3GPP TSG-RAN WG2 #115-e electronic R2-2110701

Electronic, 1 – 12 Nov 2021

Agenda Item: 5.4.1.1

Source: Ericsson

Title:  [Post115-e][054][NR15] Common Fields Dedicated Signalling (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [Post115-e][054][NR15] Common Fields Dedicated Signalling (Ericsson)

Scope: Continue discussion from baseline at R2 115-e.   
1) to address specific issues, such as SUL/IAB.

2) to find an agreeable description of the desired behaviour, e.g. a generic statement such as: “Fields that are dedicated configurations should be subject to UE capability check (regardless IE name). Fields that are cell specific configurations, but also distributed in dedicated signalling does not need to be subject to UE capability check”; OR e.g. a list of fields and how each should be handled, OR both/combination.

Intended outcome: Report

Deadline: Long

Deadline: October 21th, 0900 UTC

Contact person(s) for each participating company:

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# 2 Discussion

## 2.1 Agreements reached so far

At RAN2-115e the following agreements were captured in the chairman notes:

* **Fields that are present in ServingCellConfigCommon delivered by dedicated signalling shall have the same value as the corresponding field in SIB1.**
* **Confirm that dedicatedSIB1-Delivery shall have the same fields and values as the broadcasted SIB1.**

According to the first agreement above, the need for alignment with SIB1 applies only for the bold fields in the RRCReconfiguration message:

1> RRCReconfiguration-IEs

2> secondaryCellGroup (type *CellGroupConfig*)

3> spCellConfig

4> reconfigurationWithSync

5> **spCellConfigCommon** (type ServingCellConfigCommon)

3> sCellToAddModList

4> **sCellConfigCommon** (type ServingCellConfigCommon)

2> nonCriticalExtension (RRCReconfiguration-v1530-IEs)

3> masterCellGroup (type *CellGroupConfig*)

4> spCellConfig

5> reconfigurationWithSync

6> **spCellConfigCommon** (type ServingCellConfigCommon)

4> sCellToAddModList

5> **sCellConfigCommon** (type ServingCellConfigCommon)

The **content of fields outside those occurrences of ServingCellConfigCommon is independent of values configured in MIB or SIB and it is subject to capability validation**. And this is independent of the names of those fields or types, i.e., it applies even if the name of the containing IE ends with „*Common*“. Prominent examples are ...

1> RRCReconfiguration-IEs

1> nonCriticalExtension (RRCReconfiguration-v1530-IEs)

2> masterCellGroup (type CellGroupConfig)

3> spCellConfig

4> spCellConfigDedicated

5> downlinkBWP-ToAddModList

6> bwp-**Common** (type BWP-DownlinkCommon)

7> pdcch-Config**Common**

7> pdsch-Config**Common**

5> uplinkConfig

6> uplinkBWP-ToAddModList

7> bwp**-Common**

5> supplementaryUplink

6> uplinkBWP-ToAddModList

7> bwp-**Common**

## 2.2 Remaining issues

### 2.2.1 Need to omit fields in ServingCellConfigCommon

The agreements cited in section 2.1 state that fields in *RRCReconfiguration-> ...-> ServingCellConfigCommon* shall have the same values as in the corresponding SIB. However, it has been suggested that the gNB should **omit** fields in those IEs for which the UE does not support the corresponding functionality.

In the recent discussions some companies said that a UE should in any case be able to parse the ASN.1 even if it does not support the functionality associated to some of the contained fields. Hence, it should be easy for a UE to accept the RRCReconfiguration even if it does not comprehend the purpose of some of the fields in ServingCellConfigCommon.

However, one company raised the concern that the (unfortunate) use of “Need M” on various levels of ServingCellConfigCommon would require that a UE handles those fields in terms of delta signalling.

Example: A UE does not support SUL on the band of the current PCell but the cell provides *supplementaryUplinkConfig* in *ServingCellConfigCommon* and in *ServingCellConfigCommonSIB*. Since the UE does not support the feature, it could in principle ignore the fields in ASN.1. However, if the network triggers an inter-frequency handover to a PCell on which the UE supports SUL and on which the network uses SUL, the UE must have maintained the *supplementaryUplinkConfig* of the source cell to correctly interpret the delta configuration obtained from the target cell in *ServingCellConfigCommon*.

**Q1: Should the gNB omit fields in “*RRCReconfiguration-> ...-> ServingCellConfigCommon*” and/or in “*dedicatedSIB1-Delivery*” for which the UE does not support the corresponding feature? If not, is the UE required to handle delta signalling (Need M) for those fields?**

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| **Company** | **Comments** |
| Ericsson | No, the gNB should not be required to omit those fields.  The intention has always been that the fields in ServingCellConfigCommon are treated as if the UE had received them via system information. This means that the gNB should provide the same value as in SIB1 (otherwise the UE would override the value with the value found in SIB1 of the target cell) and that the gNB does not need to validate them against the UE capabilities.  For some fields the gNB could in principle omit the value if the UE does not support the associated feature according to its capabilities. However, for some fields no capability bit exists. Introducing a capability bit later is not backwards compatible.  We agree to the complication due to the use of Need M in ServingCellConfigCommon and its child IEs. However, in the example with *supplementaryUplinkConfig* the UE supports the feature on another band and hence knows how to deal with the delta signalling of those parameters.  For all future additions to ServingCellConfigCommon (including all child IEs) RAN2 should use “Need R” and “Need N” only. |
| Qualcomm Incorporated | From the UE behaviour point of view, the current specification is not 100% clear. ServingCellConfigCommonIssue 1)Section 5.3.5.8.2 (Inability to comply with *RRCReconfiguration*) of 38.331 states that the UE shall initiate the connection re-establishment procedure “if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message”. The specification text does not distinguish the handling between *ServingCellConfigCommon* and *ServingCellConfig*. Issue 2)  Even if the UE disregards the configuration that it does not support, it is not clear in the current specification whether the UE;   * Ignores the configuration, but stores the configuration (for further delta configuration), or * Ignores and discards the configuration.   Issue 3)  Yet another issue is compatibility of configurations in *RRCReconfiguration*. Taking SUL configuration again, when the network does not intend to configure SUL and does not omit SUL configuration in *ServingCellConfigCommon*, the overall configuration indicates that SUL is configured in *ServingCellConfigCommon*, but not in *ServingCellConfig*. This means that even if the UE supports SUL, the UE shall be able to gracefully ignore the common configuration and consider that SUL is not configured by the *RRCReconfiguration* message, which again is not clear in the current specification.  dedicatedSIB1-Delivery  For “dedicatedSIB1-Delivery”, we think it is sufficiently clear from the IE name and procedural text that the UE treat it as reception of SIB1 as follows.  1> if the *RRCReconfiguration* message includes the *dedicatedSIB1-Delivery*:  2> perform the action upon reception of *SIB1* as specified in 5.2.2.4.2;  So we do not think that gNB needs to omit IEs/Fields according to the UE capability. |
| MediaTek | In *dedicatedSIB1-Delivery* à No  We believe that the common understanidng is that *dedicatedSIB1-Delivery* contains the same value as SIB1 broadcasted in common channel.  In *ServingCellConfigCommon* à No, but....  The UE could ignore the unsupported field in common configuration (as ignoring the NCE in SI). However, we do recoginze there is some ambigulity from current speficiaion. If there is legacy UE that handle in some different way for some field, we could have case by case discussion on how to resolve it. Having say that, we are still not clear on which filed really caused IODT problem in the field. Perhap there is no need to spend too much meeting time on this if there is no real issue.  Delta configuration aspect  If the feautre is not supported by UE completely, there is no delta configuration at all. The special case mentioned above (SUL) is ambigous because UE does support SUL but only in some bands. On this example, as the specification is not so clear, we think that the safe apporach is the NW always providing full configuration for SUL part. |
| Intel | In general, network should not have to consider UE capability for configCommon and omit fields that are not supported by the UE. However, if there are specific issues in the field, that should be addressed.  In *dedicatedSIB1-Delivery* à No  There does not seem to be any issues in the field with this.  In *ServingCellConfigCommon* à No, but....  As a general principle, network does not need to omit specific fields based on individual UE capability. UE can and should be able to ignore fields not supported in ConfigCommon based on ASN.1 extension principles. The specific case of *ServingCellConfigCommon* has not been captured explicitly though and hence any corresponding implementation issues in Rel-15 should be addressed. As a specific issue on SUL has been mentioned, an exception can be made for this field for Rel-15 UEs.  Delta configuration aspect  Delta configuration cannot be applied for SIB and configCommon fields as there is normally no mechanism to delete a configuration other than omit them (i.e., behave as Need R). For SIB, we have the following statement in spec:  Any field with Need M or Need N in system information shall be interpreted as Need R.  The same can also be applied for fields in IEs of *servingCellConfigCommon*. We think we need this as some IEs may be used in both dedicated and Common signalling and hence it may not be possible to use Need R for the fields of these IEs. |
| CATT | The intention has always been that the fields in ServingCellConfigCommon are treated as if the UE had received them via system information.  dedicatedSIB1-Delivery à No  No, the gNB should not be required to omit those fields which is provided the same value as in SIB1. ServingCellConfigCommon à No We didn't see the exact IOT issues which are mentioned as issue1),2),3)by QC. There is nothing break if legency UE follows the specification strictly.  So the gNB should not be required to omit those fields.  Delta configuration aspect  Although the use of Need M in ServingCellConfigCommon and its child IEs bring effort to UE because of the delta configuration, as Ericsson mentioned, in the example with *supplementaryUplinkConfig* the UE supports the feature on another band and hence knows how to deal with the delta signalling of those parameters. It seems there is no real IOT issue in Rel-15. |
| Huawei, HiSilicon | dedicatedSIB1-Delivery à No  Agree with others. ServingCellConfigCommon à No Agree with majorities that this should also be seen like system information. We are not sure either if there is a real IoT issue.  Regarding the SUL case mentioned above, as the SUL common configuration is treated like those in system information, the network would provide full configuration in the target cell, i.e. no delta issue. |
| Nokia | - For dedicatedSIB1-Delivery no need for network to prune the fields  - For the ServingCellConfigCommon we see no need for network to prune the field based on individual UE capability. Agree with Intel and MediaTek that if there are any specific issues with Rel-15 UEs out there which may be ignoring the fields and discarding them this may cause issues with delta signalling and RAN2 can discuss these on a case by case basis  - On the issue of delta configuration aspect for SUL, release of (dedicated) SUL configuration is only possible via fullConfig in Rel-15 or when the common SUL field is released. That's why the field to release it was added in Rel-16. Hence, releasing SUL fields must be done by full configuration in Rel-15 even if the band doesn't support SUL i.e. in the new cell the target cell does not make any assumptions on UE behaviour and always provides the field based on the UE capability and/or band (and not make any assumption about delta being thrown away at UE or retained due to ambiguous specification). But we need to discuss this on a case by case basis and we cannot agree to have any generic formulation unless we are all clear that there is really an issue there to fix. |
| OPPO | At least UE should not be required to handle delta signalling (Need M) for those fields, while based on the reply above, full-configuration seems a feasible way-out. If there are more concrete issues in field, further discussion is needed. |

It has been mentioned that some legacy UEs cause problems when they detect certain fields in ServingCellConfigCommon (e.g. due to the above-mentioned challenges related to delta signalling).

**Q2: Is there a need to introduce exceptions for dealing with issues identified in legacy UEs?**

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| **Company** | **Comments** |
| Ericsson | Preferably not. But if legacy UEs are known to have issues with presence of individual fields or with handling delta signalling thereof, we are open for work-arounds. |
| Qulacomm Incoporated | Yes, as in our input for Q1, we see multiple issues if we are to allow the network to include the configuration of a feature in *ServingCellConfigCommon*, even if the feature is not configured.  It is too late to change the release-15 UE behaivour. We are open for trying to resolve this for release-16. RAN2 then should look into each release-16 field in *ServingCellConfigCommon* to see whether those configurations will lead to any of the issues we mentioned in Q1. |
| MediaTek | Maybe, we would like to understand which field (in which kind of scenario) cause the problem and discuss work around if possible. |
| Intel | We are open to consider exceptions on an as needed basis. |
| CATT | Share the same understanding as Ericsson. |
| Huawei, HiSilicon | We would like to better understand the real issue. |
| Nokia | At least for Rel-15, we need this discusion on a case by case basis and we cannot agree to have any generic formulation unless we are all clear that there is really an issue there to fix. |
| OPPO | Share the same view that we need to better understand the issue in field. |

To avoid the above-mentioned problems in future and to simplify the handling of the fields in *ServingCellConfigCommon* and *ServingCellConfigCommonSIB*, it seems advisable to mark all optional fields added to those two IEs in future with “Need R” or “Need N”. In this context it should be noted that section 6.1.2 of 38.331 says already: “*Any field with Need M or Need N in system information shall be interpreted as Need R*”.

**Q3: Should all optional fields added in future to ServingCellConfigCommon and ServingCellConfigCommonSIB (including their child IEs) be marked as “Need R” or “Need N” (not as “Need M”)?**

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| **Company** | **Comments** |
| Ericsson | Yes! |
| Qualcomm Incorporated | This is indeed desirable, but probably needs careful review.  There are cases in the current ASN.1 structure that the same field is included in *ServingCellConfigCommon* and *ServingCellConfig*, e.g. *BWP-DownlinkCommon, SCS-SpecificCarrier*. It is not clear what this suggestion means for those cases. |
| MediaTek | Yes, in principle. There should be no delta configuration applicable for system information. The UE does not combine two SIB1 to make the finial configuration. We believe that “using Need R or Need N in SI” is already including in current ASN.1 rules.  However, as QC pointed out, it would request careful review while same IE is used in both dedicated message and SI. |
| Intel | While this is OK in principle, as mentioned above, it may not be possible for IEs that are used in dedicated and common signalling. For these, we will a statement similar to what we already have for SIBs: Any field with Need M or Need N in system information shall be interpreted as Need R. |
| CATT | Yes, from Rel-16. |
| Huawei, HiSilicon | Agree with Intel. For those fields also used in dedicated configurations, the existing statemetn is still valid. |
| Nokia | Agree with Intel: We cannot always used Need R for all (child) fields if the same configuration is used also in dedicated signalling. That's also why we have the statement for Need N/M - fields in SIBs. |
| OPPO | Agree with Intel. |

**Rapporteur Summary:**

For dedicatedSIB1-Delivery, it is clear from 38.331 procedural text that the UE treats SIB1 as if it was received on BCCH. No clarification is needed.

For ServingCellConfigCommon, gNB need not omit fields in “RRCReconfiguration- ... -> ServingCellConfigCommon” for which the UE does not support the corresponding feature.

* Problems with existing UE implementation issues (in Rel-15) should be addressed case by case when identified
* One identified Rel-15 case is SUL and delta-signalling upon handover. It has already been agreed that in Rel-15 the network uses the fullConfig option to release the SUL configuration.
* RAN2 should review each Rel-16 field in *ServingCellConfigCommon* for potential isues.
* In future it is recommended that optional fields added to ServingCellConfigCommon and ServingCellConfigCommonSIB (including their child IEs) be marked as “Need R” or “Need N” (not as “Need M”) but need careful review in case the IE is also included in ServingCellConfig.

In Q1, Qualcomm raised a slightly different topic: inconsistently configured fields for a feature that the UE supports (the feature is configured in *ServingCellConfigCommon* but not in *ServingCellConfig*. The rapporteur assumes this results in that UE considers the configuration is incomplete and does hence not use the feature. Nevertheless, the rapporteur considers this unavoidable if a feature relies on parameters signaled in the common branch (SIB1 and ServingCellConfigCommon) and on dedicated parameters and if some UEs are supposed to use the feature, but others are not. The rapporteur assumes that a UE that finds such parameters in SIB1 and/or ServingCellConfigCommon but not the associated parameters in ServingCellConfig will not use the feature. But the UE should not consider the configuration faulty. Nevertheless, RAN2 should discuss and confirm this aspect and discuss how to avoid or minimize such cases in future (e.g. decouple common configuration (initial access) from dedicated configuration (connected mode) wherever possible.

# 4 Conclusion

As result of this email discussion, the following is proposed:

1. For dedicatedSIB1-Delivery, it is clear from 38.331 procedural text that the UE treat SIB1 as if it was received on BCCH. No clarification is needed.
2. For ServingCellConfigCommon, the gNB does not need to omit fields in “RRCReconfiguration-> ... -> ServingCellConfigCommon” for which the UE does not support the corresponding feature.
3. Problems with existing UE implementation issues (in Rel-15) should be addressed case by case when identified.
4. One identified Rel-15 case is SUL and delta-signalling upon handover. It has already been agreed that in Rel-15 the network uses the fullConfig option to release the SUL configuration.
5. RAN2 should review each Rel-16 field in *ServingCellConfigCommon* for potential issues.
6. In future it is recommended that optional fields added to ServingCellConfigCommon and ServingCellConfigCommonSIB (including their child IEs) be marked as “Need R” or “Need N” (not as “Need M”) but need careful review in case the IE is also included in ServingCellConfig. To minimize such problems, RAN2 should only add those parameters to “xxxCommon” IEs that are needed for initial access.
7. RAN2 to discuss handling of inconsistently configured fields for a feature that the UE supports (the feature is configured in *ServingCellConfigCommon* but not in *ServingCellConfig*).