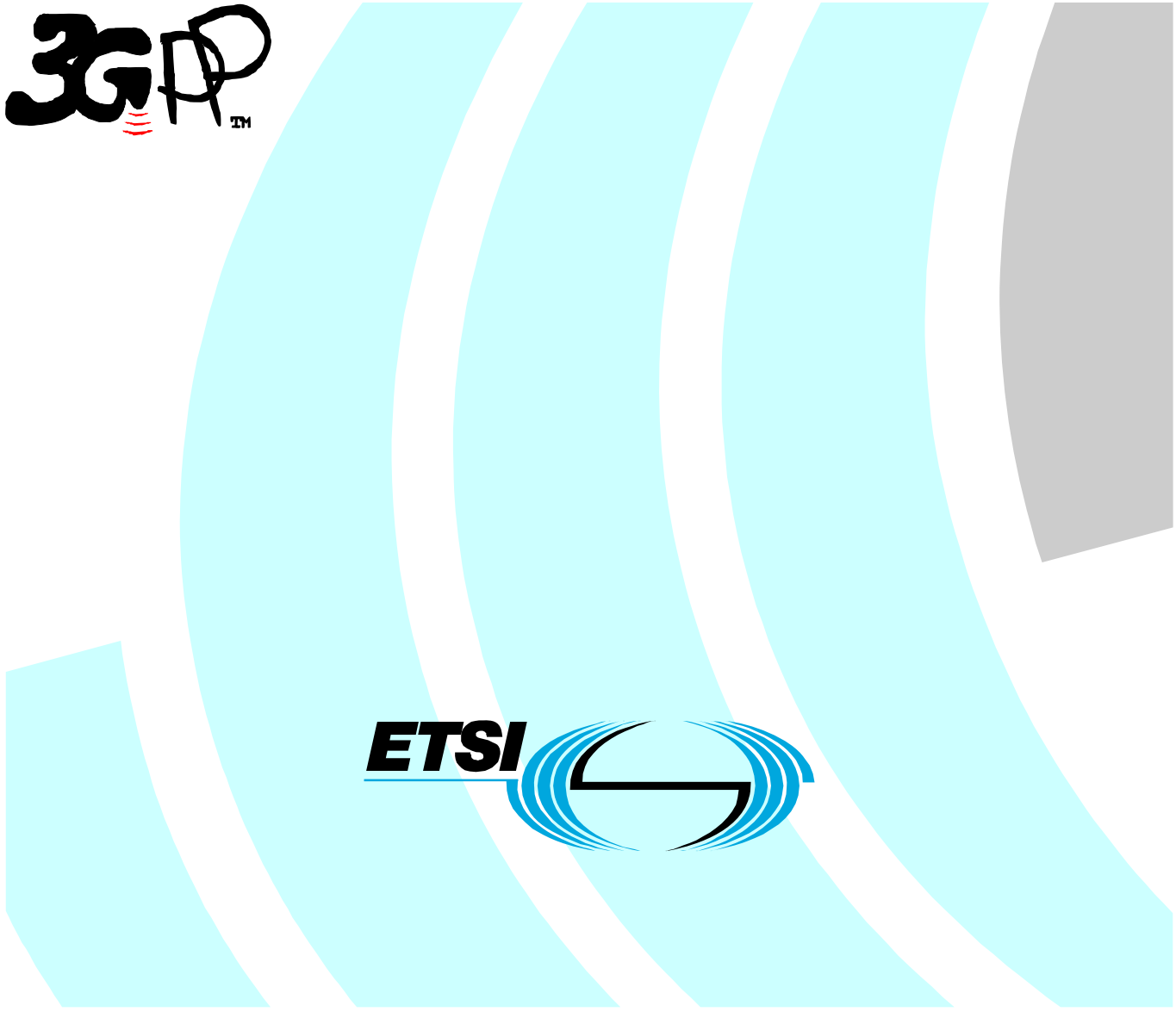
ETSI TS 129 332 V6.14.0 (2010-01)

Technical Specification

Universal Mobile Telecommunications System (UMTS);
Media Gateway Control Function (MGCF)
- IM Media Gateway (IM-MGW);
Mn interface
(3GPP TS 29.332 version 6.14.0 Release 6)



Reference
RTS/TSGC-0429332v6e0

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.

The present document is valid for a 3rd generation PLMN (UMTS) complying with Release 6 and later.

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 (05/02): "Gateway Control Protocol: Version 2" including the Corrigendum1 for Version 2 (03/04).

[10] ITU-T Recommendation H.248.8: "Error Codes and Service Change Reason Description".

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

[12] ITU-T Recommendation H.248.10: "Media Gateway Resource Congestion Handling Package".

[13] ITU-T Recommendation T.140: "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 2327: "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: "Generic Announcement Package".

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

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

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.
Mg Interface between the MGCF and the CSCF
Mj Interface between the MGCF and the BGCF

3.3 Abbreviations

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

BICC Bearer Independent Call Control
IM-MGW IP Multimedia Media Gateway

ISUP	ISDN User Part
MGCF	Media Gateway Control Function
RFC	Request For Comment; this includes both discussion documents and specifications in the IETF domain
SCTP	Stream Control Transmission Protocol

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.

5.2 Termination names

5.2.1 Termination naming convention

For definition on termination naming convention see 3GPP TS 29.232 [5]

5.2.2 Termination naming convention for TDM terminations

For the definition of TDM terminations see 3GPP TS 29.232[5]

6 Topology descriptor

The Topology Descriptor may be supported by the IM-MGW and MGCF, see Annex A.

7 Transaction timers

All transaction timers specified in H.248 shall be supported in this subset of the protocol.

8 Transport

Each implementation of the Mn interface should provide SCTP (as defined in IETF RFC2960 [14] and as updated by RFC3309 [28]). If using SCTP as defined in IETF RFC 2960 [12] the MGW shall always be the node to perform the "Initiation".

An implementation alternative may provide UDP (as defined in IETF RFC 768 [23]). The M3UA layer may also be added to SCTP for pure IP signalling transport (as defined in IETF RFC 3332 [24] with options detailed in 3GPP TS 29.202 [25]).

See also Annex A.

9 Multiple Virtual MG.

Not Applicable

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 staticRTP 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"
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"-line.
RtcpbwRR	Local Descriptor or Remote Descriptor	<bandwidth> in SDP "b:RR"-line.
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.
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 Codec

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)
- "ptime"
- "maxptime"

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 [27]. 3GPP TS 29.163 [4], clause B.2.5.4, specifies the options applicable within 3GPP.

IETF RFC 3555 [27] 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.

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

This section shall be in accordance with the subclause "Mandatory Support of SDP and ITU-T Recommendation 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.

For this application the BIR length shall be fixed at 4 Octets and the NSAP length shall be fixed at 20 Octets.

12 General on packages and Transactions

The base root package (0x0002) properties shall be provisioned in the MGW.

H.248 Statistics shall not be audited via the Mn interface.

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.

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

Notifications shall not be sent by the MGW in response to Release Termination procedure.

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

14.1 Non-call related procedures

Table 14 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 14: 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).
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	

14.1 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.

15 Transactions towards IM CN Subsystem

15.1 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 15.1.1: 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 13.2.1.1
Configure IMS Resources	Not Defined	Not Defined	Mandatory	See 13.2.1.2
Reserve IMS Connection Point and configure remote resources	Not defined	Not Defined	Mandatory	See 13.2.1.3
Release IMS termination	n. a. for reuse	Release Termination	Mandatory	
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	
IMS Bearer Released	n.a for re-use.	Bearer Released	Mandatory	

NOTE: 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.

15.1.1 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 15.1.2: Reserve IMS Connection Point Request

Address Information	Control information	Bearer information

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 indication on Bearer Released requested:
	NotificationRequested (Event ID = x, "BNC Release (Cause)") – as defined in ITU-T Recommendation Q.1950
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

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

2 Add.resp (Reserve IMS Connection Point Ack)

Table 15.1.3: Reserve IMS Connection Point Acknowledge

Address Information	Control information	Bearer information

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

15.1.2 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 15.1.4: Configure IMS Resources Request

Address Information	Control information	Bearer information

If local resources are modified:
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:
		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 15.1.5: Configure IMS Resources Acknowledge

Address Information	Control information	Bearer information

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

15.1.3 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 Mod.req command with the following information.

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

Table 15.1.6: Reserve IMS Connection Point and configure remote resources Request

Address Information	Control information	Bearer information

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 indication on Bearer Released requested:
	NotificationRequested (Event ID = x, "BNC Release (Cause)") – as defined in ITU-T Recommendation Q.1950
		Local Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}
		Remote Descriptor {
		Codec List
		RTP Payloads
		RtcpbwRS
		RtcpbwRR
		}

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 15.1.7: Reserve IMS Connection Point and configure remote resources Acknowledge

Address Information	Control information	Bearer information

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

15.1.4 Void

15.2 IMS packages

None

16 Transactions towards ISUP

Table 16.1: 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 13.2.2.1
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)	
TDM Tone Completed	n,a. for re-use	Tone Completed	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 13.2.2.1
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 13.2.2.1
Release TDM Termination	n. a. for reuse	n. a. for reuse	Optional (NOTE 4)	See Clause 13.2.2.2
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	
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: Necessary for optional terminations towards ISUP

16.1 Procedures related to a termination towards ISUP

16.1.1 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.

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 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.

2 Add.resp (Reserve TDM Circuit) IM-MGW to MGCF

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

16.1.2 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.

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.

2 Sub.resp (Release TDM Termination) IM-MGW to MGCF

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

16.2 ISUP packages

None

17 Transactions towards BICC

17.1 Procedures related to a termination towards BICC

Table 17.1: 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)	
Release Termination	n. a. for reuse	Release Termination	Optional (NOTE 5)	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)	
Tone Completed	n,a. for re-use	Tone Completed	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	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
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

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: Profile version

Profile name:	threegimscsiw
Version:	1

A.2 Summary

This Profile describes the minimum mandatory settings and procedures required to fulfil the requirements for the IMS-CS interworking gateway control.

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

ITU Recommendation H.248.1 Version 2

A.4 Connection Model

Table A.4: Connection Model

Maximum number of contexts:	No restriction
Maximum number of terminations per context:	32
Allowed terminations type combinations in a Context	All

A.5 Context Attributes

Table A.5: 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

See Clause 5.

A.6.2 Multiplexed terminations

Table A.6.2: Multiplexed terminations

MultiplexTerminations Supported	No

A.7 Descriptors

A.7.1 Stream Descriptor

Table A.7.1: Stream descriptors

Maximum number of streams per termination type	1

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 (NOTE1)	Terminations Toward IMS	Not Applicable
NOTE1: The "Reserve value" parameter is, inter alia, required for negotiation of multiple payload types, ie G.711, comfort noise, 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	Not Applicable	SendOnly, RecvOnly, SendRecv, Inactive
BICC IP	Not Applicable	SendOnly, RecvOnly, SendRecv, Inactive
BICC ATM	Not Applicable	SendOnly, RecvOnly, SendRecv, Inactive

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
	Start tone detected (tonedet/std)	IMS, TDM, BICC	Not Applicable
	End Tone detected (tonedet/etd)	IMS, TDM, BICC	Not Applicable
	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
NOTE: Events for Terminations towards BICC network dependent on option to support such interworking, 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:	Yes

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: 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	Not Applicable

Table A.7.4/2: Signal Lists

Signals Lists supported:		Yes
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

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

Signal type and duration supported:	Optional

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: (NOTE)	NO	
NOTE: This field requires support of version 3 of 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:	Yes

A.7.5 DigitMap Descriptor

Table A.7.5: DigitMap Descriptor

Digit Maps supported:	No

A.7.6 Statistics Descriptor

Table A.7.6: Statistics Descriptor

Statistics reported on subtract:	No

A.7.7 ObservedEvents Descriptor

Table A.7.7: Observed Events Descriptor

Event detection time supported:	Yes

A.7.8 Topology Descriptor

Table A.7.8: Topology Descriptor

Allowed triples:	Optional (NOTE) : (T1, T2, isolate) (T1, T2, oneway) (T1, T2, bothway)
NOTE: 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 shallbe supported.

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, Topology

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, Topology 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 15.1.1 and 15.1.3

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, Topology

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, Topology 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 "Configure IMS Resources" procedure as specified in 15.1.2.

A.8.3 Subtract

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

Descriptors used by Subtract Request:	AUDIT (empty)

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

Descriptors used by Subtract Reply:	None

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, Topology. 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.

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

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

A.8.5 Auditvalue

Table A.8.5: Auditvalue

Audited Properties:	**Property Name and Identity**	**Descriptor**
Termination ID	TerminationState: - TDM: ALL (indicating 1 TDM group) - ATM/IP: individual termination - Root (MGW Audit) The ServiceState property within the TerminationState descriptor shall not take the value "Test".	TerminationState Descriptor
Termination ID	For Packages: - Root	Packages Descriptor (NOTE1)
Termination ID	None (MGW Audit) : - Root	Audit (empty) Descriptor
Audited Statistics:	None	
Audited Signals:	None	
Audited Events:	FFS<Event name and Identity e.g. Generic Error Event (g/cause, 0x0001/0x0001), ALL or None>	
Packages Audit Possible	FFS<Yes/No>	
NOTE1: Support of this capability is optional.		

A.8.6 Auditcapabilities

Table A.8.6: Auditcapabilities

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

A.8.7 Notify

Table A.8.7: 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 (NOTE 1)	"901 Cold Boot" (Optional) "902 Warm Boot" (Optional)
Handoff (NOTE 1, NOTE 2)	"903 MGC Directed Change" (Mandatory)
Forced (NOTE 1)	"905 Termination Taken Out Of Service" (Optional)
Graceful (NOTE 1)	"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) (NOTE 1) "902 Warm Boot" (Mandatory) (NOTE 1) "910 Media Capability Failure "(Optional), ALL except ROOT "913 Signal Capability Failure "(Optional), ALL except ROOT"914 Event Capability Failure "(Optional) ALL except ROOT"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 (NOTE 1, NOTE 2)	"903 MGC Directed Change" (Mandatory)
Disconnected (NOTE 1)	"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

Table A.8.8/6: Service Change Version

Version used in ServiceChangeVersion:	2

Table A.8.8/7: Profile negotiation

Profile negotiation as per H.248.18:	No

A.8.9 Manipulating and auditing context attributes

Table A.8.9: 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: Encodings

Supported Encodings:	Binary (optional) (NOTE 1) Text (optional)
NOTE 1: For 3GPP Mn interface binary encoding is strongly recommended if only one encoding is selected to ensure interoperability.	

A.10 Transactions

Table A.10/1: Transactions per Message

Maximum number of TransactionRequests / TransactionReplies / TransResponseAcks / Segment Replies per message:	2

Table A.10/2: Commands per Transaction Requests

Maximum number of commands per Transaction request:	TBD

Table A.10/3: Commands per Transaction Reply

Maximum number of commands per Transaction reply:	TBD

Table A.10/4: Optional Commands

Commands able to be marked "Optional":	ALL

Table A.10/5: 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 identifythe originator of the message.

A.12 Transport

Table A.12/1: Transport

Supported Transports:	SCTP(recommended) (NOTE1),, SCTP/M3UA(optional) as defined in IETF RFC 3332 [6] with options detailed in 3GPP TS 29.202 [7] (NOTE2), UDP(optional)
NOTE 1	H.248 is "SCTP user" in this case of H.248/SCTP/IP based transport according ITU-T Rec. H.248.4. The number of used SCTP Streams for traffic of the H.248 Control Association must be defined, see § 8/H.248.4. A single SCTP Stream is the default assumption ("Single-Stream Mode") in this Profile.
NOTE 2	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.
NOTE 3	Checksum calculation for SCTP shall be supported as specified in RFC 3309 [28] instead of the method specified in RFC 2960 [12].

Table A.12/2: Segmentation

Segmentation Supported:	No

A.13 Security

Table A.13: 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
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
Basic DTMF Generator Package (see ITU-T Recommendation H.248.1 [9] Annex E.5); Only the DTMF Signal Ids shall be used, not the Tone Ids within the PlayTone Signal Id.	dg, (0x0005)	v1
DTMF Detection Package (see ITU-T Recommendation H.248.1 [9] Annex E.6);	dd, (0x0006)	v1
TDM Circuit Package (see ITU-T Recommendation H.248.1 [9] Annex E.13);	tdmc, (0x000d)	v1
Media Gateway Resource Congestion Handling Package (see ITU-T Recommendation H.248.10 [12]).	chp, (0x0029)	v1
Basic Continuity Package (see ITU-T Recommendation H.248.1 [9] Annex E.10);	ct, (0x000a) Only required for TDM side terminations.	v1

Table A.14/2: Optional packages

Package Name	Package ID	Version	Support dependent on:
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
TFO package (see subclause 15.2.2 of 3GPP TS 29.232 [5])	threegtfoc, (0x0031)	v2	

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

A.14.1 Generic Package

Table A.14.1: 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)	M	ADD, MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	General Cause (GeneralCause, 0x0001)	M	"NR" (0x0001) Normal Release "UR" (0x0002) Unavailable Resources "FT" (0x0003) Failure, Temporary "FP" (0x0004) Failure, Permanent "IW" (0x0005) Interworking Error "UN" (0x0006) Unsupported	Not Applicable
	Failure Cause (FailureCause, 0x0002)	O	Octet String	Not Applicable
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 (SIgID , 0x0001)	M	pkgdName syntax	Not Applicable
	Termination Method (Meth,0x0002)	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	Not Applicable
	Signal List Id	O	Integer	Not Applicable

A.14.2 Base Root Package

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

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
root/maxNumberOfContexts	O	<ADD, MOD, MOVE, AUDITVALUE, AUDITCAP>	<Values / ALL >	<Value / Not Applicable>
root/maxTerminationPerContext	O			
root/normalMGExecutionTime	O			
root/normalMGCExecutionTime	O			
root/MGProvisionalResponseTimerValue	O			
root/MGCProvisionalResponseTimerValue	O			
root/MGCOriginatedPendingLimit	O			
root/MGOriginatedPendingLimit	O			
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.14.3 Basic DTMF Generator Package

Table A.14.3: 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	-			

A.14.4 Basic DTMF Detection Package

Table A.14.4: 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" d4, "4" d5, "5"	M	ADD, MOD, NOTIFY		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	None	-	-	-
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**

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"	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: 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: 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: 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: 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	-
	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: 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: 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)	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: Mandatory for BICC ATM Terminations, not used otherwise				

A.14.11 Call Progress Tones Generator Package v1

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

Properties	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	**Provisioned Value:**
<name and Identity e.g. Packets Sent (rtp/ps, 0x00c/0x0004), ALL or None>	<M/O>	<ADD, MOD, MOVE, AUDITVALUE, AUDITCAP>	<Values / ALL >	<Value / Not Applicable>
Signals	**Mandatory/ Optional**	**Used in command:**		**Duration Provisioned Value:**
<name and Identity >	<M/O>	<ADD, MOD, MOVE, AUDITVALUE, AUDITCAP>		<Value / Not Applicable>
	Signal Parameters	**Mandatory/ Optional**	**Supported Values:**	**Duration Provisioned Value:**
	<name and Identity>	<M/O>	<Values / ALL>	<Value / Not Applicable>
Events	**Mandatory/ Optional**	**Used in command:**		
<name and Identity >	<M/O>	<ADD, MOD, MOVE, NOTIFY, AUDITVALUE, AUDITCAP>		
	Event Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**

	<name and Identity>	<M/O>	<Values / ALL>	<Value / Not Applicable>
	ObservedEvent Parameters	**Mandatory/ Optional**	**Supported Values:**	**Provisioned Value:**
	<name and Identity>	<M/O>	<Values / ALL>	<Value / Not Applicable>
Statistics	**Mandatory/ Optional**	**Used in command:**	**Supported Values:**	
<name and Identity >	<M/O>	<ADD, MOD, MOVE, SUBTRACT, AUDITVALUE, AUDITCAP>	<Values / ALL >	
Error Codes	**Mandatory/ Optional**			
<number>	<M/O>			

A.14.12 Basic Call Progress Tones Generator with Directionality

Table A.14.12: 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: 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: 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: 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: 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: 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: 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 [5]	See 3GPP TS 29.232 [5]
UP versions (threegup/ upversions, 0x002f/0x0002)	M	ADD, MOD, MOVE	See 3GPP TS 29.232 [5]	See 3GPP TS 29.232 [5]
Delivery of erroneous SDUs (threegup/ delerrsdu, 0x002f/0x0003)	M	ADD, MOD, MOVE	See 3GPP TS 29.232 [5]	See 3GPP TS 29.232 [5]
Interface (threegup/ interface, 0x002f/0x0004)	M	ADD, MOD, MOVE	See 3GPP TS 29.232 [5]	See 3GPP TS 29.232 [5]
Initialisation Direction (threegup/ initdir, 0x002f/0x0005)	M	ADD, MOD, MOVE	See 3GPP TS 29.232 [5]	See 3GPP TS 29.232 [5]
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: 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/O>	<ADD, MOD, MOVE, NOTIFY, AUDITVALUE, AUDITCAP>		
	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 TFO package

Table A.14.20: 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.14.21 Tone Generator Package

Table A.14.21: 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.14.22 Tone Detection Package

Table C.14.22: 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 detected (tonedet/ltd, 0x0004/0x0003)	Not Used	-		
	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.15 Mandatory support of SDP and Annex C information elements

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

Information Element	Annex C Support	SDP Support
v-line	"SDP_V "	
m-line	"SDP_M "	<port> <transport> and <fmt-list> are required. Both static and dynamic payload types shall be supported.
c-line	"SDP_C "	<connection address> required
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 "	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). 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 should populate this line as follows or use the value received from the MGC: - <user name> should contain an hyphen - <session ID> and <version> should contain one or mode digits as described in RFC 2327 [x] - <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 use an hyphen "-" as a session name or the value received from the MGC.

t-line	"SDP_T"	The time (t=) line consists of two fields: *t= <start-time> <stop-time>.* This line is ignored by both the MGC and the MG if received in local and remote descriptors. The MGC is not required to supply a time description but shall accept one. When supplied, this line shall be set to 0 0.
NOTE: SDP or SDP_equivalents are only used for terminations towards the IM CN Subsystem. NOTE1: b-line is optional		

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

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

Information Element	Annex C Support	SDP Support

A.17 Procedures

A.17.1 Call Independent Procedures

See clause 14.

A.17.2 IMS Terminations Procedures

See clause 15.

A.17.3 TDM Terminations Procedures

See clause 16.

A.17.4 BICC Terminations Procedures

See clause 17.

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
2005-12	CT#30	CP-050619	0009	1	Alignment of Rel6 Mn with Rel7 Changes	6.3.0	6.4.0
		CP-050619	0010	1	Open Mn		
		CP-050619	0016	1	Addition of TFO procedure		
2006-03	CT#31	CP-060066	0029	1	Bearer Released Event to Reserve TDM Circuit procedure	6.4.0	6.5.0
		CP-060066	0031	1	BICC packages in Mn profile		
		CP-060066	0033		Service Change Method "Disconnected" and "Failover" removal from Service Changes sent by MGCF		
2006-06	CT#32	CP-060306	0035	1	Corrections to Mn Specification for Inter Vendor Operability	6.5.0	6.6.0
			0049		Update for packages defined in 29.232 in Mn profile		
			0042		Update for Generic Bearer Connection package in Mn profile		
			0043	1	Adding of Bearer Released Event to Procedures related to a termination towards IM CN Subsystem		
			0045	1	Mode-change-period support on Mn interface		
2006-09	CT#33	CP-060401	0047	1	AuditValue procedure	6.6.0	6.7.0
			0057	2	Corrections to Profile Description: Descriptors		
			0059		Corrections to Profile Description: Command API		
			0061	1	Corrections to Profile Description: Packages		
			0065	1	Definition of the use of mandatory and optional in Mn Profile Template		
			0067		Missing Procedures Towards IMS		
2006-12	CT#34	CP-060725	0070	1	Profile registration procedure	6.7.0	6.8.0
			0072	2	Rules for SDP equivalents		
			0076	3	Codec Parameters		
2007-06	CT#36	CP-070315	0090		RFC 3309 for SCTP checksum	6.8.0	6.9.0

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2007-09	CT#37	CP-070525	0093	3	Service Change Methods and Reasons	6.9.0	6.10.0
			0096		Correction to Package Ids		
			0098		Priority Indicator in Context Attributes		
			0100		H.248 Message Encoding		
			0102	2	Correction to Re-use of Procedures		
			0104	1	Correction to Signals Descriptor		
			0106	1	Correction to Events Descriptor		
			0108	1	Clarification of Message Identifier		
2007-10					Editorial correction to cover page date and to previous history box entry.	6.10.0	6.10.1
2007-12	CT#38	CP-070742	0122	1	Properties returned in commands	6.10.1	6.11.0
2008-03	CT#39	CP-080012	0127	1	Correction on the Mn profile: BNC Release event	6.11.0	6.12.0
2008-04					Correction to history table	6.12.0	6.12.1
2008-09	CT#41	CP-080454	0132		Service Change Reason in (G)MSC Server Out of Service	6.12.1	6.13.0
2008-10					Correction to history table	6.13.0	6.13.1
2009-12	CT#46	CP-090967	0145		Correction to Profile for Commands marked optional	6.13.1	6.14.0

History

Document history		
V6.0.0	January 2005	Publication
V6.1.0	March 2005	Publication
V6.2.0	June 2005	Publication
V6.3.0	September 2005	Publication
V6.4.0	December 2005	Publication
V6.5.0	March 2006	Publication
V6.6.0	June 2006	Publication
V6.7.0	September 2006	Publication
V6.8.0	December 2006	Publication
V6.9.0	June 2007	Publication
V6.10.1	October 2007	Publication
V6.11.0	January 2008	Publication
V6.12.1	April 2008	Publication
V6.13.1	October 2008	Publication
V6.14.0	January 2010	Publication