

CLUE Protocol Data Channel
draft-ietf-clue-datachannel-04

Abstract

This document defines how to use the WebRTC Data Channel mechanism, together with the Data Channel Establishment Protocol (DCEP) and the SDP-based "SCTP over DTLS" data channel negotiation mechanism, in order to establish a data channel, referred to as CLUE Data Channel, for transporting CLUE protocol messages between two CLUE entities.

The document defines the SCTP considerations specific to a CLUE Data Channel, the SDP Media Description- and SDP dcmmap attribute values, and the DCEP procedures for opening, a CLUE Data Channel.

Details and procedures associated with the CLUE protocol, and the SDP Offer/Answer procedures for negotiating a CLUE data channel, are outside the scope of this document.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on May 25, 2015.

Copyright Notice

Copyright (c) 2014 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1.	Introduction	3
2.	Conventions	3
3.	CLUE Data Channel	4
3.1.	General	4
3.2.	SDP Considerations	4
3.2.1.	General	4
3.2.2.	SDP Media Description Fields	4
3.2.3.	SDP sctpmap Attribute	5
3.2.4.	SDP dcpmap Attribute	5
3.2.5.	SDP dcsa Attribute	5
3.2.6.	Example	6
3.3.	Data Channel Establishment Protocol (DCEP) Considerations	6
3.3.1.	General	6
3.3.2.	Open CLUE Data Channel	6
3.3.3.	Close CLUE Data Channel	6
3.3.4.	SCTP Association Failure	7
3.4.	SCTP Considerations	7
3.4.1.	SCTP Payload Protocol Identifier (PPID)	7
3.4.2.	Reliability	7
3.4.3.	Order	8
3.4.4.	Stream Reset	8
3.4.5.	SCTP Multihoming	8
4.	Security Considerations	8
5.	IANA Considerations	8
5.1.	New WebRTC Data Channel Protocol Value	8
5.2.	New SDP dcpmap attribute subprotocol value	9
6.	Acknowledgments	9
7.	Change Log	9
8.	References	10
8.1.	Normative References	10
8.2.	Informative References	12
	Author's Address	12

1. Introduction

This document defines how to use the WebRTC Data Channel mechanism [[I-D.ietf-rtcweb-data-channel](#)], together with the Data Channel Establishment Protocol (DCEP) [[I-D.ietf-rtcweb-data-protocol](#)] and the SDP-based "SCTP over DTLS" data channel negotiation mechanism [add-ref], in order to establish a data channel, referred to as CLUE Data Channel, for transporting CLUE protocol [[I-D.ietf-clue-protocol](#)] messages between CLUE entities.

The document defines the SCTP considerations specific to a CLUE Data Channel, the SDP Media Description- and SDP dcmmap attribute values, and the DCEP procedures for opening, a CLUE Data Channel.

Details and procedures associated with the CLUE protocol, and the SDP Offer/Answer [[RFC3264](#)] procedures for negotiating a CLUE data channel, are outside the scope of this document.

2. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#), [RFC 2119](#) [[RFC2119](#)].

WebRTC Data Channel refers to a SCTPoDTLS association [[I-D.ietf-tsvwg-sctp-dtls-encaps](#)] that is used to transport non-media data between two entities, according to the procedures in [[I-D.ietf-rtcweb-data-channel](#)].

CLUE Data Channel refers to a WebRTC Data Channel [[I-D.ietf-rtcweb-data-channel](#)], with a specific set of SCTP characteristics, and usage of the Data Channel Establishment Protocol (DCEP) [[I-D.ietf-rtcweb-data-protocol](#)] in order to open a WebRTC Data Channel for the purpose of transporting CLUE protocol [[I-D.ietf-clue-protocol](#)] messages between two CLUE entities.

CLUE entity refers to a SIP User Agent (UA) [[RFC3261](#)] that supports the CLUE Data Channel and the CLUE protocol.

CLUE session refers to a SIP session [[RFC3261](#)] between to SIP UAs, where a CLUE Data Channel, associated with the SIP session, has been established between the SIP UAs.

[RFC4960] defines an SCTP stream as a unidirectional logical channel established from one to another associated SCTP endpoint, within which all user messages are delivered in sequence except for those submitted to the unordered delivery service.

[RFC4960] defines an SCTP identifier as a unsigned integer, which identifies a SCTP stream.

3. CLUE Data Channel

3.1. General

This section describes the realization of a CLUE Data Channel. This includes a set of SCTP characteristics specific to a CLUE Data Channel, the usage of the SDP-based "SCTP over DTLS" data channel negotiation mechanism to describe a CLUE data channel in SDP, and the usage of the Data Channel Establishment Protocol (DCEP) [[I-D.ietf-rtcweb-data-protocol](#)] in order to open a WebRTC Data Channel for the purpose of transporting CLUE protocol [[I-D.ietf-clue-protocol](#)] messages between two CLUE entities.

As described in [[I-D.ietf-rtcweb-data-channel](#)], the SCTP streams realizing a WebRTC Data Channel must be associated with the same SCTP association. In addition, both SCTP streams realizing the WebRTC Data Channel must use the same SCTP stream identifier value. These rules also apply to a CLUE Data Channel.

Within a given CLUE session, a CLUE entity **MUST** use a single CLUE Data Channel for transport of all CLUE messages towards its peer.

3.2. SDP Considerations

3.2.1. General

This section defines how to construct the SDP Media Description ("m=" line), and the associated SDP dcmmap attribute, used to describe a CLUE data channel in SDP.

[[I-D.ietf-clue-signaling](#)] describes the SDP Offer/Answer procedures for negotiating a CLUE session, including the CLUE controlled media streams and the CLUE data channel.

3.2.2. SDP Media Description Fields

The field values of the "m=" line for the SCTPoDTLS association are set as following:

media	port	proto	fmt
"application"	DTLS port value	"DTLS/SCTP"	SCTP port value

Table 1: SDP "proto" field values

3.2.3. SDP sctpmap Attribute

The field values of the SDP sctpmap attribute, associated with the "m=" line describing the SCTPoDTLS association, are set as following:

sctpmap-number	app
fmt value of the "m=" line	"webrtc-datachannel"

Table 2: SDP sctpmap attribute values

3.2.4. SDP dcpmap Attribute

The SDP dcpmap attribute [[I-D.ejzak-mmusic-data-channel-sdpneg](#)] values for the CLUE data channel, associated with the "m=" line describing the SCTPoDTLS, are set as following:

stream-id	subprotocol	label	ordered	max-retr	max-time
Value of the SCTP stream used to realize the CLUE data channel	"CLUE"	"CLUE Data Channel"	N/A	N/A	N/A

Table 3: SDP dcpmap attribute values

3.2.5. SDP dcsa Attribute

The SDP dcsa attribute [[I-D.ejzak-mmusic-data-channel-sdpneg](#)] is not used to describe a CLUE data channel.

3.2.6. Example

```
m=application 54111 SCTP/DTLS webrtc-datachannel
a=dcmap:2 subprotocol="CLUE";label="CLUE Data Channel"
```

Figure 1: SDP Media Description for a CLUE Data Channel

3.3. Data Channel Establishment Protocol (DCEP) Considerations

3.3.1. General

A CLUE entity MUST support the Data Channel Establishment Protocol (DCEP) [[I-D.ietf-rtcweb-data-channel](#)], which can be used in order to open a WebRTC Data Channel.

This section describes how to open and close a CLUE data channel using DCEP.

3.3.2. Open CLUE Data Channel

Once the SCTP association, to be used to realized the CLUE Data Channel, has been established, the offerer [[RFC3264](#)] is responsible for opening the CLUE Data Channel. If DCEP is used, the offerer MUST send a DCEP DATA_CHANNEL_OPEN message [[I-D.ietf-rtcweb-data-protocol](#)]. The value of the 'protocol' field MUST be "CLUE". The value of the 'channel type' MUST be 'DATA_CHANNEL_RELIABLE'.

Once the offerer has received the associated DCEP DATA_CHANNEL_ACK message [[I-D.ietf-rtcweb-data-protocol](#)], the CLUE Data channel has been opened.

If the offerer receives a DCEP DATA_CHANNEL_OPEN message, for the purpose of opening a CLUE Data Channel, the offerer MUST reset the SCTP stream, in order to prevent two CLUE Data Channels from being established within the same CLUE session. The offerer MUST NOT send a DCEP DATA_CHANNEL_ACK message.

3.3.3. Close CLUE Data Channel

DCEP [[I-D.ietf-rtcweb-data-protocol](#)] does not define a message for closing a WebRTC Data Channel. As described in [[I-D.ietf-rtcweb-data-protocol](#)], in order to close a CLUE Data Channel, a SCTP reset message is sent, in order to close the SCTP stream associated with the CLUE Data Channel. The SCTP association,

and WebRTC Data Channels associated with other SCTP streams, are not affected by the SCTP reset message.

3.3.4. SCTP Association Failure

In case of SCTP association failure, the offerer is responsible for trying to re-establish the SCTP association (including sending a new SDP offer, if needed). Once the SCTP association has been successfully re-established, the offerer is responsible for sending a DCEP DATA_CHANNEL_OPEN message.

3.4. SCTP Considerations

3.4.1. SCTP Payload Protocol Identifier (PPID)

As described in [[I-D.ietf-rtcweb-data-protocol](#)], the PPID value 50 is used when sending a DCEP message on a WebRTC Data Channel.

A CLUE entity MUST use the PPID value 51 when sending a CLUE message on a CLUE Data Channel.

NOTE: As described in [[I-D.ietf-rtcweb-data-channel](#)], the PPID value 51 indicates that the SCTP message contains data encoded in a UTF-8 format. The PPID value 51 does not indicate what application protocol is transported in a WebRTC Data Channel, only the format in which the data is encoded.

+-----+-----+		
Protocol	PPID Value	
+-----+-----+		
DCEP	50	
CLUE	51	
+-----+-----+		

Table 4: CLUE Data Channel PPID Values

3.4.2. Reliability

The usage of SCTP for the CLUE Data Channel ensures reliable transport of CLUE protocol [[I-D.ietf-clue-protocol](#)] messages.

A CLUE entity MUST NOT use the partial reliability and limited retransmission extensions defined in [[RFC3758](#)].

NOTE: [[I-D.ietf-rtcweb-data-channel](#)] requires the support of the partial reliability extension defined in [[RFC3758](#)]. This is not needed for a CLUE Data Channel, as messages are required to always be sent reliably. [[I-D.ietf-rtcweb-data-channel](#)] also mandates support

of the limited retransmission policy defined in [\[I-D.ietf-tsvwg-sctp-prpolicies\]](#).

3.4.3. Order

A CLUE entity MUST use the ordered delivery SCTP service, as described in [section 6.6 of \[RFC4960\]](#).

3.4.4. Stream Reset

A CLUE entity MUST support the stream reset extension defined in [\[RFC6525\]](#).

The dynamic address reconfiguration extension defined in [\[RFC5061\]](#) MUST be used to signal the support of the stream reset extension defined in [\[RFC6525\]](#). Other features of [\[RFC5061\]](#) MUST NOT be used.

3.4.5. SCTP Multihoming

SCTP multihoming cannot be used for a CLUE Data Channel.

NOTE: SCTPoDTLS does not support SCTP multihoming.

4. Security Considerations

This specification does not introduce new security considerations, in addition to those defined in [\[I-D.ietf-rtcweb-data-channel\]](#) and [\[I-D.ietf-rtcweb-data-protocol\]](#). Security considerations associated with the CLUE protocol are defined in [\[I-D.ietf-clue-protocol\]](#).

5. IANA Considerations

5.1. New WebRTC Data Channel Protocol Value

[RFC EDITOR NOTE: Please replace RFC-XXXX with the RFC number of this document.]

This document adds the 'CLUE' value to the "WebSocket Subprotocol Name Registry" as follows:

Subprotocol Identifier:	CLUE
Subprotocol Common Name:	CLUE
Subprotocol Definition:	RFC-XXXX

5.2. New SDP dcmap attribute subprotocol value

[RFC EDITOR NOTE: Please replace RFC-XXXX with the RFC number of this document.]

OPEN ISSUE: [[I-D.ejzak-mmusic-data-channel-sdpneg](#)] has not yet created a registry for new subprotocol values.

6. Acknowledgments

Thanks to Paul Kyzivat and Christian Groves for comments on the document.

7. Change Log

[RFC EDITOR NOTE: Please remove this section when publishing]

Changes from [draft-ietf-clue-datachannel-03](#)

- o IANA considerations added.
- o Editorial changes based on comments from Christian Groves.

Changes from [draft-ietf-clue-datachannel-02](#)

- o SDP m- line example fixed.
- o OPEN ISSUE #1 closed.
- o - It was agreed (IETF#91) to use [draft-ejzak-mmusic-data-channel-sdpneg](#), as it was adopted as a WG item in MMUSIC.
- o - Details for [draft-ejzak-mmusic-data-channel-sdpneg](#) usage added.
- o SDP Offer/Answer procedures removed, as they will be defined in the CLUE protocol draft.
- o References updated.

Changes from [draft-ietf-clue-datachannel-01](#)

- o Support of interleaving "MUST"->"SHOULD".
- o Example updated.
- o Reference update.

Changes from [draft-ietf-clue-datachannel-00](#)

- o SDP Offer/Answer procedures structures according to [RFC 3264](#).
- o Reference update.

Changes from [draft-holmberg-clue-datachannel-04](#)

- o Draft submitted as [draft-ietf-clue-data-channel-00](#).
- o Editorial nits fixed.

- o Changes based on comments from Paul Kyzivat (<http://www.ietf.org/mail-archive/web/clue/current/msg03559.html>).
- o - Proto value fixed.
- o - Explicit text that the partial reliability and limited retransmission policies MUST NOT be used.
- o - Added open issue on whether the DCEP 'protocol' field value for CLUE should contain a version number.
- o - Removed paragraph saying that an offerer must not insert more than one m- line describing an SCTPoDTLS association to be used to realize a CLUE Data Channel, as the draft already states that only one CLUE Data Channel per CLUE session shall be opened.
- o - Added reference to [draft-ietf-rtcweb-data-protocol](#) regarding details on resetting SCTP streams.
- o - Added text saying that the value of the DCEP 'channel type' MUST be DATA_CHANNEL_RELIABLE.
- o - Clarified that DCEP must be supported, and used in the absence of another mechanism for opening a CLUE Data Channel.

Changes from [draft-holmberg-clue-datachannel-03](#)

- o Procedures updated, based on WG agreement (IETF#89) to use DCEP for the CLUE data channel.
- o Procedures updated, based on WG agreement (IETF#89) that offerer is responsible for sending DCEP DATA_CHANNEL_OPEN.
- o Editorial changes, and alignments caused by changes in referenced specifications.

Changes from [draft-holmberg-clue-datachannel-02](#)

- o PPID value for CLUE messages added
- o References updated

Changes from [draft-holmberg-clue-datachannel-01](#)

- o More text added

Changes from [draft-holmberg-clue-datachannel-00](#)

- o Editorial corrections based on comments from Paul K

[8. References](#)

[8.1. Normative References](#)

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

- [RFC3261] Rosenberg, J., Schulzrinne, H., Camarillo, G., Johnston, A., Peterson, J., Sparks, R., Handley, M., and E. Schooler, "SIP: Session Initiation Protocol", [RFC 3261](#), June 2002.
- [RFC3264] Rosenberg, J. and H. Schulzrinne, "An Offer/Answer Model with Session Description Protocol (SDP)", [RFC 3264](#), June 2002.
- [RFC4960] Stewart, R., "Stream Control Transmission Protocol", [RFC 4960](#), September 2007.
- [RFC5061] Stewart, R., Xie, Q., Tuexen, M., Maruyama, S., and M. Kozuka, "Stream Control Transmission Protocol (SCTP) Dynamic Address Reconfiguration", [RFC 5061](#), September 2007.
- [RFC6525] Stewart, R., Tuexen, M., and P. Lei, "Stream Control Transmission Protocol (SCTP) Stream Reconfiguration", [RFC 6525](#), February 2012.
- [I-D.ietf-clue-protocol]
Presta, R. and S. Romano, "CLUE protocol", [draft-ietf-clue-protocol-02.txt](#) (work in progress), October 2014.
- [I-D.ietf-clue-signaling]
Kyzivat, P., Xiao, L., Groves, C., and S. Romano, "CLUE Signaling", [draft-ietf-clue-signaling-04.txt](#) (work in progress), October 2014.
- [I-D.ietf-tsvwg-sctp-dtls-encaps]
Tuexen, M., Stewart, R., Jesup, R., and S. Loreto, "DTLS Encapsulation of SCTP Packets", [draft-ietf-tsvwg-sctp-dtls-encaps-06.txt](#) (work in progress), November 2014.
- [I-D.ietf-rtcweb-data-channel]
Jesup, R., Loreto, S., and M. Tuexen, "WebRTC Data Channels", [draft-ietf-rtcweb-data-channel-12.txt](#) (work in progress), September 2014.
- [I-D.ietf-rtcweb-data-protocol]
Jesup, R., Loreto, S., and M. Tuexen, "WebRTC Data Channel Establishment Protocol", [draft-ietf-rtcweb-data-protocol-08.txt](#) (work in progress), September 2014.

[I-D.ietf-tsvwg-sctp-prpolicies]

Tuexen, M., Seggelmann, R., Stewart, R., and S. Loreto,
"Additional Policies for the Partial Reliability Extension
of the Stream Control Transmission Protocol", [draft-ietf-tsvwg-sctp-prpolicies-05.txt](#) (work in progress), November
2014.

[I-D.ejzak-mmusic-data-channel-sdpneg]

Drage, K., Makaraju, R., Ejzak, R., and J. Marcon, "SDP-
based WebRTC data channel negotiation", [draft-ejzak-mmusic-data-channel-sdpneg-02.txt](#) (work in progress),
October 2014.

[8.2.](#) Informative References

[RFC3758] Stewart, R., Ramalho, M., Xie, Q., Tuexen, M., and P.
Conrad, "Stream Control Transmission Protocol (SCTP)
Partial Reliability Extension", [RFC 3758](#), May 2004.

Author's Address

Christer Holmberg
Ericsson
Hirsalantie 11
Jorvas 02420
Finland

Email: christer.holmberg@ericsson.com