternative to the wildcarded audit (TDM: ALL) to derive the service state of the TDM group. All the terminations of the TDM group share the same service state.

A.8.6 Auditcapability

Table A.8.6/1: Auditcapability

Audited Properties:	Property Name and Identity	Descriptor
	FFS	FFS
Audited Statistics:	None	
Audited Signals:	None	
Audited Events:	None	

NOTE: AuditCapability command is not supported by the ETSI TISPAN profile.

A.8.7 Notify

Table A.8.7/1: Descriptors Used Notify

Descriptors used by Notify Request or Reply:	ObservedEvents, Error

NOTE : The Error Descriptor shall not be used in Notify Request.

A.8.8 Service Change

Table A.8.8/1: Service Change Methods and Reasons Sent By MGCF

ServiceChange Methods supported:	ServiceChange Reasons supported:
Restart (NOTE1)	"901 Cold Boot" (Optional) "902 Warm Boot" (Optional)
Handoff (NOTE1, NOTE 2)	"903 MGC Directed Change" (Mandatory)
Forced (NOTE1)	"905 Termination Taken Out Of Service" (Optional)
Graceful (NOTE1)	"905 Termination Taken Out Of Service" (Optional)
NOTE : When a Service Change command on the Root termination with a method other than Graceful is sent, the command shall always be sent as the only command in a message. The sending node shall always wait for the reply to a Service Change command on the Root termination with a method other than Graceful before sending further command requests. A Service Change command on the Root termination with method Graceful may be combined with other commands in a single message. NOTE 1: ROOT Only. NOTE 2: Not involving more than 1 MGCF. No support of handoff relates to a network deployment scenario with "primary H.248 systems only", which translates to no geographic redundancy of the MGCF.	

Table A.8.8/2: Service Change Methods and Reasons Sent By MGW

ServiceChange Methods supported:	ServiceChange Reasons supported:
Restart	"900 Service Restored" (Mandatory) "901 Cold Boot" (Mandatory) (NOTE1) "902 Warm Boot" (Mandatory) (NOTE1) "910 Media Capability Failure " ALL except ROOT (Optional) "913 Signal Capability Failure " ALL except ROOT (Optional) "914 Event Capability Failure " ALL except ROOT (Optional)"916 Packages Change (Optional) "917 Capability Change (Optional)
Graceful	"904 Termination Malfunction" ,ALL except ROOT, (Mandatory) "905 Termination Taken Out Of Service",(Mandatory) "906 Loss Of Lower Layer Connectivity" , ALL except ROOT,(Mandatory) "907 Transmission Failure" ALL except ROOT,(Mandatory) "908 MG Impending Failure" ROOT only (Mandatory)
Forced	"904 Termination Malfunction" ,ALL except ROOT, (Mandatory) "905 Termination Taken Out Of Service" (Mandatory) "906 Loss Of Lower Layer Connectivity" ALL except ROOT, (Mandatory) "907 Transmission Failure" ALL except ROOT, (Mandatory) "908 MG Impending Failure" ROOT only (Mandatory)
Handoff (NOTE1, NOTE 2)	"903 MGC Directed Change" (Mandatory)
Disconnected (NOTE1)	"900 Service Restored" (Mandatory) "916 Packages Change (Optional) "917 Capability Change (Optional)
NOTE : When a Service Change command on the Root termination with a method other than Graceful is sent, the command shall always be sent as the only command in a message. The sending node shall always wait for the reply to a Service Change command on the Root termination with a method other than Graceful before sending further command requests. A Service Change command on the Root termination with method Graceful may be combined with other commands in a single message. NOTE 1: ROOT Only. NOTE 2: In response to a MGC Ordered Re-Register.	

Table A.8.8/3: Service Change Address

ServiceChangeAddress used:	No

Table A.8.8/4: Service Change Delay

ServiceChangeDelay used:	No

Table A.8.8/5: Service Change Incomplete Flag

ServiceChange Incomplete Flag used:	No
NOTE: This field requires at least version 3 of the H.248.1 protocol.	

Table A.8.8/6: Service Change Version

Version used in ServiceChangeVersion:	2

Table A.8.8/6: Service Change Profile

ServiceChangeProfile mandatory:	Yes

Table A.8.8/8: H.248.18 Profile negotiation

Profile negotiation as per H.248.18:	No

A.8.9 Manipulating and auditing context attributes

Table A.8.9/1: Manipulating and auditing context attributes

Context Attributes Manipulated:	Topology (Optional) , Emergency, Priority
Context Attributes Audited:	None

A.9 Generic command syntax and encoding

Table A.9/1: Encodings

Supported Encodings:	Binary (optional) (NOTE 1) Text (optional) (NOTE 2) : The receiver shall support: • Short Token Notation Long Token Notation
If binary encoding, is indefinite length encoding supported:	Yes (NOTE3)
NOTE 1: For 3GPP Mn interface binary encoding is strongly recommended if only one encoding is selected to ensure interoperability. NOTE 2: Text encoding is required by TISPAN NGN R2 TMGW. For implementations providing both 3GPP Mn and TISPAN functionality text encoding is required as a minimum. NOTE3: The binary encoding rules which are applicable to the defined Abstract Syntaxes are the Basic Encoding Rules for Abstract Syntax Notation One, defined in ITU-T Recommendation X.690 [41]. Specifically in accordance with ITU-T Recommendation X.690 [41] section 7.3, alternative encodings based on the definite and indefinite form of length are permitted by the basic encoding rules as a sender's option. Receivers shall support both alternatives.	

A.10 Transactions

Table A.10/1: Transactions per Message

Maximum number of TransactionRequests / TransactionReplies / TransResponseAcks / Segment Replies per message:	2(NOTE 1) 10(NOTE 2)
NOTE 1: Maximum required by TISPAN NGN R2 NOTE 2: Maximum required by 3GPP	

Table A.10/2: Commands per Transaction Requests

Maximum number of commands per Transaction request:	2(NOTE 1) Unspecified(NOTE 2)
NOTE 1: Maximum required by TISPAN NGN R2 NOTE 2: Not specified by 3GPP	

Table A.10/3: Commands per Transaction Reply

Maximum number of commands per Transaction reply:	2 (NOTE 1) Unspecified (NOTE 2)
NOTE 1: Maximum required by TISPAN NGN R2 NOTE 2: Not specified by 3GPP however for auditing with wildcarded requests (e.g TDM E1) then the reply may include up to 32 commands to indicate the termination state.	

Table A.10/4: Commands for Wildcarded Responses

Wildcarded responses may be requested for:	Modify, Subtract, AuditValue

Table A.10/5: Procedures for Wildcarded Responses

Procedures that make use of wildcarded responses:	Release Bearer, Release Termination, Audit Value, Release IMS Termination, Release TDM Termination
NOTE: Used when multiple terminations are released with one command and in audit responses where multiple terminations are implied by the audit request.	

Table A.10/6: Optional Commands

Commands able to be marked "Optional":	ALL

Table A.10/7: Transaction Timers

Transaction Timer:	Value
normalMGExecutionTime	Provisioned
normalMGCExecutionTime	Provisioned
MGOriginatedPendingLimit	Provisioned
MGCOriginatedPendingLimit	Provisioned
MGProvisionalResponseTimerValue	Provisioned
MGCProvisionalResponseTimerValue	Provisioned

A.11 Messages

The MGC/MGW may be named according to the naming structure of the underlying transport protocol which carries the H.248 protocol.

It is however recommended that MGC and MG names are in the form of fully qualified domain names. For example the domain name of the MGC may be of the form mgc1.whatever.net and the name of the MG may be of the form mg1.whatever.net.

The "Message Identifier" in the H.248 messages may be used by the MGC and MG to identify the originator of the message.

A.12 Transport

Table A.12/1: Transport

Supported Transports:	• SCTP(recommended) (NOTE1). • SCTP/M3UA(optional) optional – as defined in IETF RFC 3332 [24] with options detailed in 3GPP TS 29.202 [25] (NOTE2). • UDP(optional).
NOTE: If using SCTP as defined in IETF RFC 2960 [15] the MGW shall always be the node to perform the "Initiation". NOTE1 H.248 is "SCTP user" in this case of H.248/SCTP/IP based transport according ITU-T Rec. H.248.4 [38]. The number of used SCTP Streams for traffic of the H.248 Control Association must be defined, see § 8/H.248.4 [38]. A single SCTP Stream is the default assumption ("Single-Stream Mode") in this Profile. NOTE2 This is slightly different with regards to SCTP encapsulation. H.248 is "M3UA user" in this case of H.248/M3UA/SCTP/IP based transport. H.248 Messages are corresponding to M3UA user protocol data units. "SCTP multistreaming" may be also applied (see § 1.4.7/RFC 3332). If not then the complete M3UA traffic is mapped on a single SCTP Stream, i.e., the Single-Stream Mode. NOTE3 Checksum calculation for SCTP shall be supported as specified in RFC 3309 [43] instead of the method specified in RFC 2960 [12].	

Table A.12/2: Segmentation

Segmentation Supported:	No
NOTE: This field requires at least version 3 of the H.248.1 protocol.	

Table A.12/3: Support of Control Association Monitoring

Control Association Monitoring Supported:	Monitoring mechanism is dependent on used H.248 transport (see Table A.12/1): • **SCTP**: inherent capability of SCTP (NOTE 1) • **SCTP/M3UA**: inherent capability of SCTP • **UDP**: 1. H.248.14 (MGW-driven monitoring) 2. Empty AuditValue on ROOT (MGC-driven monitoring)
NOTE 1: Use of H.248.14 for this is FFS	

A.13 Security

Table A.13/1: Security

Supported Security:	None

A.14 Packages

Table A.14/1: Mandatory packages

Package Name	Package ID	Version
Generic (see ITU-T Recommendation H.248.1 [9] Annex E.1);	g, (0x0001)	v1
Base Root Package (see ITU-T Recommendation H.248.1 [9] Annex E.2);	root, (0x0002)	v2
Basic Continuity Package (see ITU-T Recommendation H.248.1 [9] Annex E.10);	ct, (0x000a)	**v1**
TDM Circuit Package (see ITU-T Recommendation H.248.1 [9] Annex E.13);	tdmc, (0x000d)	**v1**

Table A.14/2: Optional packages

Package Name	Package ID	Version	Support dependent on:
Tone Detection Package (see ITU-T Recommendation H.248.1 [9] Annex E.4);	tonedet, (0x0004) This package is "extension only". It must be supported if extended but shall not be published over the protocol. It is here for information only.	v1	Mandatory for 3GPP
Basic DTMF Generator Package (see ITU-T Recommendation H.248.1 [9] Annex E.5);	dg, (0x0005)	v1	Mandatory for 3GPP
DTMF Detection Package (see ITU-T Recommendation H.248.1 [9] Annex E.6);	dd, (0x0006)	v1	Mandatory for 3GPP
Media Gateway Resource Congestion Handling Package (see ITU-T Recommendation H.248.10 [12]).	chp, (0x0029)	v1	Mandatory for 3GPP
Generic Announcement Package (see ITU-T Recommendation H.248.7 [28]). Only Fixed Part is required.	an(0x001d)	v1	3GPP applications
Bearer Characteristics Package (see ITU-T Recommendation Q.1950 [23] annex A..3).	bcp (0x001e	V2	Terminations Towards BICC
Generic Bearer Connection Package (see ITU-T Recommendation Q.1950 [23] annex A.6).	Gb, (0x0021)	v1	Interworking with BICC
Tone Generator Package (see ITU-T Recommendation H.248.1 [9] Annex E.3);	tongen, (0x0003)	v1	This package is "extension only". It must be supported if extended but shall not be published over the protocol. It is here for information only.
Call Progress Tones Generator Package (see ITU-T Recommendation H.248.1 [10] annex E.7).	Cg, (0x0007)	v1	
Basic Call Progress Tones Generator with Directionality, (see ITU-T Recommendation Q.1950 [23] annex A.8).	bcg, (0x0023)	v1	Services provided by network
Expanded Call Progress tones Generator Package (see ITU-T Recommendation Q.1950 [23] annex A.9).	xcg, (0x0024	v1	Services provided by network
Basic Services Tones Generation Package, (see ITU-T Recommendation Q.1950 [23] annex A.10).	srvtn, (0x0025)	v1	Services provided by network
Bearer Control Tunnelling Package (see ITU-T Recommendation Q.1950 [23] annex A.7).	Bt, (0x0022)	v1	Interworking with BICC and IP transport
Expanded Services Tones Generation Package (see ITU-T Recommendation Q.1950 [23] annex A.11).	xsrvtn, (0x0026)	v1	Services provided by network
Intrusion Tones Generation Package (see ITU-T Recommendation Q.1950 [23] annex A.12).	Int, (0x0027)	v1	Services provided by network
3GUP package (see subclause 15.1.1 of 3GPP TS 29.232 [5])	threegup, (0x002f)	v1	Interworking with BICN PLMN
Modification of Link Characteristics Bearer Capability (see subclause 15.1.5 of 3GPP TS 29.232 [5])	threegmlc, (0x0046)	v1	Interworking with BICN PLMN with Codec Modification
Inactivity (see ITU-T Recommendation. H248.14 [29])	it, (0x0045)	v1	Only applicable for UDP transport.
Hanging Termination Detection package (see ITU-T Recommendation H.248.36 [27]).	hangterm (0x0098)	v1	
TFO package (see subclause 15.2.2 of 3GPP TS 29.232 [5])	threegtfoc, (0x0031)	v2	
Media Gateway Overload Control Package (see ITU-T Recommendation H.248.11 [28]).	ocp, (0x0051)	v1	

MGC Information Package (see ITU-T Recommendation H.248.45 [30])	Mgcinfo, (0x00a0)	v1	This package may be supported as an operator option. For this Profile the information string shall be limited to 32 octets in length.
RTP (ITU-T Recommendation H248.1 [9] Annex E.12) (NOTE 1)	Rtp, (0x000c)	V1	Used for connection statistics
H324 package (see ITU-T Recommendation H.248.12 [41])	H324,(0x002c)	V1	Multimedia calls
H.245 Transport Package (see ITU-T Recommendation H.248.12a2 [42])	H245transport, (0x00b4)	V1	Multimedia calls
IP Domain connection package (see ITU-T Recommendation H.248.41 [44])	ipdc, (0x009d)	V1	Multiple IP realms supported
NOTE 1: support of RTP Package does not require support of Network Package.			

Table A.14/3: Package Provisioning Information

Package Name	Property, Parameter, Signal, Event ID	Provisioned Value:
Generic Announcement (H.248.7)	Fixed Announcement Play, AV	Provisioned
NOTE: This may not be required by TISPAN NGN R2 TMGW.		

A.14.1 Generic Package

Table A.14.1/1: Package Usage Information For Generic Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
Cause (g/cause. 0x0001/0x0001) (NOTE)	M	ADD, MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Generalcause	M	"NR" Normal Release (0x0001) "UR" Unavailable Resources (0x0002) "FT" Failure, Temporary (0x0003) "FP" Failure, Permanent (0x0004) "IW" Interworking Error (0x0005) "UN" Unsupported (0x0006)	Not Applicable
	Failure Cause (FailureCause, 0x0002)	O	Octet String	Not Applicable

Events	**Mandatory/ Optional**	**Used in command:**		
Signal Completion. (g/sc, 0x0001/0x0002)	M	ADD, MOD, MOVE, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Signal Identity	M	pkgdName syntax	-
	Termination Method	M	"TO" (0x0001) Signal timed out or otherwise completed on its own "EV" (0x0002) Interrupted by event "SD" (0x0003) Halted by new Signals descriptor "NC" (0x0004) Not completed, other cause	-
	Signal List Id	O	Integer	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
-	-			
NOTE: This event may also be used to report temporary errors in the MGW for both IMS, BICC and TDM connections where the termination is not out of service and thus sending a Service Change is inappropriate. On receipt of this event, the MGC is expected to release the connection in the MGW and force release the associated call. An example of such an error could be loss of RTP on an IMS termination.				

A.14.2 Base Root Package

Table A.14.2/1: Package Usage Information For Base Root Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
root/maxNumberOfContexts	O	AuditValue	1 and up	Implementation Specific
root/maxTerminationPerContext	O	AuditValue	See A.4	Implementation Specific
root/normalMGExecutionTime	O	MOD	Integer	Operator Defined
root/normalMGCExecutionTime	O	MOD	Integer	Operator Defined
root/MGProvisionalResponseTimerValue	O	MOD	Integer(NormalMGExecutionTime + networkdelay)	Operator Defined
root/MGCProvisionalResponseTimerValue	O	MOD	Integer(NormalMGCExecutionTime + networkdelay)	Operator Defined
root/MGCOriginatedPendingLimit	O	MOD	Integer	Operator Defined
root/MGOriginatedPendingLimit	O	MOD	Integer	Operator Defined
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**		**Supported Values:**
None	-	-		-
Error Codes	**Mandatory/ Optional**			
None	-			
NOTE : All transaction timers specified in H.248 shall be supported for 3GPP				

A.14.3 Basic DTMF Generator Package

Table A.14.3/1: Package Usage Information For Basic DTMF Generator Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
DTMF character 0 ,d0 DTMF character 1	M	ADD, MOD, MOVE		
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**

d1 DTMF character 2 d2 DTMF character 3 d3 DTMF character 4 d4 DTMF character 5 d5 DTMF character 6 d6 DTMF character 7 d7 DTMF character 8 d8 DTMF character 9 d9 DTMF character * ds DTMF character # do DTMF character A da DTMF character B db DTMF character C dc DTMF character D dd	None	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			
NOTE: Only the DTMF Signal Ids shall be used, not the Tone Ids within the PlayTone Signal Id.				

A.14.4 Basic DTMF Detection Package

Table A.14.4/1: Package Usage Information For Basic DTMF Generator Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
d0, "0" d1, "1" d2, "2" d3, "3"	M	ADD, MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-

d4, "4" d5, "5" d6, "6" d7, "7" d8, "8" d9, "9" ds, "*" do, "#" da, "A" or "a" db, "B" or "b" dc, "C" or "c" dd, "D" or "d"	**ObservedEvent Parameters**	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**		**Supported Values:**
None	-	-		-
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.5 TDM Circuit Package

Table A.14.5/1: Package Usage Information For TDM Circuit Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
Echo Cancellation, tdmc/ec	M	ADD, MOD, MOVE	ALL	Default= Off (False)
Gain Control, tdmc/gc	Not Used	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**		**Supported Values:**
None	-	-		-
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.6 MGW Congestion Package

Table A.14.6/1: Package Usage Information For Media Gateway Overload Control Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**

	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
MG Congestion, chp/mgcon(0x0001)	M/	MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Reduction (0x0001)	M	0-100	Not Applicable
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.7 Continuity Package

Table A.14.7.1: Package Usage Information For Basic Continuity Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Continuity Test, ct/ct Respond, ct/rsp	M	ADD, MOD, MOVE		Default
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	None	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
Completion, ct/cmp(0x0005)	M/	ADD, MOD, MOVE, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	result, res(0x0008)	M	success, failure	Not Applicable
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.8 Announcement Package

Table A.14.8/1: Package Usage Information For Announcement Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Fixed Announcement Play, apf(0x0001)	M	ADD, MOD, MOVE		<Value / Not Applicable>
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Announcement name, an(0x0001)	M	enumeration	<Value / Not Applicable>
	Number Of Cycles, noc(0x0002)	M	Any Integer	-

	Announcement Variant, av(0x0003)	O	string	-
	Announcement Direction, di(0x0004)	M	Internal, External	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.9 Bearer Characteristics Package

Table A.14.9/1: Package Usage Information For Bearer Characteristics Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
BNC Characteristics (BCP/BNCChar,0x001e/0x01)	M	ADD	AAL type 2 / IP/RTP	Not Applicable
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.10 Generic Bearer Connection Package

Table A.14.10/1: Package Usage Information For Generic Bearer Connection Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Establish BNC (GB/EstBNC,0x0021/0x01)	M	ADD, MOD		Not Applicable
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**

	Not Applicable	-	-	Not Applicable
Modify BNC (GB/ModBNC,0x0021/0x02)	O	MOD		Not Applicable
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Not Applicable	-	-	Not Applicable
Release BNC (GB/RelBNC,0x0021/0x03)	M (NOTE 1)	MOD		Not Applicable
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	General cause (Generalcause,0x01)	O	Normal Release/ Unavailable Resources/ Failure Temporary/ Failure Permanent/ Interworking Error/ Unsupported	Not Applicable
	Failure Cause (Failurecause,0x02)	O	OCTET STRING	Not Applicable
	Reset (Reset,0x03)	O	0/ 1	Not Applicable
Events	**Mandatory/ Optional**	**Used in command:**		
BNC Change (GB/BNCChange,0x0021/0x01)	M	ADD, MOD,NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Type (Type ,0x01)	M	Bearer Established / Bearer Modified/ Bearer Modification Failure	Not Applicable
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Type (Type,0x01)	M/	Bearer Established / Bearer Modified/ Bearer Modification Failure	Not Applicable
Statistics	**Mandatory/ Optional**	**Used in command:**		**Supported Values:**
None				
Error Codes	**Mandatory/ Optional**			
None				
NOTE 1: Mandatory for BICC ATM Terminations, not used otherwise				

A.14.11 Call Progress Tones Generator Package v1

Table A.14.11/1: Package Usage Information For Call Progress Tones Generator Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Ringing Tone, cg/rt	M	ADD, MOD, MOVE		Not Applicable
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Busy Tone, cg/bt	O	ADD, MOD, MOVE		Not Applicable
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Congestion Tone, cg/ct	O	ADD, MOD, MOVE		Not Applicable
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
	-	-	-	-

Events	Mandatory/ Optional	Used in command:		
None	-	-		
	Event Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
	ObservedEvent Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.12 Basic Call Progress Tones Generator with Directionality

Table A.14.12/1: Package Usage Information For Basic Call Progress Tones Generator with Directionality Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Dial Tone (bcg/bdt, 0x0023/0x0040) Ringing Tone (bcg/brt,0x0023/0x0041) Busy Tone (bcg/bbt,0x0023/0x0042) Congestion Tone (bcg/bct,0x0023/0x0043) Special Information Tone (bcg/bsit,0x0023/0x0044) Warning Tone (bcg/bwt,0x0023/0x0045) Payphone Recognition Tone (bcg/bpt,0x0023/0x0046) Call Waiting Tone (bcg/bcw,0x0023/0x0047) Caller Waiting Tone (bcg/bcr, 0x0023/0x0048) Pay Tone (bcg/bpy, 0x0023/0x0049)	O	ADD, MOD, MOVE		Value
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Tone Direction (btd, 0x0001)	M	Internal / External	Default=External
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.13 Expanded Call Progress Tones Generator Package

Table A.14.13/1: Package Usage Information For Expanded Call Progress Tones Generator Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Comfort Tone (xcg/cmft,0x0024/0x004a) Off-hook warning Tone (xcg/roh, 0x0024/0x004b) Negative Acknowledgement (xcg/nack,0x0024/0x004c) Vacant Number Tone (xcg/vac, 0x0024/0x004d) Special Conditions Dial Tone (xcg/spec,0x0024/0x004e)	O	ADD, MOD, MOVE		Value
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Tone Direction (btd, 0x0001)	M	Internal / External	Default=External
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**		**Supported Values:**
None	-	-		-
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.14 Basic Services Tones Generation Package

Table A.14.14/1: Package Usage Information For Basic Services Tones Generation Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Recall Dial Tone (srvtn/rdt,0x0025/0x004f) Confirmation Tone (srvtn/conf,0x0025/0x0050) Held Tone (srvtn/ht,0x0025/0x0051) Message Waiting Tone (srvtn/mwt,0x0025/0x0052)	O	ADD, MOD, MOVE		Value
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Tone Direction (btd, 0x0001)	M	Internal / External	Default=External
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-

Statistics	Mandatory/ Optional	Used in command:	Supported Values:
None	-	-	-
Error Codes	**Mandatory/ Optional**		
None	-		

A.14.15 Bearer Control Tunnelling Package

Table A.14.15/1: Package Usage Information For Bearer Control Tunnelling Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
Tunneling Options (BT/TunOpt, 0x0022/0x01)	M	ADD, MOD	1 /2	Not Applicable
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Bearer Information Transport (BT/BIT, 0x0022/0x01)	M	ADD, MOD		Not Applicable
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Bearer Information Tunnel (BIT,0x01)	M	Octet String	Not Applicable
Events	**Mandatory/ Optional**	**Used in command:**		
Tunnel Indication (BT/TIND. 0x0022/0x01)	M	ADD, MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Not applicable	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Bearer Information transport (BIT,0x01)	M	Octet String	Not Applicable

Statistics	Mandatory/ Optional	Used in command:	Supported Values:
None	-	-	-
Error Codes	**Mandatory/ Optional**		
None	-		

A.14.16 Expanded Services Tones Generation Package

Table A.14.16/1: Package Usage Information For Expanded Services Tones Generation Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Call Transfer Dial Tone (xsrvtn/xferdt,0x0026/0x0053) Call Forward Tone (xsrvtn/cft,0x0026/0x0054) Credit Card service Tone (xsrvtn/ccst,0x0026/0x0055) Special Recall Dial Tone (xsrvtn/srdt,0x0026/0x0056)	O	ADD, MOD, MOVE		Value
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Tone Direction (btd, 0x0001)	M	Internal / External	Default=External
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-

	ObservedEvent Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**		**Supported Values:**
None		-		-
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.17 Intrusion Tones Generation Package

Table A.14.17/1: Package Usage Information For Intrusion Tones Generation Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Intrusion Pending Tone (int/pend,0x0027/0x0057) Intrusion Tone (int/int,0x0027/0x0058) Intrusion Reminder Tone (int/rem,0x0027/0x0059) Toll Break-In Tone (int/tbi,0x0027/0x005a) Intrusion Queue Tone (int/intque,0x0027/0x005b) Busy Verification Tone (int/bv,0x0027/0x005c)	O	ADD, MOD, MOVE		Value
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Tone Direction (btd, 0x0001)	M	Internal / External	Default=External
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**		**Supported Values:**
None	-	-		-
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.18 3GUP Package

Table A.14.18/1: Package Usage Information For 3GUP Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
UP Mode of operation (threegup/mode, 0x002f/0x0001)	M	ADD, MOD, MOVE	See 3GPP TS 29.232	See 3GPP TS 29.232
UP versions (threegup/ upversions, 0x002f/0x0002)	M	ADD, MOD, MOVE	See 3GPP TS 29.232	See 3GPP TS 29.232
Delivery of erroneous SDUs (threegup/ delerrsdu, 0x002f/0x0003)	M	ADD, MOD, MOVE	See 3GPP TS 29.232	See 3GPP TS 29.232
Interface (threegup/ interface, 0x002f/0x0004)	M	ADD, MOD, MOVE	See 3GPP TS 29.232	See 3GPP TS 29.232
Initialisation Direction (threegup/ initdir, 0x002f/0x0005)	M	ADD, MOD, MOVE	See 3GPP TS 29.232	See 3GPP TS 29.232
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.19 Modification of Link Characteristics Bearer Capability

Table A.14.19/1: Package Usage Information For Modification of Link Characteristics Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-

Events	Mandatory/ Optional	Used in command:		
Bearer Modification Support Event.(threegmlc/ mod_link_supp, 0x0046/0x0001)	M	ADD, MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.20 Hanging Termination Detection Package

Table A.14.20/1: Package Usage Information For Hanging Termination Detection Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None				
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
Events	**Mandatory/ Optional**	**Used in command:**		
Termination Heartbeat	M	ADD, MOD, MOVE, AUDITVALUE, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Timer X	M	ALL	0 (no heartbeat message)
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None				
Error Codes	**Mandatory/ Optional**			

A.14.21 TFO package

Table A.14.21/1: Package Usage Information For TFO

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
TFO Activity Control (threegtfoc /tfoenable, (0x0031/0x0001)	M	ADD, MOD, MOVE	See 3GPP TS 29.232	See 3GPP TS 29.232
TFO Codec List (threegtfoc / codeclist, (0x0031/0x0002)	M	ADD, MOD, MOVE	See 3GPP TS 29.232	See 3GPP TS 29.232
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None				
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
Events	**Mandatory/ Optional**	**Used in command:**		
Optimal Codec Event (threegtfoc / codec_modify, (0x0031/0x0010)	O	ADD, MOD, MOVE, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None			
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Optimal Codec Type	M	See 3GPP TS 29.232	See 3GPP TS 29.232
Codec List Event (threegtfoc / distant codec_list, (0x0031/0x0012)	O	ADD, MOD, MOVE, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None			
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Distant Codec List	M	See 3GPP TS 29.232	See 3GPP TS 29.232
TFO Status Event (threegtfoc / TFO_status) (0x0031/0x0014)	O	ADD, MOD, MOVE, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None			
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	TFO Status	M	See 3GPP TS 29.232	See 3GPP TS 29.232
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None				
Error Codes	**Mandatory/ Optional**			

A.14.22 Media Gateway Overload Control Package

Table A.14.22/1: Media Gateway Overload Control Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	–	–	–	–
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	–	–		–
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	–	–	–	–
Events	**Mandatory/ Optional**	**Used in command:**		
MG_Overload ocp/mg_overload	M	MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	–	–	–
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	–	–	–
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	–	–	–	
Error Codes	**Mandatory/Optional**			
None	–			

A.14.23 Inactivity Timer Package

Table A.14.23/1: Inactivity Timer Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
Inactivity Timeout, it/ito	M	MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Maximum Inactivity Time, mit	M	Any integer	Unspecified
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.24 MGC Information Package

Table A.14.24/1: MGC Information Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
Data Block, MGCInfo/db	M	ADD, MOD, AUDITVALUE	A range of 0 to 32 octets	An empty string
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.25 RTP Package

Table A.14.25/1: RTP Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
Payload Transition, rtp/pltrans	-	NA		
	Event Parameters	**Mandatory/Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	rtppayload, rtppltype	-	A valid encoding name	-

Statistics	Mandatory/ Optional	Used in command:	Supported Values:
Packets Sent, rtp/ps	M	SUBTRACT REPLY	ALL
Packets Received, rtp/pr	M	SUBTRACT REPLY	ALL
Packet Loss, rtp/pl	M	SUBTRACT REPLY	ALL
Jitter, rtp/jit	M	SUBTRACT REPLY	ALL
Delay, rtp/delay	M	SUBTRACT REPLY	ALL
Error Codes	**Mandatory/ Optional**		
None	-		

A.14.26 Tone Generator Package

Table A.14.26/1: Package Usage Information For Tone Generator Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	Mandatory/ Optional	Used in command:		Duration Provisioned Value:
Play Tone (tonegen/pt,0x0003/0x0001)	Not Used	-		-
	Signal Parameters	Mandatory/ Optional	Supported Values:	Duration Provisioned Value:
	-	-	-	-
Events	Mandatory/ Optional	Used in command:		
None	-	-		
	Event Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
	ObservedEvent Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
Statistics	Mandatory/ Optional	Used in command:	Supported Values:	
None	-	-	-	
Error Codes	Mandatory/ Optional			
None	-			

A.14.27 Tone Detection Package

Table C.14.27/1: Package Usage Information For Tone Detection Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	Mandatory/ Optional	Used in command:		Duration Provisioned Value:
None	-	-		-
	Signal Parameters	Mandatory/ Optional	Supported Values:	Duration Provisioned Value:
	-	-	-	-
Events	Mandatory/ Optional	Used in command:		
Start tone detected (tonedet/std, 0x0004/0x0001)	O	ADD, MOD, MOVE, NOTIFY		
	Event Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	Tone ID List (tl,0x0001)	M	wildcard	Not Applicable
	ObservedEvent Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	Tone ID (tid,0x0003)	M	Value	Not Applicable
Events	Mandatory/ Optional	Used in command:		
End Tone detected (tonedet/etd, 0x0004/0x0002)	M	ADD, MOD, MOVE, NOTIFY		
	Event Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	Tone ID List (tl,0x0001)	M	wildcard	Not Applicable
	ObservedEvent Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	Tone ID (tid,0x0003)	M	Value	Not Applicable
	Duration (dur,0x0002)	O	Value	Not Applicable
Events	Mandatory/ Optional	Used in command:		
Long Tone	Not Used	-		

detected (tonedet/ltd, 0x0004/0x0003)	Event Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
	ObservedEvent Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
Statistics	Mandatory/ Optional	Used in command:	Supported Values:	
None	-	-	-	
Error Codes	Mandatory/ Optional			
None	-			

A.14.28 H324 Package

Table A.14.28/1: Package Usage Information For H324 Package

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
Communication mode (h324/cmod,0x002c/0x0001)	Not used	-	-	-
Highest Multiplexing Level (h324/muxlv,0x002c/0x0002)	Not Used	-	-	Based on capability of IM-MGW
Demultiplex (h324/demux,0x002c/0x0003)	Not used	-	-	-
Remote H.223 capability (h324/h223capr,0x002c/0x0004)	M	MOD	OCTET STRING	Not Applicable
Incoming Multiplex Table (h324/muxtbl_in,0x002c/0x0005)	M	MOD	OCTET STRING	Not Applicable
Outgoing Multiplex Table (h324/muxtbl_out,0x002c/0x0006)	M	MOD	OCTET STRING	Not Applicable
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
None	-	-		-
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	-	-	-	-
Events	**Mandatory/ Optional**	**Used in command:**		
None	-	-		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	-	-	-	-

Statistics	Mandatory/ Optional	Used in command:	Supported Values:
MUXPDU sent (h324/muxsent,0x002c/0x0001)	Not used	-	-
MUXPDU received (h324/muxrec,0x002c/0x0002)	Not used	-	-
MUXPDU error (h324/muxerr,0x002c/0x0003)	Not used	-	-
Error Codes	**Mandatory/ Optional**		
None	-		

A.14.29 H.245 Transport Package

Table A.14.29/1: Package Usage Information For H.245 Transport Package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
None	-	-	-	-
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
Outgoing H.245 Message (h245transport/h245msgout, 0x00??/0x0001)	M	MOD		**-**
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	Contents of H.245 message (h245mc,0x0001)	M	OCTET STRING	-
Events	**Mandatory/ Optional**	**Used in command:**		
Incoming H.245 message (h245transport/h245msgin, 0x00??/0x0001)	M	ADD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	Contents of H.245 message (h245mc,0x0001)	M	OCTET STRING	Not Applicable
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
None	-	-	-	
Error Codes	**Mandatory/ Optional**			
None	-			

A.14.30 IP domain connection

Table C.14.30: Package usage information for IP domain connection package

Properties	Mandatory/ Optional	Used in command:	Supported Values:	Provisioned Value:
IP Realm Identifier (ipdc /realm, 0x009d /0x0001)	M	ADD	String	Operator Defined (NOTE1)
Signals	Mandatory/ Optional	Used in command:		Duration Provisioned Value:
None	-	-		-
	Signal Parameters	Mandatory/ Optional	Supported Values:	Duration Provisioned Value:
	-	-	-	-
Events	Mandatory/ Optional	Used in command:		
None	-	-		
	Event Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
	ObservedEvent Parameters	Mandatory/ Optional	Supported Values:	Provisioned Value:
	-	-	-	-
Statistics	Mandatory/ Optional	Used in command:	Supported Values:	
None	-	-	-	
Error Codes	Mandatory/ Optional			
None	-			
NOTE1: A default IP realm may be configured such that if the MGW has not received the IP realm identifier and the MGW supports multiple IP realms then the default IP realm shall be used.				

A.15 Mandatory support of SDP and H.248 Annex C information elements

Table A.15/1: Supported Annex C and SDP information elements

Information Element	Annex C Support	SDP Support
v-line	"SDP_V "	The value must always be equal to zero: v=0.
m-line	"SDP_M "	<port> <transport> and <fmt-list> are required. Both static and dynamic payload types shall be supported. The MGC may underspecify the <fmt-list> subfield in place of a single dynamic payload type. In this case the mapping between the underspecified payload type and the <encoding name>/<clock rate> shall be provided in the rtpmap attribute.
c-line	"SDP_C "	<connection address> required The address type may be IPv4 or IPv6. The MGC will fully specify the IP version. The MGC may apply parameter underspecification to the <address type> subfield. (NOTE 2)
a-line	"SDP_A "	For a dynamic RTP payload type, for each codec information on the codec type shall be provided in a separate SDP "a=rtpmap "-line and possibly additional SDP "a=fmtp "-line(s). See Clause 10.2.
b-line	"SDP_B "	(NOTE1). B:RS and b:RR bandwidth modifiers required Bandwidth information shall be supplied by the MGC if the required bandwidth cannot be immediately derived from the information contained in the m= line. If the MGC is using parameter underspecification, the MG shall assume a reasonable default bandwidth value for well-known codecs and shall provide this value in the response sent to the MGC. The Modifier field shall be set to "AS". The Bandwidth Value field shall be set to the maximum bandwidth requirement of the media stream in kbit/s and shall take into account all headers down to the IP layer. The MGC may also supply additional RTCP bandwidth modifiers (i.e. RR and RS, see IETF RFC 3556 [39]). If the RTCP modifiers are not supplied, the bandwidth value for the AS modifier shall take into account an extra 5% bandwidth for RTCP packets.
o-line	"SDP_O"	The origin line consists of 6 fields: *o= <user name> <session ID> <version> <network type> <address type> <address>.* The MGC is not required to supply this line but shall accept it. The MG shall return the value received from the MGC or if there is no o-line sent by the MGC, the MG shall populate this line as follows: - <user name> should contain an hyphen - <session ID> and <version> should contain one or mode digits as described in RFC 4566 [17] - <network type> shall be set to IN - <address type> shall be set to IP4 or IP6 The Address Type shall be set to "IP4" or "IP6" depending on the addressing scheme used by the network to which the MG is connected. - <address> should contain the fully qualified domain name or IP address of the gateway.

s-line	"SDP_S"	The session name (s=) line contains a single field: *s= <session-name>.* The MGC is not required to supply a session name but shall accept one. This line may be used to convey correlation information for use in CDRs. The MG shall return the value received from the MGC or if there is no s-line sent by the MGC, the MG shall populate this line as follows: - "s=-"
t-line	"SDP_T"	The time (t=) line consists of two fields: *t= <start-time> <stop-time>.* The MGC is not required to supply a time description but shall accept one. The MG shall return the value received from the MGC or if there is no t-line sent by the MGC, the MG shall populate this line as follows: - "t=0 0"
NOTE a: SDP or SDP_equivalents are only used for terminations towards the IM CN Subsystem. NOTE b: For BICC terminations, mandatory support of SDP and Annex C information elements shall be in accordance with the subclause "Mandatory Support of SDP and H.248.1 annex C information elements" in ITU-T Recommendation Q.1950 [14]. For IP the IANA ICP IDI format of the NSAP addressing format as specified in X.213 [33] shall be used. For Ipv4 networks the IPv4 format recommended by X.213 shall be adopted. The BIR length shall be fixed at 4 Octets and the NSAP length shall be fixed at 20 Octets.. NOTE 1: b-line is optional in TISPAN NGN R2. NOTE 2: The address type may be IPv4 or IPv6. The default IP version (i.e. IPv4 or IPv6) may be provisioned in the H.248 MG. The MGC may apply H.248 parameter underspecification. If the MGC does require a different IP version than the provisioned default, then the MGC applies complete H.248 parameter specification.		

A.16 Optional support of SDP and H.248 Annex C information elements

Table A.16/1: Optional Supported Annex C and SDP information elements

Information Element	Annex C Support	SDP Support

A.17 Procedures

A.17.1 Call Independent Procedures

Table A.17.1/1 shows the relationship between each non call-related procedure in 3GPP TS 29.232 [5] and the corresponding procedure defined in 3GPP TS 29.163 [4].

For further description of error codes and service change reasons, refer to ITU-T Recommendation H.248.8 [14].

Table A.17.1/1: Non call-related transaction reused from 3GPP TS 29.232 [5]

Procedure defined in 3GPP TS 29.163 [4]	Procedure defined in 3GPP TS 29.232 [5]	Support	Comment
IM-MGW Out of service	MGW Out of Service	Mandatory	
IM-MGW Communication Up	MGW Communication Up	Mandatory	
IM-MGW Restoration	MGW Restoration	Mandatory	
IM-MGW Register	MGW Register	Mandatory	
IM-MGW Re-register	MGW Re-register	Mandatory	
MGCF Ordered Re-register	(G)MSC Server Ordered Re-register	Mandatory	
MGCF Restoration	(G)MSC Server Restoration	Optional	
MGCF Out of Service	(G)MSC Server Out of Service	Optional	
Termination Out-of-Service	Termination Out-of-Service	Mandatory	
Termination Restoration	Termination Restoration	Mandatory	
Audit Value	Audit Value	Mandatory	Mandatory support only for audit of Termination Service State and for periodic audit of MGW (empty Audit descriptor). Optional support for audit of Packages or to retrieve MGC Information.
Audit Capability	Audit Capability	Optional	
Command Rejected	Command Rejected	Mandatory	The "Command Rejected" procedure may be used in response both to call-related and non-call-related ITU-T Recommendation H.248 Commands
IM-MGW Capability Change	Capability Update	Optional	
IM-MGW Resource Congestion Handling - Activate	MGW Resource Congestion Handling - Activate	Mandatory	
IM-MGW Resource Congestion Handling - Indication	MGW Resource Congestion Handling - Indication	Mandatory	
Inactivity Timeout - Activate	Inactivity Timeout - Activate	Optional	
Inactivity Timeout - Indication	Inactivity Timeout - Indication	Optional	

A.17.1.2 Profile registration

The following description is based on H.248.1 profile registration procedure with some clarifications. The reply to the ServiceChange Request containing the SCP parameter indicates if the MGCF supports the requested profile or if it does not support it and wants to propose an alternative profile. The profile (name and version) is only returned in the reply if the MGCF cannot support the specified profile in the ServiceChangeRequest. The returned reply shall indicate the profile and version supported. Upon reception of a profile in the reply, if the IM-MGW supports the indicated profile, it shall issue a new ServiceChange Request with the agreed profile to explicitly confirm the acceptance of the profile to the MGCF ; otherwise, if the IM-MGW does not support the indicated profile, it may continue the registration or re-registration procedure by issuing a new ServiceChange Request with an alternative profile ; until such procedure is successfully completed the IM-MGW shall remain out of service. If the profile is not returned the MGCF shall use the capabilities specified by the Profile indicated in the service change request.

NOTE: It should be observed that the profile registration is not a "cold calling" negotiation; it is expected that the operator will have configured the network to support certain profiles and so the profile registration within the Mn interface permits network upgrade scenarios but otherwise is simply a means to confirm the connection of the profile to be used over the Mn interface between MGCF and IM-MGW.

A.17.2 IMS Terminations Procedures

A.17.2.1 Summary of Procedures related to a termination towards IM CN Subsystem

Table 1 shows the relationship between each call-related procedure in ITU-T Recommendation Q.1950 [14] (see 3GPP TS 29.205 [3]) or TS 29.232 [5] and the corresponding stage 2 procedure defined in 3GPP TS 29.163 [4].

Table A.17.2.1/1: Correspondence between ITU-T Recommendation Q.1950 [13] or 29.232 [5] call-related transactions and 3GPP TS 29.163 [4] procedures

Procedure defined in 3GPP TS 29.163 [4]	Transaction used in Q.1950 [14]	Transaction used in TS 29.232 [5]	Supported	Comment
Reserve IMS Connection point	Not defined	Not Defined	Mandatory	See A.17.2. 2
Configure IMS Resources	Not Defined	Not Defined	Mandatory	See A.17.2. 3
Reserve IMS Connection Point and configure remote resources	Not defined	Not Defined	Mandatory	See A.17.2. 4
Release IMS termination	n. a. for reuse	Release Termination	Mandatory	See A.17.2. 5
Change IMS ThroughConnection	n.a. for re-use	Change Through Connection	Mandatory	only the Explicit (MGC Controlled Cut-Through) procedure is supported
Detect IMS RTP Tel Event	n.a. for re-use	Detect DTMF	Optional	Only applicable if termination towards IMS is connected with a termination towards a BICC network.
End IMS RTP Tel Event	n.a. for re-use	Stop Detect DTMF	Optional	Only applicable if termination towards IMS is connected with a termination towards a BICC network.
Notify IMS RTP Tel Event	n.a. for re-use	Report DTMF	Optional	Only applicable if termination towards IMS is connected with a termination towards a BICC network.
Send IMS RTP Tel Event	n.a. for reuse	Send DTMF	FFS	
Stop IMS RTP Tel Event	n.a.for reuse	Stop DTMF	FFS	
IMS Send Tone	n,a. for re-use	Send Tone	Optional	
IMS Stop Tone	n,a. for re-use	Stop Tone	Optional	
IMS Tone Completed	n,a. for re-use	Tone Completed	Optional	
Termination heartbeat Indication	Not defined	Termination hearbeat Indication	Optional (NOTE 2)	See A.17.2.6
IMS Bearer Released	n.a for re-use.	Bearer Released	Mandatory	

NOTE 1: A procedure defined in table 13.2.1 can be combined with another procedure in the same table. This means that they can share the same contextID and termination ID(s) and that they can be combined in the same H.248 command.

NOTE 2: It is highly recommended to support this procedure to allow detection of hanging contexts and terminations in the MGW that may result e.g. from a loss of communication between the MSC-S and the MGW.

A.17.2.2 Reserve IMS Connection Point

When the procedure "Reserve IMS Connection Point" is required the following procedure is initiated:

The MGCF sends an Add.req command with the following information.

1 Add.req (Reserve IMS Connection Point) MGCF to IM-MGW

Table A.17.2.2/1: Reserve IMS Connection Point Request

Address Information	Control information	Bearer information

Stream ID
Local Descriptor {
Port = ?
IP Address = ?
}
	Transaction ID = z
	Termination ID = ?
	If Context Requested:
	Context ID = ?
	If Context Provided:
	Context ID = c1
	If Resources for multiple Codecs shall be reserved:
	Reserve_Value
	If detection of hanging termination is requested: (NOTE 1)
	NotificationRequested (Event ID = x, "termination heartbeat")
	If indication on Bearer Released requested:
	NotificationRequested (Event ID = x, "BNC Release (Cause)") – as defined in ITU-T Recommendation Q.1950
	If multiple IP realms: IP realm Identifier = required IP realm identifier
		Stream ID
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

NOTE1: It is highly recommended to request termination heartbeat notification to detect hanging context and termination in the MGW that may result e.g. from a loss of communication between the MGCF and the IM-MGW.		

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

2 Add.resp (Reserve IMS Connection Point Ack)

Table A.17.2.2/2: Reserve IMS Connection Point Acknowledge

Address Information	Control information	Bearer information

Stream ID
Local Descriptor {
Port
IP Address
}
	Transaction ID
	Termination ID
	Context ID
		Stream ID
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

A.17.2.3 Configure IMS Resources

When the procedure "Configure IMS Resources" is required the following procedure is initiated:

The MGCF sends an Mod.req command with the following information.

1 Mod.req (Configure IMS Resources) MGCF to IM-MGW

Table A.17.2.3/1: Configure IMS Resources Request

Address Information	Control information	Bearer information

If local resources are modified:
Stream ID
Local Descriptor {
Port
IP Address
}
If remote resources are modified:
Remote Descriptor {
Port
IP Address
}
	Transaction ID
	Termination ID
	Context ID
	If Resources for multiple Codecs shall be reserved:
	Reserve_Value
		If local resources are modified:
		Stream ID
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}
		If remote resources are modified:
		Remote Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

2 Mod.resp (Configure IMS Resources Ack)

Table A.17.2.3/2: Configure IMS Resources Acknowledge

Address Information	Control information	Bearer information

If local resources were provided in request:
Stream ID
Local Descriptor {
Port
IP Address
}
If remote resources were provided in request:
Remote Descriptor {
Port
IP Address
}
	Transaction ID
	Context ID
	Termination ID
		If local resources were provided in request:
		Stream ID
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}
		If remote resources were provided in request:
		Remote Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

A.17.2.4 Reserve IMS Connection Point and configure remote resources

When the procedure "Reserve IMS Connection Point and configure remote resources" is required the following procedure is initiated:

The MGCF sends a Add.req command with the following information.

1 Add.req (Reserve IMS Connection Point and configure remote resources) MGCF to IM-MGW

Table A.17.2.4/1: Reserve IMS Connection Point and configure remote resources Request

Address Information	Control information	Bearer information

Stream ID
Local Descriptor {
Port = ?
IP Address = ?
}
Remote Descriptor {
Port
IP Address
}
	Transaction ID
	Termination ID = ?
	If Context Requested:
	Context ID = ?
	If Context Provided:
	Context ID = c1
	If Resources for multiple Codecs shall be reserved:
	Reserve_Value
	If detection of hanging termination is requested: (NOTE 1)
	NotificationRequested (Event ID = x, "termination heartbeat")
	If indication on Bearer Released requested:
	NotificationRequested (Event ID = x, "BNC Release (Cause)") – as defined in ITU-T Recommendation Q.1950
	If multiple IP realms: IP realm Identifier = required IP realm identifier
		Stream ID
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}
		Remote Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

NOTE 1: It is highly recommended to request termination heartbeat notification to detect hanging context and termination in the MGW that may result e.g. from a loss of communication between the MGCF and the IM-MGW.		

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

2 Add.resp (Reserve IMS Connection Point and configure remote resources Ack)

Table A.17.2.4/2: Reserve IMS Connection Point and configure remote resources Acknowledge

Address Information	Control information	Bearer information

Stream ID
Local Descriptor {
Port
IP Address
}
Remote Descriptor {
Port
IP Address
}
	Transaction ID
	Termination ID
	Context ID
		Stream ID
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}
		Remote Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

A.17.2.5 VOID

A.17.2.6 Termination heartbeat indication

When the procedure "Termination heartbeat indication" is required the following procedure is initiated: the MGW sends a NOT.req command with the following information.

Table A.17.2.6/1: NOT.req (Termination heartbeat) MGW to MGC

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = bearer1 Event_ID (Event ID = x, "termination heartbeat")	

When the processing of command is complete, the MGC initiates the following procedure.

Table A.17.2.6/2: NOT.resp (Termination heartbeat) MGC to MGW

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = bearer1	

The heartbeat timer shall be configured to a value much greater than the mean call holding time.

The MSC-S is in charge of correcting any detected mismatch, by substracting hanging terminations or clearing hanging contexts.

A.17.3 TDM Terminations Procedures

A.17.3.1 Summary Procedures related to a termination towards ISUP

Table A.17.3.1/1: Correspondence between ITU-T Recommendation Q.1950 [13] or 29.232 [5] call-related transactions and 3GPP TS 29.163 [4] procedures related to a termination towards an ISUP network

Procedure defined in 3GPP TS 29.163 [4]	Transaction used in ITU-T Q.1950 [14]	Transaction used in TS 29.232 [5]	Support	Comment
Reserve TDM Circuit	n. a. for reuse	n. a. for reuse, (NOTE2)	Optional (NOTE 4)	See Clause A.17.3.2
Change TDM Through-connection	n. a. for reuse	Change Through-connection	Optional (NOTE 4)	only the Explicit (MGC Controlled Cut-Through) procedure is supported
Activate TDM voice-processing function	n. a. for reuse	Activate Voice Processing Function	Optional (NOTE 4)	
Send TDM Tone	n,a. for re-use	Send Tone	Optional (NOTE 4)	
Stop TDM Tone	n,a. for re-use	Stop Tone	Optional (NOTE 4)	
Play TDM Announcement	n. a. for reuse	Play Announcement	Optional (NOTE 4)	
TDM Announcement Completed	n. a. for reuse	Announcement Completed	Optional (NOTE 4)	
Stop TDM Announcement	n. a. for reuse	Stop Announcement	Optional (NOTE 4)	
Continuity Check	Continuity Check Tone	n. a. for reuse	Optional (NOTE 4)	The addition to "Prepare BNC Notify" defined in Annex B.7.1.1 of Q.1950 [10] shall be applied instead to "Reserve TDM Circuit", as defined in Clause A.17.3.2
Continuity Check Verify	Continuity Check Verify	Continuity Check Verify	Optional (NOTE 4)	
Continuity Check Response	Continuity Check Response	n. a. for reuse	Optional (NOTE 4)	The addition to "Prepare BNC Notify" defined in Annex B.7.1.2 of Q.1950 [10] shall be applied instead to "Reserve TDM Circuit", as defined in Clause A.17.3.2
Release TDM Termination	n. a. for reuse	n. a. for reuse	Optional (NOTE 4)	See Clause A.17.3.3
Termination heartbeat Event	Not defined	Termination heartbeat Indication	Optional	See Clause A.17.3.4
Not defined	Not defined	TFO Activation	Optional	See Clause A.14.21
Not defined	Not defined	Codec Modify	Optional	See Clause A.14.21
Not defined	Not defined	Optimal Codec and Distant List_Notify	Optional	See Clause A.14.21
Not defined	Not defined	Distant Codec List	Optional	See Clause A.14.21
Not defined	Not defined	TFO status Notify	Optional	See Clause A.14.21
Not defined	Not defined	TFO status	Optional	See Clause A.14.21
Bearer Released	n.a. for re-use.	Bearer Released	Optional (NOTE 4)	

NOTE 1: A procedure defined in table 13.2.2 can be combined with another procedure in the same table. This means that they can share the same contextID and termination ID(s) and that they can be combined in the same H.248 command.
NOTE 2: The reserve circuit procedure of 29.232 is not to be used only a reduced set of the parameters is required for reserve TDM circuit.
NOTE 3: VOID
NOTE 4: Required for TDM terminations towards an ISUP based network
.

A.17.3.2 Reserve TDM Circuit

When the procedure "Reserve TDM Circuit" is required the following procedure is initiated:

The MGCF sends an Add.req command with the following information.

Table A.17.3.2/1: Add.req (Reserve TDM Circuit) MGCF to IM-MGW

Address Information	Control information	Bearer information
	Transaction ID Termination ID If Context Requested: Context ID = ? If Context Provided: Context ID = c1 If detection of hanging termination is requested: NotificationRequested (Event ID = x, "termination heartbeat") If indication on Bearer Released requested: NotificationRequested (Event ID = x, "BNC Release (Cause)") – as defined in ITU-T Recommendation Q.1950	Bearer Service Characteristics

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

Table A.17.3.2/2: Add.resp (Reserve TDM Circuit) IM-MGW to MGCF

Address Information	Control information	Bearer information
	Transaction ID Termination ID Context ID	

A.17.3.3 Release TDM Termination

When the procedure "Release TDM Termination" is required the following procedure is initiated:

The MGCF sends an Sub.req command with the following information.

Table A.17.3.3/1: Sub.req (Release TDM Termination) MGCF to IM-MGW

Address Information	Control information	Bearer information
	Transaction ID Termination ID Context ID	

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

Table A.17.3.3/2: Sub.resp (Release TDM Termination) IM-MGW to MGCF

Address Information	Control information	Bearer information
	Transaction ID Termination ID Context ID	

A.17.3.4 Termination heartbeat indication

When the procedure "Termination heartbeat indication" is required the following procedure is initiated: the MGW sends a NOT.req command with the following information.

Table A.17.3.4/1: NOT.req (Termination heartbeat) MGW to MGC

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = bearer1 Event_ID (Event ID = x, "termination heartbeat")	

When the processing of command is complete, the MGC initiates the following procedure.

Table A.17.3.4/2: NOT.resp (Termination heartbeat) MGC to MGW

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = bearer1	

The heartbeat timer shall be configured to a value much greater than the mean call holding time.

The MSC-S is in charge of correcting any detected mismatch, by substracting hanging terminations or clearing hanging contexts.

A.17.4 BICC Terminations Procedures

A.17.4.1 Procedures related to a termination towards BICC

Table A.17.4.1/1: Correspondence between ITU-T Recommendation Q.1950 [13] or 3GPP TS 29.232 [5] call-related transactions and 3GPP TS 29.163 [4] procedures related to a termination towards a BICC network

Procedure defined in 3GPP TS 29.163 [4]	Transaction used in Q.1950 [14]	Transaction used in TS 29.232 [5]	Support	Comment
Establish Bearer	Establish_BNC_Notify +(tunnel)	Establish Bearer (NOTE 1)	Optional (NOTE 5)	
Prepare Bearer	Prepare_BNC_Notify +(tunnel)	Prepare Bearer (NOTE 1), (NOTE 2)	Optional (NOTE 5)	
Change Through-Connection	n.a. for re-use	Change Through-Connection	Optional (NOTE 5)	only the Explicit (MGC Controlled Cut-Through) procedure is supported
Release Bearer	n.a. for re-use	Release Bearer	Optional (NOTE 5)	(NOTE 3)
Release Termination	n. a. for reuse	Release Termination	Optional (NOTE 5)	Includes Subtract in the transaction. Statistics about "Ctmbits" are not applicable in Sub.resp
Bearer Established	n. a. for reuse	Bearer Established	Optional (NOTE 5)	
Bearer Released	n. a. for reuse	Bearer Released	Optional (NOTE 5)	
Send Tone	n,a. for re-use	Send Tone	Optional (NOTE 5)	
Stop Tone	n,a. for re-use	Stop Tone	Optional (NOTE 5)	
Play Announcement	n. a. for reuse	Play Announcement	Optional (NOTE 5)	
Stop Announcement	n. a. for reuse	Stop Announcement	Optional (NOTE 5)	
Announcement Completed	n. a. for reuse	Announcement Completed n	Optional (NOTE 5)	
Bearer Modification Support	Not defined	Bearer Modification Support	Optional (NOTE 5)	
Confirm Char	Confirm_Char	Confirm Bearer Characterictics (NOTE 1)	Optional (NOTE 6)	
Modify Bearer Characteristics	Modify Char	Modify Bearer Characteristics (NOTE 1)	Optional (NOTE 6)	
Reserve Char	Reserve_Char_Notify	Reserve Bearer Characteristics (NOTE 1)	Optional (NOTE 6)	
Bearer Modified	BNC Modified	Bearer Modified	Optional (NOTE 6)	
Activate Voice Processing Function	n. a. for reuse	Activate Voice Processing Function	Optional (NOTE 5)	
Tunnel Information Down	Tunnel (MGC-MGW)	Tunnel Information Down	Optional (NOTE 7)	For IP Transport at BICC termination
Tunnel Information Up	Tunnel (MGW-MGC)	Tunnel Information Up	Optional (NOTE 7)	For IP Transport at BICC termination
Termination heartbeat	Not defined	Termination heartbeat indication	Optional (NOTE 8)	
Not defined	Not defined	TFO Activation	Optional	
Not defined	Not defined	Codec Modify	Optional	
Not defined	Not defined	Optimal Codec and Distant List_Notify	Optional	
Not defined	Not defined	Distant Codec List	Optional	
Not defined	Not defined	TFO status Notify	Optional	
Not defined	Not defined	TFO status	Optional	

NOTE 1: The procedure is only applicable if the Nb framing protocol is applied at the BICC termination. Only requesting of Observed events defined in the corresponding TS 29.232 and parameters defined in the "3GUP" package of TS 29.232 are applicable in addition the parameters of the corresponding Q.1950 procedure. Those parameters shall be applies as follows: UP mode = Supported mode; UP versions = 2; interface = CN;
NOTE 2: Parameters and Observed events defined for Cellular Text telephone Modem Text Transport in the corresponding procedure of TS 29.232 are not applicable.
NOTE 3: VOID
NOTE 4: VOID
NOTE 5: Necessary for optional terminations towards BICC
NOTE 6: Optional for optional terminations towards BICC
NOTE 7: Necessary for optional terminations towards BICC network with IP transport
NOTE 8: It is highly recommended to support this procedure to allow detection of hanging contexts and terminations in the MGW that may result e.g. from a loss of communication between the MSC-S and the MGW.

A.17.5 Multiplex Termination Procedures

A.17.5.1 Procedures related to a Multiplex termination

Table A.17.5.1/1: Correspondence between ITU-T Recommendation Q.1950 [13] or 3GPP TS 29.232 [5] call-related transactions and 3GPP TS 29.163 [4] procedures related to a multiplex termination

Procedure defined in 3GPP TS 29.163 [4]	Transaction used in Q.1950 [14]	Transaction used in TS 29.232 [5]	Support	Comment
Add Multiplex Termination	Not defined	Not defined	Optional (NOTE 1)	See A.17.5.2
Configure Multiplex Termination	Not defined	Not defined	Optional (NOTE 1)	See A.17.5.3
Signal H245 Message	Not defined	Not defined	Optional (NOTE 1)	See A.17.5.4
Notify H245 message	Not defined	Not defined	Optional (NOTE 1)	See A.17.5.5
NOTE 1: Necessary for interworking of multimedia calls				

A.17.5.2 Add Multiplex Termination

When the procedure "Add Multiplex Termination" is required the following procedure is initiated:

The MGCF sends an Add.req command with the following information.

1 Add.req (Add Multiplex Termination) MGCF to IM-MGW

Table A.17.5.2/1: Add Multiplex Termination Request

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = ? Muxdescriptor NotificationRequested (Event ID = x, "Incoming H245 message") If detection of hanging termination is requested: (NOTE 1) NotificationRequested (Event ID = x, "termination heartbeat") If indication on Bearer Released requested: NotificationRequested (Event ID = x, "BNC Release (Cause)") – as defined in ITU-T Recommendation Q.1950	
NOTE 1: It is highly recommended to request termination heartbeat notification to detect hanging context and termination in the MGW that may result e.g. from a loss of communication between the MGCF and the IM-MGW.		

On receipt of this procedure, and the setting of the muxdescriptor, the IM-MGW shall initiate the H.324 negotiation, with connection mode H.324M and predefined Highest Multiplexing Level.

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

2 Add.resp (Add Multiplex Termination Ack)

Table A.17.5.2/2: Add Multiplex Termination Acknowledge

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = mux1	

A.17.5.3 Configure Multiplex Termination

When the procedure "Configure Multiplex Termination" is required the following procedure is initiated:

The MGCF sends an Mod.req command with the following information.

1 Mod.req (Configure Multiplex Termination) MGCF to IM-MGW

Table A.17.5.3/1: Configure Multiplex Termination Request

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = mux1 Remote H223 Capability Incoming Multiplex table Outgoing Multiplex table	

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

2 Mod.resp (Configure Multiplex Termination Ack)

Table A.17.5.3/2: Configure Multiplex Termination Acknowledge

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = mux1	

A.17.5.4 Signal H245 Message

When the procedure "Signal H245 Message" is required the following procedure is initiated:

The MGCF sends an Mod.req command with the following information.

1 Mod.req (Signal H245 Message) MGCF to IM-MGW

Table A.17.5.4/1: Signal H245 Message Request

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = mux1 Signal = Outgoing H245 message (Outgoing H.245 message content)	

When the processing of command (1) is complete, the IM-MGW initiates the following procedure.

2 Mod.resp (Signal H245 Message Ack)

Table A.17.5.4/2: Signal H245 Message Acknowledge

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = mux1	

A.17.5.5 Notify H.245 Message

When the procedure "Notify H.245 message" is required the following procedure is initiated: the IM-MGW sends a NOT.req command with the following information.

1 Not.req (Notify H245 Message) IM-MGW to MGCF

Table A.17.5.5/1: Notify H245 Message Request

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = mux1 Event_ID (Event ID = x, "Incoming H245 message (H245 message content)")	

When the processing of command is complete, the MGCF initiates the following procedure.

2 Not.resp (Notify H245 Message Ack) MGCF to IM-MGW

Table A.17.5.5/2: Notify H245 Message Acknowledge

Address Information	Control information	Bearer information
	Transaction ID = z Context ID = c1 Termination ID = mux1	

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2004-09	CN#25				Approved in CN#25	2.0.0	6.0.0
2005-03	CN#27	NP-050045	001	1	Introduction Of Formal Profile	6.0.0	6.1.0
			002	1	Corrections to Mn Specification		
2005-06	CT#28	CP-050208	0001	4	Introduction Of Formal Profile	6.1.0	6.2.0
		CP-050208	0005		Inclusion of Insert Digit Procedure at IMS termination		
2005-09	CT#29	CP-050442	0007	3	Alignment of Mn Profile with ITU template and Mc interface decisions	6.2.0	6.3.0
		CP-050454	0008	3	Alignment of Mn Profile with TISPAN TMGW	6.3.0	7.0.0
2005-12	CT#30	CP-050630	0015	3	Clean-up of hanging contexts and terminations	7.0.0	7.1.0
		CP-050619	0017	1	Addition of TFO procedure		
		CP-050630	0019	2	Add virtual media gateway function		
		CP-050619	0022		Alignment with TISPAN		
		CP-050619	0023		Open Mn		
2006-03	CT#31	CP-060077	0024	1	Add the UDPTL/TCPTL transport and mediatype for T.38	7.1.0	7.2.0
		CP-060077	0026	2	Clarification the SDP used in the BICC termination		
		CP-060077	0028		Remove the redundant symbols		
		CP-060066	0030	1	Bearer Released Event to Reserve TDM Circuit procedure		
		CP-060066	0032	1	BICC packages in Mn profile		
		CP-060066	0034		Service Change Method "Disconnected" and "Failover" removal from Service Changes sent by MGCF		
2006-06	CT#32	CP-060314	0037	1	Alignment with TISPAN TGW profile	7.2.0	7.3.0
		CP-060306	0036	1	Corrections to Mn Specification for Inter Vendor Operability		
			0041		Update of Mn profile with packages defined in 29.232		
			0044	1	Adding of Bearer Released Event to Procedures related to a termination towards IM CN Subsystem		
			0046	1	Mode-change-period support on Mn interface		

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2006-09	CT#33	CP-060401	0048	1	AuditValue procedure	7.3.0	7.4.0
		CP-060410	0051		Alignment Mn towardsTISPAN Endorsement		
		CP-060410	0052	2	Removal of duplicated functionality in body of specification		
		CP-060401	0053	1	Definition of the use of mandatory and optional in Mn Profile Template		
		CP-060401	0054	1	Missing Procedures Towards IMS		
		CP-060410	0055	2	Correction to Terminations chapter		
		CP-060401	0058	1	Corrections to Profile Description: Descriptors		
		CP-060401	0060		Corrections to Profile Description: Command API		
		CP-060401	0062	1	Corrections to Profile Description: Packages		
2006-12	CT#34	CP-060570	0068	1	Alignment of Mn towards TISPAN Endorsement	7.4.0	7.5.0
		CP-060570	0069	1	Setting of 3GPP manadatory parameters to conditional		
		CP-060570	0074		CR miss implementation Call independent procedures and packages		
		CP-060570	0075	2	Removal of TBD for Number of Commands Per Transaction		
		CP-060570	0080		Missing Procedures Towards IMS		
		CP-060725	0071	1	Profile registration procedure		
		CP-060725	0073	2	Rules for SDP equivalents		
		CP-060725	0077	3	Codec Parameters		
2007-03	CT#35	CP-070013	0081	1	Further Alignment of Mn Towards TISPAN Endorsement	7.5.0	7.6.0
2007-06	CT#36	CP-070323	0087	1	Addition of missing references and text corrections	7.6.0	7.7.0
		CP-070434	0088	3	Multimedia interworking Mn procedures		
		CP-070323	0089	1	Wrong implementation of CP-060401 / C4-060998 (CR 0048r1 29.332 Rel-7)		
		CP-070315	0091		RFC 3309 for SCTP checksum		
2007-09	CT#37	CP-070538	0092	1	Corrections to Multimedia Interworking	7.7.0	7.8.0
			0094	3	Service Change Methods and Reasons		
			0095		Correction to Package Ids		
			0097		Priority Indicator in Context Attributes		
			0099	1	H.248 Message Encoding		
			0101	2	Correction to Re-use of Procedures		
			0103	1	Correction to Signals Descriptor		
			0105	1	Correction to Events Descriptor		
			0107	1	Clarification of Message Identifier		
			010	1	IP realm connection indication		
			011	2	Correction of parameter in Sending H.245 Message		
			0112	2	Mn profile corrections		
			0117	1	Corrections to maxptime syntax in SDP of encoding of AMR codec		

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2007-12	CT#38	CP-070742	0123	1	Properties returned in commands	7.8.0	7.9.0
		CP-070746	0119	1	Inactivity timout procedures – Alignment to Mc profile		
		CP-070746	0125	1	Audit of individual TDM terminations		
2008-03	CT#39	CP-080012	0128	1	Correction on the Mn profile: BNC Release event	7.9.0	7.10.0
2008-09	CT#41	CP-080454			Service Change Reason in (G)MSC Server Out of Service	7.10.0	7.11.0
2009-12	CT#46	CP-090967	0146		Correction to Profile for Commands marked optional	7.11.0	7.12.0

History

Document history		
V7.7.0	June 2007	Publication
V7.8.0	October 2007	Publication
V7.9.0	January 2008	Publication
V7.10.0	April 2008	Publication
V7.11.0	October 2008	Publication
V7.12.0	January 2010	Publication