**3GPP TSG-SA4 Meeting #124 *S4-230778r2***

**, Germany, 22th May 2023 - 26th May 2023 Revision of S4-230778r1**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **26.114** | **CR** |  | **rev** | **2** | **Current version:** | **18.2.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](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:*** | Mechanism to distinguish two bootstrap data channels with the same stream ID value | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI18 | | | | |  | ***Date:*** | | | 2023-05-06 |
|  |  | | | |  | |  | | |  |
| ***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 can be 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | According to TS 26.114, when both UE A and UE B and their networks support IMS data channel capability, two different bootstrap data channels with the same stream ID 100 in an IMS session are contained in the SDP transferred between the originating network and the terminating network. One used by the caller needs to be terminated by the terminating network, and the other used by the callee needs to be forwarded to UE B by the terminating network. For the DCMF in the terminating network, it can’t distinguish the two bootstrap data channels and handle them correctly for lacking of enough information.  It’s suggested to define a new attribue "a=3gpp-bdc-used-by" to provide information helping the DCMF in the terminating network to distinguish the two bootstrap data channels. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Specify a new attribute "a=3gpp-bdc-used-by" attribute to provide information helping the DCMF in the terminating network to distinguish the two bootstrap data channels with the same stream ID value 100 between the originating network and the terminating network. A SDP example is provided.  In addition, two typos in A.17 are corrected. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The DCS in the terminating network could not distinguish the two boostrap data channels with the same stream ID value and handle them correctly. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.2.10.1, 6.2.X(new) and A.17 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* \* First change \* \* \* \*

#### 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 must 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 must 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 must 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 must 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 must 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 must support ICE Lite and may support full ICE [184], for data channel media. DCMTSI clients supporting full ICE must only use host candidate addresses. SDP "a=candidate" line host address information must 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.

Data channel stream IDs below 1000 must be reserved for using the HTTP [73] protocol, henceforth denoted as "bootstrap data channels", to retrieve an HTML web page including JavaScript(s), and optionally image(s) and style sheet(s), henceforth denoted as a "data channel application". 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.

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

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.

5. Sent through a bootstrap data channel to the remote UE B. 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 sent in a bootstrap data channel may be updated at any time, automatically or interactively, using normal HTTP procedures.

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

a=dcmap:0 subprotocol="http"

When the HTTP subprotocol is used, any other data channels used by the data channel application JavaScript(s) sent in the bootstrap data channel must 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 must 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 3: 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 4: 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:caller" 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:callee" 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 peer 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

\* \* \* \* Second change \* \* \* \*

### 6.2.X The a=3gpp-bdc-used-by SDP attribute

#### 6.2.X.1 General

The "a=3gpp-bdc-used-by" attribute indicates which party uses the bootstrap data channel(s) in the media description. It’s a media level attribute, and each data channel SDP media description has at most one "a=3gpp-bdc-used-by" attribute.

Before the SDP offerer's network sends the SDP offer to its peer network, it should add the "a=3gpp-bdc-used-by" attribute into the media description(s) to help the SDP answerer's network to distinguish m= lines containing the bootstrap data channels with the same stream ID.

#### 6.2.X.2 3gpp-bdc-used-by ABNF syntax and semantics

3gpp-bdc-used-by-value = bdc-used-by

bdc-used-by = "caller" / "callee"

The bdc-used-by parameter indicates which party uses the bootstrap data channel(s) in the media description. The following bdc-used-by values are defined:

- "caller": It shall indicate that tin the corresponding media description (m= line) It means that the bootstrap data channel(s) are used by the originating UE. Thus the bootstrap data channel(s) are established between the originating UE and the terminating network and need to be terminated by the terminating network.

- "callee": It shall indicate that the stream ID values of the bootstrap data channel(s) in the corresponding media description (m= line) are mapped to data channel application contents sources as seen from the terminating UE which takes a role of a "callee". It means that the bootstrap data channel(s) are used by the called UE. Thus the bootstrap data channel(s) are established between the terminating UE and the originating network, and need to be terminated by the originating network.

\* \* \* \* 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:ice2  a=ice-lite ...  m=application 52718 UDP/DTLS/SCTP webrtc-datachannel  c=IN IP4 192.0.2.156  b=AS:500  a=candidate:1 1 UDP 2130706431 192.0.2.156 52718 typ host a=ice-ufrag:8hhY  a=ice-pwd:asd88fgpdd777uzjYhagZg  a=max-message-size:1024  a=sctp-port:5000  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=tls-id: abc3de65cddef001be82  a=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 192.0.2.1  b=AS:500  a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ host a=ice-ufrag:9uB6  a=ice-pwd:YH75Fviy6338Vbrhrlp8Yh  a=max-message-size:1024  a=sctp-port:5002  a=setup:passive  a=fingerprint:SHA-1 5B:AD:67:B1:3E:82:AC:3B:90:02:B1:DF:12:5D:CA:6B:3F:E5:54:FA  a=tls-id: dcb3ae65cddef0532d42  a=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:ee4a  b=AS:500  a=candidate:1 1 UDP 2130706431 fe80::6676:baff:fe9c:ee4a 52718 typ host  a=ice-ufrag:8hhY  a=ice-pwd:asd88fgpdd777uzjYhagZg a=max-message-size:1024  a=sctp-port:5000  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=tls-id: abc3de65cddef001be82  a=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:ice2 a=ice-lite  ...  m=application 52718 UDP/DTLS/SCTP webrtc-datachannel  c=IN IP4 192.0.2.1  b=AS:500  a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ host a=ice-ufrag:9uB6  a=ice-pwd:YH75Fviy6338Vbrhrlp8Yh a=max-message-size:1024  a=sctp-port:5002  a=setup:passive  a=fingerprint:SHA-1 5B:AD:67:B1:3E:82:AC:3B:90:02:B1:DF:12:5D:CA:6B:3F:E5:54:FA  a=tls-id: dcb3ae65cddef0532d42  a=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:ice2 a=ice-lite  ...  m=application 52718 UDP/DTLS/SCTP webrtc-datachannel  c=IN IP4 192.0.2.1  b=AS:500  a=candidate:1 1 UDP 2130706431 192.0.2.1 52718 typ host a=ice-ufrag:9uB6  a=ice-pwd:YH75Fviy6338Vbrhrlp8Yh a=max-message-size:1024  a=sctp-port:5010  a=setup:active  a=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:45:AF  a=tls-id: cd3bea56dced0f35d224  a=dcmap:10 subprotocol="http" |

Table A.17.6 demonstrates an example SDP (re-)offer that adds two non-bootstrap data channel streams used by the data channel application in 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 are offered as a separate m= line due to having different QoS requirements and different destination (e.g. a peer UE) than the bootstrap data channel. 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.

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

|  |
| --- |
| **SDP offer** |
| c=IN IP4 192.0.2.156 a=ice-options:ice2  a=ice-lite  ...  m=application 52718 UDP/DTLS/SCTP webrtc-datachannel  b=AS:500  a=candidate:1 1 UDP 2130706431 192.0.2.156 52718 typ host a=ice-ufrag:8hhY  a=ice-pwd:asd88fgpdd777uzjYhagZg a=max-message-size:1024  a=sctp-port:5000  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=tls-id: abc3de65cddef001be82  a=dcmap:10 subprotocol="http"  m=application 52720 UDP/DTLS/SCTP webrtc-datachannel  b=AS:1000  a=candidate:1 1 UDP 2130706431 192.0.2.156 52720 typ host a=ice-ufrag:9uB6  a=ice-pwd: YH75Fviy6338Vbrhrlp8Yh a=max-message-size:1024  a=sctp-port:5000  a=setup: actpass  a=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:45:AF  a=tls-id: cd3bea56dced0f35d224  a=dcmap:38754 max-time=150;label="low latency"  a=dcmap:7216 max-retr=5;label="low loss"  a=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:caller" line which means it is established between User A and User B’s network, the other is marked by "a=3gpp-bdc-used-by:callee" 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-datachannel  b=AS:500  a=max-message-size:1024  a=sctp-port:5000  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=tls-id: abc3de65cddef001be82  a=dcmap:100 subprotocol="http"  a=3gpp-bdc-used-by:caller  m=application 52722 UDP/DTLS/SCTP webrtc-datachannel  b=AS:500  a=max-message-size:1024  a=sctp-port:5000  a=setup:actpass  a=fingerprint:SHA-1 BC:8A:99:A0:E3:28:CA:B3:09:20:1B:FD:21:D5:AC:B6:F3:5E:45:AF  a=tls-id: cd3bea56dced0f35d224  a=dcmap:100 subprotocol="http"  a=3gpp-bdc-used-by:callee |

\* \* \* \* End of changes \* \* \* \*