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                   Session Description Protocol (SDP) Format for
                   Binary Floor Control Protocol (BFCP) Streams

Status of This Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements. Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol. Distribution of this memo is unlimited.

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Abstract

   This document specifies how to describe Binary Floor Control Protocol
   (BFCP) streams in Session Description Protocol (SDP) descriptions.
   User agents using the offer/answer model to establish BFCP streams
   use this format in their offers and answers.

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1. Introduction

As discussed in the BFCP (Binary Floor Control Protocol)
specification [8], a given BFCP client needs a set of data in order
to establish a BFCP connection to a floor control server. These data
include the transport address of the server, the conference
identifier, and the user identifier.

One way for clients to obtain this information is to use an
offer/answer [4] exchange. This document specifies how to encode
this information in the SDP session descriptions that are part of
such an offer/answer exchange.

User agents typically use the offer/answer model to establish a
number of media streams of different types. Following this model, a
BFCP connection is described as any other media stream by using an
SDP 'm' line, possibly followed by a number of attributes encoded in
'a' lines.

2. Terminology

In this document, the key words "MUST", "MUST NOT", "REQUIRED",
"SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT
RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as
described in BCP 14, RFC 2119 [1] and indicate requirement levels for
compliant implementations.

3. Fields in the 'm' Line

This section describes how to generate an 'm' line for a BFCP stream.

According to the SDP specification [11], the 'm' line format is the
following:

    m=<media> <port> <transport> <fmt> ...

The media field MUST have a value of "application".

The port field is set following the rules in [7]. Depending on the
value of the 'setup' attribute (discussed in Section 7), the port
field contains the port to which the remote endpoint will initiate
its TCP connection or is irrelevant (i.e., the endpoint will initiate
the connection towards the remote endpoint) and should be set to a
value of 9, which is the discard port. Since BFCP only runs on top
of TCP, the port is always a TCP port. A port field value of zero
has the standard SDP meaning (i.e., rejection of the media stream).

We define two new values for the transport field: TCP/BFCP and
TCP/TLS/BFCP. The former is used when BFCP runs directly on top of
TCP, and the latter is used when BFCP runs on top of TLS, which in
turn runs on top of TCP.

The fmt (format) list is ignored for BFCP. The fmt list of BFCP 'm'
lines SHOULD contain a single "*" character.

The following is an example of an 'm' line for a BFCP connection:

    m=application 50000 TCP/TLS/BFCP *

4. Floor Control Server Determination

When two endpoints establish a BFCP stream, they need to determine
which of them acts as a floor control server. In the most common
scenario, a client establishes a BFCP stream with a conference server
that acts as the floor control server. Floor control server
determination is straight forward because one endpoint can only act
as a client and the other can only act as a floor control server.

However, there are scenarios where both endpoints could act as a
floor control server. For example, in a two-party session that
involves an audio stream and a shared whiteboard, the endpoints need
to decide which party will be acting as the floor control server.

Furthermore, there are situations where both the offerer and the
answerer act as both clients and floor control servers in the same
session. For example, in a two-party session that involves an audio
stream and a shared whiteboard, one party acts as the floor control
server for the audio stream and the other acts as the floor control
server for the shared whiteboard.

We define the 'floorctrl' SDP media-level attribute to perform floor
control determination. Its Augmented BNF syntax [2] is:

floor-control-attribute = "a=floorctrl:" role *(SP role)
role   = "c-only" / "s-only" / "c-s"

The offerer includes this attribute to state all the roles it would
be willing to perform:

c-only: The offerer would be willing to act as a floor control
   client only.

s-only: The offerer would be willing to act as a floor control
   server only.

c-s: The offerer would be willing to act both as a floor control
   client and as a floor control server.

If an 'm' line in an offer contains a 'floorctrl' attribute, the
answerer MUST include one in the corresponding 'm' line in the
answer. The answerer includes this attribute to state which role the
answerer will perform. That is, the answerer chooses one of the
roles the offerer is willing to perform and generates an answer with
the corresponding role for the answerer. Table 1 shows the
corresponding roles for an answerer, depending on the offerer's role.

```
                  +---------+----------+
                  | Offerer | Answerer |
                  +---------+----------+
                  |  c-only |  s-only  |
                  |  s-only |  c-only  |
                  |   c-s   |    c-s   |
                  +---------+----------+
```

                         Table 1: Roles

The following are the descriptions of the roles when they are chosen
by an answerer:

c-only: The answerer will act as a floor control client.
   Consequently, the offerer will act as a floor control server.

s-only: The answerer will act as a floor control server.
   Consequently, the offerer will act as a floor control client.

c-s: The answerer will act both as a floor control client and as a
   floor control server. Consequently, the offerer will also act
   both as a floor control client and as a floor control server.

Endpoints that use the offer/answer model to establish BFCP
connections MUST support the 'floorctrl' attribute. A floor control
server acting as an offerer or as an answerer SHOULD include this
attribute in its session descriptions.

If the 'floorctrl' attribute is not used in an offer/answer exchange,
by default the offerer and the answerer will act as a floor control
client and as a floor control server, respectively.

The following is an example of a 'floorctrl' attribute in an offer.
When this attribute appears in an answer, it only carries one role:

    a=floorctrl:c-only s-only c-s

5. The 'confid' and 'userid' SDP Attributes

   We define the 'confid' and the 'userid' SDP media-level attributes.
   These attributes are used by a floor control server to provide a
   client with a conference ID and a user ID, respectively. Their
   Augmented BNF syntax [2] is:

   confid-attribute   = "a=confid:" conference-id
   conference-id   = token
   userid-attribute   = "a=userid:" user-id
   user-id   = token

   The 'confid' and the 'userid' attributes carry the integer
   representation of a conference ID and a user ID, respectively.

   Endpoints that use the offer/answer model to establish BFCP
   connections MUST support the 'confid' and the 'userid' attributes. A
   floor control server acting as an offerer or as an answerer SHOULD
   include these attributes in its session descriptions.

6. Association between Streams and Floors

   We define the 'floorid' SDP media-level attribute. Its Augmented BNF
   syntax [2] is:

   floor-id-attribute = "a=floorid:" token [" mstrm:" token *(SP token)]

   The 'floorid' attribute is used in BFCP 'm' lines. It defines a
   floor identifier and, possibly, associates it with one or more media
   streams. The token representing the floor ID is the integer
   representation of the Floor ID to be used in BFCP. The token
   representing the media stream is a pointer to the media stream, which
   is identified by an SDP label attribute [9].

   Endpoints that use the offer/answer model to establish BFCP
   connections MUST support the 'floorid' and the 'label' attributes. A
   floor control server acting as an offerer or as an answerer SHOULD
   include these attributes in its session descriptions.

7. TCP Connection Management

   The management of the TCP connection used to transport BFCP is
   performed using the 'setup' and 'connection' attributes, as defined
   in [7].

The 'setup' attribute indicates which of the endpoints (client or
floor control server) initiates the TCP connection. The 'connection'
attribute handles TCP connection reestablishment.

The BFCP specification [8] describes a number of situations when the
TCP connection between a client and the floor control server needs to
be reestablished. However, that specification does not describe the
reestablishment process because this process depends on how the
connection was established in the first place. BFCP entities using
the offer/answer model follow the following rules.

When the existing TCP connection is reset following the rules in [8],
the client SHOULD generate an offer towards the floor control server
in order to reestablish the connection. If a TCP connection cannot
deliver a BFCP message and times out, the entity that attempted to
send the message (i.e., the one that detected the TCP timeout) SHOULD
generate an offer in order to reestablish the TCP connection.

Endpoints that use the offer/answer model to establish BFCP
connections MUST support the 'setup' and 'connection' attributes.

8. Authentication

When a BFCP connection is established using the offer/answer model,
it is assumed that the offerer and the answerer authenticate each
other using some mechanism. Once this mutual authentication takes
place, all the offerer and the answerer need to ensure is that the
entity they are receiving BFCP messages from is the same as the one
that generated the previous offer or answer.

When SIP is used to perform an offer/answer exchange, the initial
mutual authentication takes place at the SIP level. Additionally,
SIP uses S/MIME [6] to provide an integrity-protected channel with
optional confidentiality for the offer/answer exchange. BFCP takes
advantage of this integrity-protected offer/answer exchange to
perform authentication. Within the offer/answer exchange, the
offerer and answerer exchange the fingerprints of their self-signed
certificates. These self-signed certificates are then used to
establish the TLS connection that will carry BFCP traffic between the
offerer and the answerer.

BFCP clients and floor control servers follow the rules in [10]
regarding certificate choice and presentation. This implies that
unless a 'fingerprint' attribute is included in the session
description, the certificate provided at the TLS-level MUST either be
directly signed by one of the other party's trust anchors or be
validated using a certification path that terminates at one of the
other party's trust anchors [5]. Endpoints that use the offer/answer

model to establish BFCP connections MUST support the 'fingerprint'
attribute and SHOULD include it in their session descriptions.

When TLS is used, once the underlaying TCP connection is established,
the answerer acts as the TLS server regardless of its role (passive
or active) in the TCP establishment procedure.

[9](#). Examples

For the purpose of brevity, the main portion of the session
description is omitted in the examples, which only show 'm' lines and
their attributes.

The following is an example of an offer sent by a conference server
to a client.

```
m=application 50000 TCP/TLS/BFCP *
a=setup:passive
a=connection:new
a=fingerprint:SHA-1 \
     4A:AD:B9:B1:3F:82:18:3B:54:02:12:DF:3E:5D:49:6B:19:E5:7C:AB
a=floorctrl:s-only
a=confid:4321
a=userid:1234
a=floorid:1 m-stream:10
a=floorid:2 m-stream:11
m=audio 50002 RTP/AVP 0
a=label:10
m=video 50004 RTP/AVP 31
a=label:11
```

Note that due to RFC formatting conventions, this document splits SDP
across lines whose content would exceed 72 characters. A backslash
character marks where this line folding has taken place.   This
backslash and its trailing CRLF and whitespace would not appear in
actual SDP content.

The following is the answer returned by the client.

```
m=application 9 TCP/TLS/BFCP *
a=setup:active
a=connection:new
a=fingerprint:SHA-1 \
     3D:B4:7B:E3:CC:FC:0D:1B:5D:31:33:9E:48:9B:67:FE:68:40:E8:21
a=floorctrl:c-only
m=audio 55000 RTP/AVP 0
m=video 55002 RTP/AVP 31
```

10. Security Considerations

The BFCP [8], SDP [11], and offer/answer [4] specifications discuss
security issues related to BFCP, SDP, and offer/answer, respectively.
In addition, [7] and [10] discuss security issues related to the
establishment of TCP and TLS connections using an offer/answer model.

BFCP assumes that an initial integrity-protected channel is used to
exchange self-signed certificates between a client and the floor
control server. For session descriptions carried in SIP [3], S/MIME
[6] is the natural choice to provide such a channel.

11. IANA Considerations

11.1. Registration of the 'TCP/BFCP' and 'TCP/TLS/BFCP' SDP 'proto' Values

The IANA has registered the following two new values for the SDP
'proto' field under the Session Description Protocol (SDP) Parameters
registry:

```
            +--------------+-----------+
            | Value        | Reference |
            +--------------+-----------+
            | TCP/BFCP     | RFC4583   |
            | TCP/TLS/BFCP | RFC4583   |
            +--------------+-----------+
```

                Table 2: Values for the SDP 'proto' field

11.2. Registration of the SDP 'floorctrl' Attribute

The IANA has registered the following SDP att-field under the Session
Description Protocol (SDP) Parameters registry:

Contact name: Gonzalo.Camarillo@ericsson.com

Attribute name: floorctrl

Long-form attribute name: Floor Control

Type of attribute: Media level

Subject to charset: No

Purpose of attribute: The 'floorctrl' attribute is used to perform
   floor control server determination.

   Allowed attribute values: 1*("c-only" / "s-only" / "c-s")

[11.3](#). Registration of the SDP 'confid' Attribute

   The IANA has registered the following SDP att-field under the Session
   Description Protocol (SDP) Parameters registry:

   Contact name: Gonzalo.Camarillo@ericsson.com

   Attribute name: confid

   Long-form attribute name: Conference Identifier

   Type of attribute: Media level

   Subject to charset: No

   Purpose of attribute: The 'confid' attribute carries the integer
      representation of a Conference ID.

   Allowed attribute values: A token

[11.4](#). Registration of the SDP 'userid' Attribute

   This section instructs the IANA to register the following SDP
   att-field under the Session Description Protocol (SDP) Parameters
   registry:

   Contact name: Gonzalo.Camarillo@ericsson.com

   Attribute name: userid

   Long-form attribute name: User Identifier

   Type of attribute: Media level

   Subject to charset: No

   Purpose of attribute: The 'userid' attribute carries the integer
      representation of a User ID.

   Allowed attribute values: A token

11.5. Registration of the SDP 'floorid' Attribute

   This section instructs the IANA to register the following SDP att-
   field under the Session Description Protocol (SDP) Parameters
   registry:

   Contact name: Gonzalo.Camarillo@ericsson.com

   Attribute name: floorid

   Long-form attribute name: Floor Identifier

   Type of attribute: Media level

   Subject to charset: No

   Purpose of attribute: The 'floorid' attribute associates a floor
      with one or more media streams.

   Allowed attribute values: Tokens

12. Acknowledgements

   Joerg Ott, Keith Drage, Alan Johnston, Eric Rescorla, Roni Even, and
   Oscar Novo provided useful ideas for this document.

13. Normative References

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