3GPP TSG-RAN WG2 Meeting #110-e draftR2-2005926

Online, 1st – 12th June 2020

**Agenda item: 7.2.5**

**Source: Huawei (offline email discussion rapporteur)**

**Title: Report of [AT110-e][306][NBIOT] R16 RAN1 features list and UE capabilities (Huawei)**

**Document for: Report**

# 1 Introduction

This document is the report of the following e-mail discussion:

* [AT110-e][306][NBIOT] R16 RAN1 features list and UE capabilities (Huawei)

Status: Not Started.

Scope: [R2-2005030](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005030.zip).

Intended outcome: Report in R2-2005926

Deadline: June 5 1000 UTC

The discussion is based on the proposals in [2].

# 2 Discussion

## 2.1 Assistance information for inter-RAT cell selection to/from NB-IoT

**Proposal S1-1: For NB-IoT and eMTC,** there is no need to introduce an optional feature for support of assistance information for inter-RAT cell selection to/from NB-IoT in TS 36.306

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry |  | The consequence may be that the feature becomes mandatory for the UE. This may need to be discussed with this in mind. |
| Qualcomm | Yes |  |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

## 2.2 AS RAI enhancement for UE connected to 5GC

**Proposal S2-1: For NB-IoT and NB-IoT,** *rai-Support-r14* applies to both EPC and 5GC without EPC/5GC differentiation.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | Yes |  |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

**Proposal S2-2: For NB-IoT and eMTC, i**ntroduce an optional feature for support of AS RAI enhancement for UE connected to 5GC in TS 36.306.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | Yes |  |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

## 2.3 Group Wake Up signal

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Index | Feature group | Components | Prerequisite feature groups | Need of FDD/TDD differentiation | Note | Mandatory/Optional |
| 2-1 | UE-group wake-up signal (Group WUS) with a wake-up time before the first associated PO (without group resource alternation) |  | Rel-15 NWUS | FDD only |  | Optional with capability signalling |
| 2-2 | UE-group WUS with a wake-up time before the first associated PO (with group resource alternation) |  | 2-1 | FDD only | If UE does not support group resource alternation and the eNB enables group resource alternation, UE falls back to Rel-15 NWUS when Rel-15 NWUS is configured or no NWUS when Rel-15 NWUS is not configured. | Optional with capability signalling |

**Proposal S3-1:** For NB-IoT and eMTC, for FDD, clarify in TS 36.331 and TS 36.306 that the capability *groupWakeUpSignal-r16* corresponds to GWUS without group alternation.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | To align the names between NB-IoT and eMTC, there is a proposal to rename the field name for NB-IoT to *groupWakeUpSignalFDD-r16* (this applies to FDD only in NB-IoT, and the eMTC RRC CR already uses the name ‘*groupWakeUpSignalFDD-r16*’). |
| Qualcomm | Yes | Now *groupWakeUpSignal-r16* applies to FDD in eMTC CR. |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

**Proposal S3-2:** For NB-IoT and eMTC, for FDD, introduce a new capability *groupWakeUpSignalAlternation-r16* corresponding to GWUS with group alternation, conditional to support of *groupWakeUpSignal-r16*.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | For NB-IoT, can we have it clarified in the RAN2 agreements that this apply to FDD only ? (even if this seems indicated in the RAN1 feature list). This is to avoid further discussions later.  Can we call it *groupWakeUpSignalAlternationFDD-r16* for NB-IoT and eMTC FDD ? (I assume that for eMTC TDD we will have a different parameter *groupWakeUpSignalAlternationTDD-r16* as proposal below, like was done for *groupWakeUpSignalTDD-r16)*. |
| Qualcomm | Yes |  |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

**Proposal S3-3:** For eMTC, for TDD, clarify in TS 36.331 and TS 36.306 that the capability *groupWakeUpSignalTDD-r16* corresponds to GWUS without group alternation.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| Qualcomm | Yes |  |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

**Proposal S3-4:** For eMTC, for TDD, introduce a new capability *groupWakeUpSignalAlternationTDD-r16* corresponding to GWUS with group alternation, conditional to support of *groupWakeUpSignalTDD-r16*.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | Yes | In line with RAN1 feature list. It can be handled in running CR. |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

**Proposal S3-4:** For NB-IoT and eMTC**,** update TS 36.304 to specify that if the UE does not support GWUS with group alternation and the eNB enables group alternation, then the UE does not use GWUS.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | Yes but | But it needs to be clarified that UE falls back to Rel-15 WUS when Rel-15 WUS is configured otherwise WUS is not used. |
| Huawei | Yes | We do not need to specify fallback to WUS rel-15 as RAN2 has agreed that WUS R15 and WUS R16 were independent features. i.e. UE can support R16 WUS bit not R16 GWUS. |
| Lenovo | Yes | It may could be, UE falls back to Rel-15 WUS when Rel-15 WUS is configured and UE supports R15 WUS. |
| Ericsson | Yes | Agree with Huawei |

Conclusion:

Proposal:

## 2.4 PUR

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Index | Feature group | Components | Prerequisite feature groups | Need of FDD/TDD differentiation | Note | Mandatory/Optional |
| 2-3 | Transmission in preconfigured UL resources (PUR)  (with potential UE-specific cyclic shift for DMRS) |  |  | FDD only | RAN2 has agreed that PUR with UP and CP solutions have separate indications, but this is not captured in this RAN1 UE feature list. | Optional with capability signalling |
| 2-4 | PUR with serving cell RSRP for TA validation |  | 2-3 | FDD only | RAN2 has agreed that PUR with UP and CP solutions have separate indications, but this is not captured in this RAN1 UE feature list.  TA validation mechanisms based on ‘Serving cell changes’, ‘TA timer for idle mode’ and ‘TA always valid’ are mandatory for PUR UEs. | Optional with capability signalling |
| 2-5 | PUR with L1 ACK |  | 2-3 | FDD only | RAN2 has agreed that PUR with UP and CP solutions have separate indications, but this is not captured in this RAN1 UE feature list. | Optional with capability signalling |

**Proposal S4-1:** For NB-IoT FDD and for eMTC, introduce a new general capability *pur-RSRP-Validation-r16*, conditional to support of *pur-CP-EPC-r16* and/or *pur-CP-5GC-r16* and/or *pur-UP-EPC-r16* and/or *pur-UP-EPC-r16.*

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Can we have a RAN2 agreement that for NB-IoT this applies to FDD only ? (to avoid discussions later). |
| Qualcomm | Yes | This is in line with RAN1 UE feature list. It can be directly handled in running CR. However, for eMTC, naming of PUR capabilities will be different for CE mode A and B. |
| Huawei | Yes | We think it is important to agree here before capturing in the CRs. This helps to get alignment between 36.331 and 36.306 as well as between NB-IoT and eMTC. We are fine to have a separate proposal for eMTC to capture the actual capability names. |
| Lenovo | Yes | Positive to HW’s view. |
| Ericsson | Yes | Agree with NB-IoT FDD only |

Conclusion:

Proposal:

**Proposal S4-2:** For NB-IoT FDD and for eMTC, introduce a new physical layer capability *pur-CP-L1Ack-r16*, conditional to support of *pur-CP-EPC-r16* and/or *pur-CP-5GC-r16*.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Can we have a RAN2 agreement that for NB-IoT this applies to FDD only ? (to avoid discussions later). |
| Qualcomm | Yes | This is in line with RAN1 UE feature list. It can be directly handled in running CR. However, for eMTC, naming of PUR capabilities will be different for CE mode A/B. |
| Huawei | Yes | We think it is important to agree here before capturing in the CRs. This helps to get alignment between 36.331 and 36.306 as well as between NB-IoT and eMTC. We are fine to have a separate proposal for eMTC to capture the actual capability names. |
| Lenovo | Yes | Positive to HW’s view. |
| Ericsson | Yes | Agree with NB-IoT FDD only |

Conclusion:

Proposal:

## 2.5 MultiTB scheduling

| Index | Feature group | Components | Prerequisite feature groups | Need of FDD/TDD differentiation | Note | Mandatory/Optional |
| --- | --- | --- | --- | --- | --- | --- |
| 2-6 | Multi-TB scheduling for unicast in DL with a single DCI  (Interleaved transmission) |  | Two HARQ processes | FDD only |  | Optional with capability signalling |
| 2-7 | Multi-TB scheduling for unicast in DL with a single DCI (Non-interleaved transmission) |  | Two HARQ processes | FDD only |  | Optional with capability signalling |
| 2-8 | Multi-TB scheduling for unicast in UL with a single DCI  (Interleaved transmission) |  | Two HARQ processes | FDD only |  | Optional with capability signalling |
| 2-9 | Multi-TB scheduling for unicast in UL with a single DCI  (Non-interleaved transmission) |  | Two HARQ processes | FDD only |  | Optional with capability signalling |
| 2-10 | Multi-TB scheduling for unicast in DL in a single DCI  (HARQ bundling for HARQ-ACK feedback to interleaved transmission) |  | 2-6 | FDD only |  | Optional with capability signalling |

**Proposal S5-1:** For NB-IoT FDD, remove the conditions in TS 36.331 and TS 36.306 that a UE that supports *multiTB-DL-Interleaving-r16* (*multiTB-UL-Interleaving-r16)* shall also support general *multiTB-DL-r16* (*multiTB-UL-r16).*

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | Yes | Yes for NB-IoT as per RAN1 feature list. |
| Huawei | yes but | Note that in the NB-IoT CR v0, the capability names were changed to npdsch-MultiTB-Interleaving-r16 to align with eMTC endorsed CR.  However, we notice that eMTC CR v1 has now changed the naming from ce-ModeA-PDSCH-MultiTB-r16 to ce-ModeA-MultiTB-PDSCH-r16. We need to agree on the exact naming and be consistent between the different capabilities (e.g. in eMTC Cr v1 we have ce-ModeA-PDSCH-RxInLTE-ControlRegion-r16)  We think the former naming ce-ModeA-PDSCH-MultiTB-r16 is more aligned with the parameter names and also with legacy capabilities. |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

## 2.6 Resource reservation for NR

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Index | Feature group | Components | Prerequisite feature groups | Need of FDD/TDD differentiation | Note | Mandatory/Optional |
| 2-12 | DL resource reservation with subframe-level granularity of NB-IoT non-anchor carriers. |  |  | FDD only |  | Optional with capability signalling |
| 2-12a | DL resource reservation with slot-level and symbol-level granularity of NB-IoT non-anchor carriers. |  | 2-12 | FDD only |  | Optional with capability signalling |
| 2-13 | UL resource reservation with subframe-level granularity of NB-IoT non-anchor carriers. |  |  | FDD only |  | Optional with capability signalling |
| 2-13a | UL resource reservation with slot-level and symbol(s)-level granularity of NB-IoT non-anchor carriers. |  | 2-13 | FDD only |  | Optional with capability signalling |

**Proposal S6-1:** For NB-IoT FDD and TDD, rename the two already defined capabilities to *ul-ResourceReservationSubframeLevel-r16* and *dl-ResourceReservationSubframeLevel-r16*.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | Yes | Naming can be aligned with eMTC CR i.e., *SubframeResourceResvUL-r16* and *SubframeResourceResvDL-r16*. |
| Huawei | Yes | OK to align with eMTC naming |
| Lenovo | Yes |  |
| Ericsson | Yes | OK to align with eMTC naming (but without the ce- part) |

Conclusion:

Proposal:

**Proposal S6-2:** For NB-IoT FDD and TDD, introduce two new physical layer capabilities *ul-ResourceReservationSlotLevel-r16* and *dl-ResourceReservationSlotLevel-r16*, conditional to support of resource reservation with subframe level granularity.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | Yes | Naming can be aligned with eMTC CR i.e., *SlotSymbolResourceResvUL-r16* and *SlotSymbolResourceResvDL-r16*. |
| Huawei | Yes | OK to align with eMTC naming |
| Lenovo | Yes |  |
| Ericsson | Yes | OK to align with eMTC naming (but without the ce- part) |

Conclusion:

Proposal:

## 2.7 NRS presence on non-anchor carrier

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Index | Feature group | Components | Prerequisite feature groups | Need of FDD/TDD differentiation | Note | Mandatory/Optional |
| 2-16 | NRS on a non-anchor carrier for paging | 1. Presence of NRS on a set of subframes on a non-anchor carrier when no paging NPDCCH is transmitted | Paging non-anchor carrier | FDD only |  | Optional without capability signalling |

**Proposal S7-1:** For NB-IoT FDD**, i**ntroduce a new optional feature “NRS presence on non-anchor paging carriers” in TS 36.306.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Can you clarify that this applies to NB-IoT FDD only ? (and can we have it clear in the RAN2 agreement). |
| Qualcomm | Yes | RAN1 has already clarified it. |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

**Proposal S7-2:** For NB-IoT FDD**, c**larify in the description of the already agreed optional feature “RRM measurements on non-anchor paging carriers” that it is dependent on support of ‘NRS presence on non-anchor paging carriers”.

**Company views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | - | Aren’t NPBCH and NSSS based RRM measurements applicable to non-anchor carriers? |
| Huawei | Yes | To answer Qualcomm’s comments NPBCH and NSS are always related to the anchor carrier (only carrier with the two signals) |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

Proposal:

# 3 Summary

**Conclusions:**

**Potential easy agreements**

To be completed

**For further discussion**

To be completed

# 4 List of referenced documents

1. [R2-2005080](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005080.zip) Updates for Rel-16 additional enhancements NB-IoT BlackBerry UK Limited CR Rel-16 36.306 16.0.0 1746 - C NB\_IOTenh3-Core

1. [R2-2005030](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005030.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003248.zip) RAN1 features list and UE capabilities issues Huawei, HiSilicon discussion Rel-16 NB\_IOTenh3-Core