3GPP TSG-RAN WG2 Meeting #109bis-e draftR2-2004048

Online, 20th – 30th April 2020

**Agenda item: 7.2.5**

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

**Title: Report of [AT109bis-e][313][NBIOT] UE capabilities, TDD/FDD differentiation and 5GC applicability for NB-IoT and eMTC (Huawei (Huawei)**

**Document for: Report**

# 1 Introduction

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

* [AT109bis-e][313][NBIOT] UE capabilities, TDD/FDD differentiation and 5GC applicability for NB-IoT and eMTC (Huawei)

Scope: Discuss the open issues on UE capabilities

Intended outcome: Finalise the issues, report in R2-2004048

Deadline: 27-04-2020, 10:00 UTC

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

# 2 Discussion

## 2.1 GWUS

**Proposal S1-1:** For NB-IoT and eMTC, the existing capability *wakeUpSignalMinGap-eDRX-r15* also applies to Rel-16 WUS.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | This is rather a device feature. |
| Qualcomm | Yes | capability on the need of the gap is same for Rel-15 and Rel-16 WUS. |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

**Proposal S1-2:** For NB-IoT, Rel-16 GWUS is only applicable to FDD.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Same as the Rel-15. |
| Qualcomm | Yes |  |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes | Already clear in WID, no even need for separate agreement |

Conclusion:

All companies agree with the proposal

**Proposal S1-3:** For eMTC, separate capability indications are introduced for FDD and TDD.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Same as the Rel-15. |
| Qualcomm | Yes | Already clear from RAN1 feature list, see RAN1 LS R2-2002519. |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes | Agree with QC |

Conclusion:

All companies agree with the proposal

**Proposal S1-4:** For NB-IoT and eMTC, Rel-16 GWUS is applicable to both EPC and 5GC, and there is no need for capability differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Probably better for simplicity if we can keep no difference as seen from the AS level. |
| Qualcomm | Yes |  |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

:

## 2.2 Multiple TB scheduling

**Proposal S2-1:** For NB-IoT, multiple TB scheduling in unicast and in multicast is only applicable to FDD.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Seems to align with RAN1 view. |
| Qualcomm | Yes | Already clear from RAN1 feature list, see RAN1 LS R2-2002519. |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes | Already clear in WID, no even need for separate agreement |

Conclusion:

All companies agree with the proposal.

**Proposal S2-2:** For NB-IoT and eMTC, multiple TB scheduling in unicast is applicable to both EPC and 5GC without differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Probably better for simplicity if we can keep no difference as seen from the AS level. |
| Qualcomm | Yes | Same UE capability should work for eNB and ng-eNB. |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

**Proposal S2-3:** For NB-IoT and eMTC, multiple TB scheduling in multicast is only applicable to EPC

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | SC-PTM is not supported in 5GC. |
| Qualcomm | Yes | Agree, multicast is applicable to ONLY EPC. |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

**Proposal S2-4:** For NB-IoT and eMTC, support of multiple TB scheduling in multicast is optional without capability signalling.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| Qualcomm | Yes | In RAN1 feature list (1-21 and 1-22), RAN1 has left this decision to RAN2. |
| Huawei | yes | already agreed at RAN2#109e   * For LTE-M and NB-IoT, multiple TBs scheduling in multicast is optional without capability reporting. |
| Lenovo | Yes |  |
| Ericsson | Yes | Agree with HW |

Conclusion:

The proposal was already agreed.

## 2.3 SON

**Proposal S3-1:** For NB-IoT, support of ANR, RACH report and RLF report are applicable to both FDD and TDD and there is no need for FDD/TDD differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | RRM measurements are defined for FDD and TDD. |
| Qualcomm | Yes |  |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

## 2.4 DL channel quality reporting in MSG3

**Proposal S4-1:** For NB-IoT, move the featureDL channel quality reporting in MSG3 for non-anchor carrier to section 6.17.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | This should go under 6.17 idle mode measurements (sorry my mistake).  Note that it is already moved there in the latest version of the running CR. |
| Qualcomm | Yes | Ok to move under the IDLE mode measurement section. |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

**Proposal S4-2:** For eMTC, introduce a separate capability for DL channel reporting in MSG3

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | The scope of the feature is different between eMTC and NB-IoT (cell versus carrier). |
| Qualcomm | No | The use of this capability is not clear. If UE does not support, it simply does not include the report in Msg3. |
| Huawei | yes with rewording | We understand the proposal is to have separate optional features for DL channel quality reporting in MSG3 in eMTC and NB-IoT. |
| Lenovo | Yes | The separate capability is necessary for eMTC. |
| Ericsson | Yes | Agree with Huawei that rewording is required as also pointed by QC it is not clear. The intention to have separate capability between eMTC and NB-IoT should be mentioned in the Proposal. |

Conclusion:

Companies think that the proposal was not very clear

Proposal:

Rapporteur propose to reword the proposal as below:

**Proposal S4-2’:** DL channel quality reporting in Msg3 for NB-IoT anchor carrier and DL channel quality reporting in Msg3 for eMTC are two separate optional features.

**Proposal S4-3:** For NB-IoT, update the description of the legacy featureDL channel quality reporting to avoid conflicting description with the Rel-16 capabilities.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Much better for clarity. |
| Qualcomm | Yes | We should update the legacy text as below  It is optional for UE to support DL channel quality reporting of the serving cell for anchor/non-anchor carrier for FDD in Msg3, as specified in TS 36.331 [5].  Therefore, we should remove the description from section 6.7.6. |
| Huawei | Yes | We think that reporting on MSG3 for anchor carrier and non anchor carrier are separate features (different measurement timing requirement). We propose to update as follows:  6.17.2 DL channel quality reporting in Msg3 for the anchor carrier  It is optional for UE to support DL channel quality reporting of the anchor carrier for FDD in Msg3, as specified in TS 36.331 [5]. This feature is only applicable if the UE supports any ue-Category-NB |
| Lenovo | Yes |  |
| Ericsson | Yes, but | If I recall, there was some discussion on this prior. We should follow the same previous agreed wording. |

Conclusion:

One company proposes to a single feature for anchor/non anchor carrier. However, this is not in line with RAN2 agreement at RAN2#107

* Support of DL channel quality in MSG3 for non-anchor carrier is optional without capability reporting and is a separate capability from support of DL channel quality in MSG3 for the anchor carrier.

Three companies propose to reword the description of the legacy feature to indicate that it applies to the anchor carrier.

One company thinks we should follow the previously agreed wording.

Proposal:

Rapporteur proposes to reword the proposal as below.

**Proposal S4-3’:** For NB-IoT, update the description of the legacy featureDL channel quality reporting in MSG3 (6.17.2) to reflect that it applies to the anchor carrier.

**Proposal S4-4:** For NB-IoT, DL channel quality reporting in MSG3 for non-anchor carrier is only applicable to FDD.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Same as legacy. |
| Qualcomm | Yes | Already clear from RAN1 feature list, see RAN1 LS R2-2002519. |
| h | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes | Already clear in WID, no even need for separate agreement |

Conclusion:

All companies agree with the proposal. One company indicates that it is clear in the WID and does not need agreement.

Rapporteur thinks it is not clear in the WID.

|  |
| --- |
| **Improved multi-carrier operation:**   * Specify support of Msg3 quality reporting for non-anchor access [RAN1, RAN2, RAN4] |

**Proposal S4-5:** For NB-IoT and eMTC, DL channel quality reporting in MSG3 is applicable to both EPC and 5GC without capability differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Better for simplicity if we can keep no difference as seen from the AS level. |
| Qualcomm | Yes |  |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

## 2.5 DL channel quality reporting in connected mode

**Proposal S5-1:** Keep a common capability for NB-IoT and eMTC for DL channel quality reporting in connected mode and clarify in the description that reporting of the serving cell applies to E-UTRAN and reporting of the configured carrier applies to NB-IoT.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry |  | No strong view, the scope of the feature is different (cell/carrier) but the reporting mechanism is the same. |
| Qualcomm | Yes |  |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Ok |  |

Conclusion:

All companies agree with the proposal.

**Proposal S5-2:** For NB-IoT, DL channel quality reporting in MSG3 in connected mode is only applicable to FDD. For eMTC, it is applicable to both FDD and TDD.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Same as legacy. |
| Qualcomm | Yes | Already clear from RAN1 feature list, see RAN1 LS R2-2002519. |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes | Already clear in WID, no even need for separate agreement |

Conclusion:

All companies agree with the proposal. One company indicates that it is clear in the WID and does not need agreement.

Rapporteur thinks it is not clear in the WID.

|  |
| --- |
| **Improved multi-carrier operation:**   * Specify support for quality reporting in connected mode for anchor and non-anchor carriers. The quality report is not carried in the physical layer. [RAN1, RAN2, RAN4]. |

:

**Proposal S5-3:** For NB-IoT and eMTC, DL channel quality reporting in connected mode is applicable to both EPC and 5GC without capability differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Better for simplicity if we can keep no difference as seen from the AS level. |
| Qualcomm | Yes |  |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

## 2.6 NRS presence on non-anchor carrier

**Proposal S6-1:** For NB-IoT, Idle modeRRM measurementson non–anchor paging carrier is only applicable to FDD.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Seems to align with RAN1 view. |
| Qualcomm | Yes | Already clear from RAN1 feature list, see RAN1 LS R2-2002519. |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes | Already clear in WID, no even need for separate agreement |

Conclusion:

All companies agree with the proposal. One company indicates that it is clear in the WID and does not need agreement.

Rapporteur thinks it is not clear in the WID.

|  |
| --- |
| **Improved multi-carrier operation:**   * Specify signalling to indicate on a non-anchor carrier for paging a set of subframes which will contain NRS even when no paging NPDCCH is transmitted [RAN1, RAN2, RAN4] |

**Proposal S6-2:** For NB-IoT, Idle modeRRM measurementon non–anchor carrier is applicable to EPC and 5GCwithout capability differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Better for simplicity if we can keep no difference as seen from the AS level. |
| Qualcomm | Yes |  |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

:

## 2.7 Inter-RAT cell selection

**Proposal S7-1:** For NB-IoT and eMTC, there is no need to define a optional feature for support of assistance information for inter-RAT cell selection to/from NB-IoT.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry |  | No strong view. May need to be re-discussed later if some optional UE behaviours are added in other specs. |
| Qualcomm | Yes | Not needed. |
| Huawei | Yes |  |
| Lenovo | Yes |  |
| Ericsson |  | There was no agreement to provided assistance information in RRC Connected mode so yes, the optional feature is not required.  However, a capability should still be applicable if UE supports inter-RAT cell selection to/from NB-IoT. |

Conclusion:

Three companies agree with the proposal. One company is not sure. One company thinks a capability is needed.

Proposal:

**Proposal S7-1’:** FFS **-** For NB-IoT and eMTC, there is no need to define a optional feature for support of assistance information for inter-RAT cell selection to/from NB-IoT.

## 2.8 Co-existence with NR

**Proposal S8-1:** For NB-IoT and eMTC, UL andDL resource reservation for coexistence with NRare applicable to EPC and 5GCwithout capability differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Better for simplicity if we can keep no difference as seen from the AS level. |
| Qualcomm | Yes |  |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

## 2.9 Connection to 5GC

**Proposal S9-1**: For NB-IoT, introduce a new optional feature, NB-IoT/5GC, in section 6.18.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | eNB does not need to know, so no need to have a capability reporting (clause 4). |
| Qualcomm | Yes | If the question is whether network needs to know NB-IoT UE supports connectivity to 5GC, then yes. |
| Huawei | yes | the proposal is to define a optional feature w/o capability reporting. eNB does not need to know |
| Lenovo | Yes | eNB does not need to know. |
| Ericsson | Yes | Wondering whether QC above means yes or no? |

Conclusion:

All companies agree with the proposal.

**Proposal S9-2**: For NB-IoT and eMTC, remove the capabilities introduced in 6.18.1 (User Plane CIoT 5GS optimisations) and 6.18.2 (Control Plane CIoT 5GS optimisations).

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | We don’t want to replicate the NAS options in 306. |
| Qualcomm | Yes | We didn’t capture same for EPS. |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

**Proposal S9-3**: For NB-IoT and eMTC, introduce a new optional feature, MO-EDT for Control Plane CIoT 5GS Optimisation, in section 6.18 and remove the editor’s note in 6.8.4.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | We need the 5GS equivalent. |
| Qualcomm | Yes |  |
| Huawei | yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Conclusion:

All companies agree with the proposal.

**Proposal S9-4:** For NB-IoT, all pre-Rel15 capabilities not CIoT EPS optimisations related and other than *rai-Support-r14* are applicable to 5GC without capability differentiation.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes | Question: This will mean that when the EPC/5GC applicability is not stated, this applies to both by default (same as what is being done in Rel-16 NB-IoT/eMTC). Do the other parallel groups follow the same approach ? It would be useful to have a coherent use in 36.306. |
| Qualcomm | No | We need to check each individual capability. We do not need to duplicate the capabilities but just update the descriptions. |
| Huawei | yes | There is no need for update. Unless specified otherwise, the capabilities apply to both EPC and 5GC |
| Lenovo | Yes |  |
| Ericsson | No | R14 AS RAI is being discussed in another offline, for that particular capability we should agree based on the outcome of that discussion.  For other capabilities OK – agree with HW that capabilities should apply in either case unless stated otherwise. |

Conclusion:

One company wants to check each individual capability. One company agrees with the proposal except for *rai-Support-r14.* The other companies agree with the proposal.

Proposal:

**Proposal S9-4’:** For NB-IoT, all pre-Rel15 capabilities not CIoT EPS optimisations related and other than *rai-Support-r14* are applicable to 5GC without capability differentiation. FFS *rai-Support-r14.*

**Proposal S9-5**: For NB-IoT and eMTC connected to 5GC, support of AS RAI enhancement is optional at the UE, a new optional feature RAI Enhancement is introduced in section 6.18.

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry | Yes |  |
| Qualcomm | No | RAN2 already agreed it is mandatory to support. |
| Huawei | Yes | RAN2 has agreed ‘always enabled’ which does mean that the UE has to support. In particular a UE only supporting the CP solution may have no interest in implementing this. |
| Lenovo | Yes |  |
| Ericsson | No | Have similar view as QC. |

Conclusion:

Three companies think Rel-16 AS RAI enhancement is optional at the U, two companies thinks it is mandatory.

Proposal:

**Proposal S9-5’**: FFS - For NB-IoT and eMTC connected to 5GC, support of AS RAI enhancement is optional at the UE

**Proposal S9-6:** For eMTC, introduce the following capabilities for support of connection to 5GC:

* *ce-eutra-5GC*
* *ce-eutra-5GC-HO-ToNR-FDD-FR1*
* *ce-eutra-5GC-HO-ToNR-TDD-FR1*
* *ce-eutra-5GC-HO-ToNR-FDD-FR2*
* *ce-eutra-5GC-HO-ToNR-TDD-FR2*

**Company’s views**

|  |  |  |
| --- | --- | --- |
| **Company** | **do you agree**  **(yes/no)** | **Comments** |
| BlackBerry |  | No strong view, normally we use FGI bits instead if the issue may come from testing. |
| Qualcomm | For non-BL UE, yes to all.  For BL UE, Only ce-eutra-5GC is applicable. | Interworking with NR is not applicable for Cat M UEs. Therefore, capabilities other than ce-eutra-5GC are not applicable for Cat M UEs. |
| Huawei | non BL UE: yes  BL UE: FFS | non BL UEs: yes to all  BL UEs: need for HO capabilities pending on outcome of [offline-417] |
| Lenovo | For non BL UE, yes.  For BL UE, FFS | Same view as Huawei. |
| Ericsson | Yes | Similarly as is done for LTE UEs connected to 5GC.  Agree that BL UEs (Cat-M1/M2) don't indicate 5GC HO capabilities. |

Conclusion:

All companies agree to introduce a new *ce-eutra-5GC* capability for eMTC

All companies agree to introduce new capabilities, *ce-eutra-5GC-HO-ToNR-FDD-FR1, ce-eutra-5GC-HO-ToNR-TDD-FR1, ce-eutra-5GC-HO-ToNR-FDD-FR2* and *ce-eutra-5GC-HO-ToNR-TDD-FR2 for non-BL UEs* but think it is nt applicable to BL UEs.

Proposal:

**Proposal S9-6’:** For eMTC, introduce a new capability, *ce-eutra-5GC,* for support of connection to 5GC.

**Proposal S9-6’’:** For eMTC non-BL UEs, introduce new capabilities, *ce-eutra-5GC-HO-ToNR-FDD-FR1, ce-eutra-5GC-HO-ToNR-TDD-FR1, ce-eutra-5GC-HO-ToNR-FDD-FR2* and *ce-eutra-5GC-HO-ToNR-TDD-FR2* for support of connection to 5GC.

* *ce-eutra-5GC*

# 3 Summary

**Potential easy agreements (all companies agree)**

*GWUS*

**Proposal S1-1:** For NB-IoT and eMTC, the existing capability *wakeUpSignalMinGap-eDRX-r15* also applies to Rel-16 WUS.

**Proposal S1-2:** For NB-IoT, Rel-16 GWUS is only applicable to FDD.

**Proposal S1-3:** For eMTC, separate capability indications are introduced for FDD and TDD.

**Proposal S1-4:** For NB-IoT and eMTC, Rel-16 GWUS is applicable to both EPC and 5GC, and there is no need for capability differentiation.

*Multi-TB scheduling*

**Proposal S2-1:** For NB-IoT, multiple TB scheduling in unicast and in multicast is only applicable to FDD.

**Proposal S2-2:** For NB-IoT and eMTC, multiple TB scheduling in unicast is applicable to both EPC and 5GC without differentiation.

**Proposal S2-3:** For NB-IoT and eMTC, multiple TB scheduling in multicast is only applicable to EPC

*SON*

**Proposal S3-1:** For NB-IoT, support of ANR, RACH report and RLF report are applicable to both FDD and TDD and there is no need for FDD/TDD differentiation.

*DL channel quality reporting in MSG3*

**Proposal S4-1:** For NB-IoT, move the featureDL channel quality reporting in MSG3 for non-anchor carrier to section 6.17.

**Proposal S4-4:** For NB-IoT, DL channel quality reporting in MSG3 for non-anchor carrier is only applicable to FDD.

**Proposal S4-5:** For NB-IoT and eMTC, DL channel quality reporting in MSG3 is applicable to both EPC and 5GC without capability differentiation.

*DL channel quality reporting in connected mode*

**Proposal S5-1:** Keep a common capability for NB-IoT and eMTC for DL channel quality reporting in connected mode and clarify in the description that reporting of the serving cell applies to E-UTRAN and reporting of the configured carrier applies to NB-IoT.

**Proposal S5-2:** For NB-IoT, DL channel quality reporting in MSG3 in connected mode is only applicable to FDD. For eMTC, it is applicable to both FDD and TDD.

**Proposal S5-3:** For NB-IoT and eMTC, DL channel quality reporting in connected mode is applicable to both EPC and 5GC without capability differentiation.

*NRS presence on non-anchor carrier*

**Proposal S6-1:** For NB-IoT, Idle modeRRM measurementson non–anchor paging carrier is only applicable to FDD.

**Proposal S6-2:** For NB-IoT, Idle modeRRM measurementon non–anchor carrier is applicable to EPC and 5GCwithout capability differentiation.

*Co-existence with NR*

**Proposal S8-1:** For NB-IoT and eMTC, UL andDL resource reservation for coexistence with NRare applicable to EPC and 5GCwithout capability differentiation.

*Connection to 5GC*

**Proposal S9-1**: For NB-IoT, introduce a new optional feature, NB-IoT/5GC, in section 6.18.

**Proposal S9-2**: For NB-IoT and eMTC, remove the capabilities introduced in 6.18.1 (User Plane CIoT 5GS optimisations) and 6.18.2 (Control Plane CIoT 5GS optimisations).

**Proposal S9-3**: For NB-IoT and eMTC, introduce a new optional feature, MO-EDT for Control Plane CIoT 5GS Optimisation, in section 6.18 and remove the editor’s note in 6.8.4.

**Proposal S9-4’:** For NB-IoT, all pre-Rel15 capabilities not CIoT EPS optimisations related and other than *rai-Support-r14* are applicable to 5GC without capability differentiation. FFS *rai-Support-r14.*

**Proposal S9-6’:** For eMTC, introduce a new capability, *ce-eutra-5GC,* for support of connection to 5GC.

**Proposal S9-6’’:** For eMTC non-BL UEs, introduce new capabilities, *ce-eutra-5GC-HO-ToNR-FDD-FR1, ce-eutra-5GC-HO-ToNR-TDD-FR1, ce-eutra-5GC-HO-ToNR-FDD-FR2* and *ce-eutra-5GC-HO-ToNR-TDD-FR2* for support of connection to 5GC.

**Potential agreements**

*DL channel quality reporting in MSG3*

Note: The proposals have been reworded by the rapporteur to address unclarities

**Proposal S4-2’:** DL channel quality reporting in Msg3 for NB-IoT anchor carrier and DL channel quality reporting in Msg3 for eMTC are two separate optional features.

**Proposal S4-3’:** For NB-IoT, update the description of the legacy featureDL channel quality reporting in MSG3 (6.17.2) to reflect that it applies to the anchor carrier.

**For further discussion**

*Inter-RAT cell selection*

**Proposal S7-1’:** FFS **-** For NB-IoT and eMTC, there is no need to define a optional feature for support of assistance information for inter-RAT cell selection to/from NB-IoT.

*Connection to 5GC*

**Proposal S9-5’**: FFS - For NB-IoT and eMTC connected to 5GC, support of AS RAI enhancement is optional at the UE

# 4 List of referenced documents

1. [R2-2002588](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002588.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 Late

1. [R2-2003248](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003248.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003248.zip) UE capabilities, TDD/FDD differentiation and 5GC applicability for NB-IoT and eMTC Huawei, HiSilicon discussion Rel-16 NB\_IOTenh3-Core, LTE\_eMTC5-Core