**3GPP TSG RAN WG1 Meeting #102-e R1-20xxxxx**

**e-Meeting, August 17th – 28th, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **Draft CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.214** | **CR** |  | **rev** | **-** | **Current version:** | **16.2.0** |  |
|  | | | | | | | | |
| *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 | **x** | Core Network |  |

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| ***Title:*** | Draft CR on Tx switching | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Moderator (China Telecom) | | | | | | | | | |
| ***Source to TSG:*** | R1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RF\_FR1-Core | | | | |  | ***Date:*** | | | 2020-08-25 |
|  |  | | | |  | |  | | |  |
| ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Align IE names with RAN2 specification  For SRS triggering, the current spec text on minimal time interval between the last symbol of the PDCCH triggering the aperiodic SRS transmission adds two values (N2 and Tswitch) that are not in the same units. N2 is in units of symbols, and Tswitch is in absolute time. Additionally, it was agreed that the numerology of both carriers are considered when computing minimum processing time. | | | | | | | | |
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| ***Summary of change:*** | | Align IE names with RAN2 specification  Align the units of N2 and Tswitch on SRS triggering | | | | | | | | |
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| ***Consequences if not approved:*** | | Misalignment of IE name between RAN1 specification and RAN2 specification.  For SRS triggering, the computing of minimal time interval between the last symbol of the PDCCH triggering the aperiodic SRS transmission is incorrect. | | | | | | | | |
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| ***Clauses affected:*** | | 6.1.6, 6.2.1, 6.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | 38.101-1, 38.101-3, 38.133, 38.331, 38.213 | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

6.1.6 Uplink switching

**< unchanged text omitted>**

The UE may omit uplink transmission during the uplink switching gap if the conditions defined in this sub-clause are met and the UE is configured with *uplinkTxSwitching-r16*. The switching gap is indicated by UE capability *uplinkTxSwitchingPeriod-r16*:

- If a UE indicated a capability for uplink switching with *uplinkTxSwitchRequested-r16* for a band combination, and if it is for that band combination

- Configured with a MCG using E-UTRA radio access and with a SCG using NR radio access (EN-DC), or

- Configured with uplink carrier aggregation, or

- Configured in a serving cell with two uplink carriers with higher layer parameter *supplementaryUplink*.

the conditions under which the switching gap may be present and the location of the switching gap are defined for each of the cases in sections 6.1.6.1, 6.1.6.2, and 6.1.6.3 respectively.

If an uplink switching is triggered for an uplink transmission starting at *T0*, after *T0-Toffset*, the UE is not expected to cancel the uplink switching, or to trigger any other new uplink switching occurring before *T0* for any other uplink transmission that is scheduled after *T0-Toffset*, where *Toffset* is the UE processing procedure time defined for the uplink transmission triggering the switch given in subclause 5.3, subclause 5.4, subclause 6.2.1, subclause 6.4 and in subclause 9 of [6, TS 38.213].

The UE does not expect to perform more than one uplink switching in a slot with *µUL* = max(*µUL,carrier1, µUL,carrier2*), where the *µUL,carrier1* corresponds to the subcarrier spacing of the uplink transmitted before the switching gap and the *µUL,carrier2* corresponds to the subcarrier spacing of the uplink transmitted after the switching gap.

6.1.6.1 Uplink switching for EN-DC

For a UE indicating a capability for uplink switching with *BandCombination-UplinkTxSwitch-r16* for a band combination, and if it is for that band combination configured with a MCG using E-UTRA radio access and with a SCG using NR radio access (EN-DC), if the UE is configured with uplink switching with parameter *uplinkTxSwitching-r16*,

* for the UE configured with *switchedUL* by the parameter *uplinkTxSwitchingOption-r16*, when the UE is to transmit in the uplink based on DCI(s) received before or based on a higher layer configuration(s):
* when the UE is to transmit an NR uplink that takes place after an E-UTRA uplink on another uplink carrier then the UE is not expected to transmit for the duration of on any of the two carriers.
* when the UE is to transmit an E-UTRA uplink that takes place after an NR uplink on another uplink carrier then the UE is not expected to transmit for the duration of on any of the two carriers.
* the UE is not expected to transmit simultaneously on the NR uplink and the E-UTRA uplink. If the UE is scheduled or configured to transmit any NR uplink transmission overlapping with an E-UTRA uplink transmission, the NR uplink transmission is dropped,
* for the UE configured with *dualUL* by the parameter *uplinkTxSwitchingOption-r16,* when the UE is to transmit in the uplink based on DCI(s) received before or based on a higher layer configuration(s):
* when the UE is to transmit an NR two-port uplink that takes place after an E-UTRA uplink on another uplink carrier then the UE is not expected to transmit for the duration of on any of the two carriers. .
* when the UE is to transmit an E-UTRA uplink that takes place after an NR two-port uplink on another uplink carrier then the UE is not expected to transmit for the duration of on any of the two carriers.
* the UE is not expected to transmit simultaneously a two- port transmission on the NR uplink and the E-UTRA uplink.

- in all other cases the UE is expected to transmit normally all uplink transmissions without interruptions.

- when the UE is configured with *tdm-PatternConfig-r15* or by *tdm-PatternConfig-r16*

- for the E-UTRA subframes designated as uplink by the configuration, the UE assumes the operation state in which one-port E-UTRA uplink can be transmitted.

- for the E-UTRA subframes other than the ones designated as uplink by the configuration, the UE assumes the operation state in which two-port NR uplink can be transmitted.

6.1.6.2 Uplink switching for Carrier Aggregation

For a UE indicating a capability for uplink switching with *BandCombination-UplinkTxSwitch-r16* for a band combination, and if it is for that band combination configured with uplink carrier aggregation:

- If the UE is configured with uplink switching with parameter *uplinkTxSwitching-r16*, when the UE is to transmit in the uplink based on DCI(s) received before or based on a higher layer configuration(s):

- When the UE is to transmit a 2-port transmission on one uplink carrier and if the preceding uplink transmission is a 1-port transmission on another uplink carrier, then the UE is not expected to transmit for the duration of on any of the two carriers.

- When the UE is to transmit a 1-port transmission on one uplink carrier and if the preceding uplink transmission is a 2-port transmission on another uplink carrier, then the UE is not expected to transmit for the duration of on any of the two carriers.

- For the UE configured with *switchedUL* by the parameter *uplinkTxSwitchingOption-r16*, when the UE is to transmit a 1-port transmission on one uplink carrier and if the preceding uplink transmission was a 1-port transmission on another uplink carrier, then the UE is not expected to transmit for the duration of on any of the two carriers.

- For the UE configured with *dualUL* by the parameter *uplinkTxSwitchingOption-r16*, when the UE is to transmit a 2-port transmission on one uplink carrier and if the preceding uplink transmission was a 1-port transmission on the same uplink carrier and the UE is under the operation state in which 2-port transmission cannot be supported in the same uplink carrier, then the UE is not expected to transmit for the duration of on any of the two carriers.

- For the UE configured with *dualUL* by the parameter *uplinkTxSwitchingOption-r16*, when the UE is to transmit a 1-port transmission on one uplink carrier and if the preceding uplink transmission was a 1-port transmission on another uplink carrier and the UE is under the operation state in which 2-port transmission can be supported on the same uplink carrier, then the UE is not expected to transmit for the duration of on any of the two carriers.

- The UE is not expected to be scheduled or configured with uplink transmissions that result in simultaneous transmission on two antenna ports on one uplink carrier, and any transmission on another uplink carrier.

- In all other cases the UE is expected to transmit normally all uplink transmissions without interruptions.

6.1.6.3 Uplink switching for Supplementary Uplink

For a UE indicating a capability for uplink switching with *BandCombination-UplinkTxSwitch-r16* for a band combination, and if it is for that band combination configured in a serving cell with two uplink carriers with higher layer parameter *supplementaryUplink*:

- If the UE is configured with uplink switching with parameter *uplinkTxSwitching-r16*,

- If the UE is to transmit any uplink channel or signal on a different uplink from the preceding transmission occasion based on DCI(s) received before or based on a higher layer configuration(s), then the UE assumes that an uplink switching is triggered in a duration of switching gap , where is the start time of the first symbol of the transmission occasion of the uplink channel or signal and is the preparation procedure time of the transmission occasion of the uplink channel or signal given in subclause 5.3, subclause 5.4, subclause 6.2.1, subclause 6.4 and in subclause 9 of [6, TS 38.213], respectively. During the switching gap , the UE is not expected to transmit on any of the two uplinks.

- In all other cases the UE is expected to transmit normally all uplink transmissions without interruptions.

**< unchanged text omitted>**

### 6.2.1 UE sounding procedure

**< unchanged text omitted>**

If the UE has an active semi-persistent SRS resource configuration and has not received a deactivation command, the semi-persistent SRS configuration is considered to be active in the UL BWP which is active, otherwise it is considered suspended.

For a UE configured with one or more SRS resource configuration(s), and when the higher layer parameter *resourceType* in *SRS-Resource* or *SRS-PosResource-r16* is set to 'aperiodic':

- the UE receives a configuration of SRS resource sets,

- the UE receives a downlink DCI, a group common DCI, or an uplink DCI based command where a codepoint of the DCI may trigger one or more SRS resource set(s). For SRS in a resource set with usage set to 'codebook' or 'antennaSwitching', the minimal time interval between the last symbol of the PDCCH triggering the aperiodic SRS transmission and the first symbol of SRS resource is *N2* symbols and an additional time duration *Tswitch*. Otherwise, the minimal time interval between the last symbol of the PDCCH triggering the aperiodic SRS transmission and the first symbol of SRS resource is *N2* +14 symbols and an additional time duration *Tswitch*. The minimal time interval unit of OFDM symbol is counted based on the minimum subcarrier spacing given by min(*µPDCCH, µUL*) where *µUL* is given by min(*µUL,carrier1, µUL,carrier2, µSRS*) when the UE is configured with *dualUL* by the parameter *uplinkTxSwitchingOption-r16* for uplink carrier aggregation, and by *µSRS*otherwise. *µSRS* and *µPDCCH*are the subcarrier spacing configurations for triggered SRS and PDCCH carrying the triggering command respectively.

- *Tswitch* , *µUL,carrier1* and *µUL,carrier2* are defined in clause 6.4.

**< unchanged text omitted>**

6.4 UE PUSCH preparation procedure time

**< unchanged text omitted>**

If the first uplink symbol in the PUSCH allocation for a transport block, including the DM-RS, as defined by the slot offset *K2* and the start and length indicator *SLIV* of the scheduling DCI and including the effect of the timing advance, is no earlier than at symbol *L2*, where *L2* is defined as the next uplink symbol with its CP starting after the end of the reception of the last symbol of the PDCCH carrying the DCI scheduling the PUSCH, then the UE shall transmit the transport block.

*- N2* is based on *µ* of Table 6.4-1 and Table 6.4-2 for UE processing capability 1 and 2 respectively, where *µ* corresponds to the one of (*µDL*, *µUL*) resulting with the largest *Tproc,2*, where the *µDL* corresponds to the subcarrier spacing of the downlink with which the PDCCH carrying the DCI scheduling the PUSCH was transmitted and *µUL* corresponds to the subcarrier spacing of the uplink channel with which the PUSCH is to be transmitted, and *κ* is defined in clause 4.1 of [4, TS 38.211].

- If the first symbol of the PUSCH allocation consists of DM-RS only, then *d2,1* = 0*,* otherwise *d2,1* = 1.

- If the UE is configured with multiple active component carriers, the first uplink symbol in the PUSCH allocation further includes the effect of timing difference between component carriers as given in [11, TS 38.133].

- If the scheduling DCI triggered a switch of BWP, *d2,2* equals to the switching time as defined in [11, TS 38.133], otherwise *d2,2*=0.

- For a UE that supports capability 2 on a given cell, the processing time according to UE processing capability 2 is applied if the high layer parameter *processingType2Enabled* in *PUSCH-ServingCellConfig* is configured for the cell and set to *enable*,

- If the PUSCH indicated by the DCI is overlapping with one or more PUCCH channels, then the transport block is multiplexed following the procedure in clause 9.2.5 of [6, TS 38.213], otherwise the transport block is transmitted on the PUSCH indicated by the DCI.

- If uplink switching gap is triggered as defined in subclause 6.1.6, ** equals to the switching gap duration and for the UE configured with *dualUL* by the parameter *uplinkTxSwitchingOption-r16* for uplink carrier aggregation *µUL*=min(*µUL,carrier1, µUL,carrier2*), otherwise **.

**< unchanged text omitted>**