**3GPP TSG-RAN WG2 Meeting #109-e  *R2-200xxxx***

**online, online, 24 February 2020 – 6 March 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.321** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **15.8.0** |  |
|  |
| *For* [***HE******LP***](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 |  |

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| ***Title:***  | Introduction of a new MAC subheader for MAC CEs |
|  |  |
| ***Source to WG:*** | Samsung |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | TEI16 |  | ***Date:*** | 2020-03-05 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Since RAN2 decides to introduces new MAC CEs from each Rel-16 WIs (see below) which consumes LCID space, a new MAC subheader format with extended LCID space for the MAC CEs needs to be introduced.New DL MAC CEs in Rel-16:

|  |  |  |  |
| --- | --- | --- | --- |
| WI | No | Purpose | Remarks |
| IAB | 1 | Extended logical channel ID field | R2-1915256 |
| IAB | 2 | Timing Delta MAC CE | R2-1915256; fixed (2B) |
| IAB | 3 | (ProvidedGuardSymbols from RAN1) | variable? |
| IIoT | 4 | Duplication RLC Activation/Deactivation MAC CE | [108#12]; fixed (1B) |
| 2-step RACH | 5 | Absolute Timing Advance Command MAC CE | [108#82]; fixed (2B) |
| eMIMO | 6 | Enhanced TCI States Activation/Deactivation for UE-specific PDSCH | [108#69]; variable |
| eMIMO | 7 | Extended PUCCH spatial relation Activation/Deactivation MAC CE | [108#68]; fixed (3B) |
| eMIMO | 8 | Group-based PUCCH spatial relation Activation/Deactivation MAC CE | [108#68]; fixed (2B) |
| eMIMO | 9 | AP SRS spatial relation Indication MAC CE | [108#68]; variable |
| eMIMO | 10 | SRS Pathloss Reference RS Activation/Deactivation MAC CE | [108#68]; fixed (3B) |
| eMIMO | 11 | PUSCH Pathloss Reference RS Activation/Deactivation MAC CE | [108#68]; fixed (3B) |
| eMIMO | 12 | CC list-based TCI States Activation/Deactivation for UE-specific PDSCH MAC CE | [108#68]; variable |
| eMIMO | 13 | CC list-based TCI State Indication for UE-specific PDCCH MAC CE | [108#68]; fixed (2B) |
| eMIMO | 14 | CC list-based SRS Activation/Deactivation MAC CE | [108#68]; TBD |
| eMIMO | 15 | (maybe one more according to RAN1 input) | - |

New UL MAC CEs in Rel-16:

|  |  |  |  |
| --- | --- | --- | --- |
| WI | No | Purpose | Remarks |
| IAB | 1 | Extended logical channel ID field | R2-1915256 |
| IAB | 2 | Pre-emptive BSR MAC CE | R2-1915256; variable |
| IAB | 3 | (DesiredGuardSymbols from RAN1) | variable? |
| NR-U | 4 | LBT failure MAC CE | [108#75]; fixed (4B); no 1B format |
| V2X | 5 | Sidelink Configured Grant Confirmation | [108#100]; fixed (1B) |
| V2X | 6 | Truncated Sidelink BSR MAC CE | [108#100]; variable |
| V2X | 7 | Sidelink BSR MAC CE | [108#100]; variable |
| IIoT | 8 | Multiple Entry Configured Grant Confirmation | [108#12]; fixed (4B); no 1B format? |
| eMIMO | 9 | SCell BFR MAC CE (four octets Ci) | [108#70]; variable |
| eMIMO | 10 | SCell BFR MAC CE (one octet Ci) | [108#70]; variable |

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| ***Summary of change:*** | A new MAC subheader with one-byte eLCID field is introduced from Rel-16.When the new MAC subheader with one-byte eLCID field is used, eLCID values 0 to 255 indicates LCID values 64 to 319, accordingly. |
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| ***Consequences if not approved:*** | The specification cannot accommodate the new MAC CEs introduced in Rel-16. |
|  |  |
| ***Clauses affected:*** | 6.1.2 and 6.2.1 |
|  |  |
|  | **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:*** | - |

### 6.1.2 MAC PDU (DL-SCH and UL-SCH except transparent MAC and Random Access Response)

A MAC PDU consists of one or more MAC subPDUs. Each MAC subPDU consists of one of the following:

- A MAC subheader only (including padding);

- A MAC subheader and a MAC SDU;

- A MAC subheader and a MAC CE;

- A MAC subheader and padding.

The MAC SDUs are of variable sizes.

Each MAC subheader corresponds to either a MAC SDU, a MAC CE, or padding.

A MAC subheader except for fixed sized MAC CE, padding, and a MAC SDU containing UL CCCH consists of the header fields R/F/LCID/(eLCID)/L. A MAC subheader for fixed sized MAC CE, padding, and a MAC SDU containing UL CCCH consists of the two header fields R/LCID.





Figure 6.1.2-1: R/F/LCID/(eLCID)/L MAC subheader with 8-bit L field





Figure 6.1.2-2: R/F/LCID/(eLCID)/L MAC subheader with 16-bit L field





Figure 6.1.2-3: R/LCID/(eLCID) MAC subheader

MAC CEs are placed together. DL MAC subPDU(s) with MAC CE(s) is placed before any MAC subPDU with MAC SDU and MAC subPDU with padding as depicted in Figure 6.1.2-4. UL MAC subPDU(s) with MAC CE(s) is placed after all the MAC subPDU(s) with MAC SDU and before the MAC subPDU with padding in the MAC PDU as depicted in Figure 6.1.2-5. The size of padding can be zero.



Figure 6.1.2-4: Example of a DL MAC PDU



Figure 6.1.2-5: Example of a UL MAC PDU

A maximum of one MAC PDU can be transmitted per TB per MAC entity.

Next change

### 6.2.1 MAC subheader for DL-SCH and UL-SCH

The MAC subheader consists of the following fields:

- LCID: The Logical Channel ID field identifies the logical channel instance of the corresponding MAC SDU or the type of the corresponding MAC CE or padding as described in Tables 6.2.1-1 and 6.2.1-2 for the DL-SCH and UL-SCH respectively. There is one LCID field per MAC subheader. The LCID field size is 6 bits. If the LCID field is set to 34, one additional octet is present in the MAC subheader containing the eLCID field and follow the octet containing LCID field;

- eLCID: The extended Logical Channel ID field identifies the logical channel instance of the corresponding MAC SDU as described in Tables 6.2.1-1a, 6.2.1-1b, 6.2.1-2a, and 6.2.1-2b for the DL-SCH and UL-SCH respectively. The size of the eLCID field is either 8 bits or 16 bits;

- L: The Length field indicates the length of the corresponding MAC SDU or variable-sized MAC CE in bytes. There is one L field per MAC subheader except for subheaders corresponding to fixed-sized MAC CEs, padding, and MAC SDUs containing UL CCCH. The size of the L field is indicated by the F field;

- F: The Format field indicates the size of the Length field. There is one F field per MAC subheader except for subheaders corresponding to fixed-sized MAC CEs, padding, and MAC SDUs containing UL CCCH. The size of the F field is 1 bit. The value 0 indicates 8 bits of the Length field. The value 1 indicates 16 bits of the Length field;

- R: Reserved bit, set to 0.

The MAC subheader is octet aligned.

Table 6.2.1-1 Values of LCID for DL-SCH

|  |  |
| --- | --- |
| Index | LCID values |
| 0 | CCCH |
| 1–32 | Identity of the logical channel |
| 33 | Extended logical channel ID field (two octets) |
| 34 | Extended logical channel ID field (one octet) |
| 35-46 | Reserved |
| 47 | Recommended bit rate |
| 48 | SP ZP CSI-RS Resource Set Activation/Deactivation |
| 49 | PUCCH spatial relation Activation/Deactivation |
| 50 | SP SRS Activation/Deactivation  |
| 51 | SP CSI reporting on PUCCH Activation/Deactivation |
| 52 | TCI State Indication for UE-specific PDCCH |
| 53 | TCI States Activation/Deactivation for UE-specific PDSCH |
| 54 | Aperiodic CSI Trigger State Subselection |
| 55 | SP CSI-RS/CSI-IM Resource Set Activation/Deactivation |
| 56 | Duplication Activation/Deactivation |
| 57 | SCell Activation/Deactivation (four octets) |
| 58 | SCell Activation/Deactivation (one octet) |
| 59 | Long DRX Command |
| 60 | DRX Command |
| 61 | Timing Advance Command |
| 62 | UE Contention Resolution Identity |
| 63 | Padding |

Table 6.2.1-1a Values of one-octet eLCID for DL-SCH

|  |  |
| --- | --- |
| Index | LCID values |
| 64 to 319 | reserved |

Table 6.2.1-2 Values of LCID for UL-SCH

|  |  |
| --- | --- |
| Index | LCID values |
| 0 | CCCH of size 64 bits (referred to as "CCCH1" in TS 38.331 [5]) |
| 1–32 | Identity of the logical channel |
| 33 | Extended logical channel ID field (two octets) |
| 34 | Extended logical channel ID field (one octet) |
| 35–51 | Reserved |
| 52 | CCCH of size 48 bits (referred to as "CCCH" in TS 38.331 [5]) |
| 53 | Recommended bit rate query |
| 54 | Multiple Entry PHR (four octets Ci) |
| 55 | Configured Grant Confirmation |
| 56 | Multiple Entry PHR (one octet Ci) |
| 57 | Single Entry PHR |
| 58 | C-RNTI |
| 59 | Short Truncated BSR |
| 60 | Long Truncated BSR |
| 61 | Short BSR |
| 62 | Long BSR |
| 63 | Padding |

Table 6.2.1-2a Values of one-octet eLCID for UL-SCH

|  |  |
| --- | --- |
| Index | LCID values |
| 64 to 319 | reserved |