3GPP TSG-RAN WG2 #113 electronic R2-210xxxx

Electronic Meeting, 25th Jan – 5 Feb, 2021

Agenda Item: 6.1.2

Source: Intel Corporation

Title: [AT113-e][018][NR16] Summary of UE Cap Main (Intel)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT113-e][018][NR16] UE Cap Main (Intel)

Scope: Treat R2-2100018, R2-2100053, R2-2101058, R2-2100060, R2-2100954, R2-2101433, R2-2100013, R2-2100452, R2-2100453, R2-2100454, R2-2101020, R2-2100008, R2-21001486, R2-2100455, R2-2100385, R2-2100386, R2-2101873, R2-2101874, R2-2101821 + Incoming LSes at meeting, if any.

Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

Intended outcome: Report and Agreed CRs.

Deadline:

A first round with Deadline for comments Thursday Jan 28 1200 UTC to settle scope what is agreeable etc

Note that R2-2100018 and R2-2100053 are LS from RAN1 and RAN4 related to the R1 and R4 feature list which had been used in the mega CRs in the previous meeting. Hence they do not have to be treated here.

The following documents are treated in this discussion:

R2-2100385 UE capability of NR to UTRA-FDD CELL\_DCH CS handover Intel Corporation CR Rel-16 38.306 16.3.0 0485 - F SRVCC\_NR\_to\_UMTS-Core

R2-2100386 UE capability of NR to UTRA-FDD CELL\_DCH CS handover Intel Corporation CR Rel-16 38.331 16.3.1 2321 - F SRVCC\_NR\_to\_UMTS-Core

R2-2100013 Reply LS to RAN2 on beamSwitchTiming (R1-2009496; contact: vivo) RAN1 LS in Rel-16 TEI16 To:RAN2

R2-2100452 Correction on beamSwitchTiming capability vivo, Intel Corporation CR Rel-15 38.306 15.12.0 0488 - F TEI16

R2-2100453 Correction on beamSwitchTiming capability vivo, Intel Corporation CR Rel-16 38.306 16.3.0 0489 - A TEI16

R2-2100454 Correction on beamSwitchTiming-r16 capability vivo, Intel Corporation CR Rel-16 38.306 16.3.0 0490 - F TEI16

R2-2100008 LS on TPMI grouping capability (R1-2009449; contact: vivo) RAN1 LS in Rel-16 NR\_eMIMO-Core To:RAN2

R2-2100455 Correction on TPMI grouping capability vivo, Intel Corporation CR Rel-16 38.306 16.3.0 0491 - F NR\_eMIMO-Core

R2-2100060 LS on Rel-16 mandatory RRM requirements (R4-2017803; contact: CMCC) RAN4 LS in Rel-16 NR\_RRM\_enh-Core To:RAN2

R2-2100954 Capturing suppport of mandatory Rel-16 requirements Nokia, Nokia Shanghai Bell discussion Rel-16 NR\_RRM\_enh-Core

R2-2101058 Handling of other TEI features Lenovo, Motorola Mobility discussion Rel-16 TEI16

R2-2101020 Fixing issue with FGs 22-8a/b/c/d Nokia, Nokia Shanghai Bell CR Rel-16 38.306 16.3.0 0500 - F TEI16

R2-2101433 Clarification on UE capabilities with FDD/TDD differentiation Ericsson CR Rel-16 38.306 16.3.0 0509 - F NR\_newRAT-Core

R2-2101486 Correction on UE capabilities for enhanced MIMO Huawei, HiSilicon CR Rel-16 38.306 16.3.0 0513 - F NR\_eMIMO-Core

R2-2101821 Capability for dormant BWP switching of multiple SCells MediaTek Inc. discussion Rel-16

R2-2101873 CR on the Capability of PUCCH transmissions for HARQ-ACK-38331 ZTE Corporation, Sanechips,Intel CR Rel-16 38.331 16.3.0 2447 - F NR\_L1enh\_URLLC

R2-2101874 CR on the Capability of PUCCH transmissions for HARQ-ACK-38306 ZTE Corporation, Sanechips,Intel CR Rel-16 38.306 16.3.0 0521 - F NR\_L1enh\_URLLC

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# 2 Discussion

## 2.1 Part 1: Intended to determine agreeable parts

The proposals listed in this subsection 2.1 are extracted from CRs to facilitate the discussion and follow the numbering of the corresponding TDoc from which they were extracted (i.e. they do not represent actual proposals from this TDoc, which should be listed in subsection 2.2).

### 2.1.1 UE capability of NR to UTRA-FDD CELL\_DCH CS handover

In R2-2100385/386, the following are provided in the reasons for change and summary of change respectively:

It is noticed that the handover from NR to UTRA-FDD CELL\_DCH CS handover per UE capability has both xDD differentiation and FRx differentiation set to ‘Yes’. For such capability, the intention is to make these Rel-16 capabilities per band (instead of per UE) to resolve the issue that one combination of xDD diff and FRx diff is not possible when either XDD or FRX or both is set to ‘Yes’, as per LS to RAN1 [R2-2006367]:

*For release-16 UE capabilities for which both xDD and FRx differentiations are allowed, RAN2 intends to use “per band” capability signalling.*

1. Dummify the ***handoverUTRA-FDD-r16*** per UE capability in FRx and xDD differentiation signalling (i.e. remove the per UE ***handoverUTRA-FDD-r16*** from 38.306) in Section 4.2.9
2. Add per band capability for ***handoverUTRA-FDD-r16*** in Section 4.2.7.2 with the consistency statement ‘UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively’ to reflect that it is per UE capability even though it has been moved to per band capability

**Q1 Do companies agree to the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes (Proponent) |  |
| Lenovo | No | We see no harm if case 6 is not supported. At least it does not justify the late ASN.1 changes. |
| Qualcomm Incorporated | Yes | If RAN2 applies this change, it should be done in this meeting, OItherwise it becomes too late after March plenary from our perspective. |
| LG | No strong view | We are not convinced if case 6 should be supported for this capability. Fine with a majority view. |
| Nokia | No | Agree with Lenovo. |
| OPPO | Yes |  |
| vivo | Neutral | Slightly prefer to have this change as early as possible. But fine to follow the majority. |
| Huawei, HiSilicon | Yes | Ok to apply the agreed per band principle to handoverUTRA-FDD-r16 UE capability. |
| MediaTek | Yes | The proposal indeed follow previous RAN2 agreement. It is better to avoid FRx/xDD discussion again if we find case 6 is needed.  We are still OK to have this kind of ASN.1 change in Rel-16 at this quarter. But as QC mentioned, it may be too late in next meeting. |
| Ericsson | Yes | On the inter-operability analysis, maybe we should rather say that it is not clear how the current capability would be interpreted, and thus the network may not be able to configure handover to UTRA for SRVCC. |
| ZTE(LiuJing) | See comments | If we want to solve the problem for case 6, We think updating *handoverInterF* and *handoverLTE-EPC* (R15 capabilities) would be much more urgent than *handoverUTRA-FDD-r16*.  So if we fix this, we should fix all of them. Otherwise, we think it is ok to leave this Rel-16 cap as it is. |
| Samsung | Yes | Changes are aligned with what RAN2 agreed before. |
| CATT | Yes | We agree the changes since they aligned with what RAN2 agreed before. |

### 2.1.2 Correction on beam Switch Timing capabilities

RAN1 sends RAN2 a LS on the UE behaviour related to the beam switch timing capabilities in R2-2100013.

In R2-2100452/453, the following are provided on the change to the Rel-15 beamSwitchTiming field description in the reason for change and the summary of change, respectively:

1. In R15, when UE reports one value among {224, 336} for beamSwitchTiming, it will be used to determine UE expectation/behavior for aperiodic CSI-RS for tracking and latency requirements for L1-RSRP reporting, while UE behaviour/assumption regarding before or after beam switch timing is unspecified for measuring AP CSI-RS for CSI acquisition (without trs-Info and without repetition) and for beam management (with repetition ‘off’).
2. RAN1 listed ‘No recommendation on the desired beam switching timing’ as ‘Consequences if the feature is not supported by the UE’ in UE feature list R1-1907862.
3. In the description of Rel-15 beamSwitchTiming capability, add the description that:

*beamSwitchTiming* of value (*sym224* or *sym336*) will be used to determine UE expectation/behavior for aperiodic CSI-RS for tracking and latency requirements for L1-RSRP reporting, while UE behaviour/assumption regarding before or after beam switch timing is unspecified for measuring AP CSI-RS for CSI acquisition (without trs-Info and without repetition) and for beam management (with repetition ‘off’).

1. Remove the decription “If this field is not included, the beam switch timing is up to 48 OFDM symbols for each supported sub-carrier spacing.”

**Q2.1 Do companies agree with the proposed changes in the CRs? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes (Proponent) |  |
| Lenovo | Yes but | Change 1 should be added as a note as it’s a clarification how the values are used by NW and supported in RAN1 spec. |
| Qualcomm Incorporated | Yes, but | The following text is not very clear and does not seem suitable as specification text. Is it possible to add RAN1 specification reference explaining what the „explectation/behaviour“ is?  *beamSwitchTiming* of value (*sym224* or *sym336*) will be used to determine UE expectation/behavior for aperiodic CSI-RS for tracking and latency requirements for L1-RSRP reporting, |
| LG | Partly | Removed part is fine, but the added part is not necessary, since this is merely FYI provided by RAN1. |
| Nokia, Nokia Shanghai Bell | Yes |  |
| OPPO | Yes |  |
| vivo | Yes (Proponent) | Regarding the comments from Lenovo and LG: we think this part has not been clearly captured in RAN1 spec. Thus, we prefer to have field description here in 38.306 spec.  Regarding the comment from Qualcomm: we are fine to add the RAN1 specification reference. |
| Huawei, HiSilicon | Partly yes | We are ok with the second change, i.e. the removal, but we don’t think the first change is needed, as it was captured in RAN1 spec, RAN1 just informing RAN2 their understanding. |
| MediaTek | Yes, but | We wonder whether the following bullet (from RAN1 LS) also need to be captured.   In R15, if the UE indicates one value among {14, 28, 48} for beamSwitchTiming, the UE behavior for receiving AP-CSI-RS configured with repetition (set as ‘ON’ or ‘OFF’) with a scheduling offset smaller than reported beamSwitchTiming was unspecified, while the UE behavior for receiving AP-CSI-RS with a scheduling offset equal to or greater than reported beamSwitchTiming was specified. |
| Ericsson | Yes, but | We also agree with QC that we may just need to add reference to RAN1. |
| ZTE(Wenting) | Yes |  |
| Samsung | Yes |  |
| CATT | maybe | We also think this has been captured in R1 spec. |

For R2-2100454, the following are provided on the change to the Rel-16 beamSwitchTiming-r16 field description in the reason for change and the summary of change, respectively:

Regarding Rel-16 UE behavior, if the UE receives parameter *enableBeamSwitchTiming-r16*, then, the UE does the following:

* 1. **Answer A**: For CSI-RS configured with repetition “ON”, the UE applies switch time that is the same as the signalled value from the set {224, 336}
  2. **Answer B:** For CSI-RS configured with repetition “OFF”, the UE applies switch time of 48 if beamSwitchTiming-r16 is reported.
  3. **Answer C:** For CSI-RS configured without repetition and without *trs-info*, the UE applies switch time of 48 if beamSwitchTiming-r16 is reported.

In the description of Rel-16 beamSwitchTiming capability, add the description that:

For CSI-RS configured with repetition “OFF”, the UE applies beam switch time of sym48 if *beamSwitchTiming-r16* is reported. For CSI-RS configured without repetition and without *trs-info*, the UE applies beam switch time of sym48 if *beamSwitchTiming-r16* is reported.

**Q2.2 Do companies agree with the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes (Proponent) | One typo, it should be ‘In the description of Rel-16‘ rather than Rel-15 in the summary of change in the cover page. |
| Lenovo | Partly | The first change by adding „if enableBeamSwitchTiming-r16 is configured.“ is ok.  The second change clarifies UE behaviour and should be better added in the description of enableBeamSwitchTiming in 38.331. In this context the UE behaviour acc. to Answer A should be added in the description as well to be complete. |
| Qualcomm Incorporated | Yes |  |
| LG | Yes |  |
| Nokia, Nokia Shanghai Bell |  | Not sure if this last note from the RAN1 LS is captured correctly:   * + Note that if aperiodic CSI-RS resource set is configured with trs-info, only Rel-15 beamSwitchTiming is used according to RAN1 specification   The CR says: "For CSI-RS configured without repetition and without *trs-info*, the UE applies beam switch time of sym48 if *beamSwitchTiming-r16* is reported and *enableBeamSwitchTiming-r16* is configured."  So it is written with an inverse logic. But it is generic for CSI-RS, and not focused on AP CSI-RS as such and it mixes repetition and trs-info.  Please clarify the above to us as something is not seemingly consistent. |
| OPPO | Yes |  |
| vivo | Yes (Proponent) | Regarding the comments from Nokia:  Actually, the change in the CR comes from the below Answer from RAN1 LS “***Answer C:*** *For CSI-RS configured without repetition and without trs-info, the UE applies switch time of 48 if beamSwitchTiming-r16 is reported.*”.  For the last note from RAN1 LS “*Note that if aperiodic CSI-RS resource set is configured with trs-info, only Rel-15 beamSwitchTiming is used according to RAN1 specification*”, we did not make any change on this part, as we assume it is captured in RAN1 specification (i.e. mentioned by LS “*according to RAN1 specification*”). But we are also fine to add one note to capture this part in TS 38.306, if companies agree. |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes, but | We wonder whether RAN2 also has to capture the following bullet or it is already clear in RAN1 SPEC.  “ Note that if aperiodic CSI-RS resource set is configured with trs-info, only Rel-15 beamSwitchTiming is used according to RAN1 specification” |
| Ericsson | Partly | We are ok with the sentence „if enableBeamSwitchTiming-r16 is configured“. But we are not sure whether we really need to capture any further details in 38.306. |
| ZTE(Wenting) | Yes |  |
| Samsung | Yes |  |
| CATT | Yes |  |

### 2.1.3 TPMI grouping capability

RAN1 sends RAN2 a LS on adding the TPMI grouping index definition to TS38.306 in R2-2100008.

In R2-2100455, the following are provided in the summary of change:

:

In the description of Rel-16 capability *ul-FullPwrMode2-TPMIGroup*:

1. Add the description that 2bits bitmap with {TPMI=0} and {TPMI=1} and the TPMI index is as specified in Table 6.3.1.5-1 of TS 38.211 [6] for mode 2 in case of non-coherent with 2 ports.
2. Add the definition table of G0~G6 according to RAN1 conclusion.

**Q3 Do companies agree with the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes (Proponent) |  |
| Qualcomm Incorporated | Yes |  |
| LG | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes |  |
| OPPO | Yes |  |
| vivo | Yes (Proponent) |  |
| Huawei, HiSilicon | Yes with comments | The wording in R2-2101486 is clearer. About the table, perhaps it would fit better in RAN1 specifications ? (but no strong opinion). |
| Ericsson | Yes | We should align the description with the rest of 38.306, e.g. “The leading / leftmost bit (bit 0) corresponds to {TPMI index = 0}. The next bit (bit 1) corresponds to {TPMI index = 1}“. |
| ZTE(Wenting) | Yes |  |
| Samsung | Yes |  |
| CATT | Yes |  |

### 2.1.4 Rel-16 mandatory RRM requirements

RAN4 sends RAN2 a LS informing RAN2 that RAN4 specified RRM requirements that are mandatory to be supported for Rel-16 UEs in R2-2100060.

In R2-2100954, it discusses how the network is aware of the Rel-16 mandatory capability support and has the following observation and proposal:

:

**Observation 2:** Network is always aware of UE access stratum release via UE capabilities.

**Proposal 2:** Indicate to RAN4 that network can determine UE support of the mandatory Rel-16 requirements from the AS release indicator in UE capabilities (i.e. *accessStratumRelease*).

From rapporteur point of view, even though the RRM requirements are mandatory for Rel-16, there is still a need to have IOT bit for these features so that UE has opportunity to be tested with a network that takes the RRM requirements into account.

**Q4.1 Do companies think that there is a need to introduce IOT/capability bits for the mandatory Rel-16 RRM requirement or AS release indicator is sufficient for the mandatory Rel-16 RRM requirements?**

|  |  |  |
| --- | --- | --- |
| **Company** | **IOT bits needed or AS release indicator is sufficient** | **Comments** |
| BT | No | A mandatory without signalling capabiltiy doesn’t require capabilty bits and the introduction for them cannot be accepted by BT.  AS release indicator is enough and all the mandatory without signalling parameters must be supported by the UE for the reported release. |
| Intel | IOT bits needed | Agree with the rapporteur’s view |
| Qualcomm Incorporated | No | Adding IOT bit would not be backward compatible for UE’s already supporting the feature and implementing the current ASN.1. |
| LG | Yes, but no strong view | IOT bit may work unless there are UEs already supporting this. |
| Nokia, Nokia Shanghai Bell | No | Agree with BT: IOT bits would effectively make the features optional. Any UE indicating Rel-16 AS release shall support these requirements. |
| OPPO | IoT bit is needed | Same view as LG |
| vivo | No | We also think it is not backward compatible. UEs with reported release should support all mandatory without signaling features. |
| Huawei, HiSilicon | No | Based on the LS, it is clear that it is mandatory Rel-16 requirements, so we think AS release indicator is enough, the UE supporting Rel-16 should support such requirement. |
| MediaTek | No | We understand this requirement is mandatory and RAN4 does not requst capability bit for this. |
| Ericsson | Yes, but | It may be safer to add such bits instead of just relying on the AS release indicator, such bits can be stated as mandatory for Rel-16 UEs, so it should meet what RAN4 requests as well. But we are also fine to not add such bits, in which case we think there is nothing to be captured in 38.306 either. |
| ZTE(LiuJing) | No | Same view as BT and Nokia. |
| CATT | No | If it has been agreed in R4 as requirements maybe no need to add to R2 capability spec. |

R2-2100954 is also proposed that TS38.306 document the following Rel-16 RAN4 mandatory capabilities:

- RRM requirements of multiple SCell activation,

- UE requirements for UE-specific channel bandwidth change

- UE requirements for UL spatial relation switch.

**Observation 1:** RAN4 has defined three mandatory UE requirements that do not have capability signalling for Rel-16

**Proposal 1:** RAN2 to document the RAN4 mandatory capabilities in [TS38.306](https://www.3gpp.org/DynaReport/38306.htm) and indicate this to RAN4.

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**Proposal 2:** Indicate to RAN4 that network can determine UE support of the mandatory Rel-16 requirements from the AS release indicator in UE capabilities (i.e. *accessStratumRelease*).

As mentioned in R2-2100954, RAN2 did not capture all Rel-15 mandatory capabilities in since that would have caused a lot of "basic" requirements to be written into RAN2 specifications.

From the online discussion (Rapporteur’s feeling), most companies do not think it should impact RAN2 specifications. However, it is still good to double check that this is the case.

**Q4.2 If AS release indicator is sufficient for network to determine UE support of the mandatory Rel-16 RRM requirements, do companies think that there is a need to capture the following mandatory Rel-16 RRM requirement in TS38.306?**

| Definitions for feature |
| --- |
| **RRM requirements of multiple SCell activation**  It is mandatory for UE to support the requirements for multiple SCell activation as specified in subclause 8.3.7 of TS 38.133 [5]. |
| **UE requirements for UE-specific channel bandwidth change**  It is mandatory for UE to support the requirements for UE-specific channel bandwidth change as specified in clause 8.13 of TS 38.133 [5]. |
| **UE requirements for UL spatial relation switch**  It is mandatory for UE to support the delay requirements for UL spatial relation switch as specified in subclause 8.12 of TS 38.133 [5]. |

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| BT | Yes | In a situation where a parameter is optional for Rel-15 UEs but mandatory for Rel-16, it is simpler to capture them in a single document. TS 38.306 seems to be the most appropriate one considering 38.822 was a draft an discontinued time ago. |
| Intel | No | We have not done this for Rel-15 and hence we should not do it for Rel-16. Otherwise, there is inconsistency. |
| Qualcomm Incorporated | No | This should carefully be done together with RAN4 so it does not backfire. Keeping 38.306 updated to RAN4’s latest status has been very difficult and sometimes resulted in much work for RAN2 to resolve out of sync. |
| LG | No | Agree with Intel and QC. Too detailed description in 306 is not always beneficial. |
| Nokia, Nokia Shanghai Bell | Yes (proponent) | We have two choices: 1) RAN2 captures this requirement in 38.306 OR 2) RAN4 captures the requirement in 38.133. The end result should be the same no matter what, but since we normally capture all relevant capability requirements in 38.306, we didn't see a reason to deviate.  To repeat once again: These requirements relate to Rel-15 procedures. If a Rell-16 UE doesn't support these features, it doesn't need to support the requirements. But if the Rel-16 UE does support the features, it shall also support the RAN4 requirements.  In any case, RAN2 should indicate to RAN4 what is done concerning these requirements. |
| OPPO | No | We think RAN4 spec is clear enough |
| vivo | No | We think the applied requirement could be clarified in RAN4. |
| Huawei, HiSilicon | No | Agree with rapporteur that we have not done this for Rel-15. |
| MediaTek | No | Similar view as Qualcomm.  We disagree with Nokia that we normally capture some UE requirement is optional or mandatory in 306. We capture whether some UE feature is mandatory or not in 306. UE supports an optional feature shall support the corresponding requirement defined in RAN4. |
| Ericsson | No | We think that if we do not add IoT bits for it, we do not need to capture anything in 38.306, which would be the usual case for other RAN4 requirements. |
| ZTE | No | We share Intel’s views, we haven’t done this for other Rel-15 mandatory features, and it is hard for RAN2 to maintain the information in the future. |
| CATT | No |  |

R2-2100954 also proposed to copy RAN5 in cc in the reply LS back to RAN4 so that RAN5 is made aware of these mandatory RRM requirements so that they can update their test coverage accordingly.

**Observation 3:** RAN5 needs to be aware of the mandatory Rel-16 capabilities and how the support for them can be inferred based on UE capabilities.

**Proposal 3:** Include RAN5 in the LS to ensure they are aware of the RAN2 (and RAN4) decisions on Rel-16 mandatory capabilities.

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**Proposal 2:** Indicate to RAN4 that network can determine UE support of the mandatory Rel-16 requirements from the AS release indicator in UE capabilities (i.e. *accessStratumRelease*).

**Q4.3 Do companies think that there is a need to inform RAN5 in the RAN2 reply LS to RAN4 so that RAN5 is made aware of these mandatory RRM reqiorements so that they can update their test coverage accordingly?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| BT | Yes | RAN5 needs to be aware of these mandatory RRM requirements considering this was mention in RAN4 LS “*It is common understanding that Rel-15 NR UEs may not meet the respective requirements and network needs to know whether the UE can meet the new Rel-16 requirement to adjust the scheduling behavior*” |
| Intel | No | RAN5 can base it on RAN4 spec to update their test coverage |
| Qualcomm Incorporated | Yes | Indeed, our RAN5 colleagues indicated RAN4 should have included RAN5 from the begging, and requested to involve RAN5 going forward. We believe RAN5 is interested not only in what the mandatory requirements are, but also in the mechanism to be used to identify release-16 UE. |
| LG | No strong view |  |
| Nokia, Nokia Shanghai Bell | Yes (proponent) | We don't see harm in informing RAN5 of these: Due to the proliferation of NR features, RAN5 has a lot of work to do, so anything that clarifies how their test cases should work is welcome.  Note that RAN5 has different kinds of test cases: For signalling test cases, they do read also RAN2 specifications, whereas for RRM test cases they need to read both RAN2 and RAN4 specifications. |
| OPPO | No strong opinion |  |
| vivo | Yes | RAN5 anyway needs such information, either from LS or refer to RAN4 specification. There is no harm to inform RAN5 by LS. |
| Huawei, HiSilicon | No | RAN4 will inform RAN5 if it is really needed. |
| MediaTek | No strong view | We could put RAN5 in CC list while reply RAN4 LS. |
| Ericsson |  | If we do not capture anything in RAN2 there may not be a need. The actual content of the reply LS depends on the discussion above, but fine to add RAN5 to the reply if RAN2 introduces any change. |
| ZTE(Jing) | Yes |  |
| CATT | No strong view |  |

### 2.1.5 Handling of other TEI features

R2-2101058 has the following proposals

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**Proposal 1:** RAN2 is asked to add the feature eCall over IMS as optional feature w/o capability signaling in the RAN2 feature list and TS 38.306 as well.

**Proposal 2:** RAN2 is asked to add the feature “UAC-AC1-SelectAssistInfo-r16 in SIB1” in the RAN2 feature list and TS 38.306 as well, and to decide whether the feature should be conditionally mandatory or optional w/o capability signaling for the UE.

**Q5.1 Do companies agree with Proposal 1 above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes | No strong view. OK to go with majority view. |
| Lenovo | Yes (proponent) |  |
| Qualcomm Incorporated | Yes | In line with 36.331 and 36.306. |
| LG | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes | No strong view. |
| OPPO | Yes |  |
| vivo | Yes | No strong view. |
| Huawei, HiSilicon | Yes | No strong view. |
| MediaTek | No strong view | This eCall over IMS looks more like a NAS feature. The RRC only forward information to upper. Seems no strong need to have to this but fine to follow majroties. |
| Ericsson | Yes |  |
| Samsung | No strong view |  |
| CATT | Yes |  |

For Proposal 2, RAN2 has to decide on whether it should be a conditionally mandatory for a UE that is configured for delay tolerant service or it should be an optional without capability signalling since the legacy R15 field uac-AccessCategory1-SelectionAssistanceInfo needs to be present anyway in case of per-PLMN signaling, and many networks may not have any problems with the limited flexibility in configuring uac-AccessCategory1-SelectionAssistanceInfo.

**Q5.2 Do companies think that “UAC-AC1-SelectAssistInfo-r16 in SIB1” should be defined as conditionally mandatory for a UE that is configured for delay tolerant service or simply as optional without capability signaling?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Conditionally mandatory without capability signalling/ Optional without capability signalling** | **Comments** |
| Intel | Optional without capability signalling | No strong view. OK to go with majority |
| Lenovo | Slight preference for optional w/o capability signalling |  |
| Qualcomm Incorporated | Optional without capability signalling |  |
| LG | Optional without capability signaling |  |
| Nokia, Nokia Shanghai Bell | Conditionally mandatory | Since this relates to the delay-tolerant service, it's better to make it mandatory from Rel-16 onwards. Otherwise we may end up with yet another feature in specifications that is not utilized in real deployments. |
| OPPO | Optional without capability signaling |  |
| vivo | Optional without capability signaling | Just slight preference. |
| Huawei, HiSilicon | Optional without capability signalling |  |
| MediaTek | Optional without capability signalling | No strong view. |
| Ericsson | Optional without capability signalling |  |
| ZTE(Wenting) | Conditionally mandatory | We share the same view as Nokia. |
| Samsung | Optional without capability signalling |  |
| Samsung | Optional without capability signalling |  |

During the online discussion, Qualcomm would also want to check whether the following in the RAN2 feature list should be optional with or without capability signalling:

|  |  |
| --- | --- |
| 24-16 | Introduction of PRACH prioritization parameters for MPS and MCS in RACH-ConfigCommon |

The review comments from companies and resolution from the rapporteur are provided for information below from the RAN2 feature list review:

Agree, adding it as ‘Mandatory without capability signalling’ since it is not specified in Section 5 and 6 of 38.306 and the 38.321 text seems to mandate the UE implementation

[Huawei] In the cover sheet of agreed CR R2-2002102, it describes “The feature is optional…”, so we understand it is “Optional without capability signalling” and needs to be added in 38.306.

{Rapp} The full sentence is ‘The feature is optional and can be enabled on a per gNB basis.’. So the optionaility is from the gNB. The 38.321 text below seems to mandate the UE implementation (in view that network can configure it from SIB for idle/inactive mode):

2> else if *ra-PrioritizationForAccessIdentityTwoStep* is configured for the selected carrier

2> else if *ra-PrioritizationForAccessIdentity* is configured for the selected carrier; and

**Q5.3 “PRACH prioritization parameters for MPS and MCS in RACH-ConfigCommon” can be one of the following:**

**Option 1: Mandatory without capability signalling**

**Option 2: Optional without capability signalling**

**Option 3: Optional with capability signalling**

**Option 4: Others??**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option?** | **Comments** |
| Intel | Option 1 | According to 38.321 text, it seems to mandate the UE implementation (in view that network can configure it from SIB for idle/inactive mode):  2> else if *ra-PrioritizationForAccessIdentityTwoStep* is configured for the selected carrier  2> else if *ra-PrioritizationForAccessIdentity* is configured for the selected carrier; and  However we are also fine to go with the majority view. |
| Lenovo | Option 2 | The feature is only relevant for certain type of UEs, so we can leave it to those UEs whether to support this feature or not. |
| Qualcomm Incorporated | Option 2 | IOT opportunity is not guaranteed. We should keep the principle that it is possible for the UE and the network to implement only features that are requested by customers.  Option 2, as opposed to Option 3 because we now understand the corresponding RRC configuration is provided only in SIB for initial access from idle or Inactive. This is BTW is not entirely clear in 38.331 and will need a clarification separately. |
| LG | Option 2 | The feature shoud not be mandatory for all UEs |
| Nokia, Nokia Shanghai Bell | Option 1 | Agree with Intel: This was supposed to be mandatory for Rel-16 UEs. |
| OPPO | Option2 | This is mainly for initiation of MPS and MCS hence no capabiliy signaling is needed. And it is bit strange that it could be optional for gNB but mandatory for UE. |
| vivo | Option 2 | We agree with Lenovo. |
| Huawei, HiSilicon | Option 2 |  |
| MediaTek | Option 2 |  |
| Ericsson | Option 2 |  |
| ZTE(Wenting) | Option 1,2 | prefer option1, but option 2 is also acceptable. |
| Samsung | Option 2 |  |
| CATT | Option 2 |  |

### 2.1.6 Fixing issue with FGs 22-8a/b/c/d

In R2-2101020, the following are provided in the reason for change and the summary of change, respectively:

RAN1#103-e introduced further UE features in R1-2009585, including FG 22-8 “for SRS for CB PUSCH and antenna switching on FR1 with symbol level offset for aperiodic SRS transmission”. The introduction of this FG required introduction of four related FGs as well in order to avoid NBC issues appearing. A correction is required on those newly introduced FGs in order to ensure they indicate the functionality as intended.

Update the relevant capabilities in section 4.2.7.7 removing the dependencies from 3-2, 3-5, 3-5a and 3-5b. Also relevant updates from the feature excel are also updated to the capabilities due to removal of the dependency.

**Q6 Do companies agree with the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | No | The removal of dependencies from 3-2, 3-5, 3-5a and 3-5b does not seem to be in line with what RAN1 indicates for 22-8a/b/c/d in R1-2009586.  Appreciate more explanations from the proponent. |
| Nokia, Nokia Shanghai Bell | Yes (proponent) | On QC's comments: Please check the latest RAN1 agreements (from 26.1.2021) on this matter, copy-pasted below  **Agreements:**   * Components descriptions of FG22-8a/b/c/d are revised as in R1-2101249 to incorporate a copy of each of FG 3-2, 3-5, 3-5a, and 3-5b into each of FG 22-8a, 22-8b, 22-8c, and 22-8d, respectively * Inform RAN2 that 3-2/5/5a/5b should not be the part of prerequisite FGs of FG22-8a/8b/8c/8d, and ask RAN2 to update FG22-8a/b/c/d according to above updated FGs in RAN1 UE features list |
| Intel | Yes, with modification | It seems like this was agreed yesterday (26 Jan) by RAN1, as from Nokia’s response.  However, the same should be done also for FG22-8a (***offsetSRS-CB-PUSCH-PDCCH-MonitorSingleOcc-fr1-r16***) since this is done for 22-8b/c/d.  Indicates whether UE requires minimum of 19 symbols offset between aperiodic SRS triggering and transmission for SRS for codebook based PUSCH and antenna switching for the case of PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot with the capability of supporting at least 44 blind decodes in a slot for 15 kHz subcarrier spacing. The capability is applied to FR1 carrier only. |
| vivo |  | Still checking with RAN1. We are fine to follow RAN1 conclusion. |
| Huawei, HiSilicon | Yes, but | We are fine to follow RAN1 conclusion. But based on the agreement from Nokia’s response, it clear that the prerequisite 3-2/5/5a/5b should be removed, we are not sure about other changes in the CRs. |
| Ericsson | Postpone? | We understand the updates were just made by RAN1 as indicated above, then maybe we can just postpone it for the time being until we get a further update in the actual RAN1 feature list. |
| ZTE(Wenting) | Yes (but) | We understand the intention, and RAN1 has achieved the conclusion on it. But we slightly prefer to wait for the official LS from RAN1. |
| CATT | See comments | we can wait for R1 input on this. |

### 2.1.7 Clarification on UE capabilities with FDD/TDD differentiation

In R2-2101433, the following are provided in the reason for change and the summary of change, respectively:

The clarification of the FR1/FR2 differentiation for the following feautres are missing:

* drx-Adaptation-r16
* aggregationFactorSPS-DL-r16
* twoTCI-Act-servingCellInCC-List-r16
* cli-RSSI-Meas-r16
* cli-SRS-RSRP-Meas-r16
* handoverUTRA-FDD-r16
* interFrequencyMeas-NoGap-r16
* simultaneousRxDataSSB-DiffNumerology-Inter-r16

Some of those features are clarified within their corresponding field description (as previously done for similar cases in Rel-15), while others are clarified in Annex A.2 (as previously done for similar cases in Rel-15).

In clause 4.2.7.10 the following capabilities are clarified:

* cli-RSSI-Meas-r16 - To clarify that this feature corresponds to the FR of the cells to be measured;
* cli-SRS-RSRP-Meas-r16 - To clarify that this feature corresponds to the FR of the cells to be measured;

In clause 4.2.9 the following capabilities are clarified:

* interFrequencyMeas-NoGap-r16 - To clarify that this feature corresponds to the FR of the cells to be measured;
* simultaneousRxDataSSB-DiffNumerology-Inter-r16 - To clarify that this feature corresponds to the FR of the cells where the SSB and PDCCH/PDSCH are received.

In Annex A.2 the following capabilities are added:

* drx-Adaptation-r16 - Classification is "PCell";
* aggregationFactorSPS-DL-r16 - Classification is "All serving cells";
* twoTCI-Act-servingCellInCC-List-r16 - Classification is "All serving cells";
* handoverUTRA-FDD-r16 - Classification is "PCell";

**Q7 Do companies agree with the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes |  |
| Lenovo | Yes | In the title of Table A.2-1 the „Rel-15“ can be removed. |
| Qualcomm Incorporated | Yes |  |
| LG | Yes | There may be better wording than“differently” becaue the statement is true even when FR1 cap and FR2 cap has the same value, but it is also true that the wording “differently“ works well. |
| Nokia, Nokia Shanghai Bell | Yes but | Agree with Lenovo on removal of "Rel-15".  Shouldn't we be consistent with these at least in Rel-16 and either ONLY add these descriptions to capability descriptions, or only to the Annex? |
| OPPO | Yes with comment | The change to the section 4.2.9 is not necessary since that’s the basic meaning of the last column for FRX differene |
| vivo | Yes |  |
| Huawei, HiSilicon | Partly yes | We are wonder why aggregationFactorSPS-DL-r16 - Classification is "All serving cells", as the SPS is only related to the cells applying the command, how to understand cell sending the command for this capability? We are ok with other clarifications. |
| MediaTek | Yes |  |
| Ericsson | Yes (Proponent) | Our understanding is that this is similar excercise as we did for the capabilities with FDD/TDD differentiation in the last meeting, but this one focus on the capabilities with FR1/FR2 differentiation.  There are of course more capabilities in Rel-16 with FR1/FR2 differentiation, but in our understanding those already had sufficient clarification in their field description. We can further discuss the aspecs raised above in phase 2. |
| ZTE(LiuJing) | Yes with comment | For cli-RSSI-Meas-r16 and cli-SRS-RSRP-Meas-r16, they are a bit different from other measurement capabilities. Because there is no measured target cell, only measured resources. Considering only intra-frequency CLI measurement is supported, may be we can use the FR of serving cell instead. For instance:  If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of ~~cells~~serving cell to be measured.  Note: the “serving cell“ includes both SpCell and SCell, because CLI measurement can be configured for SCell frequency. |
| Samsung | Yes |  |
| CATT | Yes |  |

### 2.1.8 Correction on UE capabilities for enhanced MIMO

In R2-2101486, there are 2 changes to the CR. The second change related to the TPMI index definition for non-coherent with 2 ports is already discussed in Section 2.1.3 and is aligned to the changes in R2-2100455. So for R2-2101486, only the first change needs to be discussed as provided in the reason for changes and summary of change, respectively:

1. According to the latest UE features list for Rel-16 designed by RAN1 (R1-2009585), the feature group of out-of-order operation for DL (FG16-2a-2) has two components:

1)  Support out-of-order operation for PDCCH to PDSCH

2)  Support out-of-order operation for PDSCH to HARQ-ACK.

The above two components have been captured by TS 38.331. However, in the current TS 38.306, only component 1 is captured and component 2 is missed. To make TS 38.306 consistent with both TS 38.331 and the UE FG design by RAN1, we propose to add the description on *supportPDSCH-ToHARQ-ACK-r16* to *outOfOrderOperationDL-r16* in TS 38.306.

1. Add the description on *supportPDSCH-ToHARQ-ACK-r16* to the field description of *outOfOrderOperationDL-r16*.

**Q8 Do companies agree with the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes |  |
| Lenovo | Yes | To be complete the sentence „The capability signalling comprises the following parameters.“ can be added in the description of outOfOrderOperationDL-r16. |
| Qualcomm Incorporated | Yes |  |
| LG | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes |  |
| OPPO | Yes |  |
| vivo | Yes |  |
| Huawei, HiSilicon | Yes | Proponent |
| Ericsson | Yes | It seems the companies involved the CRs in 2.18 and 2.13 could probably work on a merged version. |
| ZTE(Wenting) | Yes |  |
| Samsung | Yes |  |
| CATT | Yes |  |

### 2.1.9 Capability for dormant BWP switching of multiple SCells

In R2-2101821, it is stated that RAN4 has concluded to introduce a new capability for dormant BWP switching of multiple SCells that is separate from corresponding capability for active BWP switching (*bwp-SwitchingMultiCCs-r16*). However, RAN4 is still discussing the exact value of this new capability.

From rapporteur point of view, RAN2 should wait for RAN4 to conclude on the exact value for the new capability before introducing it. RAN2 can wait for the updated R4 feature list to include this.

**Q9 Do companies agree with adding the new capability for dormant BWP switching of multiple SCells or wait for updated R4 feature list?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel |  | Wait for RAN4 to provide the updated R4 feature list via a LS. |
| Lenovo |  | Wait for RAN4. |
| Qualcomm Incorporated |  | Wait for RAN4 as proposed in R2-2101821. |
| LG | No | Wait for RAN4 (Still under discussion in RAN4) |
| Nokia, Nokia Shanghai Bell |  | Wait for RAN4. |
| OPPO |  | Wait for RAN4 |
| vivo |  | Wait for RAN4. |
| Huawei, HiSilicon |  | Wait for RAN4. |
| MediaTek |  | Our intention is just to highlight there is missing capability. We are of course okay to wait RAN4. |
| Ericsson |  | We think the intention is to discuss this Tdoc only if/when a RAN4 input is received, then we are fine to wait for RAN4. |
| ZTE(Wenting) |  | Wait for RAN4 |
| Samsung |  | Wait for RAN4 |
| CATT |  | Wait for RAN4 |

### 2.1.10 Capability of PUCCH transmissions for HARQ-ACK

In R2-2101873, the following are provided in the reason for change and summary of change:

:

The component 6 of RAN1 feature 11-4/4a as below were not included in the current ASN.1

**11-4/4a component 6:**

Supported maximum number of actual PUCCH transmissions for HARQ-ACK within a slot

Candidate values for the component 6 of FG11-4/4a is: For NCP, {4, 5, 6, 7} for 2-symbol\*7 sub-slot configuration; For ECP, the candidate value is {4, 5, 6} for 2-symbol\*6 sub-slot configuration.

(1)Dummy the legacy capabilities: twoHARQ-ACK-Codebook-type1-r16/

twoHARQ-ACK-Codebook-type2-r16

(2)Add new field twoHARQ-ACK-Codebook-type1-r16/

twoHARQ-ACK-Codebook-type2-r16 to indicate the maximum number of actual PUCCH transmissions for HARQ-ACK within a slot

**Q10 Do companies agree with the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes (Proponent) |  |
| Lenovo | Yes | In the CR the values of ENUMERATED type should be non-Integer values, so a “n” should be added as prefix. |
| Qualcomm Incorporated | Yes |  |
| LG | Yes | And agree with Lenovo‘s comments |
| Nokia, Nokia Shanghai Bell | Yes (with comments) | For the FeatureSetUplink modifications:  1) As Lenovo pointed out, ENUMERATED requires the values to start with a letter, so e.g. "ENUMERATED {n4, n5, n6, n7}" shuold be used  2) There are now two capabilities with identical data type: To ensure these are consistent, it would be better to define IE for them, e.g. *SubSlot-Codebook-r16*  See below for code examle of this:  FeatureSetUplink-v16xy ::= SEQUENCE {  -- R1 11-4: Two HARQ-ACK codebooks with up to one sub-slot based HARQ-ACK codebook (i.e. slot-based + slot-based, or slot-based +  -- sub-slot based) simultaneously constructed for supporting HARQ-ACK codebooks with different priorities at a UE  twoHARQ-ACK-Codebook-type1-r16 SubSlot-Codebook-r16 OPTIONAL,  -- R1 11-4a: Two sub-slot based HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different  -- priorities at a UE  twoHARQ-ACK-Codebook-type2-r16 SubSlot-Codebook-r16 OPTIONAL  }  SubSlot-Codebook-r16 ::= SEQUENCE {  sub-SlotConfig-NCP-r16 ENUMERATED {n4,n5,n6,n7} OPTIONAL,  sub-SlotConfig-ECP-r16 ENUMERATED {n4,n5,n6} OPTIONAL  } |
| OPPO | Yes but | We just wonder whether this is a NBC change assuming some gNB and UE has already deploy existing field. Alternative is not dummy existing one but interpret with minimum value. |
| vivo | Yes |  |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes |  |
| Ericsson | Yes |  |
| ZTE | Yes (Proponent) | We will revise these 2 CRs based on the companies comments. |
| Samsung | Yes |  |
| CATT | Yes |  |

## 2.2 Part 2: Intended to progress discussion on agreeable parts

- To be updated after discussion on part 1 -

# 3 Conclusion

- To be updated after discussion on part 1 -