SDP negotiation of DataChannel sub-protocols

draft-ejzak-dispatch-webrtc-data-channel-sdpneg-00

draft-ejzak-dispatch-msrp-data-channel-00

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Richard Ejzak

Problem Statement

- How to negotiate use of well-defined sub-protocols over DataChannels

  - For sub-protocols that usually use SDP for negotiation, e.g., MSRP, BFCP, T140, T38

  - To support e2e signaling between different endpoint types via protocols that depend on SDP for media negotiation (e.g., SIP)

  - To allow interworking through gateways to endpoints that do not support DataChannels

  - To also support non-WebRTC endpoints

  - To support e2e negotiation of new protocols using DataChannel transport such as clue control

Proposed charter

To define a mechanism to negotiate use of well-defined sub-protocols over DataChannels
- For sub-protocols that usually use SDP for negotiation, e.g., MSRP, BFCP, T140, T38
- To support e2e signaling between different endpoint types via protocols that depend on SDP for media negotiation (e.g., SIP)
- To allow interworking through gateways to endpoints that do not support DataChannels
- To also support non-WebRTC endpoints
- To support e2e negotiation of new protocols using DataChannel transport such as CLUE control

Customers for this work include 3GPP (developing IMS extensions for access from WebRTC clients), SIP/XMPP networks providing interoperable services with WebRTC clients based on protocols such as MSRP, BFCP, T140 or T38, and CLUE based clients (for transport of the CLUE control protocol).

The DataChannel design allows two means of creating a DataChannel: either via in-band negotiation, or external negotiation. No external negotiation mechanism is defined in the core DataChannel specification to allow applications the freedom to choose how to perform the external negotiation.

We propose to prepare I-Ds to:
- Define generic SDP procedures to enable external negotiation of DataChannel transport for sub-protocol sessions, and to enable negotiation of sub-protocol specific options.
- Describe how to use the generic SDP procedures negotiate DataChannel transport for specific protocols, potentially including MSRP, BFCP, T.140, T.38 and the CLUE control protocol.

A first draft of an I-D for generic SDP procedures for external negotiation of DataChannel sub-protocols is available in draft-ejzak-dispatch-webrtc-data-channel-sdpneg-00. A first draft of an I-D for negotiation of MSRP sessions over DataChannels is available in draft-ejzak-dispatch-msrp-data-channel-00. Volunteers are sought to draft I-Ds for the remaining protocols.

Initially identified issues with stream id assignment appear to have been resolved. Sub-protocol registry is still under discussion. No other significant technical issues have been identified to date.

DataChannel external negotiation

- Some mechanism other than the data channel control protocol is used between peers to negotiate the data channel parameters for each bi-directional data channel
  - In particular, the stream identifier is selected
- The SCTP protocol at each peer is told of the agreed data channel parameters and the DC is available for use as soon as the SCTP association is established

Stream identifier assignment rules

1. For in-band negotiation before establishment of the SCTP association, the application should use only deferred stream id assignment based on DTLS role (the initial DTLS role used for the SCTP association within the peer connection). Otherwise a preselected stream id on one side might conflict with a deferred selection on the other side.

2. For external negotiation before establishment of the SCTP association, the application must select stream ids without waiting for determination of DTLS role. Both peers need to know the stream id allocated to each data channel via the external negotiation mechanism, so deferred selection cannot be used.

3. Prior to establishment of the SCTP association, if the application has data channels to establish using both in-band and external negotiation, external negotiation data channels should always be created before in-band negotiation data channels. This allows the protocol to avoid reusing any potentially conflicting stream ids allocated by the external negotiation mechanism.

4. After establishment of the SCTP association, in-band and external negotiation can be freely mixed as long as stream id assignment is based on DTLS role while avoiding already allocated ids. For application selection of stream ids (rather than protocol selection of stream ids), the application can determine the DTLS role by examining the exchanged SDP messages.

SDP for external negotiation

- Within the m line for the SCTP association in the SDP offer, add the following attribute(s) for each data channel
  - One attribute to specify DC parameters (stream id, sub-protocol, reliability)
  - Zero or more sub-protocol specific attributes
- If the answer echoes the attribute with the DC parameters, the data channel is agreed
- Sub-protocol negotiation completed with sub-protocol specific attributes in answer
- DC open on each side when application receives indication that SCTP at both peers have been informed of DC parameters

Two new SDP attributes

- To represent data channel parameters:

  Example for SCTP port 5000:

  ```
  a=data-channel:5000 stream=2;label="channel 2"; \
          subprotocol="MSRP"
  ```

- To represent data channel sub-protocol attributes (dcsa):

  ```
  a=dcsa:sctp-port:stream-id original-attribute
  ```

  Example:

  ```
  a=dcsa:5000:2 accept-types:text/plain
  ```

- Note changes from draft!

Example SDP offer

```
m=application 54111 DTLS/SCTP 5000
c=IN IP4 79.97.215.79
a=sctpmap:5000 webrtc-datachannel 16
a=data-channel:5000 stream=2; \
   label="channel 2";subprotocol="MSRP"
a=dcsa:5000:2 accept-types:text/plain
```

Note: Changes to sctpmap attribute might be appropriate
   but that is defined in a separate mmusic draft

Stream id assignment with SDP

- Before SCTP association establishment:
    - SDP offerer picks any stream ids for DCs
    - If agreed, peers create both ends of each DC
- After SCTP association established:
    - Stream id selection based on initial DTLS role
- SDP external negotiation consistent with in-band negotiation stream id assignment
- Note: slight change from draft

Changes and open issues from draft

- Generic and SDP-specific stream id assignment
- Attribute names "data-channel" and "dcsa"
- Typos
- Sub-protocol registry TBD
- Need to generalize procedures for non-browser applications

- Cleanup and update needed, but generally in good shape

MSRP over DataChannels

- One DC per MSRP session
- MSRP URI adds "dc" transport option
- msrp-scheme is always "MSRPS" with DC transport
- Use default DC reliability parameters (reliable, ordered) with binary format
- dcsa attributes can include: path, accept-types, accept-wrapped-types, max-size, sendonly, etc., setup, msrp-cema, [file attributes from RFC5547]

11

Example SDP for MSRP over DC

```
m=application 54111 DTLS/SCTP 5000
c=IN IP4 79.97.215.79
a=sctpmap:5000 webrtc-datachannel 16
a=data-channel:5000 stream=1;label="chat"; subprotocol="MSRP"
a=dcsa:5000:1 accept-types:message/cpim text/plain
a=dcsa:5000:1 path:msrps://bob.example.com:54111/si438dsaodes;dc
a=data-channel:5000 stream=2;label="file transfer"; subprotocol="MSRP"
a=dcsa:5000:2 sendonly
a=dcsa:5000:2 accept-types:message/cpim
a=dcsa:5000:2 accept-wrapped-types:*
a=dcsa:5000:2 path:msrps://bob.example.com:54111/jshA7we;dc
a=dcsa:5000:2 file-selector:name:"My cool picture.jpg" \
         type:image/jpeg size:32349 hash:sha-1: \
         72:24:5F:E8:65:3D:DA:F3:71:36:2F:86:D4:71:91:3E:E4:A2:CE:2E
a=dcsa:5000:2 file-transfer-id:vBnG916bdberum2fFEABR1FR3ExZMUrd
a=dcsa:5000:2 file-disposition:attachment
a=dcsa:5000:2 file-date:creation:"Mon, 15 May 2006 15:01:31 +0300„
a=dcsa:5000:2 file-icon:cid:id2@bob.example.com
a=dcsa:5000:2 file-range:1-32349
```

MSRP configurations supported

- e2e MSRP over data channel(s)
  - As described
- Via gateway to TLS/TCP transport
  - Using CEMA or MSRP B2BUA to interwork MSRP over DC with MSRP over TLS/TCP

Proposed work plan

- draft-ejzak-dispatch-webrtc-data-channel-sdpneg-00
- draft-ejzak-dispatch-msrp-data-channel-00
- One draft for each additional protocol to be supported:
  - BFCP, T140, clue control, (T38?, others?)