CSI-RS resources counting capability (TEI identifier: [SimCSI\_count])

Proponent: Tim (MediaTek) tim.frost@mediatek.com

Agreement

* For simultaneous CSI-RS reception in UE features 2-33, 2-36, 2-40, 2-41, 2-43, 16-3a and 16-3b, define 1 new UE capability:
  + UE capability 1: To allow the UE to indicate that CSI-RS ports within one periodic/semi-persistent CSI-RS resource, as well as the periodic/semi-persistent CSI-RS resource, are counted as one resource, even if the periodic/semi-persistent CSI-RS resource is referred by N Report Settings.

Agreement

* For simultaneous CSI-RS reception when operating Network Energy saving UE features 42-1/1a/1b/1c, and 42-2/2a/2b/2c, define the following new UE capability:
  + Simultaneous NZP-CSI-RS resource counting NES: To allow the UE to indicate that CSI-RS ports within one periodic/semi-persistent CSI-RS resource, as well as the periodic/semi-persistent CSI-RS resource, are counted as one resource even if the periodic/semi-persistent CSI-RS resource is referred multiple times by one or more CSI Reporting Settings with at least one CSI Reporting Setting configured with higher layer parameter *csi-ReportSubConfigToAddModList.*
* Endorse the following TP in TS 38.214 section 5.2.1.6.

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| If the UE indicates [simultaneous NZP-CSI-RS resource counting\_NES] and the CSI-RS resource is configured as periodic or semi-persistent and is referred *N* times by one or more CSI Reporting Settings with at least one CSI Reporting Setting configured with higher layer parameter *csi-ReportSubConfigToAddModList*, the CSI-RS resource is counted once and the CSI-RS ports within the CSI-RS resource are counted *P,* where *P* is the number of ports configured by *nrofPorts.*  If the UE does not indicate [simultaneous NZP-CSI-RS resource counting\_NES] or the UE indicates [simultaneous NZP-CSI-RS resource counting\_NES] and the CSI-RS resource is not configured as periodic or semi-persistent:   * For a *CSI-ReportConfig* containing a list of *L* sub-configuration(s) provided by higher layer parameter *csi-ReportSubConfigToAddModList,* if a CSI-RS resource is referred by *M* sub-configurations among *N* triggered sub-configurations for CSI reporting for aperiodic CSI-RS resource, or *L* configured sub-configurations for CSI reporting for periodic or semi-persistent CSI-RS resource, the CSI-RS resource is counted *M* times, and the CSI-RS ports within the CSI-RS resource are counted , where *P* is the number of ports configured by *nrofPorts* and is the number of CSI-RS ports in *s*-th sub-configuration from *M* sub-configurations derived from the corresponding antenna port subset indicator *portSubsetIndicator* according to clause 5.2.1.4.2 if configured, otherwise . |

Muting of always-on signals in 5G broadcast (TEI identifier: [5GBC\_CasMuting])

Proponent: Assunta (EBU) [assunta.devita@rai.it](mailto:assunta.devita@rai.it)

Agreement

* The non-MBSFN subframes containing the cell acquisition signals (PSS/SSS/PBCH/SIB1) in an MBMS-dedicated cell shall only be transmitted within the first (k×40) ms out of every (n×160) ms.
  + Introduce a new parameter n, to be configured for support MBMS, from the set {2,4,8,16}.
  + Introduce a new parameter k, to be configured for support MBMS, from the set {4,5,6,7,…,63}
  + In the absence of the above parameters {n,k}, all non-MBSFN subframes containing cell acquisition signals in an MBMS-dedicated cell shall be transmitted

NOTE: For a MBMS-dedicated cell, there is no RAN4 impact from the above TEI proposal.

Agreement

* From RAN1 perspective, values of the parameters n and k are configured in SIB1-MBMS.
  + Final decision is up to RAN2

32 HARQ process numbers (TEI identifier: [TN32HARQ]) [TN32HARQ])

Proponent: Xianghui (ZTE) han.xianghui@zte.com.cn

Agreement

* Support a maximum of 32 HARQ process numbers for TN in FR1 and FR2-1 in Rel-19.
  + Introduce new UE capabilities, by duplicating the Rel-17 UE FGs 24-8/24-9 defined for FR2-2 to FR1 and FR2-1.
    - The reporting granularity of the UE capabilities is changed to ‘per FSPC’.
  + Introduce new RRC parameters, harq-ProcessNumberSizeDCI-0-1-Ext-r19, harq-ProcessNumberSizeDCI-1-1-Ext-r19, harq-ProcessNumberSizeDCI-0-2-Ext-r19, harq-ProcessNumberSizeDCI-1-2-Ext-r19, harq-ProcessNumberSizeDCI-0-3-Ext-r19, harq-ProcessNumberSizeDCI-1-3-Ext-r19.
  + For FR1, the above downlink related parameters can only be configured when the maximum number of layers configured for PDSCH is up to 4.
  + For FR1, the above uplink related parameters can only be configured when the maximum number of layers configured for PUSCH is up to 4.

Agreement

* For up to 32 HARQ process numbers for TN in FR1 and FR2-1,
  + The value ranges of the new RRC parameters are defined as follows
    - harq-ProcessNumberSizeDCI-0-1-Ext-r19 with value range of ‘INTEGER (5)’,
    - harq-ProcessNumberSizeDCI-1-1-Ext-r19 with value range of ‘INTEGER (5)’,
    - harq-ProcessNumberSizeDCI-0-2-Ext-r19 with value range of ‘INTEGER (0..5)’,
    - harq-ProcessNumberSizeDCI-1-2-Ext-r19 with value range of ‘INTEGER (0..5)’,
    - harq-ProcessNumberSizeDCI-0-3-Ext-r19 with value range of ‘INTEGER (0..5)’,
    - harq-ProcessNumberSizeDCI-1-3-Ext-r19 with value range of ‘INTEGER (0..5)’.

Agreement

Adopt the following TPs to TS 38.212.

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| 7.3.1.1.2 Format 0\_1  <Unchanged parts are omitted>  - HARQ process number - 5 bits if higher layer parameter *harq-ProcessNumberSizeDCI-0-1* or *harq-ProcessNumberSizeDCI-0-1-Ext-r19* is configured; otherwise 4 bits  <Unchanged parts are omitted>  7.3.1.1.3 Format 0\_2  <Unchanged parts are omitted>  - HARQ process number - number of bits determined by the following:  - 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-2-v1700* if configured;  - 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-2-Ext-r19* if configured;  - otherwise 0, 1, 2, 3 or 4 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-2*  <Unchanged parts are omitted>  7.3.1.1.4 Format 0\_3  <Unchanged parts are omitted>  - HARQ process number - number of bits determined by the following:  - block number 1, block number 2,…, block number  Each block corresponds to the HARQ process number for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the HARQ process number for the cell with the smallest serving cell index. Each block is 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-3* or *harq-ProcessNumberSizeDCI-0-3-Ext-r19* configured for the cell corresponding to the block.  <Unchanged parts are omitted>  7.3.1.2.2 Format 1\_1  <Unchanged parts are omitted>  - HARQ process number - 5 bits if higher layer parameter *harq-ProcessNumberSizeDCI-1-1* or *harq-ProcessNumberSizeDCI-1-1-Ext-r19* is configured; otherwise 4 bits  <Unchanged parts are omitted>  7.3.1.2.3 Format 1\_2  <Unchanged parts are omitted>  - HARQ process number - number of bits determined by the following:  - 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-1-2-v1700* or *harq-ProcessNumberSizeDCI-1-2-Ext-r19* if configured;  - otherwise 0, 1, 2, 3 or 4 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-1-2*  <Unchanged parts are omitted>  7.3.1.2.4 Format 1\_3  <Unchanged parts are omitted>  - HARQ process number - number of bits determined by the following:  - block number 1, block number 2,…, block number  Each block corresponds to the HARQ process number for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the HARQ process number for the cell with the smallest serving cell index. Each block is 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-1-3* or *harq-ProcessNumberSizeDCI-1-3-Ext-r19* configured for the cell corresponding to the block.  <Unchanged parts are omitted> |

Two simultaneous SRS carrier switch (TEI identifier: [Simul\_SRSCS])

Proponent: Alberto (Qualcomm) [albertor@qti.qualcomm.com](mailto:albertor@qti.qualcomm.com)

Agreement

For the indication of whether a UE can simultaneously perform SRS carrier switches

* *srs-SwitchingAffectedBandsListNR-r17* is the baseline for indication.
  + *Details about UE capability will be discussed in UE feature session.*
  + *The structure of UE capability signalling is reused*
* Two SRS carrier switches are considered to be simultaneous if the SRS transmission (including RF retuning time) in both CCs overlap in time.
* A UE that indicates it is not capable of simultaneous SRS carrier switching among a set of switching pairs is not expected to be configured / scheduled with simultaneous SRS carrier switching in the set of switching pairs.
* Note: except for UE capability, the spec impact is only 38.214

UE frequency hopping enhancement for positioning (TEI identifier: [Pos\_SRSHop])

Proponent: Mengzhen (ZTE) li.mengzhen@zte.com.cn

Agreement

* Extend Rel-18’s UL frequency hopping UL SRS for positioning transmission to non-RedCap UEs in a single carrier
* UE capability for non-RedCap UEs for UL SRS frequency hopping for positioning transmission

Send LS to RAN2 to inform this agreement, whether new parameter is needed is up to RAN2 discussion.

Agreement

Send LS R1-2501573 to RAN2 with following information:

In RAN1#120 meeting TEI agenda, RAN1 has made the following agreement for enabling non-RedCap UE performing UL SRS frequency hopping for positioning:

|  |
| --- |
| Agreement   * Extend Rel-18’s UL frequency hopping UL SRS for positioning transmission to non-RedCap UEs in a single carrier * UE capability for non-RedCap UEs for UL SRS frequency hopping for positioning transmission   Send LS to RAN2 to inform this agreement, whether new parameter is needed is up to RAN2 discussion. |

As this agreement may relate to RAN2 specification, this liaison informs RAN2 about this agreement and whether new parameter for non-RedCap UE UL frequency hopping is needed is up to RAN2 discussion.

**To RAN2**

**ACTION:** RAN1 respectfully asks RAN2 to take the agreement into account in their Rel-19 specification, and feedback if there is any spec impact.

Agreement

* Adopt the following TP to Section 6.2.1.4.1, TS 38.214.

|  |
| --- |
| 6.2.1.4.1 SRS frequency hopping for positioning <Unchanged parts are omitted>  For operation in the same carrier, the reduced capability UE is not expected to be activated or triggered to transmit SRS on overlapping symbols with a SRS resource of the transmit frequency hopping configured by the higher layer parameter *SRS-PosTx-Hopping* including the switching time to or from the active bandwidth part and a SRS resource with *resourceType* of both SRS resources as 'semi-persistent' or 'aperiodic'.  A UE shall perform SRS frequency hopping for positioning according to clause 6.2.1.4.1, subject to UE capability, with the following modifications:   * “reduced capability UE” is replaced by “UE” * The reduced capability UE transmit frequency hopping is configured within one SRS resource for positioning in higher layer parameter *srs-PosConfig*, that may be configured with a bandwidth larger than the maximum bandwidth of the reduced capability UE” is replaced by “The UE transmit frequency hopping is configured within one SRS resource for positioning in higher layer parameter *srs-PosConfig*”. |

SR triggered SSSG switching (TEI identifier: [SRTrig\_SSSGSwitch])

Proponent: Wooseok (Qualcomm) wnam@qti.qualcomm.com

Agreement

* If a UE is instructed to monitor PDCCH according to search space sets with a group index other than adesignated index, the UE stops PDCCH monitoring according to search space sets with the group index and start PDCCH monitoring according to search space sets with the designated group index from the first slot that is at least P\_switch symbols after the last symbol of a PUCCH carrying an SR.
* Introduce corresponding UE capability and RRC parameters to enable/disable the above feature and indicate the designated SSSG index.
* Send LS to RAN2 to inform above agreement and ask for the support of the UE capability and the corresponding RRC parameters.

SRS-CS and UL TX switching (TEI identifier: [SRSCS\_ULTxSwitch])

Proponent: Ali (Apple) sfakoorian@apple.com

Agreement

* To resolve ambiguities with concurrent configuration of SRS-CS and ulTxswitch in a case where a UE configured with SRS CS on target CC and its “switch-from” CC on CC2 and configured with UL Tx switching operation for UL CC2 and at least one UL CC1
  + Confirm that the prioritization rules in 38.214 Sec. 6.2.1.3 are applied between target and CC1, regardless of SRS-AS antenna port configuration on target CC, if UE indicates based on srs-SwitchingAffectedBandsListNR-r17 that SRS-CS on target impacts CC1, where CC1 is one of the CC(s) which may share Tx chains with source CC. No spec change is needed.
    - Note: if UE does not indicate srs-SwitchingAffectedBandsListNR-r17, UE can only perform simultaneous transmission when the total number of involved Tx chains for simultaneous transmission on all the bands/carriers is not greater than number of Tx chains supported by the UE for simultaneous UL transmission. No spec change is needed.
  + If the UE is under the operation state in which all Tx chains are available at the source CC, the required switching time before the beginning of SRS-CS transmission on target CC is SRS-SwitchingTimeNR. Otherwise, the required switching time before the beginning of SRS-CS transmission on target CC is indicated by a UE capability. Details about UE capability will be discussed in UE feature session.
  + The existing scheduling restriction of maximum one switching per reference slot for UL Tx switching is also taking into account the triggered SRS CS
  + After SRS transmissions within an SRS resource set is done, if UE is indicated to transmit on CC1, the required switching time between the end of SRS-CS transmission on target CC and start of UL transmission on CC1 is indicated by the UE capability defined above. Otherwise, it is assumed for the determination of any future switching time that all Tx chains are returned to the source CC, and the RF tuning time to switch from target to source will be SRS-SwitchingTimeN

Conclusion

* For TEI [SRSCS\_ULTxSwitch], no new RRC parameters are introduced.

Agreement

* Adopt below TP on TS 38.214 for TEI [SRSCS\_ULTxSwitch].

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| <omitted text> 6.1.6 Uplink switching The UE may omit uplink transmission during the uplink switching gap if the conditions defined in this clause are met and the UE is configured with *uplinkTxSwitching* or *uplinkTxSwitchingMoreBands*. The switching gap is indicated by UE capability *uplinkTxSwitchingPeriod2T2T* if *uplinkTxSwitching-2T-Mode* is configured, and *uplinkTxSwitchingPeriod* otherwise in clauses 6.1.6.1, 6.1.6.2.0, 6.1.6.3, and is determined based on higher layer parameter *switchingPeriodConfigForBandPair* in clause 6.1.6.2.2 for uplink switching configured with 2, 3 or 4 uplink bands if *uplinkTxSwitchingMoreBands* is configured:  - If a UE indicated a capability for uplink switching with *BandCombination-UplinkTxSwitch* 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 are defined for each of the cases in clauses 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(s) triggering the switch given in clause 5.3, clause 5.4, clause 6.1, clause 6.2.1, clause 6.4 and in clause 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, 1, µUL, 2*), where the *µUL, 1* corresponds to the subcarrier spacing of the active UL BWP of one uplink carrier before the switching gap and the *µUL, 2* corresponds to the subcarrier spacing of the active UL BWP of the other uplink carrier after the switching gap.  For uplink switching configured with 3 or 4 uplink bands  - If two contiguous intra-band uplink carriers are configured to a UE, the UE may assume that the active UL BWPs of the two carriers are configured with the same subcarrier spacing.  - The UE does not expect to perform more than one uplink switching in a reference slot with *µUL*, where the *µUL* corresponds to the maximum subcarrier spacing of the active UL BWPs of all the configured uplink carriers.  - If 500 µs is determined by the UE capability *uplinkTxSwitchingMinimumSeparationTime*, when within any two consecutive reference slots corresponding to numerology *µUL*,  - the UE first performs one uplink switch and later performs another uplink switch and  - at least three bands are involved in the transmissions before the first switch, between the first switch and the second switch, and after the second switch,  the separation time between the start of all transmission(s) after the first switch and the start of all transmission(s) after the second switch is not expected to be less than 500 µs. If other than 500 µs is determined by the UE capability *uplinkTxSwitchingMinimumSeparationTime*, no additional restrictions apply.  - If an uplink switching is triggered for uplink transmission(s) with a gap between the start of the first uplink transmission(s) and the end of the last preceding uplink transmission(s) that is smaller than the determined switching gap , the UE determines the band of the switching period location, defined in [8, TS 38.101-1] based on the priority of the bands configured by *uplinkTxSwitchingBandList*. Among the bands either in switch-from or switch-to bands but not both, the switch is located on either,  - the switch-from band(s) if the highest priority band is a switch-to band, or  - the switch-to band(s) if the highest priority band is a switch-from band.  If an uplink carrier is configured as a switch-from carrier for a UE with higher layer parameter *srs-SwitchFromServCellIndex* and *srs-SwitchFromCarrier* as defined in clause 6.2.1.3 and the uplink carrier is also configured with *uplinkTxSwitching* or *uplinkTxSwitchingMoreBands*, then  - if an uplink switching is triggered by an uplink transmission on a band other than the band where the switch-from carrier is configured and the preceding uplink transmission is an SRS transmission as defined in clause 6.2.1.3,  - if the uplink transmission is not associated with a DCI, or it is based on a DCI ending at least symbols before the end of the SRS transmission, then the uplink switching gap in this clause is determined as if the UE indicates [*SRSCS\_ULTxSwitch*] set to ‘sum’ for the band combination and otherwise,   * Otherwise, if the DCI triggering uplink Tx switching does not end in the time interval [T-N2, T+ - N2], where T is the end of the SRS transmission, the uplink switching gap in this clause is determined as * if the UE indicates [*SRSCS\_ULTxSwitch*] set to ‘sum’ for the band combination, * if the UE indicates [*SRSCS\_ULTxSwitch*] set to ‘max’ for the band combination; * UE does not expect to receive the DCI triggering uplink Tx switching ending in the time interval [T-N2, T+ - N2], where T is the end of the SRS transmission,   - where is the switching gap determined in this clause assuming that one uplink channel or signal were transmitted on the switch-from carrier and would trigger an UL Tx switch.  - the UE does not expect to perform both uplink switching and the switching defined in clause 6.2.1.3 in a reference slot with µUL, where the µUL corresponds to the maximum subcarrier spacing of the active UL BWPs of all the configured uplink carriers.  - if an uplink transmission is triggered on the band where the switch-from carrier is configured and the preceding uplink transmission is an SRS transmission as defined in clause 6.2.1.3, no uplink switching is triggered by this clause.  <omitted text> 6.2.1.3 UE sounding procedure between component carriers For a carrier of a serving cell *c1* with slot formats comprised of DL and UL symbols, not configured for PUSCH/PUCCH transmission, denote as the corresponding carrier of a serving cell whose UL transmissions are temporarily suspended as signalled by higher layer parameter *srs-SwitchFromServCellIndex* and *srs-SwitchFromCarrier*. Define the set as the set of carriers of serving cells that each carrier meets one of the following conditions:  - is in the same band and same TAG as;  - is a carrier of inter-band CA with and is indicated through the capability signalling *srs-SwitchingAffectedBandsListNR-r17* to be affected by the SRS switch from to ;  where .  A UE can be configured with SRS resource(s) on a carrier *c1* with slot formats comprised of DL and UL symbols and not configured for PUSCH/PUCCH transmission. For carrier *c1*, the UE is configured with higher layer parameter *srs-SwitchFromServCellIndex* and *srs-SwitchFromCarrier* the switching from carrier *c2* which is configured for PUSCH/PUCCH transmission. During SRS transmission on carrier *c1* (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133] as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR* or as defined by below), the UE temporarily suspends the uplink transmission on carriers in the set *S(c2)*.  For an SRS transmission starting in symbol of carrier and a conflicting transmission in any carrier starting in symbol, the UE shall apply the prioritization / dropping rules in the remainder of this clause taking into account:  - DCI(s) for which the time interval between the last symbol of PDCCH and is at leastsymbols and an additional time duration , and the time interval between the last symbol of PDCCH and is at least symbols*;* and  - semi-persistent CSI reports or SRS considered active at least symbols and an additional time duration before , and considered active at least symbols before .  where  - if the switch-from carrier is not configured with Uplink switching as defined in clause 6.1.6,  ,  - if the switch-from carrier is configured with Uplink switching as defined in clause 6.1.6  - if the UE indicates [*SRSCS\_ULTxSwitch*] set to ‘max’ for the band combination,  ,  - if the UE indicates [*SRSCS\_ULTxSwitch*] set to ‘sum’ for the band combination,  ,  where is determined in clause 6.1.6 assuming that one uplink channel or signal were transmitted on the switch-from carrier and would trigger an UL Tx switch. , if no uplink switching were triggered.  and the time interval unit of OFDM symbol is counted based on the smaller subcarrier spacing across any carrier within the set , and their corresponding scheduling cells.  The following prioritization rules shall be applied in case of collision between a transmission of SRS over carrier and transmission of a physical signal/channel over a carrier of a serving cell in set  - the UE shall not transmit SRS whenever SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133] as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell and PUSCH/PUCCH transmission carrying HARQ-ACK/positive SR/RI/CRI/SSBRI and/or PRACH on a carrier of a serving cell in set happen to overlap in the same symbol  - the UE shall not transmit a periodic/semi-persistent SRS whenever periodic/semi-persistent SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133] as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell and PUSCH transmission carrying aperiodic CSI on a carrier of a serving cell in set happen to overlap in the same symbol  - the UE shall drop PUCCH/PUSCH transmission carrying periodic/semi-persistent CSI comprising only CQI/PMI/L1-RSRP/L1-SINR, and/or SRS transmission on a carrier of a serving cell in set configured for PUSCH/PUCCH transmission whenever the transmission and SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133] as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell happen to overlap in the same symbol  - the UE shall drop PUSCH transmission carrying aperiodic CSI comprising only CQI/PMI/L1-RSRP/L1-SINR on a carrier of a serving cell in set whenever the transmission and aperiodic SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133]) as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell happen to overlap in the same symbol.  <omitted text> |