3GPP TSG-RAN WG2 #112 electronic R2-200xxxx

Electronic Meeting, Nov 2-13, 2020

Agenda Item: 6.1.2

Source: Intel Corporation

Title: [AT112-e][015][NR16] UE capabilities (Intel)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT112-e][015][NR16] UE cap Main (Intel)

 Scope: a) Treat tdocs on specific issues as assigned..

 Deadline: Intermediate deadline(s) by Rapporteur, Final: Discussion stop at Wed Nov 11, 1200 UTC

The following documents are treated in this discussion:

[1] [R2-2009663](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009663.zip) Corrections to NR UE capabilities and features Lenovo, Motorola Mobility CR Rel-16 38.306 16.2.0 0432 - F NR\_UE\_pow\_sav-Core, NR\_SON\_MDT-Core

Treat by email in Main UE cap discussion.

[2] [R2-2010993](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs/R2-2010993.zip) Corrections for drx-Adaptation capability Ericsson CR Rel-16 38.306 16.2.0 0612 - F NR\_UE\_pow\_sav-Core

Treat by email in Main UE cap discussion.

[3] [R2-2009846](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2009846.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2009846.zip) UE capability for configuration of SMTC of target SCG cell Ericsson CR Rel-16 38.306 16.2.0 0436 - F TEI16

[4] [R2-2009847](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2009847.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2009847.zip) UE capability for configuration of SMTC of target SCG cell Ericsson CR Rel-16 38.331 16.2.0 2139 - F TEI16

# 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.

### 2.1.1 R2-2009663 Corrections to NR UE capabilities and features

In [1], the following are provided in the reason for change:

1. Grouping of Power saving capabilities is not aligned with TS 38.331. In TS 38.306 they have been grouped under “General parameters”, however in TS 38.331 they have been grouped under IE *PowSav-Parameters*.
2. The features “Relaxed measurement”, “Mobility history information storage”, “Cross RAT RLF Report” and “Radio Link Failure Report for inter-RAT MRO EUTRA” are misplaced under “UE receiver features”. It is recommended to place these features under meaningful feature groups.

For 1 above, from the TS38.306 rapporteur point of view, we normally do such grouping of feature into a section in TS38.306 only for WI with many capabilities.

**Q1 Do companies agree with the proposed changes in the CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Partially yes | For 1, agree with rapporteur.For 2, OK |
| Ericsson (Lian) | Partially yes | For 1, we are fine with the suggestion from the rapporteur.For 2, we are ok with the proposed change in the CR. |
| CATT | Partially yes | Same comments as Huawei and Ericsson above. |
| OPPO |  | For1, it seems not so necessaryFor 2, yes |
| Lenovo | Yes | Proponent.On the comment from rapporteur to change 1): what is the definition of „many“? In R16 38.306 there are grouping of features with few entries:* 4.2.3 SDAP Parameters: 1 entry
* 4.2.5 RLC parameters: 5 entries
* 4.2.13 IMS Parameters: 4 entries
* 4.2.17 SON parameters: 1 entry

Furthermore, in the future releases the one or other new capability to power saving may be introduced. |
| ZTE(Wenting) | Yes | We agree with lenovo for that some new capability maybe added to the related WI in the future release version. |

### 2.1.2 [R2-2010993](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs/R2-2010993.zip) Corrections for drx-Adaptation capability

In [2], the following are provided in the reason for change and summary of change:

Reason for Change:

RAN2 agreed that DCP is supported with Long DRX only. The description of the *drx-Adaptation* capability is ambiguous concerning this aspect. Furthermore the capability is unclear if DCP is supported on the primary cell (PCell/PSCell) of the Frequency Range only.

Summary of Change:

It is clarified that *drx-Adaptation* capability only applies to the DCP of Long DRX. It is clarified that the UE may support DCP on the PCell/PSCell in FR1 or FR2. Furthermore some editorial corrections are added.

**Q2 Do companies agree with the proposed changes in the CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Partially yes | The clarification for DCP on the PCell/PSCell in FR1 or FR2 seems not needed, it is explicitly captured in RAN1 spec: A UE configured with DRX mode operation [11, TS 38.321] on the Pcell or on the SpCell [12, TS 38.331]. Other editorial corrections are OK.The editorial changes for sharedSpectrumChAccess-r16 and non-SharedSpectrumChAccess-r16 are overlapped with [R2-2009277](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs/R2-2009277.zip).One more editorial change: ps\_Offset should be ps-Offset. |
| Ericsson (Martin) | Proponent | We agree that the clarification for DCP on PCell/PSCell is not needed, and should be removed, thanks for spotting. We propose to remove the editorial change for sharedSpectrumChAccess-r16 and non-SharedSpectrumChAccess-r16 from this CR, and correct that in [R2-2009277](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs/R2-2009277.zip).We can included the editorial change for ps-Offset in this CR.  |
| CATT | Partially yes | Same comments as Huawei.  |
| OPPO | Yes with comment | Fine with change in general. The sentence „If the UE supports *drx-Adaptation* on FR1 (or FR2) the UE supports DCI 2\_6 monitoring on PCell/PSCell in FR1 (or FR2)“ could be simplified as „If the UE supports *drx-Adaptation* ,the UE supports DCI 2\_6 monitoring on SpCell“ |
| ZTE(Wenting) | Partially Yes | Agree with the comments from Huawei |

### 2.1.3 R2-2009846/9847 UE capability for configuration of SMTC of target SCG cell

In [3] and [4], the following are provided in the reason for change:

Reason for Change:

The CR1787r1 ([R2-2008477](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_111-e/Inbox/R2-2008477.zip)) introduced new SMTC configuration for PSCell Addition and SN Change in NR-DC. Currently a UE capability is missing, so the feature seems to be truly mandatory for Rel-16 UE.

Typically, new features introduced in a release have a UE capability bit.

Furthermore, this feature is an alterative to existing Rel-15 mechanism (SMTC configuration in target cell’s *reconfigurationWithSync* for NR PSCell addition).

Based on the online discussion, the proponent thinks that when a configuration is added, we normally include a capability/IOT bit to ensure that the network does not signal a configuration that are not supported by a UE but only signal the UE that support. On the other hand, some companies think that the configuration is just a one-shot configuration for the case of PSCell addition and so such UE capability is not needed.

**Q3 Do companies agree with the proposed changes in the CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| CATT | Maybe no | As discussed there seems to be no big issue without this capability. If network configures it but not supported by UE the PSCell Addition and SN Change continues. But there seems to be some support from ue vendor, so we can accept this if there is majority‘s view.  |
| OPPO | No | We also think this UE capability is not needed. Network may blindly configure this parameter to UE. For UE supporthing this parameter, it works. For UE not supporting this parameter, it is ignored and UE follows the SMTC configuration in *reconfigurationWithSync* . so it seems no interoperation issue there. |
| Huawei, HiSilicon | No | Agree above. There is no any inter-operability issue without introducing this capability. |
| Nokia | No | As long as the UE does not reject the configuration without the configuration parameter and the UE continues the operation, we are okay also not to add any new capability. As long as it is clear that the use may or may not use the configuration parameter, it should be okay not to add any new capability. |
| Ericsson | Yes (Proponent) | Looking at the inter-operability analysis that lead the CR in R2-2008677 to be agreed, the following inter-operability issue was discovered:“*the UE cannot know the timing information of the target PSCell for the initial cell search if UE is not configured with the measObjectNR (incl. SMTC configuration) having the same SSB frequency and subcarrier spacing before*.“This mean basically mean that, regardless if the network configure the SMTC in the reconfigurationWithSync (that is OPTIONAL) if there is no SMTC either in the measurement object the UE will not know the timing information.According to this, we basically need the capability bit for the following reason:* We have now 3 SMTC values that can be signaled (one in measurement object, one in ReconfigurationWithSync, and one in top level RRCReconfiguration). If there is no capability bit, this means that the network should signal all the 3 SMTC field to make sure the UE know the right timing. This it will result in an unnecessary signaling overhead and also a confusion since 3 SMTC needs to be signaled at the same time.
* We now have two different frameworks for Rel-15 and Rel-16 for delivering the SMTC to the UE. To our understanding, the Rel-16 field is an optional feature (as pretty much all the Rel-16 features) and thus the UE may not support/implement it. This mean that the network may signal a configuration that the UE may not configured thus leading to a reconfiguration error. Please note that the purpose of the Rel-16 framework is to be used instead of the Rel-15 framework. There is no point to use both at the same time.
* As already stated during the online discussion, it is a common/good practise that when a new feature is added in Rel-16, a related capability is also added. We do not see any strong motivation to deviate from this principle. Further, please note that the depriotitization (introduced in LTE and ported to LTE) should be an exception and not the rule.
 |
| ZTE(Jing) | No | Response to Ericsson’s comments:* For Reason 1: Although we have several smtc fields, they are set by different RAN nodes, e.g. MN or SN. Even if UE capability is added, still each node has no idea whether the other will or will not provide the smtc configuration. Note the situation is same as in EN-DC, that both MN and SN can provide smtc config of target PSCell, but MN and SN will not exchange the information: “I will provide, so you don’t need to; Or I will not provide, so you have to“. So even if both are provided, either one can be used by UE.
* For Reason 2: As clarified by several UE vendors, even if network configures the field but UE does not support, it only means the UE cannot use this assistance information, but configuration failure will not happen.
* For Reason 3: We think UE capability is needed in case that failure will happen due to unexpected RRC configuration, but as mentioned above, this won’t cause configuration failure, thus it is not necessary to have a capability.
 |
| Intel | Yes | It is a good practice to include a capability bit to indicate whether the UE support this newly added feature; otherwise the network will be signalling unnecessarily. |

### 2.1.4 ASN.1 structure 22-5a and 22-5c (22-5b and 22-5d)

There are 2 options of 22-5a and 22-5c (likewise for 22-5b and 22-5d):

Option 1: Group them into 1 common IE as follow:

simulTX-SRS-AntSwitchingIntraBandUL-CA-r16 SimulSRS-ForAntennaSwitching-r16 OPTIONAL,

SimulSRS-ForAntennaSwitching-r16 ::= SEQUENCE {

 supportSRS-xTyR-xLessThanY-r16 ENUMERATED {supported} OPTIONAL,

 supportSRS-xTyR-xEqualToY-r16 ENUMERATED {supported} OPTIONAL,

 supportSRS-AntennaSwitching-r16 ENUMERATED {supported} OPTIONAL

}

Option 2: Keep them separate as follow:

simul-TX-SRS-xTyR-AntSwitchingIntraBandUL-CA-r16 SEQUENCE {

 supportTX-SRS-xLessThanY-r16 ENUMERATED {supported} OPTIONAL,

 supportTX-SRS-xEqualToY-r16 ENUMERATED {supported} OPTIONAL

} OPTIONAL,

simul-TX-SRS-AntennaSwitchingIntraBandUL-CA-r16 ENUMERATED {supported} OPTIONAL

Option1 makes the ASN.1 more compact. However, a company that think Option 2 keeps the intention clear and another think it is safer to keep the 2 features separate as they are not sure if there will be any extension for the IE

**Q4 Do companies prefer Option 1 or 2 for 22-5a and 22-5c (likewise for 22-5b and 22-5d)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option 1 or Option 2** | **Comments** |
| CATT | No strong view | Either seems fine.  |
| OPPO | Option1 | But the IE names are difference between options. |
| Huawei, HiSilicon | Option2 | As we usually do, the different FG corresponds to the separate IE. We are not sure if there will be any extension for the IEs, so it would be safer to keep them separately. |
| Ericsson (Lian) |  | Both can work, but if we go for option 2 we assume we would then clarify the dependencies between the fields in any case. |
| ZTE(Wenting) | No strong view | Slightly prefer option 1 |
|  |  |  |

## 2.2 Report Summary

### 2.2.1 Q1:

6 companies responded.

For 1: Grouping of Power saving capabilities is not aligned with TS 38.331. In TS 38.306 they have been grouped under “General parameters”, however in TS 38.331 they have been grouped under IE *PowSav-Parameters*.

4 companies think that it is not needed, but 2 company think it is good to do it. From Rapporteur point of view, we only do this for WI with many capabilities. For the listed item (SDAP-parameter, RLC-Parameters), even though they are not many capabilities, they are basic functionality of NR. Hence they are with a section. Since this is not a technical issue, we go with a simple majority that this is not pursued for now. Proponent can gather more company support if it sees a strong need in the next meeting

For 2: The features “Relaxed measurement”, “Mobility history information storage”, “Cross RAT RLF Report” and “Radio Link Failure Report for inter-RAT MRO EUTRA” are misplaced under “UE receiver features”. It is recommended to place these features under meaningful feature groups.

All companies responded supported this. Hence proposed to agree to 2).

**Proposal#1:** Grouping of power saving capabilities into a new section is not pursued for now. Agree to place the features “Relaxed measurement”, “Mobility history information storage”, “Cross RAT RLF Report” and “Radio Link Failure Report for inter-RAT MRO EUTRA” in Section 5.2 “UE receiver features” into meaningful feature groups as proposed in R2-2009663.

### 2.2.2 Q2: Field description update of drx-Adaptation-r16

5 companies responded. All agreed to the change DCP is supported with Long DRX only in the CR. On the DCP on the PCell/PSCell in FR1 or FR2 seems not needed, it was pointed out that it is already explicitly captured in RAN1 spec: “ A UE configured with DRX mode operation [11, TS 38.321] on the Pcell or on the SpCell [12, TS 38.331].“ Hence it is not needed. The remaining are editorial corrections. Hence it is proposed to agree to the change as follow for the field description of *drx-Adaptation-r16* capability:

**Proposal#2:** Update the field description for *drx-Adaptation-r16* capability to:

| ***drx-Adaptation-r16***Indicates whether the UE supports DRX adaptation comprised of the following functional components:- Configured *ps-Offset* for the detection of DCI format 2\_6 with CRC scrambling by ps-RNTI and reported *MinTimeGap* before the start of *drx-onDurationTimer* of Long DRX- Indication of UE whether or not to start *drx-onDurationTimer* for the next Long DRX cycle by detection of DCI format 2\_6- Configured UE wakeup or not when DCI format 2\_6 is not detected at all monitoring occasions outside Active Time- Configured periodic CSI report apart from L1-RSRP (*ps-TransmitOtherPeriodicCSI*) when impacted by DCI format 2\_6 that *drx-onDurationTimer* does not start for the next Long DRX cycle- Configured periodic L1-RSRP report (*ps-TransmitPeriodicL1-RSRP*) when impacted by DCI format 2\_6 that *drx-onDurationTimer* does not start for the next Long DRX cycleThe capability signalling includes the minimum time gap between the end of the slot of last DCI format 2\_6 monitoring occasion and the beginning of the slot where the UE would start the *drx-onDurationTimer* of Long DRX for each SCS. The value *sl1* indicates 1 slot. The value *sl2* indicates 2 slots, and so on. Support of this feature is reported for licensed and unlicensed bands, respectively. When this field is reported, either of *sharedSpectrumChAccess-r16* or *non-SharedSpectrumChAccess-r16* shall be reported, at least. | UE | No | No | Yes |
| --- | --- | --- | --- | --- |

### 2.2.3 Q3: Introduction of new capability/IOT bit for the new SMTC configuration for PSCell Addition and SN Change in NR-DC

7 companies responded to this. 4 companies think this is not needed as it does not cause any IOT issue (UE supporting the new feature will use it if provided; UE not supporting the new feature will use the smtc in Rel-15 reconfigurationWithSync). A company is leaning towards not having it but is ok if UE vendors want it. 2 company think it is needed. One company thinks it is good practice to include a capability bit, otherwise the network will be signalling unnecessarily. One company think it is needed for the following reasons:

* This it will result in an unnecessary signaling overhead and also a confusion since 3 SMTC needs to be signaled at the same time.
* The Rel-16 field is an optional feature (as pretty much all the Rel-16 features) and thus the UE may not support/implement it. This mean that the network may signal a configuration that the UE may not configured thus leading to a reconfiguration error
* It is a common/good practise that when a new feature is added in Rel-16, a related capability is also added.

In response to the above, one company thinks that the signalling overhead is unavoidable as the smtc is provided by different node (MN and SN) and there is no mechanism to negotiate whether Rel-15 or Rel-16 smtc to use. It also does not think that reconfiguration error will occur if UE does not support Rel-16 signalling. Since no reconfiguration error will occur, it does not think capability bit is needed.

**Proposal#3:** No new capability/IOT bit is introduced for the new SMTC configuration for PSCell Addition and SN Change in NR-DC.

### 2.2.4 Q4: Grouping of feature R1 22-5a and 22-5c (22-5b and 22-5d)

5 companies responded. 3 companies have no strong view, however 1 is leaning towards Option 1. 1 company supports Option 1 (group 22-5a and 22-5c) and 1 company supports Option 2 (not to group 22-5a and 22-5c). In view of this, rapporteur proposes to keep as it is in the baseline CR (i.e. Option 1).

**Proposal#4:** No change to the existing structure as in the baseline CR R2-2009278/9279 (i.e. Option 1: group 22-5a and 22-5c (likewise for 22-5b and 22-5d)).

# 3 Conclusion

**Proposal#1:** Grouping of power saving capabilities into a new section is not pursued for now. Agree to place the features “Relaxed measurement”, “Mobility history information storage”, “Cross RAT RLF Report” and “Radio Link Failure Report for inter-RAT MRO EUTRA” in Section 5.2 “UE receiver features” into meaningful feature groups as proposed in R2-2009663.

**Proposal#2:** Update the field description for *drx-Adaptation-r16* capability to:

| ***drx-Adaptation-r16***Indicates whether the UE supports DRX adaptation comprised of the following functional components:- Configured *ps-Offset* for the detection of DCI format 2\_6 with CRC scrambling by ps-RNTI and reported *MinTimeGap* before the start of *drx-onDurationTimer* of Long DRX- Indication of UE whether or not to start *drx-onDurationTimer* for the next Long DRX cycle by detection of DCI format 2\_6- Configured UE wakeup or not when DCI format 2\_6 is not detected at all monitoring occasions outside Active Time- Configured periodic CSI report apart from L1-RSRP (*ps-TransmitOtherPeriodicCSI*) when impacted by DCI format 2\_6 that *drx-onDurationTimer* does not start for the next Long DRX cycle- Configured periodic L1-RSRP report (*ps-TransmitPeriodicL1-RSRP*) when impacted by DCI format 2\_6 that *drx-onDurationTimer* does not start for the next Long DRX cycleThe capability signalling includes the minimum time gap between the end of the slot of last DCI format 2\_6 monitoring occasion and the beginning of the slot where the UE would start the *drx-onDurationTimer* of Long DRX for each SCS. The value *sl1* indicates 1 slot. The value *sl2* indicates 2 slots, and so on. Support of this feature is reported for licensed and unlicensed bands, respectively. When this field is reported, either of *sharedSpectrumChAccess-r16* or *non-SharedSpectrumChAccess-r16* shall be reported, at least. | UE | No | No | Yes |
| --- | --- | --- | --- | --- |

**Proposal#3:** No new capability/IOT bit is introduced for the new SMTC configuration for PSCell Addition and SN Change in NR-DC.

**Proposal#4:** No change to the existing structure as in the baseline CRs R2-2009278/9279 (i.e. Option 1: group 22-5a and 22-5c (likewise for 22-5b and 22-5d)).

# 4 Contact from companies

|  |  |
| --- | --- |
| Company | Email |
| Intel Corporation | Seau Sian Lim <seau.s.lim@intel.com |
| Ericsson (Lian) | lian.araujo@ericsson.com |
| Ericsson (Martin) | martin.van.der.zee@ericsson.com |
| Huawei | Kuangyiru (Yiru) <kuangyiru@HUAWEI.COM> |
| CATT | Erlin Zeng (erlin.zeng@catt.cn) |
| OPPO(Zhongda) | duzhongda@oppo.com |
| ZTE( Liujing and Wenting) |  Jing Liu <liu.jing30@zte.com.cn> Wenting Li <li.wenting@zte.com.cn>  |