**3GPP TSG- Meeting #**

**April 8 –**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **0566** | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
| ***3*** |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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)* | |
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| ***Reason for change:*** | | For the IVAS codec, an RTP packet can carry both audio data and Processing Information (PI). When the capacity of the network is limited, depending on the relative importance of audio data and PI data, it may be beneficial to have different levels of redundancy for the audio data and PI data. The current RTCP-APP Redundancy Request does not support this differentiatation in redundancy. | | | | | | | | |
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| ***Summary of change:*** | | New RTCP-APP Redundancy Request messages are defined.  Examples are given.  SDP signaling is given. | | | | | | | | |
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| ***Consequences if not approved:*** | | WI is not completed | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.2.0, 10.2.1.3, 10.2.1.12 (new), 10.2.2, 10.2.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 \*\*\*

### 10.2.0 General

To reduce the risk for confusion in the media-sender, it is beneficial if the signaling from media-receiver back to media-sender for the media adaptation is the same regardless of which triggers are used in the adaptation-decision in the media-receiver. The ANBR described in clause 10.7 should, if supported by both the access network and the MTSI client in terminal, be used as one such trigger.

NOTE 1: The media-receiver is aware that other nodes in the media path may also influence the media adaptation. A media-receiver sending a specific CMR value X can expect that (after some time) no media is received with a mode higher than X, but modes lower than X may be received any time.

The adaptation for AMR, AMR-WB and EVS includes adapting the media bit-rate, the frame aggregation, the redundancy level and the redundancy offset. The domain of adaptation for EVS furthermore includes adapting audio bandwidth, partial redundancy, switching between EVS primary mode and EVS AMR-WB IO mode.

When the AMR codec or the AMR-WB codec is used, two signaling mechanisms are defined:

- CMR in the AMR/AMR-WB RTP payload, [28].   
CMR in RTP can be used by the media-receiver to restrict the codec mode in the remote media-sender to an upper limit (maximum mode).

- RTCP-APP, see clause 10.2.1.   
If the media-sender supports RTCP-APP, then the media-receiver can use it in the following way:  
CMR in RTCP-APP can be used by the media-receiver to restrict the codec mode in the remote media-sender to an upper limit (maximum mode), in addition to CMR in RTP.   
RTCP-APP can further be used by the media-receiver for the adaptation of frame aggregation, redundancy level and redundancy offset in the RTP packets to be sent by the remote media-sender.

When the EVS codec is used, the following signaling mechanism is defined:

- CMR in the EVS RTP payload, [125].

- RTCP-APP, see clause 10.2.1.

When the IVAS codec is used, the following signaling mechanism is defined:

- CMR in the IVAS RTP payload, [xxx].

- RTCP-APP, see clause 10.2.1.

\*\*\* Next change \*\*\*

#### 10.2.1.3 Redundancy Request

**RTCP\_APP\_REQ\_RED**: Request for redundancy level and offset of redundant data.



Figure 10.3: Redundancy request

Codecs: This request can be used for all codecs. When the codec is IVAS and an RTP packet includes both audio frames and PI data, the request is for the audio frames, i.e., the payload chunk refers to the audio frames.

The Bit field is a 12 bit bitmask that signals a request on how non-redundant payloads chunks are to be repeated in subsequent packets.

The position of the bit set indicates which earlier non-redundant payload chunks is requested to be added as redundant payload chunks to the current packet.

- If the LSB (rightmost bit) is set equal to 1 it indicates that the last previous payload chunk is requested to be repeated as redundant payload in the current packet.

- If the MSB (leftmost bit) is set equal to 1 it indicates that the payload chunk that was transmitted 12 packets ago is requested to be repeated as redundant payload chunk in the current packet. Note that it is not guaranteed that the sender has access to such old payload chunks.

The maximum amount of redundancy is 300 %, i.e., at maximum three bits can be set in the Bit field.

See clause 10.2.2 for example use cases.

\*\*\* Next change \*\*\*

10.2.1.12 Redundancy Request for IVAS

Three types of messages are defined for the three types of the payload chunks: audio data only, PI data only, and a combination of audio data and PI data. For requesting redundancy for audio data only, RTCP\_APP\_REQ\_RED shall be used.

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**RTCP\_APP\_REQ\_RED\_IVAS\_PI\_DATA**: Request for redundancy level and offset of redundant data for PI data only.



**Figure 10.6g : Redundancy request for PI data for IVAS**

Codecs: This request shall be used for IVAS.

The Bit field is a 12-bit bitmask that signals a request on how the PI data portions of non-redundant payloads chunks are to be repeated in subsequent packets.

The position of the bit set indicates which earlier non-redundant payload chunks is requested to be added as redundant payload chunks to the current packet.

- If the LSB (rightmost bit) is set equal to 1 it indicates that the PI data portion of the last previous payload chunk is requested to be repeated as redundant payload in the current packet.

- If the MSB (leftmost bit) is set equal to 1 it indicates that the PI data portion of the payload chunk that was transmitted 12 packets ago is requested to be repeated as redundant payload chunk in the current packet. Note that it is not guaranteed that the sender has access to such old payload chunks.

The maximum amount of redundancy is 500 %, i.e., at maximum five bits can be set in the Bit field.

See clause 10.2.2 for example use cases.

For requesting redundancy for a combination of audio data and PI data, both RTCP\_APP\_REQ\_RED and RTCP\_APP\_REQ\_RED\_IVAS\_PI\_DATA can be sent in the same RTCP-APP packet.

\*\*\* Next change \*\*\*

10.2.3 SDP negotiation for RTCP-APP

RTCP-APP request messages that can be used are negotiated with SDP using the ‘3gpp\_mtsi\_app\_adapt’ attribute. The syntax for the 3GPP MTSI RTCP-APP adaptation attribute is:

a=3gpp\_mtsi\_app\_adapt:<reqNames>

where:

<reqNames> is a comma-separated list identifying the different request messages (see below).

The ABNF for the RTCP-APP adaptation messages negotiation attribute is the following:

adaptation attribute = "a" "=" "3gpp\_mtsi\_app\_adapt" ":" reqName \*("," reqName)

reqName = "RedReq" / "FrameAggReq" / "AmrCmr" / "EvsRateReq" / "EvsBandwidthReq" / "EvsParRedReq" / "EvsIoModeReq" / "EvsPrimaryModeReq"/ "IvasRedReqAudio" "/ "IvasRedReqPidata" / "IvasRedReqAudioPidata"

The name denotes the RTCP APP packet types the SDP sender supportes to receive. The meaning of the values is as follows:

RedReq: Redundancy Request, clause 10.2.1.3

FrameAggReq: Frame Aggregation Request, clause 10.2.1.4

AmrCmr: Codec Mode Request for AMR and AMR-WB, clause 10.2.1.5

EvsRateReq: EVS Primary Rate Request, clause 10.2.1.7

EvsBandwidthReq: EVS Bandwidth Request, clause 10.2.1.8

EvsParRedReq: EVS Partial Redundancy Request, clause 10.2.1.9

EvsIoModeReq: EVS Primary mode to EVS AMR-WB IO mode Switching Request, clause 10.2.1.10

EvsPrimaryModeReq: EVS AMR-WB IO mode to EVS Primary mode Switching Request, clause 10.2.1.11

IvasRedReqPidata: Redundancy Request for PI data for IVAS, clause 10.2.1.12

An MTSI client supporting the reception of any RTCP APP packets defined in the present specification shall indicate the supported RTCP APP packet types in an initial SDP offer or answer it sends using the SDP "a=3gpp\_mtsi\_app\_adapt" attribute. If the answerer receives an "a=3gpp\_mtsi\_app\_adapt" attribute in the SDP offer, it may send the indicated RTCP APP packet types towards the offerer. The answerer shall indicate its capabilties with the "a=3gpp\_mtsi\_app\_adapt" attribute irrespective if an "a=3gpp\_mtsi\_app\_adapt" attribute was received and the capabilities within. If the offerer receives an "a=3gpp\_mtsi\_app\_adapt" attribute in the SDP answer, it may send the indicated RTCP APP packet types towards the answerer.

An MTSI client supporting only AMR and AMR-WB therefore may for instance include the following in the SDP offer:

a=3gpp\_mtsi\_app\_adapt: RedReq,FrameAggReq,AmrCmr

An MTSI client supporting only AMR, AMR-WB, EVS and IVAS may for instance include the following in the SDP offer:

a=3gpp\_mtsi\_app\_adapt: RedReq,FrameAggReq,AmrCmr,EvsRateReq,EvsBandwidthReq,EvsParRedReq,EvsIoModeReq,EvsPrimaryModeReq,IvasRedReqPIdata

The attribute shall only be used on media level.

When interworking with pre-Rel-12 clients or non-MTSI clients, it may happen that they support the RTCP-APP signalling but not the SDP negotiation for AMR and AMR-WB. An MTSI client failing to negotiate RTCP-APP as described may still try to use the RTCP-APP signalling when requesting adaptation, but the MTSI client shall then also monitor the received media in order to determine if some or all of the adaptation requests included in the RTCP-APP were partially or fully followed or not followed at all. If none of the adaptation requests is followed, not even partially, then this is an indication that the remote client does not support the RTCP-APP signalling. The MTSI client should then try to use other means for triggering the adaptation, for example CMR in the AMR/AMR-WB payload or RTCP Sender Reports/Receiver Reports.

\*\*\* Next change \*\*\*

### 10.2.2 Example use cases

[Editor’s Note: unchanged content omitted]

EXAMPLE 6:

An RTCP\_APP\_REQ\_RED request with bit field 000000000010 (100% redundancy with offset 1 extra packet) and an RTCP\_APP\_REQ\_AGG request with value = 1 (frame aggregation 2 frames/packet) will yield packets as shown in figure 10.13.



Figure 10.13: Payload packetization with 100 % redundancy,   
one extra offset and 2 frames aggregated per packet

The following examples assume that the speech codec generates audio frames numbered N-12, …, N in a continuous flow and the associated PI data units numbered N-12, …, N.

P-1…P denote the sequence numbers of the packets.



Figure 10.14: Flow of parameter sets for encoded frames  
Each increment corresponds to a time difference of 20 ms and PI data units.

EXAMPLE 7:

An RTCP\_APP\_REQ\_RED\_PI\_DATA request with bit field 00000000011 (200% redundancy) and an RTCP\_APP\_REQ\_AGG request with value = 0 (no frame aggregation 2) will yield packets as shown in figure 10.16.



**Figure 10.15: Packetization for RTCP\_APP\_REQ\_RED\_PI\_DATA request with 200% redundancy without frame aggregation**

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