SDP parameters for supporting H.263 and H.261 options
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Abstract

This document defines the syntax and the semantics of SDP parameters needed to support features of H.261 and H.263 video codecs. This optional parameters enables the H.261 and H.263 codecs to specify their functionality enabling better video support. The document specify codec specific parameters that can be used with SIP, SAP or any similar protocol that uses SDP to signal support of those codecs.
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1. Introduction

Internet multimedia conferencing is picking up with point-to-point and multipoint video conferencing implementations. The common video codecs that are used in video conferencing applications include H.261[3] and the basic H.263 with its two revisions from 1998 and 2000[4]. The current usage of H.261[3] and H.263[4] is limited since the current SDP MIME types defined in RFC3555 [6] are defining only part of the functionality needed.

This document specifies the SDP syntax and the semantics for describing the optional H.261 and H.263 features. The syntax in this document uses the SDP "a=fmtp" attribute which is meant to carry codec specific parameters. These codec specific parameters can be used with SIP[1], SAP[2] or any similar protocol that uses SDP to signal support of those codecs.

2. H.261 Codec Parameters

For further description of these H.261 parameters refer to the ITU H.261 document[3].

The fmtp parameters for H.261 are represented in the SDP attribute.

`a=fmtp:xx H261_option`

The xx is the RTP payload number, it can be a static or dynamic payload number. The recommendation is to use dynamic payload number.

The syntax of H261_option is

`H261_option = *Size SP | *Annex SP`

`Size = "QCIF" "=" mpi | "CIF" "=" mpi`

`mpi = 1*2DIGIT`

`Annex = "D"`

The Size parameter specifies the picture size supported and at what frame rate. H.261 defines two resolution QCIF and CIF.

mpi is an integer value (1..4) and it means the maximum picture frame rate is (29.97/mpi) frames/sec. The definition of the mpi is according to the video codec specification.

Annex D specifies support for still image graphics according to H.261 annex D.
3. H.263 Codec Parameters

H.263 has three MIME types defined in RFC3555. The parameters in this section may be used with any of the H263 MIME types. When used with H.263-2000 MIME subtype name, the optional parameters profile and levels must not be used. For description of these H.263 parameters refer to the ITU H.263 document[4].

The fmtp parameters for H.263 are represented in the SDP attribute.

a=fmtp:xx H263_option

The xx is the RTP payload number, it can be a static or dynamic payload number. The recommendation is to use dynamic payload number.

The syntax of H263_option is

H263_option = *Size SP | *Annex SP | *Params

Size = "SQCIF" "=" mpi | "QCIF" "=" mpi | "CIF" "=" mpi |

"CIF4" "=" mpi I "CIF16" "=" mpi |

"XMAX" "=" xmax SP "YMAX" "=" ymax SP "MPI" "=" mpi

mpi = 1*2DIGIT

xmax=1*4DIGIT

ymax=1*4DIGIT

The Size parameter specifies the picture size supported and at what frame rate. H.263 defines fixed resolution SQCIF, QCIF, CIF, 4xCIF and 16xCIF as well as custom picture size that are presented by their maximum X and Y size. The X and Y values must be dividable by 4.

mpi is an integer value (1..32) and it means the maximum picture frame rate is (29.97/mpi) frames/sec. The definition of the mpi is according to the video codec specification.

Annex = "D" "=" #annex_d | "E" | "F" | "G" | "I" | "J" |

"K" "=" #annex_k | "L" "=" #annex_l | "M" | "N" "=" annex_n |

"O" "=" #annex_o | "P" | "Q" | "R" | "S" | "T"

annex_d= "1" | "2"
annex_k= "1" | "2" | "3" | "4"

annex_l= "1" | "2" | "3" | "4" | "5" | "6" | "7"

annex_n= "1" | "2" | "3" | "4"

annex_o= "1" | "2" | "3"

Here #term means comma separated list of term.

The H.263 parameters that can be specified are in the Params options.

Params= "PAR" "=" par_a ":" par_b | "CPCF" "=" cpcf | "MaxBR" "="
maxbr |
"BPP" "=" bpp | "HRD" | "Interlaced"

par_a=1*3DIGIT

par_b=1*DIGIT

cpcf=1*2DIGIT "." 1*3DIGIT

maxbr=1*5DIGIT

bpp=1*5DIGIT

Explanations:

Arbitrary Pixel Aspect Ratio (PAR):

Par_a and par_b are integers between 0 and 255.
Default ratio is 12:11 if not otherwise specified.

Arbitrary (Custom) Picture Clock Frequency (CPCF):

Cpcf is floating point value. Default value is 29.97.

MaxBitRate (MaxBR):

Maximum video stream bitrate, presented with units of 100 bits/s.
MaxBR value is an integer between 1..19200.

BitsPerPictureMaxKb (BPP):

Maximum amount of kilobits allowed to represent a single picture frame, value is specified by largest supported picture resolution,
see [1]. If this parameter is not present, then default value, that is based on the maximum supported resolution, is used. BPP is integer value between 0 and 65536.

Hypothetical Reference Decoder (HRD):

See annex B of H.263 specification.

Interlaced or 60 fields indicates the support for interlace display according to H.263 annex W.6.3.11

These parameters are separated by space.

4. Usage of SDP H.261 and H.263 options with SIP

This document does not specify actual SIP signaling. The decoder send its preferred parameters and let the other end select according to SIP procedures. This syntax may be sent, for example, with SIP INVITE and corresponding status response (200 ok). Other SIP methods may be used.

Codec options: (D,E,F,G,I,J,K,L,M,N,O,P,Q,R,S,T) These characters exist only if the sender of this SDP message is able or willing to decode those. E.g. If a terminal is capable of decoding Syntax based Arithmetic Coding (SAC) and Advanced Prediction (AP) options, it can put E F in the end of the format specific parameters.

Picture sizes and MPI:

Supported picture sizes and their corresponding minimum picture interval (MPI) information for H.261 and H.263 can be combined. All picture sizes can be advertised to other party, or only some subset of it. Terminal announces only those picture sizes (with their MPIs) which it is willing to receive. For example, MPI=2 means that maximum (decodeable) picture rate per second is about 15.

Parameters occurring first are the most preferred picture mode to be received.

Example of the usage of these parameters:

CIF=4  QCIF=3 SQCIF=2 XMAX=360 YMAX=240 MPI=2

This means that sender hopes to receive CIF picture size, which it can decode at MPI=4. If that is not possible, then QCIF with MPI value 3, if that is neither possible, then SQCIF with MPI value =2. It is also allowed (but least preferred) to send arbitrary picture sizes (max 360x240) with MPI=2. Note that most encoders support at
least QCIF and CIF fixed resolutions and they are expected to be available almost in every H.261 and H.263 based video application.

MaxBR and BPP parameters:

Both these parameters are useful in SIP. MaxBitRate is video decoder property, hence it differs from SDP b : bandwidth-value attribute which refers more to application’s total bandwidth (an application consists often of both audio and video).

BitsPerPictureMaxKb is needed especially for decoder buffer size estimation to reduce the probability of video buffer overflow.

Below is an example of H.263 SDP syntax in SIP message.

a=fmtp: xx CIF=4 QCIF=2 MaxBR=1000 E F

This means that the sender of this message can decode H.263 bit stream with following options and parameters: Preferred resolution is CIF (its MPI is 4), but if that is not possible then QCIF size is ok. Maximum receivable bitrate is 100 kbit/s (1000*100 bit/s) and SAC and AP options can be used.

5. Use of SDP H.263 and H.261 options with SAP

SAP announcements are one-way only. All H.263/H.261 options can be used to signal that the sending terminal is going to use these options in its transmitted video stream. It is just an informal message.

Usually only one picture size (with its MPI) exists. However, since it is possible for a video source (terminal) to change its picture size during session, several picture sizes can exist in the parameter list. First one is the original picture size to be used in the beginning of the session.

6. Security Considerations

The security for these features are the same as for SDP.

References


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