**3GPP TSG SA WG4 Meeting #128*****S4-241049***

**Jeju, Korea, 20th–24th May 2024**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **26.114** | **CR** | **0569** | **rev** | **2** | **Current version:** | **18.6.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)*** *on using this form: comprehensive instructions can be found at <http://www.3gpp.org/Change-Requests>.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Adding "a=inactive" to SDP direction attributes of IMS data channels  |
|  |  |
| ***Source to WG:*** | China Mobile Com. Corporation  |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | TEI18 |  | ***Date:*** | 2024-05-20 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | In Rel-18 CT NG\_RTC WI (Unique ID=990023), CT1 has been working on the IMS data channel interaction with existing supplementary services and specified the related requirements in TS 24.186 clause 10. However, the solution to handle DC media stream in communication HOLD service was postponed in several meetings due to lack of protocol support from SA4.TS 24.610 for communication HOLD service specifies that SDP direction attributes can be used to indicate a media stream to be held. However, RFC8841 does not specify the semantics of SDP direction attributes for SCTP association, which means the data channel media cannot be suspended when the audio/video medias are on hold.It is suggested to extend the usage of SDP direction attribute "a=inactive" to data channel media to support HOLD service interaction with IMS data channel. |
|  |  |
| ***Summary of change:*** | Defines an attribute to the SDP offer/answer exchanges to enable UEs to suspend a data channel media stream. |
|  |  |
| ***Consequences if not approved:*** | The UE cannot suspend data channel media but only close ADCs when the audio/video medias are on hold, which has impacts on the user experience.  |
| ***Q*** |  |
| ***Clauses affected:*** | 6.2.10.2, 6.2.10.3, 14.3, A.17 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications | TS 24.186 CR0011 |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

FIRST CHANGE

### 6.2.10 Data channel

#### 6.2.10.1 General

Support of data channel media is optional for an MTSI client and an MTSI client in terminal. For brevity, an MTSI client supporting data channel is henceforth denoted as a DCMTSI client or DCMTSI client in terminal, respectively.

To indicate support for the procedures in this clause, a DCMTSI client shall when including media feature tags as specified in TS 24.229 [7] include a +sip.app-subtype media feature tag, as specified by RFC 5688 [177], with a value of "webrtc-datachannel" (the application media format used by [172]), regardless of data channel media being part of the SDP or not.

One or more data channel SDP media descriptions formatted according to [172] may be added to the SDP, alongside other SDP media descriptions such as e.g. speech, video, and text. A data channel SDP media description shall not be placed before the first SDP speech media description. SDP examples are provided in Annex A.17.

If data channels are used in a session, the session setup shall determine the applicable bandwidth limit(s) as defined in clause 6.2.5.

Multiple data channels may be mapped to a single data channel SDP media description, each with a corresponding "a=dcmap" SDP attribute and stream IDs that are unique within that media description. There is no limit to the number of data channels in an SDP media description, but the aggregate of all defined data channels shall keep within the set bandwidth limit and care should be taken to avoid excessive SDP size. If the session is re-negotiated to include a changed number of data channels in an SDP media description, the bandwith limit may either be kept constant, changing the share of bandwidth available to each individual data channel, or the bandwidth limit may be changed to accommodate the changed number of data channels, keeping individual data channel bandwidth shares. Regardless of what approach is used when changing number of used data channels in a media description, the aggregate of all defined data channels shall keep within the re-negotiated bandwidth limit.

If there is a need to use data channels with either different transport IP addresses, different UDP ports, or different SCTP ports, separate data channel SDP media descriptions shall be used, as IP address, UDP port and SCTP port are all constant per SDP media description. Multiple SCTP associations for a single channel, commonly denoted as "multi-homing", defined in IETF RFC 4960 [173] for reasons of redundancy and basically using one destination transport address at a time, is not described for use with WebRTC data channel and shall therefore not be used in this specification.

NOTE 1: The main reasons to not specify multi-homing are because it cannot use the needed separation of signalling paths for redundancy purposes in the applicable usage scenarios, and it is also not considered feasible when using SCTP on top of DTLS.

To ease data channel media implementation and ease interworking with WebRTC data channels, DCMTSI clients shall support ICE Lite and may support full ICE [184], for data channel media. DCMTSI clients supporting full ICE shall only use host candidate addresses. SDP "a=candidate" line host address information shall match corresponding SDP "c=" and "m=" line information.

NOTE 2: In typical IMS deployments, it is expected that DCMTSI clients have no need to use STUN or TURN servers with ICE. This is in line with what constitutes an ICE Lite agent.

A "data channel application" consists of an HTML web page including JavaScript(s), and optionally image(s) and style sheet(s). A "bootstrap data channel" is henceforth defined as a data channel used to retrieve data channel application(s) for a DCMTSI client in terminal, with a data channel stream ID below 1000, and using the HTTP [73] protocol as data channel subprotocol. The data channel application accessible at the HTTP root ("/") URL through a bootstrap data channel describes the graphical user interface and the logic needed to handle any further data channel usage beyond the bootstrap data channel itself. The meaning of the "authority" (host) part of the URL and consequently the "Host" HTTP header are not defined, shall be ignored on reception, and shall be set to the empty value by a DCMTSI client in terminal.

NOTE 3: Data channel stream IDs below 1000 may use a well-defined subprotocol for other features than retrieving data channel application(s). For example, the “mpeg-sd” subprotocol can be used for a data channel stream ID below 1000 for scene description-based overlays as specified in Annex Y.6.9.

The data channel application is created prior to the DCMTSI call where it is intended to be used, by means left out of scope for this specification. The data channel application workflow is depicted by Figure 6.2.10.1-1 below.



Figure 6.2.10.1-1: Data Channel Workflow

NOTE 4: A Data Channel Server in this specification can be further decomposed into a number of functional entities including DC Signalling Function, Media Function (or MRF) and DC Application Server as specified in Annex AC of [167].

The data channel application is, referring to the numbered arrows in Figure 6.2.10.1-1:

1. Uploaded to the network, by the UE user or some other authorized party.

2. Stored in a data channel application repository in the network.

3. During the DCMTSI call where it should be used, retrieved from the repository.

4. Sent through a bootstrap data channel to the local UE A as a response of its request.

5. Sent through a bootstrap data channel to the remote UE B as a response of its request. This may happen in parallel with and rather independent of step 4.

6. Any additional data channels created and used by the data channel application itself are established (logically) between UE A and UE B. Data transmission on data channels shall not start until there is confirmation that both peers have instantiated the data channel, using the same procedures as described for WebRTC in section 6.5 of [172]. The traffic may effectively go through the Data Channel Server, e.g., when the bootstrap and end-to-end data channels have the same anchoring point. This traffic may pass across an inter-operator border if UE A and UE B belong to different operators’ networks.

The bootstrap data channel is not intended for use directly between DCMTSI clients in terminal. DCMTSI clients in terminal that receive HTTP requests on a bootstrap data channel shall ignore such request and shall update the session by removing the SDP "a=dcmap" line with the stream ID where such HTTP request was received, and closing that stream ID.

The data channel application including its resources retrieved via a bootstrap data channel may be updated at any time, automatically or interactively, using normal HTTP procedures over the bootstrap data channel.

A bootstrap data channel shall be configured as ordered, reliable, with normal SCTP multiplexing priority. The sub-protocol for a bootstrap data channel shall be HTTP (not encapsulating HTTP in TCP), represented by the following, example SDP "a=dcmap" line, which therefore shall be present in each data channel media description in an SDP offer from a DCMTSI client in terminal:

 a=dcmap:0 subprotocol="http"

Any other data channels used by the data channel application JavaScript(s) sent in the bootstrap data channel shall be represented in an updated SDP as additional "a=dcmap" lines with stream ID values starting from 1000, using stream ID numbers from the JavaScript(s).

There are multiple, possible providers of data channel applications. In Figure 6.2.10.1-1, assume that UE A is local to the operator hosting the data channel server. Further assume that UE B belongs to a different operator (remote). The user of UE A can create and use data channel applications (steps 1-4), which can also be sent to UE B (step 5). Similarly, some other authorized part associated with UE A’s operator can create data channel applications for use by UE A (steps 1-4), which can also be sent to UE B (step 5). For simplicity, there’s no data channel server and data channel application repository depicted for UE B in Figure 6.2.10.1-1, but those could be present in a more general case. Seen from the perspective of a single UE, there are then at least four possible data channel application providers:

1. The local UE user.

2. Other authorized parties associated with the local network (e.g. the local operator).

3. The remote UE user.

4. Other authorized parties associated with the remote network (e.g. the remote operator).

The HTML web content making up a data channel application in each bootstrap data channel represents a different context of user interaction and should open in a separate tab, or some corresponding user interface construct, but the details are out of scope for this specification and left open for individual implementations. It shall be possible to use and navigate between different data channel applications from different bootstrap data channels with different stream IDs that are open simultaneously.

Table 6.2.10.1-2 describes a mandatory mapping between stream ID and bootstrap channel data channel application content sources, as seen from a single (local) DCMTSI client in terminal, each of which shall be listed as separate "a=dcmap" lines with "http" subprotocol in SDP when the DCMTSI client in terminal supports receiving data channel application content from that source.

Table 6.2.10.1-2: Bootstrap Data Channel Content Sources

|  |  |
| --- | --- |
| **Stream ID** | **Content Source** |
| 0 | Local network provider |
| 10 | Local user |
| 100 | Remote network provider |
| 110 | Remote user |

NOTE 5: When the local user has defined and stored multiple, different data channel applications in the local data channel application repository, the local network provider may provide functionality in the stream ID 0 data channel application that enables a dynamic choice of which user-defined data channel application to use with stream ID 10 in the DCMTSI call.

NOTE 6: To help the SDP answerer's network to distinguish the two media descriptions (m= lines) containing bootstrap data channels with the same stream ID values transferred between two networks, the SDP offerer's network adds an "a=3gpp-bdc-used-by:sender" attribute in the media description of the bootstrap data channel(s) established between the originating UE and the terminating network, and optionally adds "a=3gpp-bdc-used-by:receiver" attribute in the media description of the bootstrap data channel(s) established between the originating network and the terminating UE, before it sends the SDP offer to the remote network.

Figure 6.2.10.1-3, referring to Figure 6.2.10.1-1 and Table 6.2.10.1-2, is depicting the stream IDs used for distribution of a data channel application owned by UE A from its local data channel repository to both UE A (stream ID 10) and its remote UE B (stream ID 110).



Figure 6.2.10.1-3: Distribution of local data channel application to both UE

When the user in UE A in a call with UE B selects data channel application(s) for retrieval and use, and after the new application(s) are launched, the application(s) may make use of additional data channel(s) (see step 6 of 6.2.10.1-1). In this case, UE A initiates a call upgrade to add new data channel(s) to the call for the new application(s). The SDP offer the UE A generates shall include an "a=3gpp-req-app" attribute with a "req-app-id" parameter, as defined by clause 6.2.13, to identify the requesting application as part of the media description creating application data channels for that application. The application should be configured with that identification and the network deployment should ensure that identification to be sufficiently unique to avoid ambiguity. The "a=3gpp-req-app" attribute may also include an "app-dc-info" parameter to allow the application to identify a different end point when creating multiple application data channels used for communication to a network server or to the remote UE.

The combination of "req-app-id" and "app-dc-info" parameters allows the communicating UEs to bind the SDP offers and answers for each data channel and stream IDs being negotiated for the respective applications using these data channel stream IDs.

6.2.10.2 Generating SDP offer

A DCMTSI client in terminal may include a data channel media description for the bootstrap data channels in the initial SDP offer, as described above and according to [172] [184]. A DCMTSI client in terminal may add or disable (by setting port 0, as for RTP media) additional data channel media descriptions as needed in subsequent SDP offers.

A DCMTSI client in terminal that desires to use application data channels for a data channel application retrieved from any of its bootstrap data channels, shall initiate a subsequent SDP offer after the initial SDP offer, opening those application data channels by adding or updating a data channel media description describing application data channels for the retrieved data channel application, unless it received (and potentially already answered to) an SDP offer opening those application data channels. The added or updated data channel media description shall include corresponding "a=dcmap", "a=3gpp-req-app", and (optionally) "a=dcsa" attributes.

The "a=3gpp-req-app" attribute may also include an "adc-stream-id-endpoint" parameter as part of the "app-dc-info" parameter to differentiate what the SDP offerer intends the remote, answering "endpoint" to be. It is the application responsibility to know which data flows is to use which data channels created for the application, as appropriate for the remote endpoint-type.

NOTE: The combination of the "req-app-id" and "adc-stream-id-endpoint" parameters can be used to learn which server and what network is meant by the "Server" endpoint-type value in "adc-stream-id-endpoint" parameter.

The retrieved applications are to be configured with an appropriate value for the "a=3gpp-req-app" attribute. The offering DCMTSI client uses the value in this attribute to bind the media lines in the SDP describing application data channels to the corresponding application. The application also assigns the optional "app-dc-info" parameter values and uses them to differentiate the data channels to use for communication to the respective endpoints.

The "a=3gpp-req-app" line shall not be included in a media description describing bootstrap data channels.

A data channel media description with specific loss or latency requirements should use "a=3gpp-qos-hint" in the SDP offer, as detailed in section 6.2.7.4. If subsequent SDP offers or answers adds data channels with more strict loss or latency requirements that cannot be met by keeping current "a=3gpp-qos-hint" and providing suitable SCTP "a=dcmap" parameters, the existing "a=3gpp-qos-hint" should be modified accordingly. Similarly, if subsequent SDP offers or answers closes (removes) data channels that are known to be the limiting factor for choosing the existing "a=3gpp-qos-hint", a more relaxed "a=3gpp-qos-hint" should be chosen to better fit the remaining data channels.

A DCMTSI client that desires to suspend the data channel media stream while other media streams are put on hold shall offer an updated SDP and the corresponding data channel media description shall include the SDP direction attribute "a=inactive". To resume a data channel when other media streams are resumed from hold, it shall offer an updated SDP and the corresponding data channel media description shall change the SDP direction attribute to "a=sendrecv" (or, equivalently, omit the SDP direction attribute).

6.2.10.3 Generating SDP answer

An answering DCMTSI client in terminal may accept an SDP offer with data channel as described by [172] [184].

A DCMTSI client that received an SDP offer including application data channel media descriptions, uses the "req-app-id" parameter with the "a=3gpp-req-app" attribute to identify the application for which the data channels are added/updated, and formulates a corresponding SDP answer (especially the SCTP/DTLS transport parameters).

An answering DCMTSI client that desires to accept an offer for the application data channel media description shall include the same values for the "a=3gpp-req-app" from the offer. The application on the answering DCMTSI client should already be configured with the same identification as is present in the "req-app-id" parameter value for the "a=3gpp-req-app". The answering DCMTSI client can use the received "adc-stream-id-endpoint" parameter variant of the "app-dc-info" parameter to know which application data channels to use for the media directed to the respective end points.

An answering DCMTSI client in terminal that desires to reject the entire SCTP association for all offered data channels shall set the port to 0 (zero) on the corresponding "m=application" line in SDP, as described in [172]. An SCTP association that initially, or as a result of session modification, has no open data channels ("a=dcmap" lines) should be rejected or closed by modifying the session, setting port number to 0 (zero).

An answering DCMTSI client in terminal that desires to accept some offered data channels and reject others shall indicate this by removing the non-desired data channel "a=dcmap" and "a=dcsa" lines from the SDP answer, as described in [172]. The DCMTSI client in terminal accepting a data channel must also accept the corresponding, supported bootstrap data channels with stream ID <1000 (e.g. a=dcmap:0 …).

An answering DCMTSI client that desires to accept an offer for the data channel media description including the SDP direction attribute as either "a=sendrecv" (or, equivalently, omitted) or "a=inactive" shall include the same attribute value for the corresponding data channel media description from the offer.

NOTE: The meaning of "a=sendonly" and "a=recvonly" SDP direction attributes are undefined for data channel media descriptions.

6.2.10.4 Receiving SDP answer

An offering DCMTSI client in terminal receiving an SDP answer where the data channel SCTP association is accepted (port is not 0) may use any offered stream ID that has a corresponding "a=dcmap" line in the SDP answer, as described by section 6.5 in [172]. Data channels with "a=dcmap" lines in the SDP offer that are not included in the SDP answer must be considered as rejected and shall not be used, as described by section 6.5 in [172]. The "req-app-id" parameter of the "a=3gpp-req-app" attribute is used to identify the application for which the application data channels are added/updated.

 Second CHANGE

## 14.3 Media handling in hold procedures

Whenever a supplementary service includes a hold procedure according to RFC 3264 [58], e.g. when using the HOLD supplementary service, the media flow is changed in terms of the session flow attribute (e.g. changing the session attribute "sendrecv" into "sendonly" or "recvonly" or "inactive" and then back again). When this occurs, any involved media-originating or media-terminating node should take measures to ensure that the transitions between the different media flow states in the session occur with minimal impact on the media quality.

When a full-duplex session has put the media flow on hold (see section 8.4 in RFC 3264 [58]), the media flow has been changed into a unidirectional flow through changing the session attribute into either "sendonly" or "recvonly". When resuming the session, it is restored to full duplex by changing the flow attributes back into "sendrecv" from "sendonly" and "recvonly". In this case, the encoder and decoder states in the MTSI clients may not be aligned and a state mismatch could occur. This would result in media quality degradation. Therefore, the following actions are recommended whenever the media session is not being put on hold anymore and the session is restored to full duplex:

- for speech media, the speech decoders should be reset;

- for video media, the video encoders should start the updated session with a full infra refresh even if the previously allocated encoders are still active and no infra refresh is scheduled to be sent.

In a hold procedure, the session level direction attribute is not applicable to a session with data channel media, and the media level direction attributes "sendonly" and "recvonly" are not applicable to a data channel media description. The data channel media-originating or media-terminating DCMTSI client shall consider media level attribute "inactive" to describe a data channel media to be suspended in a hold procedure as payload data of the associated SCTP association are neither sent nor received.

 THIRD CHANGE

# A.17 SDP offers and answers with data channel capability signalling

The ellipsis ("...") in the examples in this clause is not part of the SDP but indicates possible presence of other media descriptions in addition to the ones shown in the examples.

Table A.17.1 demonstrates an example SDP offer with data channel capability signalling for the bootstrap data channel defined in clause 6.2.10. The offering part is an ICE Lite agent, indicated by "a=ice-lite" on SDP session level (i.e., before first m= line), and thus only offers host candidates, in this example a single host candidate aligned with address information on the corresponding m= and c= lines.

Table A.17.1: Example SDP offer with data channel capability signalling

|  |
| --- |
| **SDP offer** |
| a=ice-options:ice2a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannel c=IN IP4 192.0.2.156b=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.156 52718 typ hosta=ice-ufrag:8hhYa=ice-pwd:asd88fgpdd777uzjYhagZga=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 4A:AD:B9:B1:3F:82:18:3B:54:02:12:DF:3E:5D:49:6B:19:E5:7C:ABa=tls-id: abc3de65cddef001be82a=dcmap:0 subprotocol="http" |

An example SDP answer is shown in Table A.17.2, where the data channel capability signalling from Table A.17.1 is also supported and accepted by the answerer, as indicated by the non-zero port on the m= line. The answering part is an ICE Lite agent, indicated by "a=ice-lite" on SDP session level, and only supports ICE according to the predecessor ICE specification to [184] as indicated by no "a=ice-options:ice2" being included on SDP session level.

Table A.17.2: Example SDP answer with data channel capability

|  |
| --- |
| **SDP answer** |
| a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannel c=IN IP4 192.0.2.1b=AS:500 a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ hosta=ice-ufrag:9uB6a=ice-pwd:YH75Fviy6338Vbrhrlp8Yha=max-message-size:1024a=sctp-port:5002a=setup:passivea=fingerprint:SHA-1 5B:AD:67:B1:3E:82:AC:3B:90:02:B1:DF:12:5D:CA:6B:3F:E5:54:FAa=tls-id: dcb3ae65cddef0532d42a=dcmap:0 subprotocol="http" |

Table A.17.3 demonstrates an example SDP offer with multiple possible data channel application sources for the bootstrap data channel defined in Table 6.2.10.1-2. In this example, the offering part supports full ICE, indicated by no "a=ice-lite" on SDP session level.

Table A.17.3: Example SDP offer with multiple data channel application sources

|  |
| --- |
| **SDP offer** |
| a=ice-options:ice2...m=application 52718 UDP/DTLS/SCTP webrtc-datachannel c=IN IP6 fe80::6676:baff:fe9c:ee4ab=AS:500a=candidate:1 1 UDP 2130706431 fe80::6676:baff:fe9c:ee4a 52718 typ hosta=ice-ufrag:8hhYa=ice-pwd:asd88fgpdd777uzjYhagZga=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 4A:AD:B9:B1:3F:82:18:3B:54:02:12:DF:3E:5D:49:6B:19:E5:7C:ABa=tls-id: abc3de65cddef001be82a=dcmap:0 subprotocol="http"a=dcmap:10 subprotocol="http"a=dcmap:100 subprotocol="http"a=dcmap:110 subprotocol="http" |

An example SDP answer is shown in Table A.17.4, where only one of the data channel application sources from the offer in Table A.17.3 is accepted by the answerer, removing the other a=dcmap lines.

Figure 6.2.10.1-3 in clause 6.2.10.1 may be used as illustration to this example, in which case UE A in that Figure would send the offer in Table A.17.3, and UE B would send the answer in Table A.17.4.

In this SDP answer, the answerer (UE B) only accepts stream ID 110 to receive the data channel application from the offerer (UE A), but UE B has rejected to use any other data channel application provider.

Table A.17.4: Example UE SDP answer choosing a single data channel application source

|  |
| --- |
| **SDP answer** |
| a=ice-options:ice2a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannelc=IN IP4 192.0.2.1b=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ hosta=ice-ufrag:9uB6a=ice-pwd:YH75Fviy6338Vbrhrlp8Yha=max-message-size:1024a=sctp-port:5002a=setup:passivea=fingerprint:SHA-1 5B:AD:67:B1:3E:82:AC:3B:90:02:B1:DF:12:5D:CA:6B:3F:E5:54:FAa=tls-id: dcb3ae65cddef0532d42a=dcmap:110 subprotocol="http" |

Figure 6.2.10.1-3 in clause 6.2.10.1 may be used as illustration also to the example in Table A.17.5, in which case UE A in Figure 6.2.10.1-3 would send the offer in Table A.17.3, and the SDP answer sent back to UE A from the network would be the one in Table A.17.5.

In the SDP answer in Table A.17.5 sent from UE A’s (local) network, it is accepting stream ID 10 that would be used by UE A to receive its own, chosen data channel application, corresponding to the data channel application sent to UE B in stream ID 110 based on the SDP answer in Table A.17.4 such that both UEs can use the same application. That application is however received through different stream IDs for UE A and UE B, as shown in Figure 6.2.10.1-3.

 Table A.17.5: Example network SDP answer choosing a single data channel application source

|  |
| --- |
| **SDP answer** |
| a=ice-options:ice2a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannelc=IN IP4 192.0.2.1b=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ hosta=ice-ufrag:9uB6a=ice-pwd:YH75Fviy6338Vbrhrlp8Yha=max-message-size:1024a=sctp-port:5010a=setup:activea=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:45:AFa=tls-id: cd3bea56dced0f35d224a=dcmap:10 subprotocol="http" |

Table A.17.6 demonstrates an example SDP (re-)offer that adds two non-bootstrap data channel streams used by a new data channel application retrieved via the bootstrap data channel in Table A.17.5. The data channel application streams (two in this example) desire specific loss and latency characteristics indicated by the "a=3gpp-qos-hint" line (see also Annex A.16), and they also terminate on different endpoints, e.g., on a server and on the remote UE, hence they are offered as a separate m= lines with different QoS requirements. The stream with ID 38754 has a strict latency requirement and data older than 150 ms will not be transmitted or re-transmitted. The stream with ID 7216 requires lower loss but can accept somewhat higher latency than stream ID 38754 and therefore allows at most 5 SCTP-level retransmissions. The application using these data channels is identified by the "a=3gpp-req-app" lines which also indicates that the two data channels are intended for communication with different end points, via the different "adc-stream-id-endpoint" parameter values, e.g., a server versus the remote UE.

Table A.17.6: Example SDP offer with data channel application streams

|  |
| --- |
| **SDP offer** |
| c=IN IP4 192.0.2.156a=ice-options:ice2a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannelb=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.156 52718 typ hosta=ice-ufrag:8hhYa=ice-pwd:asd88fgpdd777uzjYhagZga=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 4A:AD:B9:B1:3F:82:18:3B:54:02:12:DF:3E:5D:49:6B:19:E5:7C:ABa=tls-id: abc3de65cddef001be82a=dcmap:10 subprotocol="http"m=application 52720 UDP/DTLS/SCTP webrtc-datachannelb=AS:1000a=candidate:1 1 UDP 2130706431 192.0.2.156 52720 typ hosta=ice-ufrag:9uB6a=ice-pwd: YH75Fviy6338Vbrhrlp8Yha=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:45:AFa=tls-id: cd3bea56dced0f35d224a=dcmap:7216 max-retr=5;label="low loss"a=3gpp-req-app:”application1”;7216-UEa=3gpp-qos-hint:loss=0.01;latency=100m=application 52724 UDP/DTLS/SCTP webrtc-datachannelb=AS:1000a=candidate:1 1 UDP 2130706431 192.0.2.156 52724 typ hosta=ice-ufrag:3cD2a=ice-pwd: YH75Fviy6338Vbrhrlrscta=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:23:56a=tls-id: cd3bea56dced0f35e256a=dcmap:38754 max-time=150;label="low latency"a=3gpp-req-app:”application1”;38754-Servera=3gpp-qos-hint:loss=0.01;latency=100 |

Table A.17.7 demonstrates an example SDP offer that is transferred from User A’s network (the originating network) to User B’s network (the terminating network). There are two bootstrap data channels with stream ID 100 in the SDP offer, one is marked by "a=3gpp-bdc-used-by:sender" line which means it is established between User A and User B’s network, the other is marked by "a=3gpp-bdc-used-by:receiver" line which means it is established between User A’s network and User B.

**Table A.17.7: Example SDP offer with two bootstrap data channels with stream ID 100**

|  |
| --- |
| **SDP offer** |
| m=application 52718 UDP/DTLS/SCTP webrtc-datachannelb=AS:500a=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 4A:AD:B9:B1:3F:82:18:3B:54:02:12:DF:3E:5D:49:6B:19:E5:7C:ABa=tls-id: abc3de65cddef001be82a=dcmap:100 subprotocol="http"a=3gpp-bdc-used-by:senderm=application 52722 UDP/DTLS/SCTP webrtc-datachannelb=AS:500a=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:45:AFa=tls-id: cd3bea56dced0f35d224a=dcmap:100 subprotocol="http"a=3gpp-bdc-used-by:receiver |

The "a=3gpp-req-app" lines in Table A.17.6 allow the remote UE to (re-)answer and accept the two new data channels for the application as Table A.17.8 illustrates. Table A.17.8 also suggest that the network used the "adc-stream-id-endpoint" values and resolved that the second "adc-stream-id-endpoint" is to be a server and provided its IP address on the corresponding media description.

**Table A.17.8: Example SDP answer with data channel application streams**

|  |
| --- |
| **SDP answer** |
| a=ice-options:ice2a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannelc=IN IP4 192.0.2.1b=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ hosta=ice-ufrag:9uB6a=ice-pwd:YH75Fviy6338Vbrhrlp8Yha=max-message-size:1024a=sctp-port:5010a=setup:activea=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:77:22a=tls-id: cd3bea56dced0f35f156a=dcmap:10 subprotocol="http"m=application 62347 UDP/DTLS/SCTP webrtc-datachannelc=IN IP4 192.0.2.1b=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.126 62347 typ hosta=ice-ufrag:3pD2a=ice-pwd:YH75Fviy6338Vbrhrlrgb2a=max-message-size:1024a=sctp-port:5120a=setup:passivea=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:CC:EEa=tls-id: cd3bea56dced0f35792ea=dcmap:7216 max-retr=5;label="low loss"a=3gpp-req-app:”application1”;7216-UEa=3gpp-qos-hint:loss=0.01;latency=100m=application 62357 UDP/DTLS/SCTP webrtc-datachannelc=IN IP4 192.0.2.126b=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.126 62357 typ hosta=ice-ufrag:3cBea=ice-pwd:YH75Fviy6338Vbrhrlhrtla=max-message-size:1024a=sctp-port:5130a=setup:passivea=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:76:34a=tls-id: cd3bea56dced0f35514fa=dcmap:38754 max-time=150;label="low latency"a=3gpp-req-app:”application1”;38754-Servera=3gpp-qos-hint:loss=0.01;latency=100 |

Table A.17.9 demonstrates an example SDP offer with data channel media stream supporting SDP direction attribute defined in clause 6.2.10. In this example, the offering part includes the SDP direction attribute "a=inactive" to indicate the corresponding data channel media stream is to be suspended

Table A.17.9: Example SDP offer with data channel media stream supporting SDP direction attribute "a=inactive"

|  |
| --- |
| **SDP offer** |
| a=ice-options:ice2a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannel c=IN IP4 192.0.2.156b=AS:500a=candidate:1 1 UDP 2130706431 192.0.2.156 52718 typ hosta=ice-ufrag:8hhYa=ice-pwd:asd88fgpdd777uzjYhagZga=max-message-size:1024a=sctp-port:5000a=setup:actpassa=fingerprint:SHA-1 4A:AD:B9:B1:3F:82:18:3B:54:02:12:DF:3E:5D:49:6B:19:E5:7C:ABa=tls-id: abc3de65cddef001be82a=dcmap:1001 subprotocol="http"a=inactive |

Table A.17.10 demonstrates an example SDP offer with data channel media stream supporting SDP direction attribute defined in clause 6.2.10. In this example, the offering part include the SDP direction attribute "a=sendrecv" to indicate the suspended data channel media stream is to be resumed.

Table A.17.10: Example SDP offer with data channel media stream supporting SDP direction attribute "a=sendrecv"

|  |
| --- |
| **SDP offer** |
| a=ice-lite...m=application 52718 UDP/DTLS/SCTP webrtc-datachannel c=IN IP4 192.0.2.1b=AS:500 a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ hosta=ice-ufrag:9uB6a=ice-pwd:YH75Fviy6338Vbrhrlp8Yha=max-message-size:1024a=sctp-port:5002a=setup:passivea=fingerprint:SHA-1 5B:AD:67:B1:3E:82:AC:3B:90:02:B1:DF:12:5D:CA:6B:3F:E5:54:FAa=tls-id: dcb3ae65cddef0532d42a=dcmap:1001 subprotocol="http"a=sendrecv |

END OF CHANGES