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

**20th – 24th April, 2020**

**Agenda item:**5.4.1.1

**Source:** Huawei, ZTE

**Title:** Summary of offline [005][NR15] L1 Configuration

**Document for:**  Discussion and Decision

1. Introduction

This is a summary of offline discussion for the following documents:

**L1 Configuration**

* [AT109bis-e][005][NR15] L1 Configuration (Huawei, ZTE)

Scope: Treat R2-2002551, R2-2003537, R2-2003538, R2-2002697, R2-2002698

Part 1: Determine which issues that need resolution, find agreeable proposals. Deadline: April 23 0700 UTC

Part 2: For the parts that are agreeable, discussion will continue to agree on CRs.

[R2-2002508](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002508.zip) Reply LS for clarification of PUCCH configuration (R1-2001306; contact: Huawei) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2

=> Revised in [R2-2002551](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002551.zip)

[R2-2002551](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002551.zip) Reply LS for clarification of PUCCH configuration (R1-2001306; contact: Huawei) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2

[R2-2003537](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2003537.zip) Correction on PUCCH configuration Huawei, HiSilicon CR Rel-15 38.331 15.9.0 1567 - F NR\_newRAT-Core

[R2-2003538](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2003538.zip) Correction on PUCCH configuration Huawei, HiSilicon CR Rel-16 38.331 16.0.0 1568 - A NR\_newRAT-Core

[R2-2002697](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002697.zip) Clarification on SRS-CarrierSwitching structure ZTE Corporation, Sanechips, Qualcomm Incorporated discussion Rel-15 NR\_newRAT-Core

[R2-2002698](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002698.zip) CR on SRS-CarrierSwitching ZTE Corporation, Sanechips, Qualcomm Incorporated CR Rel-15 38.331 15.9.0 1518 - F NR\_newRAT-Core

2. Discussion

## 2.1 Correction on PUCCH configuration (R2-2003537, R2-2003537)

The reason for change is:

|  |
| --- |
| RAN2 sent an LS to RAN1 in R2-1916481 to ask about PUCCH configuration for NR standalone and late drop architectures, and RAN1 replied the LS in R1-2001306 (which is R2-2002551 above) with the following clarification:*The restriction for PUCCH configuration for EN-DC in the LS is also applied to NGEN-DC and NE-DC.**For NR-CA (without configured SCG), the restriction in the LS is not applied. The maximum number of PUCCH groups is two, i.e. only primary PUCCH group and secondary PUCCH group are allowed at most.**For NR-DC, the maximum number of PUCCH groups in each CG is one. Only the same numerology is supported for the CG with carriers only in FR2.*Note that for NR standalone (i.e. NR-CA above), there is already a clarification, “If supported by the UE, the network may configure at most one additional SCell of a cell group with PUCCH-Config (i.e. PUCCH SCell)” in the specification. |

Therefore, it is proposed to capture the PUCCH configuration restriction as indicated in R2-2002551 for NGEN-DC, NE-DC and NR-DC..



**Q1) Do companies agree with the changes in the CR** **R2-2003537?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (if any)** |
| Qualcomm | Yes | The change shown by Huawei in R2-2003537 is aligned with RAN1 LS.  |
| Nokia | Yes |  |
| CATT | Yes | Seems according to RAN1 LS. |
| Ericsson | Yes | Additionally, some editorials could be corrected too: (“The” -> “the”, Delete “And”).In (NG)EN-DC and NE-DC, The NW configures at most one serving cell per frequency range with PUCCH. And in (NG)EN-DC and NE-DC, if two PUCCH groups are configured, the serving cells of the NR PUCCH group in FR2 use the same numerology. For NR-DC, the maximum number of PUCCH groups in each cell group is one, and only the same numerology is supported for the cell group with carriers only in FR2. |
| Intel | Yes |  |
| ZTE | Yes |  |
| NTT DOCOMO | Yes | Agree on editorial corrections suggested by Ericsson. |
| Huawei, Hisilicon | Yes | Also fine with editorial changes suggested by Ericsson. |
| Samsung | Yes | Seems according to RAN1 LS. |

## 2.2 Clarification on SRS-CarrierSwitching ([R2-2002697](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002697.zip), [R2-2002698](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002698.zip))

In discussion paper R2-2002697, it observes that the SRS-CarrierSwitching configuration is defined differently in LTE and NR spec. In LTE, the TypeA field “typeA-SRS-TPC-PDCCH-Group-r14” is defined under PCell configuration (i.e. per-UE configured). So the definition of “SEQUENCE (SIZE (1..32)) OF… ” structure is used to indicated the mapping relationship between each PUSCH-less Scell and CC set. While for Type B, the field “typeB-SRS-TPC-PDCCH-Config-r14” is per Scell configured.

However, in NR, both Type A and Type B configuration are defined within a single structure “SRS-CarrierSwitching”, which can be per-cell configured. So for Type A, by including SRS-CarrierSwitching field in PUSCH-less Scell’s configuration, the network is able to indicate the “switch from serving cell”, “monitoring cells” and “CC set” configuration for each PUSCH-less Scell. Then it is unclear how to interpret the “SEQUENCE (SIZE (1..32)) OF …” structure defined for Type A, e.g. what is the meaning of each entry of this list?

SRS-CarrierSwitching ::= SEQUENCE {

srs-SwitchFromServCellIndex INTEGER (0..31) OPTIONAL, -- Need M

srs-SwitchFromCarrier ENUMERATED {sUL, nUL},

srs-TPC-PDCCH-Group CHOICE {

 typeA SEQUENCE (SIZE (1..32)) OF SRS-TPC-PDCCH-Config,

 typeB SRS-TPC-PDCCH-Config

} OPTIONAL, -- Need M

monitoringCells SEQUENCE (SIZE (1..maxNrofServingCells)) OF ServCellIndex OPTIONAL, -- Need M

...

}

Considering each PUSCH-less Scell can be configured with different “switch from” serving cell (as in LTE). To solve this problem, it is proposed to clarify in spec that only the first entry of “SEQUENCE” can be configured in this release, and it corresponds to the serving cell which provides the SRS-CarriersSwitching configuration (i.e. SRS “switch to” Scell).

**Proposal 1: For typeA within SRS-CarrierSwitching of a serving cell, clarify that only the first entry of “SEQUENCE(SIZE(1.32) OF…” list can be configured in this release, wherein the first entry corresponds to this serving cell.**

**Q1: For Type A, do companies agree the meaning of each entry of “SEQUENCE (SIZE (1..32)) OF ..” structure is unclear? (If answers “Disagree”, please provide your explanation on how to interpret this list)**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Qualcomm | Agree  | We have the same understanding as rapporteur that why *typeA* has 32 entries of *SRS-TPC-PDCCH-Config* is unclear, and the clarification is required. We think this ambiguity results from the different RRC Serving Cell configuration structures between LTE and NR:* In LTE, *typeA* (with 32 *SRS-TPC-PDCCH-Config*) is configured only in Pcell (*PhysicalConfigDedicated***)**, where the index (1-32) is corresponding to each serving cell (i.e. serving cell index) within the same cell group, i.e. per UE configured.
* In NR, *typeA* (also with 32 *SRS-TPC-PDCCH-Config*) is configured in each PUSCH-less Scell (in *UplinkConfig* of *ServingCellConfig),* i.e. per Scell configured.

Then we are not sure why in NR, *typeA* (in each PUSCH-less Scell) also needs 32 entries of *SRS-TPC-PDCCH-Config,* whichresults in up to 32\*32= 1024 total entries of *SRS-TPC-PDCCH-Config* for one UE.In order to NR SRS switching work, we think the clarification is required. Otherwise, the spec of NR SRS switching is broken, and may block IODT of NR SRS switching. |
| Nokia | Agree | Looking at the changes it seems the feature is broken. Nokia would be fine with these with the condition that we note that the feature shall not be implemented without this version of specifications. |
| CATT | Agree. | We agree with the issue and also we think the proposed change is ok. |
| Ericsson |  | We think it is possible for the network to provide a consistent configuration across PUSCH-less Scells. The signalling is also very (very) flexible. If there is some lack of understanding between UE and network we would be interested in knowing more.[ZTE] There can be only one understanding: Either the 32 entries correspond to all serving cell indexes (in ascending order). Or only first entry is used. Allowing both understandings is not flexible, is a mess. [Qualcomm] We understand Ericsson proposed another approach to resolve this issue:* Alt-2: each entry of *TypeA* represents a serving cell. And NW ensures that the value of *typeA* in each configured serving cell are same across different carriers

If this understanding is correct, we agree it can also work. But then it is required to capture the restriction (“NW ensures that the value of *typeA* in each configured serving cell are same across different carriers”) in field description of *typeA.* Otherwise, the UE may be confused. We don’t prefer this approach because:* It is ignaling unnecessarily wasteful, and still needs a clarification captured in RRC spec.
* It will restrict the possible future extension for this 32 entries structure (e.g. other entries than 1st may be used to indicate new grouping approach in future release)

Due to the complexity of this signalling, we think if there is a need to make changes to the signalling we should be very careful and perhaps think about this a bit more. With the proposal typeA is basically the same as typeB.[ZTE] We disagree with the comment: “with the proposal typeA is basically the same as type B”. The main difference between typeA and typeB is that typeA can configure cc-SetIndex and cc-IndexInOneCC-Set (typeB cannot configure those as mentioned in Q3). By associating PUSCH-less Scells with CC sets, type A can work as defined in RAN1. SRS-TPC-PDCCH-Config ::= SEQUENCE {srs-CC-SetIndexlist SEQUENCE (SIZE(1..4)) OF SRS-CC-SetIndex OPTIONAL -- Need M}SRS-CC-SetIndex ::= SEQUENCE {cc-SetIndex INTEGER (0..3) OPTIONAL, -- Need Mcc-IndexInOneCC-Set INTEGER (0..7) OPTIONAL -- Need M}[Qualcomm] Same understanding as ZTE. The intention to introduce TypeA is to reduce overhead in DCI 2-3 in case of more than 5CC compared with TypeB. Specially, * TypeB is used in 5CC or less with DCI 2-3 contents as {carrier1, TPC1, carrier2, TPC2, etc…}
* TypeA is used in more than 5CC with DCI 2-3 contents as {group field, TPC 1, TPC 2, TPC 3, …}, where grouping and CC trigger order is configured via *cc-SetIndex and cc-IndexInOneCC-Set of TypeA*

These has been captured in TS 38.214. We don’t understand why the change in RRC can make TypeA same as TypeB. |
| ZTE | Agree | We think the feature is broken without clarification on the “32 entries”. In any case, the spec should be clear on how to interpret those fields, otherwise, it is impossible for network and UE to implement the functionality and do IoT test.  |
| NTT DOCOMO | Agree | We agree on the fact that functionality is broken. |
| Huawei, Hisilicon | Agree | We also think how to configure typeA for SRS TPC is unclear in the current specification and some clarification is needed. Regarding Qualcomm’s interpretation of Ericsson’s solution, we also think it is unnecessarily complicated and wasteful to configure the same list on different pusch-less SCells. |
| Samsung | Agree | As mentioned in this contribution, the signaling structure for Type A is different with LTE RRC (i.e. For NR, it is configured per Cell but it is configured per CG in LTE). |

**Q2: If answers “Agree” to Q1, do companies agree the proposed solution (i.e. only use the first entry), and any comments to the CR in** [R2-2002698](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002698.zip)**? (If answers “Disagree”, please provide your solution on how to solve this issue)**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Qualcomm | Agree | At this stage, because Rel-15 ASN.1 has been frozen, it is impossible to revert NR SRS switching back to the same RRC configuration as LTE SRS switching. Thus, we think the approach in R2-2002698 is the best one to resolve the issue. It requires only one clarification in RRC, and keeps the signalling consistent for both TypeA and typeB in that the *SRS-CarrierSwitching* IE will only be configured be on the target cells (i.e. monitoring cell does not need it) |
| Nokia | Agree |  |
| CATT | Agree. |  |
| Ericsson |  | Due to the complexity of this signalling, we think if there is a need to make changes to the signalling we should be very careful and perhaps think about this a bit more. With the proposal typeA is basically the same as typeB.[ZTE]See our comment in Q1, the proposal does NOT make typeA same as typeB.  |
| ZTE | Agree |  |
| NTT DOCOMO |  | Tend to agree with Ericsson. We understand that the other approach explained in the paper is the same as in LTE. Not sure why the same approach has the problem. Is it intended to change the LTE spec as well?[Qualcomm] We assume “the other approach” means Alt-2 we list in our comments to Ericsson, right? We explain the issues of Alt-2 in the comments.The CR is not intended to change LTE spec. As we indicated in our comments in Q1, only NR SRS switching has this issue (spec broken) because of different RRC Serving Cell configuration structures between LTE and NR. |
| Huawei, Hisilicon | Agree | Regarding Qualcomm’s interpretation of Ericsson’s solution, we also think it is unnecessarily complicated and wasteful to configure the same list on different pusch-less SCells. |
| Samsung | Agree | Restriction only for the first entry is fine to us. |

For Type B in NR, there is no need to configure any SRS CC set to UE, thus it is meaningless to invoke SRS-TPC-PDCCH-Config structure when the CHOICE is set to ‘typeB’. However, the field descriptions only mention the cc-SetIndex and cc-IndexInOneCC-Set sub-field are not applicable to typeB. Then it is confused whether network should provide srs-CC-SetIndexlist (with empty sub-fields) to UE. So it is proposed to add the similar restriction to srs-CC-SetIndexlist field.

**Q3: Do companies agree to clarify in field description that srs-CC-SetIndexlist is not configured by network in case of Type B (as in** [R2-2002698](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002698.zip))**?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Qualcomm | Agree | In our understanding, it is to fix an ASN.1 coding issue, i.e. avoid NW configuring an empty *srs-CC-SetIndexlist* for typeB. We think it makes sense. |
| Nokia | Agree |  |
| CATT | Agree |  |
| Ericsson | Disagree | This is not really a major problem and would introduce differences in UE behaviour between Rel-15 and Rel-16 UEs. It is not the most efficient signalling, but it is not that much overhead either. |
| Intel | Agree |  |
| ZTE | Agree |  |
| NTT DOCOMO | Agree |  |
| Huawei, Hisilicon | Agree |  |
| Samsung | Agree, but | It is indeed needed clarification. BTW, the current text (i.e. The network does not configure this field for typeB.) in the field descriptions for cc-IndexInOneCC-Set and cc-SetIndex have no meaning.We think it would be better to remove these text to avoid confusion. |

# Conclusion

In the previous sections we made the following observations:

Based on the discussion in the previous sections we propose the following:

# References

[1] [R2-2002508](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002508.zip) Reply LS for clarification of PUCCH configuration (R1-2001306; contact: Huawei) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2

=> Revised in [R2-2002551](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002551.zip)

[2] [R2-2002551](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002551.zip) Reply LS for clarification of PUCCH configuration (R1-2001306; contact: Huawei) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2

[3] [R2-2003537](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2003537.zip) Correction on PUCCH configuration Huawei, HiSilicon CR Rel-15 38.331 15.9.0 1567 - F NR\_newRAT-Core

[4] [R2-2003538](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2003538.zip) Correction on PUCCH configuration Huawei, HiSilicon CR Rel-16 38.331 16.0.0 1568 - A NR\_newRAT-Core

[5] [R2-2002697](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002697.zip) Clarification on SRS-CarrierSwitching structure ZTE Corporation, Sanechips, Qualcomm Incorporated discussion Rel-15 NR\_newRAT-Core

[6] [R2-2002698](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2002698.zip) CR on SRS-CarrierSwitching ZTE Corporation, Sanechips, Qualcomm Incorporated CR Rel-15 38.331 15.9.0 1518 - F NR\_newRAT-Core