

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

H.248.80

(01/2014)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Communication
procedures

Gateway control protocol: Usage of the revised SDP offer/answer model with ITU-T H.248

Recommendation ITU-T H.248.80

ITU-T H-SERIES RECOMMENDATIONS
AUDIOVISUAL AND MULTIMEDIA SYSTEMS

CHARACTERISTICS OF VISUAL TELEPHONE SYSTEMS	H.100–H.199
INFRASTRUCTURE OF AUDIOVISUAL SERVICES	
General	H.200–H.219
Transmission multiplexing and synchronization	H.220–H.229
Systems aspects	H.230–H.239
Communication procedures	H.240–H.259
Coding of moving video	H.260–H.279
Related systems aspects	H.280–H.299
Systems and terminal equipment for audiovisual services	H.300–H.349
Directory services architecture for audiovisual and multimedia services	H.350–H.359
Quality of service architecture for audiovisual and multimedia services	H.360–H.369
Supplementary services for multimedia	H.450–H.499
MOBILITY AND COLLABORATION PROCEDURES	
Overview of Mobility and Collaboration, definitions, protocols and procedures	H.500–H.509
Mobility for H-Series multimedia systems and services	H.510–H.519
Mobile multimedia collaboration applications and services	H.520–H.529
Security for mobile multimedia systems and services	H.530–H.539
Security for mobile multimedia collaboration applications and services	H.540–H.549
Mobility interworking procedures	H.550–H.559
Mobile multimedia collaboration inter-working procedures	H.560–H.569
BROADBAND, TRIPLE-PLAY AND ADVANCED MULTIMEDIA SERVICES	
Broadband multimedia services over VDSL	H.610–H.619
Advanced multimedia services and applications	H.620–H.629
Ubiquitous sensor network applications and Internet of Things	H.640–H.649
IPTV MULTIMEDIA SERVICES AND APPLICATIONS FOR IPTV	
General aspects	H.700–H.719
IPTV terminal devices	H.720–H.729
IPTV middleware	H.730–H.739
IPTV application event handling	H.740–H.749
IPTV metadata	H.750–H.759
IPTV multimedia application frameworks	H.760–H.769
IPTV service discovery up to consumption	H.770–H.779
Digital Signage	H.780–H.789
E-HEALTH MULTIMEDIA SERVICES AND APPLICATIONS	
Interoperability compliance testing of personal health systems (HRN, PAN, LAN and WAN)	H.820–H.849
Multimedia e-health data exchange services	H.860–H.869

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T H.248.80

Gateway control protocol: Usage of the revised SDP offer/ answer model with ITU-T H.248

Summary

Recommendation ITU-T H.248.80 describes the interworking of the session description protocol (SDP) described by the "Revised SDP Offer/Answer (O/A) model with ITU-T H.248". This allows SDP capability negotiation and SDP media capabilities negotiation to be supported within ITU-T H.248.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.248.80	2014-01-13	16	11.1002/1000/12060

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2014

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Table of Contents

	Page
1 Scope	1
2 References.....	1
3 Definitions	2
3.1 Terms defined elsewhere	2
3.2 Terms defined in this Recommendation.....	2
4 Abbreviations and acronyms	3
5 Conventions	4
6 Interworking the Revised Offer/Answer SDP "SDPCapNeg" and ITU-T H.248.1	4
6.1 Revised Offer/Answer SDP received by MGC	4
6.2 Revised Offer/Answer SDP initiated by MGC	8
7 Interworking the Revised Offer/Answer SDP "MediaCapNeg" and ITU-T H.248.1 ..	9
8 Enhanced Revised Offer/Answer SDP support in ITU-T H.248.....	10
9 Enhanced Revised Offer/Answer SDP Support Package	10
9.1 Properties	10
9.2 Events	10
9.3 Signals	10
9.4 Statistics.....	11
9.5 Error codes.....	11
9.6 Procedures	11
10 Enhanced SDP Media Capabilities Negotiation Support Package	12
10.1 Properties	12
10.2 Events	14
10.3 Signals	14
10.4 Statistics.....	14
10.5 Error codes.....	14
10.6 Procedures	14
11 Examples	15
11.1 Audit of SDPCapNeg extensions	15
11.2 Example usage of SDP Capability Negotiation framework attributes	15
11.3 Example usage of enhanced SDP Media Capabilities Negotiation Support ..	18
11.4 Further example with respect to session configurations.....	20
11.5 Further example with respect to multiple latent configurations.....	22
Bibliography.....	26

www.itu.int

Recommendation ITU-T H.248.80

Gateway control protocol: Usage of the revised SDP offer/answer model with ITU-T H.248

1 Scope

Recommendation ITU-T H.248.80 describes the interworking of the SDP described by the "Revised SDP Offer/Answer (O/A) model" with ITU-T H.248. The "Revised SDP Offer/Answer model" is characterized by the following documents:

- SDP capability negotiation (SDPCapNeg) defined in [IETF RFC 5939]
- SDP media capabilities negotiation (MediaCapNeg) defined in [IETF RFC 6871]

NOTE – The support of miscellaneous capabilities negotiation in the Session Description document – [b-IETF RFC 7006] and Extension for PSTN bearers [b-IETF SDPCS] is for further study.

This Recommendation describes the relationship between the ITU-T H.248 group concept and the revised SDP offer/answer model concepts of actual and potential configurations. It provides guidelines for the inter-working between SDPCapNeg and normal ITU-T H.248.1 procedures. Rather than focussing on the SDPCapNeg procedures in the context of session handling, this Recommendation concentrates on mapping the between ITU-T H.248.1 and the SDP Capability negotiation framework SDP syntax. For interactions between the functions of SDPCapNeg and different SDP attributes, see [IETF RFC 5939] and associated IETF documents.

This Recommendation also discusses the support of [IETF RFC 6871] by ITU-T H.248.

In order to address several deficiencies in interworking between SDPCapNeg and [IETF RFC 6871] and ITU-T H.248 this Recommendation defines two packages that allow a more optimized support of the revised SDP offer/answer procedures on MGCs that also support ITU-T H.248.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T H.248.1] Recommendation ITU-T H.248.1 (2013), *Gateway control protocol: Version 3*.
- [ITU-T H.248.39] Recommendation ITU-T H.248.39 (2006), *Gateway control protocol: H.248 SDP parameter identification and wildcarding*.
- [ITU-T H.248.49] Recommendation ITU-T H.248.49 (2007), *Gateway control protocol: Session description protocol RFC and capabilities packages*.
- [ITU-T H.248.63] Recommendation ITU-T H.248.63 (2009), *Gateway control protocol: Resource management packages*.
- [ITU-T T.38] Recommendation ITU-T T.38 (2010), *Procedures for real-time Group 3 facsimile communication over IP networks*.
- [IETF RFC 5939] IETF RFC 5939 (2010), *Session Description Protocol (SDP) Capability Negotiation*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 actual configuration [IETF RFC 6871]: An actual configuration specifies which combinations of SDP session parameters and media stream components can be used in the current offer/answer exchange and with what parameters. Use of an actual configuration does not require any further negotiation in the offer/answer exchange. See [IETF RFC 5939] for further details.

3.1.2 potential configuration [IETF RFC 6871]: A potential configuration indicates which combinations of capabilities can be used for the session and its associated media stream components. Potential configurations are not ready for use, however they are offered for potential use in the current offer/answer exchange. They provide an alternative that may be used instead of the actual configuration, subject to negotiation in the current offer/answer exchange. See [IETF RFC 5939] for further details.

3.1.3 latent configuration [IETF RFC 6871]: A latent configuration indicates which combinations of capabilities could be used in a future negotiation for the session and its associated media stream components. Latent configurations are neither ready for use, nor are they offered for actual or potential use in the current offer/answer exchange. Latent configurations merely inform the other side of possible configurations supported by the entity. Those latent configurations may be used to guide subsequent offer/answer exchanges, but they are not offered for use as part of the current offer/answer exchange.

NOTE – Latent configurations are beneficial for fast transitioning between different media configurations during active communication phases. Examples: IP emulation services for PSTN teleservices like "alternate speech-facsimile" or "text telephony" calls.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 configuration: A configuration relates to a set of capabilities, which may be indicated and negotiated via a signalling protocol, or provisioned via a management protocol.

NOTE – This definition is derived from [IETF RFC 5939], which itself does not provide an explicit definition of this term.

3.2.1.1 media configuration: A media configuration typically covers capabilities such as media type, media format, all media format attributes, media transport stack, media transport capacity and all associated parameter values.

NOTE 1 – The notion of 'media' originates from the concept of "IP media-path" (which relates to the ITU-T H.248 bearer-path), as opposed to the "IP signalling-path". The IP packet flow of the IP media-path carries the application data between IP application endpoints and the IP signalling-path carries the correspondent application control information.

NOTE 2 – A media configuration is specified within the SDP media description block. The relationship between the ITU-T H.248 "Media Descriptor" and SDP "Media Description" is illustrated in Figure 10 in [ITU-T H.248.1].

3.2.1.2 session configuration: Defines a *combination* of multiple media configurations.

NOTE – This definition is derived from [IETF RFC 6871], which itself does not provide an explicit definition of this term.

3.2.2 configuration (codec) list: The term *configuration list* represents a list of media configurations within the SDP *media description* block (in the case of SIP-embedded SDP).

3.2.3 SDP offer/answer protocol variants: The following names are applied in this Recommendation in order to distinguish different SDP Offer/Answer *protocol variants*. There are two models for the session description protocol (SDP) concerning the indication and negotiation of media and transport capabilities:

3.2.3.1 legacy SDP Offer/Answer: This name indicates SDP Offer/Answer according to [b-IETF RFC 3264].

3.2.3.2 revised SDP Offer/Answer: This name indicates SDP Offer/Answer according to [IETF RFC 5939] and [IETF RFC 6871].

NOTE – It is noted that the terms 'legacy' and 'revised' are not related to the SDP syntax as such, rather to the overall "application", i.e., the O/A negotiation protocol. It is not expected that the SDP syntax of [b-IETF RFC 3264] will be made obsolete by the revised SDP Offer/Answer RFCs. It is expected that both SDP O/A protocol variants will be used in parallel.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DTMF	Dual Tone Multi Frequency
FoIP	Fax over Internet Protocol
FoUDPTL	Fax over User Datagram Protocol Transport Layer
IP	Internet Protocol
LD	Local Descriptor
MediaCapNeg	Media Capabilities Negotiation
MG	Media Gateway
MGC	Media Gateway Controller
MSRP	Message Session Relay Protocol
NTE	Named Telephone Events
O/A	Offer/Answer
PCMU	Pulse Code Modulated
PSTN	Public Switched Telephone Network
RD	Remote Descriptor
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
SDP	Session Description Protocol
SDPCapNeg	SDP Capabilities Negotiation
SIP	Session Initiation Protocol
UDP	User Datagram Protocol
UDPTL	User Datagram Protocol Transport Layer
VBDolP	Voice Band Data over Internet Protocol
VoIP	Voice over Internet Protocol

5 Conventions

Elements of the ITU-T H.248 protocol model, e.g., Context, Termination, Stream, Event are represented using the first letter capitalized. ITU-T H.248 Property, Event, Signal and Parameter identities are given in *italics*. When used in the main text SDP syntax is highlighted in bold, i.e., "**m**".

6 Interworking the Revised Offer/Answer SDP "SDPCapNeg" and ITU-T H.248.1

This clause describes the interworking between the Revised Offer/Answer "SDPCapNeg" SDP and ITU-T H.248. Primarily it describes the mapping with the "**a=acap:**", "**a=tcap:**", "**a=pcfg:**" and "**a=acfg:**" SDP attributes (plus any attribute defined as an extension to this framework) by using the ITU-T H.248.1 grouping concept. The "**a=csup:**" and "**a=creq:**" attributes are not described as they relate only to procedures for the SDPCapNeg framework. As this framework is not used between the MGC and MG they are not needed to be supported by ITU-T H.248.1.

An important difference between the Revised Offer/Answer SDP and ITU-T H.248.1 is the action the receiver takes when it does not understand or finds the SDP in error. The Revised Offer/Answer SDP negotiation typically ignores SDP lines it does not understand where ITU-T H.248.1 will generate an error reply. Therefore where interworking the two forms of SDP to minimise errors the MGC should perform the necessary checks (i.e., via auditing the MG or via provisioning) to ensure that the MG supports the syntax and capabilities requested.

However the mapping defined in this clause effectively provides the same capabilities as SDPCapNeg in ITU-T H.248.

6.1 Revised Offer/Answer SDP received by MGC

This clause assumes that the MGC has received a message containing SDP with the SDPCapNeg framework syntax and needs to communicate this information to the MG.

6.1.1 Relationship with the ITU-T H.248 Reserve Group concept

When the MGC detects the use of the revised Offer/Answer SDP procedures and requires that the information is sent to the MG, each of the potential configurations (as well as the actual configuration) are enumerated as a separate ITU-T H.248 Group. For more information regarding ITU-T H.248 Groups see clause 7.1.8 of [ITU-T H.248.1].

NOTE – The MGC may apply a policing function and limit the number of groups/capabilities based on internal policy. For the purposes of description this Recommendation assumes that all configurations are enumerated.

ITU-T H.248 groups are represented by providing a GroupID in the binary encoding or using multiple session descriptions (i.e., SDP) separated by v= lines. Thus each group effectively represents a "potential configuration".

The first group shall relate to the highest priority "potential configuration", i.e., the one with the lowest **a=pcfg:x** number. This group shall be followed by the next highest **a=pcfg:x** number. The final group shall be the "actual configuration".

Each group shall contain all properties/parameters to for a valid SDP description of the configuration. In the case of the text encoding using SDP this means that all SDPCapNeg attributes (and any extension attributes) related to the **a=pcfg** instance should be incorporated into a valid SDP session description.

[IETF RFC 5939] defines several modifiers that are related to the characteristics of a potential configuration: "-" (Delete), "["]" (Optional), "|" (Alternatives) and "+" (Mandatory). In incorporating SDPCapNeg attributes into a valid SDP session description these need to be taken into account.

The use of "-" is a means of indicating that the potential configuration doesn't contain attributes from the actual configuration. In mapping to ITU-T H.248 concepts there is no distinction between actual and preferred configurations. All the required properties/SDP are set for a particular ITU-T H.248 Group/Stream. Thus there is no need to indicate particular attributes are deleted from an ITU-T H.248 Group, they are simply omitted from the applicable ITU-T H.248 Descriptor.

The use of "[" indicates that it is optional to support a particular capability. There is no equivalent ITU-T H.248 element. A MGC may either indicate that all ReserveGroups/Values should be supported (= True) or a single instance (=False) should be chosen.

The use of "+" indicates that it is mandatory to support a particular capability for a particular potential configuration. There is no ITU-T H.248 element to explicitly signal this however this behaviour can be inferred when a particular capability is added to an ITU-T H.248 Group.

The use of "|" indicates alternatives. See clause 6.1.2 for more information.

However no syntax described by SDPCapNeg shall be used in the groups otherwise an error response may be generated.

For example, given the following Revised Offer/Answer SDP:

```
v=0
o=- 25678 753849 IN IP4 192.0.2.1
s=
c=IN IP4 192.0.2.1
t=0 0
m=audio 53456 RTP/AVP 0 18
a=tcap:1 RTP/SAVP
a=acap:1 crypto:1 AES_CM_128_HMAC_SHA1_80
    inline:WVNfX19zZW1jdGwgKCkgewkyMjA7fQp9CnVubGVz|2^20|1:4
a=pcfg:1 t=1 a=1
```

To create a valid SDP for the first group (related to **a=pcfg:1**) the MGC would take RTP/AVP from the **m=audio** attribute and replace it with the RTP/SAVP from the **a=tcap:1** attribute. It would then delete the **a=tcap:1** line. It would then see that **a=acap:1** introduced the crypto attribute thus it would create a new **a=crypto** line containing the necessary information. It would then remove the **a=acap:1** line. The **a=pcfg:1** would then be removed. Thus the first group would be coded:

```
v=0
o=- 25678 753849 IN IP4 192.0.2.1
s=
c=IN IP4 192.0.2.1
t=0 0
m=audio 53456 RTP/SAVP 0 18
a=crypto:1 AES_CM_128_HMAC_SHA1_80
    inline:WVNfX19zZW1jdGwgKCkgewkyMjA7fQp9CnVubGVz|2^20|1:4
```

6.1.2 Relationship with the ITU-T H.248 Reserve Value concept

SDPCapNeg also allows the ability to specify alternatives (via the use of "|") in configuration lists. The MGC can also provide this functionality via the use of over specified property values (or SDP parameters as per [ITU-T H.248.39]). Over specification of properties is equivalent to providing alternatives which effectively is a "or" function in the same way as "|".

For example, given the following Revised Offer/Answer SDP:

```
v=0
o=- 25678 753849 IN IP4 192.0.2.1
s=
c=IN IP4 192.0.2.1
t=0 0
m=audio 53456 RTP/AVPF 0 18
```