**3GPP TSG-RAN WG2 Meeting #125 R2-** **241XXX**

Athens, Greece, 26th Feb -1st Mar, 2024

**Agenda item: 7.5.4.2**

**Source: Huawei, HiSilicon**

**Title: Initial state for PSI-based SDU discard [H559]**

**Document for: Discussion and Decision**

# Introduction

The PSI-based SDU discard has been agreed as the way of RRC Configuration + MAC CE activation/deactivation in RAN2#123[1]. And RAN2#124[2] has agreed the initial state of the PSI-based SDU discard is “deactivated” upon the RRC configuring it.

*1 The initial state of the PSI-Based PDU Discard Activation/Deactivation MAC CE is deactivated.*

This way is not efficient enough if the new XR service starts when the network is slightly congested, either couldn’t overcome the ACK/NACK misdetection very well. Hence, we believe it is worth to also support RRC to indicate the initial activation/deactivation state of the PSI-based SDU discard as today’s PDCP duplication

In this document we will give our analysis and opinions about it.

# Discussion

## Initial state of activation

RAN2#123 has agreed the timer-based PDU set discarding for congestion alleviation, in which the network preconfigures two PDCP discard timers per DRB via RRC, and indicates the lower PDU sets to apply the shorter PDCP discard timer in case of congestion via MAC CE as Figure 1 shows.



Figure 1: Illustration of agreed PDU set discarding solution

However, the network may be slightly congested and can accept new XR service request but cannot afford its full data load. In this case, the network needs to send out the MAC CE immediately after sending out the RRC reconfiguration message. According to the following table quoted from Table 12.1-1 from TS 38.331 [3], it will take UE at least 16ms to process the received RRC reconfiguration message. So as Figure 2 shows, even if the subsequent MAC CE reaches UE almost at the same time as the RRC reconfiguration message, the PDU set discarding mechanism can only take effect at least 46 ms (16 ms RRC message processing delay + the blocking time caused by the 1st PDU set running with 30 ms timer) later in our example. In fact it is not a new problem, the same problem also existed in the PDCP duplication, so RAN2 agreed to use the RRC reconfiguration message to indicate the initial state of duplication to resolve this problem.

*The UE performance requirements for RRC procedures are specified in the following tables. The performance requirement is expressed as the time in [ms] from the end of reception of the network -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> network response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation). In case the RRC procedure triggers BWP switching, the RRC procedure delay is the value defined in the following table plus the BWP switching delay defined in TS 38.133 [14], clause 8.6.3.*

*Table 12.1-1: UE performance requirements for RRC procedures for UEs*

| *Procedure title:* | *Network -> UE* | *UE -> Network* | *Value [ms]* | *Notes* |
| --- | --- | --- | --- | --- |
| ***RRC Connection Control Procedures*** |
| *RRC reconfiguration* | *RRCReconfiguration* | *RRCReconfigurationComplete* | *10* |  |
| *……* |
| *RRC reconfiguration*  | *DLDedicatedMessageSegment* | *RRCReconfigurationComplete* | *16+( Nseg**-1)\*10* | *Nseg**is number of RRC segments* |
| *RRC setup* | *RRCSetup* | *RRCSetupComplete* | *10* |  |
| *……* |



Figure 2: Example of delayed PDU set discarding

Moreover, the HARQ feedback of the activation/deactivation MAC CE may be mis-detected, UE replied NACK but the network think it is ACK. Once the misdetection happens, the status of network and user will be unaligned, and this kind of un-alignment is difficult to be detected. Network may indicate deactivation already, while the UE is still discarding PDU sets due to missing the deactivation MAC CE, which will reduce the user experience greatly.

Another scenario is handover. In case that the UE moves to a congested gNB, if the initial state indication via RRC is not supported, the target gNB can only activate the PDU set discarding until the handover completion. But if we support the gNB to indicate the initial state via RRC, then the activation of PDU set discarding can be directly indicated in the handover command.

Considering the above 3 problems, it is proposed to use RRC message to indicate the initial status of PDCP discard timer similar as we did for PDCP duplication:

1. **Network indicates the initial activation/deactivation state of PSI-based SDU discard upon RRC configuring it.**

# Conclusion

In this contribution, we have discussed some details of PDU set discarding for XR traffic and made the following proposals:

1. **Network indicates the initial activation/deactivation state of PSI-based SDU discard upon RRC configuring it.**

# References

1. RAN2#123 bis ChairNotes, <https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_123bis/Inbox/Chair_Notes/R2_123bis_ChairNotes_23-10-13_13-00_final.docx>.
2. RAN2#124 ChairNotes, <https://www.3gpp.org/FTP/tsg_ran/WG2_RL2/TSGR2_124/Inbox/Chair_Notes/R2_124_ChairNotes_23-11-17_final.docx>.
3. 3GPP TS 38.331 v17.6.0, Radio Resource Control (RRC) protocol specification.

# Annex: TP for TS 38.331

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Changes start\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

– *PDCP-Config*

The IE *PDCP-Config* is used to set the configurable PDCP parameters for signalling, MBS multicast and data radio bearers.

***PDCP-Config* information element**

-- ASN1START

-- TAG-PDCP-CONFIG-START

PDCP-Config ::= SEQUENCE {

 drb SEQUENCE {

 discardTimer ENUMERATED {ms10, ms20, ms30, ms40, ms50, ms60, ms75, ms100, ms150, ms200,

 ms250, ms300, ms500, ms750, ms1500, infinity} OPTIONAL, -- Cond Setup

 pdcp-SN-SizeUL ENUMERATED {len12bits, len18bits} OPTIONAL, -- Cond Setup1

 pdcp-SN-SizeDL ENUMERATED {len12bits, len18bits} OPTIONAL, -- Cond Setup2

 headerCompression CHOICE {

 notUsed NULL,

 rohc SEQUENCE {

 maxCID INTEGER (1..16383) DEFAULT 15,

 profiles SEQUENCE {

 profile0x0001 BOOLEAN,

 profile0x0002 BOOLEAN,

 profile0x0003 BOOLEAN,

 profile0x0004 BOOLEAN,

 profile0x0006 BOOLEAN,

 profile0x0101 BOOLEAN,

 profile0x0102 BOOLEAN,

 profile0x0103 BOOLEAN,

 profile0x0104 BOOLEAN

 },

 drb-ContinueROHC ENUMERATED { true } OPTIONAL -- Need N

 },

 uplinkOnlyROHC SEQUENCE {

 maxCID INTEGER (1..16383) DEFAULT 15,

 profiles SEQUENCE {

 profile0x0006 BOOLEAN

 },

 drb-ContinueROHC ENUMERATED { true } OPTIONAL -- Need N

 },

 ...

 },

 integrityProtection ENUMERATED { enabled } OPTIONAL, -- Cond ConnectedTo5GC1

 statusReportRequired ENUMERATED { true } OPTIONAL, -- Cond Rlc-AM-UM

 outOfOrderDelivery ENUMERATED { true } OPTIONAL -- Need R

 } OPTIONAL, -- Cond DRB

 moreThanOneRLC SEQUENCE {

 primaryPath SEQUENCE {

 cellGroup CellGroupId OPTIONAL, -- Need R

 logicalChannel LogicalChannelIdentity OPTIONAL -- Need R

 },

 ul-DataSplitThreshold UL-DataSplitThreshold OPTIONAL, -- Cond SplitBearer

 pdcp-Duplication BOOLEAN OPTIONAL -- Need R

 } OPTIONAL, -- Cond MoreThanOneRLC

 t-Reordering ENUMERATED {

 ms0, ms1, ms2, ms4, ms5, ms8, ms10, ms15, ms20, ms30, ms40,

 ms50, ms60, ms80, ms100, ms120, ms140, ms160, ms180, ms200, ms220,

 ms240, ms260, ms280, ms300, ms500, ms750, ms1000, ms1250,

 ms1500, ms1750, ms2000, ms2250, ms2500, ms2750,

 ms3000, spare28, spare27, spare26, spare25, spare24,

 spare23, spare22, spare21, spare20,

 spare19, spare18, spare17, spare16, spare15, spare14,

 spare13, spare12, spare11, spare10, spare09,

 spare08, spare07, spare06, spare05, spare04, spare03,

 spare02, spare01 } OPTIONAL, -- Need S

 ...,

 [[

 cipheringDisabled ENUMERATED {true} OPTIONAL -- Cond ConnectedTo5GC

 ]],

 [[

 discardTimerExt-r16 SetupRelease { DiscardTimerExt-r16 } OPTIONAL, -- Cond DRB2

 moreThanTwoRLC-DRB-r16 SEQUENCE {

 splitSecondaryPath-r16 LogicalChannelIdentity OPTIONAL, -- Cond SplitBearer2

 duplicationState-r16 SEQUENCE (SIZE (3)) OF BOOLEAN OPTIONAL -- Need S

 } OPTIONAL, -- Cond MoreThanTwoRLC-DRB

 ethernetHeaderCompression-r16 SetupRelease { EthernetHeaderCompression-r16 } OPTIONAL -- Need M

 ]],

 [[

 survivalTimeStateSupport-r17 ENUMERATED {true} OPTIONAL, -- Cond Drb-Duplication

 uplinkDataCompression-r17 SetupRelease { UplinkDataCompression-r17 } OPTIONAL, -- Cond Rlc-AM

 discardTimerExt2-r17 SetupRelease { DiscardTimerExt2-r17 } OPTIONAL, -- Need M

 initialRX-DELIV-r17 BIT STRING (SIZE (32)) OPTIONAL -- Cond MRB-Initialization

 ]],

 [[

 pdu-SetDiscard-r18 ENUMERATED {true} OPTIONAL, -- Need R

 discardTimerForLowImportance-r18 SetupRelease { DiscardTimerForLowImportance-r18 } OPTIONAL, -- Cond DRB2

primaryPathOnIndirectPath-r18 ENUMERATED {true} OPTIONAL, -- Cond SplitBearerMP

 psi-DiscardState-r18 BOOLEAN OPTIONAL -- Need R

 ]]

}

EthernetHeaderCompression-r16 ::= SEQUENCE {

 ehc-Common-r16 SEQUENCE {

 ehc-CID-Length-r16 ENUMERATED { bits7, bits15 },

 ...

 },

 ehc-Downlink-r16 SEQUENCE {

 drb-ContinueEHC-DL-r16 ENUMERATED { true } OPTIONAL, -- Need N

 ...

 } OPTIONAL, -- Need M

 ehc-Uplink-r16 SEQUENCE {

 maxCID-EHC-UL-r16 INTEGER (1..32767),

 drb-ContinueEHC-UL-r16 ENUMERATED { true } OPTIONAL, -- Need N

 ...

 } OPTIONAL -- Need M

}

UL-DataSplitThreshold ::= ENUMERATED {

 b0, b100, b200, b400, b800, b1600, b3200, b6400, b12800, b25600, b51200, b102400, b204800,

 b409600, b819200, b1228800, b1638400, b2457600, b3276800, b4096000, b4915200, b5734400,

 b6553600, infinity, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1}

DiscardTimerExt-r16 ::= ENUMERATED {ms0dot5, ms1, ms2, ms4, ms6, ms8, spare2, spare1}

DiscardTimerExt2-r17 ::= ENUMERATED {ms2000, spare3, spare2, spare1}

UplinkDataCompression-r17 ::= CHOICE {

 newSetup SEQUENCE {

 bufferSize-r17 ENUMERATED {kbyte2, kbyte4, kbyte8, spare1},

 dictionary-r17 ENUMERATED {sip-SDP, operator} OPTIONAL -- Need N

 },

 drb-ContinueUDC NULL

}

DiscardTimerForLowImportance-r18 ::= ENUMERATED {ms0, ms2, ms4, ms6, ms8, ms10, ms12, ms14, ms18, ms22, ms26, ms30, ms40, ms50, ms75, ms100}

-- TAG-PDCP-CONFIG-STOP

-- ASN1STOP

| ***PDCP-Config* field descriptions** |
| --- |
| ***cipheringDisabled***If included, ciphering is disabled for this DRB regardless of which ciphering algorithm is configured for the SRB/DRBs. The field may only be included if the UE is connected to 5GC. Otherwise the field is absent. The network configures all DRBs with the same PDU-session ID with same value for this field. The value for this field cannot be changed after the DRB is set up. |
| ***discardTimer***Value in ms of *discardTimer* specified in TS 38.323 [5]. Value *ms10* corresponds to 10 ms, value *ms20* corresponds to 20 ms and so on. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer. |
| ***discardTimerExt***Value in ms of *discardTimer* specified in TS 38.323 [5]. Value *ms0dot5* corresponds to 0.5 ms, value *ms1* corresponds to 1ms and so on. If this field is present, the field *discardTimer* is ignored and *discardTimerExt* is used instead. |
| ***discardTimerExt2***Value in ms of *discardTimerExt* specified in TS 38.323 [5]. Value *ms2000* corresponds to 2000 ms. If this field is present, the field *discardTimer* and *discardTimerExt* are ignored and *discardTimerExt2* is used instead. |
| ***discardTimerForLowImportance***Value in ms of d*iscardTimerForLowImportance* specified in TS 38.323 [5]. Value *ms0* corresponds to 0 ms, value *ms2* corresponds to 2 ms and so on. The value of this timer for a PDCP entity is always configured shorter than *discardTimer*, *discardTimerExt* or *discardTimerExt2*, whichever is used for the PDCP entity. |
| ***drb-ContinueROHC***Indicates whether the PDCP entity continues or resets the ROHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. This field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated. The network does not include the field if the bearer is configured as DAPS bearer. This field can be configured for both DRB and multicast MRB. |
| ***duplicationState***This field indicates the uplink PDCP duplication state for the associated RLC entities at the time of receiving this IE. If set to *true,* the PDCP duplication state is activated for the associated RLC entity. The index for the indication is determined by ascending order of logical channel ID of all RLC entities other than the primary RLC entityindicated by *primaryPath* in the order of MCG and SCG, as in clause 6.1.3.32 of TS 38.321 [3]. If the number of associated RLC entities other than the primary RLC entity is two, UE ignores the value in the largest index of this field. If the field is absent, the PDCP duplication states are deactivated for all associated RLC entities.  |
| ***ethernetHeaderCompression***This fields configures Ethernet Header Compression. This field can only be configured for a bi-directional DRB or a bi-directional multicast MRB. The network reconfigures *ethernetHeaderCompression* only upon reconfiguration involving PDCP re-establishment and with neither *drb-ContinueEHC-DL* nor *drb-ContinueEHC-UL* configured. Network only configures this field when *uplinkDataCompression* is not configured. |
| ***headerCompression***If rohc is configured, the UE shall apply the configured ROHC profile(s) in both uplink and downlink. If *uplinkOnlyROHC* is configured, the UE shall apply the configured ROHC profile(s) in uplink (there is no header compression in downlink). ROHC can be configured for any bearer type. ROHC and EHC can be both configured simultaneously for a DRB or a multicast MRB. The network reconfigures *headerCompression* only upon reconfiguration involving PDCP re-establishment or involving PDCP entity reconfiguration to configure DAPS bearer(s), and without any *drb-ContinueROHC*. Network configures *headerCompression* to *notUsed* when *outOfOrderDelivery* is configured. Network only configures this field when *uplinkDataCompression* is not configured. |
| ***initialRX-DELIV***Indicates the initial value of RX\_DELIV during PDCP window initialization for multicast MRB as specified in TS 38.323 [5]. |
| ***integrityProtection***Indicates whether or not integrity protection is configured for this radio bearer. The network configures all DRBs with the same PDU-session ID with same value for this field. The value for this field cannot be changed after the DRB is set up. |
| ***maxCID***Indicates the value of the MAX\_CID parameter as specified in TS 38.323 [5].The total value of MAX\_CIDs across all bearers for the UE should be less than or equal to the value of *maxNumberROHC-ContextSessions* parameter as indicated by the UE. |
| ***moreThanOneRLC***This field configures UL data transmission when more than one RLC entity is associated with the PDCP entity. This field is not present if the bearer is configured as DAPS bearer. |
| ***moreThanTwoRLC-DRB***This field configures UL data transmission when more than two RLC entities are associated with the PDCP entity for DRBs. |
| ***outOfOrderDelivery***Indicates whether or not *outOfOrderDelivery* specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the radio bearer is established. |
| ***pdcp-Duplication***Indicates whether or not uplink duplication status at the time of receiving this IE is configured and activated as specified in TS 38.323 [5]. The presence of this field indicates that duplication is configured. PDCP duplication is not configured for CA packet duplication of LTE RLC bearer. The value of this field, when the field is present, indicates the state of the duplication at the time of receiving this IE. If set to *true*, duplication is activated. The value of this field is always *true*, when configured for a SRB. For PDCP entity with more than two associated RLC entities for UL transmission, this field is always present. If the field *moreThanTwoRLC-DRB* is present, the value of this field is ignored and the state of the duplication is indicated by *duplicationState*. For PDCP entity with more than two associated RLC entities, only NR RLC bearer is supported. |
| ***pdcp-SN-SizeDL***PDCP sequence number size for downlink, 12 or 18 bits, as specified in TS 38.323 [5]. For SRBs only the value *len12bits* is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer. |
| ***pdcp-SN-SizeUL***PDCP sequence number size for uplink, 12 or 18 bits, as specified in TS 38.323 [5]. For SRBs only the value *len12bits* is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer. |
| ***pdu-SetDiscard***If set to true, the UE shall perform PDU set based discarding for this PDCP entity, as specified in TS 38.323 [5]. |
| ***psi-DiscardState-r18***This field indicates the PSI-based SDU discard state for this PDCP entity at the time of receiving this IE. If set to true, the PSI-based SDU discard is activated for the associated PDCP entity. If set to false, the PSI-based SDU discard is deactivated for the associated PDCP entity. |
| ***primaryPath***Indicates the cell group ID and LCID of the primary RLC entity as specified in TS 38.323 [5], clause 5.2.1 for UL data transmission when more than one RLC entity is associated with the PDCP entity. In this version of the specification, only cell group ID corresponding to MCG is supported for SRBs, except for the split SRB2 of the IAB-MT, and except when the UE is required to set the *primaryPath* to refer to the SCG as specified in clause 5.7.3b.4. In this last case, if the network sends an *RRCReconfiguration* message (in NR-DC) or an EUTRA *RRCConnectionReconfiguration* message (in (NG)EN-DC) keeping SRB1 as split SRB, the network explicitly configures the *primaryPath* for the PDCP entity of SRB1 to refer to the MCG. In this version of the specification, only cell group ID corresponding to MCG is supported for DRBs when the SCG is deactivated. In MR-DC, the NW indicates *cellGroup* for split bearers using logical channels in different cell groups. The NW always indicates *logicalChannel* if CA based PDCP duplication is configured in the cell group indicated by *cellGroup* of this field. In MP, when the primay path is set to indirect path, the field *cellGroup* and *logicalChannel* are absent, and the field *primaryPathOnIndirectPath* is set to true. |
| ***primaryPathOnIndirectPath***Indicates that the primary RLC entity is on indirect path for DRB when MP is configured. |
| ***splitSecondaryPath***Indicates the LCID of the split secondary RLC entity as specified in TS 38.323 [5] for fallback to split bearer operation when UL data transmission with more than two RLC entities is associated with the PDCP entity. This RLC entity belongs to a cell group that is different from the cell group indicated by *cellGroup* in the field *primaryPath.* |
| ***statusReportRequired***For AM DRBs, AM MRBs and DAPS UM DRBs, indicates whether the DRB or the multicast MRB is configured to send a PDCP status report in the uplink, as specified in TS 38.323 [5]. For DAPS AM DRBs, it also indicates whether the DRB is configured to send a second PDCP status report in the uplink, as specified in TS 38.323 [5]. |
| ***survivalTimeStateSupport***Indicates whether the DRB associated with this PDCP entity has survival time state support. If this field is configured to be true, all associated RLC entities are activated for PDCP duplication upon reception of a retransmission grant addressed to CS-RNTI, as specified in TS 38.321 [3]. |
| ***t-Reordering***Value in ms of t-Reordering specified in TS 38.323 [5]. Value *ms0* corresponds to 0 ms, value *ms20* corresponds to 20 ms, value *ms40* corresponds to 40 ms, and so on. When the field is absent the UE applies the value *infinity*. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer. |
| ***ul-DataSplitThreshold***Parameter specified in TS 38.323 [5]. Value *b0* corresponds to 0 bytes, value *b100* corresponds to 100 bytes, value *b200* corresponds to 200 bytes, and so on. The network sets this field to *infinity* for UEs not supporting *splitDRB-withUL-Both-MCG-SCG* and when the SCG is deactivated. If the field is absent when the split bearer is configured for the radio bearer first time, then the default value *infinity* is applied. |
| ***uplinkDataCompression***Indicates the UDC configuration that the UE shall apply. Network does not configure *uplinkDataCompression* for a DRB, if *headerCompression* or *ethernetHeaderCompression* is already configured or *outOfOrderDelivery* or DAPS is configured for the DRB. The maximum number of DRBs where *uplinkDataCompression* can be applied is two. The network reconfigures *uplinkDataCompression* only upon reconfiguration involving PDCP re-establishment. If the field is set to *drb-ContinueUDC*, the PDCP entity continues the uplink data compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is set to *drb-ContinueUDC* only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated. |

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| --- |
| ***EthernetHeaderCompression field descriptions*** |
| ***drb-ContinueEHC-DL***Indicates whether the PDCP entity continues or resets the downlink EHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated. |
| ***drb-ContinueEHC-UL***Indicates whether the PDCP entity continues or resets the uplink EHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated. |
| ***ehc-CID-Length***Indicates the length of the CID field for EHC packet. The value *bits7* indicates the length is 7 bits, and the value *bits15* indicates the length is 15 bits. Once the field *ethernetHeaderCompression-r16* is configured for a DRB or a multicast MRB, the value of the field *ehc-CID-Length* for this DRB or multicast MRB is not reconfigured to a different value. |
| ***ehc-Common***Indicates the configurations that apply for both downlink and uplink. |
| ***ehc-Downlink***Indicates the configurations that apply for only downlink. If the field is configured, then Ethernet header compression is configured for downlink. Otherwise, it is not configured for downlink. |
| ***ehc-Uplink***Indicates the configurations that apply for only uplink. If the field is configured, then Ethernet header compression is configured for uplnik. Otherwise, it is not configured for uplink. |
| ***maxCID-EHC-UL***Indicates the value of the MAX\_CID\_EHC\_UL parameter as specified in TS 38.323 [5]. The total value of MAX\_CID\_EHC\_UL across all bearers for the UE should be less than or equal to the value of *maxNumberEHC-Contexts* parameter as indicated by the UE. |

|  |
| --- |
| ***UplinkDataCompression field descriptions*** |
| ***bufferSize***This field indicates the buffer size applied for UDC as specified in TS 38.323 [5]. Value *kbyte2* means 2048 bytes, *kbyte4* means 4096 bytes and so on. |
| ***dictionary***This field indicates which pre-defined dictionary is used for UDC as specified in TS 38.323 [5]. The value *sip-SDP* means that UE shall prefill the buffer with standard dictionary for SIP and SDP defined in TS 38.323 [5], and the value *operator* means that UE shall prefill the buffer with operator-defined dictionary. |

| **Conditional presence** | **Explanation** |
| --- | --- |
| *DRB* | This field is mandatory present when the corresponding DRB/multicast MRB is being set up, absent for SRBs. Otherwise this field is optionally present, need M. |
| *DRB2* | This field is optionally present in case of DRB, need M. Otherwise, it is absent for SRBs and MRBs. |
| *Drb-Duplication* | For SRBs, this field is absent. For DRBs, this field is absent if duplication is not configured. Otherwise, this field is optional, need R. |
| *MoreThanOneRLC* | This field is mandatory present upon RRC reconfiguration with setup of a PDCP entity for a radio bearer (except for multicast MRB) with more than one associated logical channel and upon RRC reconfiguration with the association of additional logical channels to the PDCP entity.The field is also mandatory present in case the field *moreThanTwoRLC-DRB* is included in *PDCP-Config*.Upon RRC reconfiguration when a PDCP entity is associated with multiple logical channels, this field is optionally present need M. Otherwise, this field is absent. Need R. |
| *MoreThanTwoRLC-DRB* | For SRBs, this field is absent.For DRBs, this field is mandatory present upon RRC reconfiguration with setup of a PDCP entity for a radio bearer with more than two associated logical channels and upon RRC reconfiguration with the association of one or more additional logical channel(s) to the PDCP entity so that the PDCP entity has more than two associated logical channels.Upon RRC reconfiguration when a PDCP entity is associated with more than two logical channels, this field is optionally present, Need M. Otherwise, the field is absent, Need R. |
| *Rlc-AM* | For RLC AM, the field is optionally present, need M. Otherwise, the field is absent. |
| *Rlc-AM-UM* | In case of DRB, for RLC UM (if the UE supports DAPS handover) or RLC AM, the field is optionally present, need R. In case of multicast MRB, if multicast MRB is associated with at least one RLC AM entity, the field is optionally present, need R. Otherwise, the field is absent. |
| *Setup* | The field is mandatory present in case of DRB setup. Otherwise the field is optionally present, need M. |
| *SplitBearer* | The field is absent for SRBs. Otherwise, the field is optional present, need M, in case of radio bearer with more than one associated RLC mapped to different cell groups. |
| *SplitBearer2* | The field is mandatory present, in case of a split bearer. Otherwise the field is absent. |
| *SplitBearerMP* | The field is absent for SRBs. Otherwise, the field is optional present, need M, when MP is configured. |
| *ConnectedTo5GC* | The field is optionally present, need R, if the UE is connected to 5GC. Otherwise the field is absent. |
| *ConnectedTo5GC1* | The field is optionally present, need R, if the UE is connected to NR/5GC or if the UE supports user plane integrity protection when connected to E-UTRA/EPC (as specified in TS 33.401 [30]). Otherwise the field is absent. |
| *Setup1* | This field is mandatory present in case of DRB setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M. |
| *Setup2* | This field is mandatory present in case for radio bearer setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M. |
| *MRB-Initialization* | This field is mandatory present in case of multicast MRB setup. In case of PDCP re-establishment for multicast MRB, this field is optionally present, Need N. Otherwise, this field is absent, Need N. |

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