

BFCPbis Working Group
Internet-Draft
Obsoletes: [4583](#) (if approved)
Intended status: Standards Track
Expires: August 19, 2014

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February 15, 2014

**Session Description Protocol (SDP) Format for Binary Floor Control
Protocol (BFCP) Streams
draft-ietf-bfcpbis-rfc4583bis-09**

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.

This document obsoletes [RFC 4583](#). Changes from [RFC 4583](#) are summarized in [Section 12](#).

Status of this Memo

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Table of Contents

1.	Introduction	3
2.	Terminology	3
3.	Fields in the 'm' Line	3
4.	Floor Control Server Determination	4
5.	The 'confid' and 'userid' SDP Attributes	6
6.	Association between Streams and Floors	6
7.	BFCP Version Negotiation	7
8.	BFCP Connection Management	8
8.1.	TCP Connection Management	8
9.	Authentication	8
10.	Examples	9
11.	Security Considerations	11
12.	IANA Considerations	12
12.1.	Registration of SDP 'proto' Values	12
12.2.	Registration of the SDP 'floorctrl' Attribute	12
12.3.	Registration of the SDP 'confid' Attribute	13
12.4.	Registration of the SDP 'userid' Attribute	13
12.5.	Registration of the SDP 'floorid' Attribute	13
12.6.	Registration of the SDP 'bfcprver' Attribute	14
13.	Changes from RFC 4583	14
14.	Acknowledgements	15
15.	Normative References	15
	Authors' Addresses	17

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. This 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

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document 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> <proto> <fmt> ...
```

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

The port field is set depending on the value of the proto field, as explained below. A port field value of zero has the standard SDP meaning (i.e., rejection of the media stream) regardless of the proto field.

When TCP is used as the transport, the port field is set following the rules in [7]. Depending on the value of the 'setup' attribute (discussed in [Section 8.1](#)), the port field contains the port to which the remote endpoint will direct BFCP messages 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.

When UDP is used as the transport, the port field contains the port to which the remote endpoint will direct BFCP messages regardless of the value of the 'setup' attribute.

This document defines four values for the proto field: TCP/BFCP, TCP/TLS/BFCP, UDP/BFCP, and UDP/TLS/BFCP. TCP/BFCP is used when BFCP runs directly on top of TCP, TCP/TLS/BFCP is used when BFCP runs on top of TLS, which in turn runs on top of TCP. Similarly, UDP/BFCP is used when BFCP runs directly on top of UDP, and UDP/TLS/BFCP is used when BFCP runs on top of DTLS [12], which in turn runs on top of UDP.

The fmt (format) list is not applicable to BFCP. The fmt list of 'm' lines in the case of any proto field value related to BFCP SHOULD contain a single "*" character. If the the fmt list contains any other value it is ignored.

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.

This document defines 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 SDP media description in an offer contains a 'floorctrl' attribute, the answerer accepting that media MUST include a 'floorctrl' attribute in the corresponding media description of 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

This document defines 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 decimal 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 MUST include these attributes in its session descriptions.

6. Association between Streams and Floors

This document defines 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 the SDP media description for BFCP media. 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 MUST include these attributes in its session descriptions.

Note: In [15] 'm-stream' was erroneously used in [Section 10](#). Although the example was non-normative, it is implemented by some vendors and occurs in cases where the endpoint is willing to act as an server. Therefore, it is RECOMMENDED to support parsing and interpreting 'm-stream' the same way as 'mstrm' when receiving.

7. BFCP Version Negotiation

This document defines the 'bfcvver' SDP media-level attribute. Its Augmented BNF syntax [2] is:

```
bfcvver-version-attribute = "a=bfcvver:" bfcvver-version *(SP bfcvver-version)
bfcvver-version           = token
```

The 'bfcvver' attribute defines the list of the versions of BFCP supported by the endpoint. Tokens representing versions MUST be integers matching the "Version" field that would be presented in the BFCP COMMON-HEADER [8]. The version of BFCP to be used will then be confirmed with a BFCP-level Hello/HelloAck.

Endpoints that use the offer/answer model to establish BFCP connections SHOULD support the 'bfcvver' attribute. A floor control server acting as an offerer or as an answerer SHOULD include this attribute in its session descriptions. However, endpoints that support RFCXXXX, and not only the [RFC 4583](#) subset, are REQUIRED to support and, when acting as a floor control server to use the 'bfcvver' attribute.

If a 'bfcvver' attribute is not present, default values are inferred from the transport specified in the m-line ([Section 3](#)). In accordance with definition of the Version field in [8], when used over a reliable transport the default value is "1", and when used over an unreliable transport the default value is "2".

8. BFCP Connection Management

BFCP connections can use TCP or UDP as the underlying transport. BFCP entities exchanging BFCP messages over UDP will direct the BFCP messages to the peer side connection address and port provided in the SDP 'm' line. TCP connection management is more complicated and is described below.

8.1. 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 **MUST** 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) **MUST** generate an offer in order to reestablish the TCP connection.

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

9. 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. TLS/DTLS is the preferred mechanism, but other mechanisms are possible and outside the scope of this document. 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/DTLS 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-/DTLS-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 MUST include it in their session descriptions.

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

Endpoints that use the offer/answer model to establish a DTLS association MUST support the 'setup' attribute, as defined in [7]. When DTLS is used with UDP, the 'setup' attribute indicates which of the endpoints (client or floor control server) initiates the DTLS association setup. The requirements for the offer/answer exchange specified in [13], Section 5 MUST be followed when using DTLS.

Informational note: How to determine which endpoint to initiate the TLS/DTLS association depends on the selected underlying transport. It was decided to keep the original semantics in [15] for TCP to retain backwards compatibility. When using UDP, the procedure above was preferred since it adheres to [13] as used for DTLS-SRTP, it does not overload offer/answer semantics, and it works for offerless INVITE in scenarios with B2BUAs.

10. 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 mstrm:10
a=floorid:2 mstrm:11
a=bfcvver:1
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
a=bfcvver:1
m=audio 55000 RTP/AVP 0
m=video 55002 RTP/AVP 31
```

A similar example using unreliable transport and DTLS is shown below, where the offer is sent from a client.


```
m=application 50000 UDP/TLS/BFCP *
a=setup:actpass
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:c-only s-only
a=confid:4321
a=userid:1234
a=floorid:1 mstrm:10
a=floorid:2 mstrm:11
a=bfcvver:2
m=audio 50002 RTP/AVP 0
a=label:10
m=video 50004 RTP/AVP 31
a=label:11
```

The following is the answer returned by the server.

```
m=application 55000 UDP/TLS/BFCP *
a=setup:active
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:s-only
a=confid:4321
a=userid:1234
a=floorid:1 mstrm:10
a=floorid:2 mstrm:11
a=bfcvver:2
m=audio 55002 RTP/AVP 0
m=video 55004 RTP/AVP 31
```

11. 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. Furthermore, when using DTLS over UDP, considerations for its use with RTP and RTCP are presented in [13]. The requirements for the offer/answer exchange, as listed in [Section 5](#) of that document, MUST be followed.

An initial integrity-protected channel is REQUIRED for BFCP 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.

12. IANA Considerations

[Editorial note: The changes in [Section 12.1](#) instruct the IANA to register the two new values UDP/BFCP and UDP/TLS/BFCP for the SDP 'proto' field. The new section [Section 12.6](#) registers a new SDP "bfcvver" attribute. The rest is unchanged from [\[14\]](#).]

12.1. Registration of SDP 'proto' Values

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

Value	Reference
TCP/BFCP	[RFC XXXX]
TCP/TLS/BFCP	[RFC XXXX]
UDP/BFCP	[RFC XXXX]
UDP/TLS/BFCP	[RFC XXXX]

Table 2: Values for the SDP 'proto' field

12.2. 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")

12.3. 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

12.4. Registration of the SDP 'userid' 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: 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

12.5. Registration of the SDP 'floorid' 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: 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

12.6. Registration of the SDP 'bfcpxer' 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: bfcpxer

Long-form attribute name: BFCP Version

Type of attribute: Media level

Subject to charset: No

Purpose of attribute: The 'bfcpxer' attribute lists supported BFCP versions.

Allowed attribute values: Tokens

13. Changes from [RFC 4583](#)

Following is the list of technical changes and other fixes from [\[15\]](#).

Main purpose of this work was to add signaling support necessary to support BFCP over unreliable transport, as described in [\[8\]](#), resulting in the following changes:

1. Fields in the 'm' Line ([Section 3](#)):

The section is re-written to remove reference to the exclusivity of TCP as a transport for BFCP streams. The proto field values UDP/BFCP and UDP/TLS/BFCP added.

2. Authentication ([Section 9](#)):
In last paragraph, made clear that a TCP connection was described.
3. Security Considerations ([Section 11](#)):
For the DTLS over UDP case, mention existing considerations and requirements for the offer/answer exchange in [\[13\]](#).
4. Registration of SDP 'proto' Values ([Section 12.1](#)):
Register the two new values UDP/BFCP and UDP/TLS/BFCP in the SDP parameters registry.
5. BFCP Version Negotiation ([Section 7](#)):
A new 'bfcprver' SDP media-level attribute is added in order to signal supported version number.

The clarification and bug fixes:

1. Errata ID: 712 ([Section 4](#) and [Section 6](#)):
Language clarification. Don't use terms like an SDP attribute is "used in an 'm' line", instead make clear that the attribute is a media-level attribute.
2. Fix typo in example ([Section 10](#)):
Do not use 'm-stream' in the SDP example, use the correct 'mstrm' as specified in [Section 10](#). Recommend interpreting 'm-stream' if it is received, since it is present in some implementations.
3. Assorted clarifications (Across the document):
Non-functional language clarifications and some corrections in the normative language as a result of reviews.

[14.](#) Acknowledgements

Joerg Ott, Keith Drage, Alan Johnston, Eric Rescorla, Roni Even, and Oscar Novo provided useful ideas for the original [\[15\]](#). The authors also acknowledge contributions to the revision of BFCP for use over an unreliable transport from Geir Arne Sandbakken, Charles Eckel, Alan Ford, Eoin McLeod and Mark Thompson. Useful and important final reviews were done by Ali C. Begen, Mary Barnes and Charles Eckel.

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