**3GPP TSG RAN meeting #93e RP-21xxxx**

**Electronic Meeting, Sep. 13-17, 2021**

## Status Report to TSG

**Agenda item:** 10.4.1

|  |  |
| --- | --- |
| **WI / SI Name** | Additional enhancements for NB-IoT and LTE-MTC |
| included in this status report | Study Item: No | Core part: Yes | Performance part:Yes | Testing part:No |
| **Acronym** | NB\_IOTenh4\_LTE\_eMTC6 |
| **Unique ID** | 860044 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-211340 |
| **Target Completion Date****(indicate if changed)** | Study Item:  | Core part: 03/2022 | Performance part: 09/2022 | Testing part:  |
| **Overall Completion level** | Study Item:  | Core part: 65% | Performance Part: 0% | Testing part:  |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN WG 1 |
| **Rapporteur** | **Name** | Yubo YANGEmre YAVUZ |
| **Company** | HuaweiEricsson |
| **Email** | yangyubo1@huawei.comemre.yavuz@ericsson.com |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

 NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

In RAN1#106-e meeting, 22 contributions [1-22] were submitted, and the following agreements were achieved:

For NB-IoT 16-QAM:

Agreement:

Confirm the following working assumption:

* Working Assumption
	+ Support 16-QAM for NPUSCH in PUR procedure.

Confirm the working assumption:

Working Assumption

For the indication of 16-QAM in uplink

* The “Modulation and coding scheme” field in DCI Format N0 is utilized as in legacy for scheduling QPSK.
* One reserved state in the “Modulation and coding scheme” field in DCI Format N0 is utilized to indicate the use of 16QAM.
* The “Repetition number” field in DCI Format N0 is utilized to indicate the TBS indices (i.e., I\_TBS indices from 14 to 21) for 16-QAM in UL.

Agreement

 **For the UE configured with 16-QAM for NPDSCH, the deployment of the carrier is signaled by *operationModeInfo* in MIB or *inbandCarrierInfo* in SIB.**

**Confirm working assumption:**

Working Assumption

For downlink power allocation to support 16QAM:

* For standalone and guard-band deployments:
	+ One power ratio is signaled optionally
		- NPDSCH EPRE to NRS EPRE in symbols without NRS
	+ The same transmit power is assumed across different symbols.
	+ If the signalling is not indicated, the legacy power allocation is used.
		- i.e., the ratio of NPDSCH EPRE to NRS EPRE is 0dB for one NRS antenna port, and -3dB for two NRS antenna ports
* UE specific signalling is used

Agreement

Down-select one option from Cat 1 as starting point

* Cat 1: Option 1, Option 2/Option 4, Option 5

FFS Cat 2: Option 3, for close-loop power control

* Option 1: Reuse the LTE definition simplified for NB-IoT: $∆\_{TF,c}\left(i\right)=10log\_{10}\left(\left(2^{BPRE∙K\_{s}}-1\right)\right)$ for $K\_{s}=1.25$ and $∆\_{TF,c}\left(i\right)=0$ for $K\_{s}=0$, where $K\_{s}$ is given by higher layer parameter *deltaMCS-Enabled*, and $BPRE=\frac{K}{N\_{RE}}$ where K is the code block size.
* Option 2: $∆\_{TF,c}$ is given in table based on MCS index if enabled, 0 otherwise.
* Option 3: A TPC command is introduce to indicate the power offset for NPUSCH with 16-QAM.
* Option 4: $∆\_{TF,c}$ is configured by high layer parameter.
* Option 5: ΔTF = $10log\_{10}\left(\frac{2^{\left(BPRE\_{16QAM}∙K\_{s}\right)}-1}{2^{\left(BPRE\_{QPSK}∙K\_{s}\right)}-1}\right)$ for *Ks* = 1.25 or ΔTF = 0 for *Ks* = 0, where BPRE =$ CodeRate\_{max}∙Q\_{m}$. $CodeRate\_{max}$ is the highest code rate in the TBS/MCS table used for the Modulation Scheme, and $Q\_{m}$ is the number of bits per M-ary symbol of the Modulation Scheme.

**Working Assumption**

For downlink power allocation to support 16QAM:

* For inband deployments, a power ratio is signaled in addition to the signalling for standalone and guard-band deployments which in this case applies to “symbols with NRS” and “symbols without NRS nor CRS”.
	+ the power ratio between NPDSCH EPRE and NRS EPRE in symbols with CRS is signalled
	+ the signalling is UE specific

Note: “symbols with NRS” and “symbols without NRS nor CRS” have the same power.

Conclusion

The channel quality report is not supported in Msg3 in connected mode in Rel-17.

For eMTC 14-HARQ processes:

Agreement

Confirm the below Working Assumption for Alt-2e with following updates

The PDSCH scheduling delay and HARQ-ACK delay are jointly encoded in a single DCI field:

* The field is 5 bits if Alt-2e is configured.
* FFS: Details of the joint encoding.
* FFS: Legacy DCI fields that might be set to zero bits in length for the jointly encoded solution Alt-2e.

For Alt-1, it will be separate discussion based existing working assumption

Agreement

Confirm the below Working Assumption for Alt-1 with following updates

The PDSCH scheduling delay and HARQ-ACK delay are jointly encoded in a single DCI field:

* The field is no more than 7 bits if Alt-1 is configured.
* FFS: Details of the joint encoding.
* FFS: Legacy DCI fields that might be set to zero bits in length for the jointly encoded solution Alt-1.

Note: Alt-1 expresses the HARQ-ACK delay as: (y) BL/CE DL subframe + 1 subframe + (z) BL/CE UL subframes, where y = {0, 1, 2, … 11} and z = {1, 2, 3}.

Agreement

For the PDSCH scheduling delay and HARQ-ACK delay jointly encoded in a single DCI field:

* The DCI field uses 7 bits if Alt-1 is configured.

Conclusion

How to implement/describe the states, e.g., table, resulting from the joint encoding solution of Alt-1 is left up to the Editor, based on the agreements for the PDSCH scheduling delay, HARQ-ACK delay and the WA confirmed for Alt-1.

#### 2.1.2 Remaining Open issues

* + Remaining details on support of 16-QAM, including support for PUR NPDSCH, confirmation of downlink power allocation for inband deployment and down-selections for power control of NPUSCH and for CQI table respectively. [NB-IoT]
	+ Remaining details to support additional PDSCH scheduling delay for introduction of 14-HARQ processes in DL, for HD-FDD Cat M1 UEs, including HARQ-ACK delay set(s) size(s) and corresponding elements, usability of legacy DCI fields, etc. [LTE-MTC]

## 2.2 RAN2

#### 2.2.1 Agreements

Contributions [23]– [50] were submitted to RAN2#115-e meeting.

**NB-IoT neighbour cell measurements and corresponding measurement triggering before RLF**

RAN2 discussed NB-IoT neighbour cell measurements and corresponding measurement triggering before RLF and made the following agreements:

|  |
| --- |
| RAN2#115-e agreements:* The configuration of the criteria for starting the measurements include a serving cell NRSRP threshold. FSS how to address variance (as agreed last meeting)
* It is useful to have a shorter T310 timer for UEs supporting this enhancement, but FFS whether this is best achieved with the existing dedicated signalling or based on a new condition
* Prioritisation of carriers/cells to measure is left to the UE implementation.
* FFS: whether to provide a separate criteria for inter-frequency measurements (i.e. needing re-tuning) considering that they will take longer and should start earlier.
* Legacy relaxed monitoring criteria is reused to address the variance part of the criteria to start the measurements.
	+ FFS: Whether it is enabled by the provision of separate SSearchDeltaP and TSearchDeltaP parameters from RRC\_IDLE.
* The conditions where the UE is required to perform measurements are specified. No requirement on when to stop measurements is needed.
* The configuration of the criteria for starting the measurements is provided via broadcast signalling.
* Provision of information regarding which cells/carriers to be considered is not supported. It is up to UE implementation to choose and prioritize carrier/cell list for measurement.
* Report of the cells measured in RRC\_IDLE to assist measurement configuration is not supported.
* Report of information about connected measurements during the RRC Connection re-establishment procedure for network optimisation is not supported.
* There is no need to specify which subframes can be used for measurements beyond them not being needed for PDCCH monitoring or data transmission / reception.
* Support for connected mode measurement is optional with capability signalling.
* FFS: Whether to support an indication from the UE that it starts/ stops performing measurement
 |

RAN2 has agreed on an email discussion until next meeting:

* [Post115-e][301][NBIOT/eMTC R17] RLF measurements (Huawei)

 Scope: Progress the FFSs

 Intended outcome: Report to next meeting

 Deadline: long

**NB-IoT carrier selection based on the coverage level and associated carrier specific configuration**

RAN2 discussed NB-IoT carrier selection based on the coverage level and associated carrier specific configuration and made the following agreements.

|  |
| --- |
| RAN2#115-e agreements:* Support coverage or carrier specific DRX configurations, FFS details.
* UE capability for Rel-17 paging carrier selection should be introduced
* UE metric for determining carrier suitability and selection is based on NRSRP.
* Use a hysteresis/longer averaging/timer for UE metric based on NRSRP.
* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.
 |

RAN2 has agreed on an email discussion until next meeting:

* [Post115-e][302][NBIOT/eMTC R17] carrier selection (Ericsson)

 Scope: progress open issues, main aim is to converge on option 1c vs. 2a for decision in next meeting.

 Intended outcome: Report to next meeting

 Deadline: long

**NB-IoT: 16-QAM for unicast in UL and DL**

RAN2 discussed 16-QAM for unicast in UL and DL and made the following agreements.

|  |
| --- |
| RAN2#115-e agreements:* Confirm the working assumption: The support of 16-QAM uses separate UE capabilities for DL and UL.
* 16QAM is configured via dedicated signaling separately for UL and DL.
* A NPUSCH 16QAM activation indication is needed in PUR configuration.
 |

**eMTC: 14-HARQ processes in DL, for HD-FDD Cat M1 UEs**

RAN2 discussed 14-HARQ processes in DL, for HD-FDD Cat M1 UEs and made the following agreements.

|  |
| --- |
| RAN2#115-e agreements:* Confirm the working assumption: No change to current L2 buffer size requirement for HD-FDD Cat M1 UEs supporting 14 HARQ processes in DL.
 |

**eMTC: maximum DL TBS of 1736 bits**

RAN2 discussed 14 maximum DL TBS of 1736 bits and made the following agreements.

|  |
| --- |
| RAN2#115-e agreements:* The table 4.1A-1 in TS 36.306 for DL Category M1 needs to be updated to indicate 1736 bits TBS and 43008 soft channel bits.
* Max DL TBS of 1736 bits can be supported for PUR.
* FFS EDT support.
 |

#### 2.2.2 Remaining Open issues

* For NB-IoT, support of NB-IoT neighbour cell measurements and corresponding measurement triggering before RLF, including how to support of a shorter T310 timer, whether to have a UE indication that it starts/stops measurements, whether to have a separate criteria for inter-frequency measurements, and the parameters to enable relaxed monitoring criteria.
* For NB-IoT, support of NB-IoT carrier selection based on the coverage level and associated carrier specific configuration, including whether to introduce a (new) UE report and down-selection of options and details for the options.
* For NB-IoT, RAN2 aspects to introduce support 16-QAM for unicast in DL and UL including L2 buffer size.
* For eMTC, RAN2 aspects to introduce support for 14-HARQ processes in DL for HD-FDD Cat M1 UEs.
* For eMTC, RAN2 aspects to introduce support for DL TBS of 1736 bits for HD-FDD Cat. M1 UEs in CE mode A including L2 buffer size and EDT support.

## 2.3 RAN3

#### 2.3.1 Agreements

In RAN#113-e meeting, 12contributions [51] ~ [62] were submitted, with the following progress:

- Updated work plan is noted.

- Support for Carrier Selection and Carrier Specific Configuration:

- Different solutions proposed, no conclusion, wait for RAN2 further progress.

#### 2.3.2 Remaining Open issues

Support for Carrier Selection and Carrier Specific Configuration.

## 2.4 RAN4

#### 2.4.1 Agreements

In RAN4#100-e, WF R4-2114943 was approved. The agreements are:

• Reuse the existing NB-IoT RB power dynamic range requirements for 16QAM for in-band or guard band operation or NB-IoT operation in NR in-band. And no changes to the specifications, nor new test cases for 16QAM RB power dynamic range are needed.

* The EVM limit for 16QAM uplink is to set to 12.5%.
* The IBE mask of NB-IoT is modified as in the CR of R4-2114002
* The MPR for 16QAM PC3 and PC5 is agreed as the moderator’s proposal. FFS MPR for PC6.

**For RRM core part:**

In RAN4#100-e meeting, 5 contributions [63-67] were submitted, and the following agreements were achieved:

**General**

RAN4 to postpone the discussions on exact section numbering until more progress is reached on the detailed requirements

The conditions related to when the neighbour cell measurements can be performed without gaps and causing interruptions as agreed in [R4-2105800] shall be taken into account when defining the requirements.

**Intra-frequency and inter-frequency measurement.**

Define requirements for both intra-frequency and inter-frequency measurement.

Regarding whether to prioritize intra-frequency measurement, follow the conclusion from RAN2 that prioritisation of carriers/cells to measure is left to the UE implementation.

**Multiple carriers for neighbour cell measurements.**

The UE with the support of CONNECTED mode neighbor cell measurements shall support neighbour cell measurements on at least same number of carriers in CONNECTED mode as in IDLE mode, including the carrier which is same as the serving carrier and at least two carriers, which are different from the serving carrier.

Detection and measurement delay shall be scaled by the number of measured carriers

Note: it is RAN4 understanding that support of CONNECTED mode neighbor cell measurements is an optional UE capability

**Triggering of neighbour cell measurements.**

RAN4 should wait for further progress in RAN2 regarding the mechanism for triggering neighbour cell measurements in connected mode.

#### 2.4.2 Remaining Open issues

**For RF core part:**

**NB-IoT:**

 FFS whether to allow different rated output power for 16QAM.

FFS whether to define new 16QAM FRCs for BS Rx dynamic range tests.

FFS MPR for PC6.

**LTE-MTC:**

For UEs supporting PUSCH sub-PRB resource allocation, study and if found feasible for the concluded options, specify support power reduction for PRACH, PUCCH, and full-PRB PUSCH, with a maximum reduction of e.g. 3 dB below sub-PRB PUSCH power.

**For RRM core part:**

Discuss conditions on neighbour cell measurement when the target carrier is different from the serving carrier

Discuss the scenario to be considered when the target cell is in normal/enhanced coverage.

Discuss maintaining known cell detected in IDLE mode in connected mode neighbour cell measurement and the corresponding impact.

**For performance part:**

Specify necessary performance requirements, measurement accuracy requirements and test cases related to the above-mentioned enhancements and core requirements. [NB-IoT][LTE-MTC]

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

1. R1-2106558 Support of 16QAM for unicast in UL and DL in NB-IoT Huawei, HiSilicon
2. R1-2106559 Support of 14-HARQ processes in DL for HD-FDD MTC UEs Huawei, HiSilicon
3. R1-2106654 Support of 16-QAM for NB-IoT Nokia, Nokia Shanghai Bell
4. R1-2106661 Support of 14-HARQ processes in DL for eMTC Nokia, Nokia Shanghai Bell
5. R1-2106758 Support of 16-QAM for NB-IoT Qualcomm Incorporated
6. R1-2106759 Support of 14 HARQ processes and scheduling delay Qualcomm Incorporated
7. R1-2106847 Discussion on UL and DL 16QAM for NB-IoT ZTE, Sanechips
8. R1-2106848 Remaining issues on 14-HARQ processes in DL for eMTC ZTE, Sanechips
9. R1-2107508 Support 16QAM in NB-IOT MediaTek Inc.
10. R1-2107684 Discussion on DL PAPR for 16-QAM of NB-IoT Huawei, HiSilicon
11. R1-2107687 Work plan of Rel-17 enhancements for NB-IoT and LTE-MTC Huawei, Ericsson
12. R1-2107941 Support 16QAM for NBIoT Lenovo, Motorola Mobility
13. R1-2108116 Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson
14. R1-2108117 Support of 14 HARQ processes in DL in LTE-MTC Ericsson
15. R1-2108118 On Rel-17 RRC parameters and specification impacts for LTE-M and NB-IoT Ericsson
16. R1-2108275 Feature lead summary #1 on 106-e-LTE-Rel17\_NB\_IoT\_eMTC-01 Moderator (Huawei)
17. R1-2108295 Feature Lead Summary [106-e-LTE-Rel17\_NB\_IoT\_eMTC-02] - 1st check point Moderator (Ericsson)
18. R1-2108296 Feature Lead Summary [106-e-LTE-Rel17\_NB\_IoT\_eMTC-02] - 2nd check point Moderator (Ericsson)
19. R1-2108297 Feature Lead Summary [106-e-LTE-Rel17\_NB\_IoT\_eMTC-02] - final check Moderator (Ericsson)
20. R1-2108466 Feature lead summary #2 on 106-e-LTE-Rel17\_NB\_IoT\_eMTC-01 Moderator (Huawei)
21. R1-2108530 Feature lead summary #3 on 106-e-LTE-Rel17\_NB\_IoT\_eMTC-01 Moderator (Huawei)
22. R1-2108642 Feature lead summary #4 on 106-e-LTE-Rel17\_NB\_IoT\_eMTC-01 Moderator (Huawei)
23. R2-2107122 Consideration on neighbour cell measurement in RRC connected state Qualcomm Incorporated
24. R2-2107123 Support for NB-IoT carrier selection based on the coverage level Qualcomm Incorporated
25. R2-2107124 Signalling for coverage-based paging carrier selection Qualcomm Incorporated
26. R2-2107207 Discussion on details of paging carrier selection options MediaTek Inc.
27. R2-2107370 Further discussion on enhanced paging carrier selection Spreadtrum Communications
28. R2-2107391 Further discussion on enhanced paging carrier selection NEC Corporation
29. R2-2107429 Open issues on connected mode measurements for RLF Huawei, HiSilicon
30. R2-2107430 Paging carrier selection Huawei, HiSilicon
31. R2-2107431 L2 buffer size calculations for eMTC and NB-IoT enhancements Huawei, HiSilicon
32. R2-2107761 Remaining issues on connected mode measurement ZTE Corporation, Sanechips
33. R2-2107762 Remaining issues on CEL-based paging carrier selection ZTE Corporation, Sanechips
34. R2-2107763 Remaining issues on 14 HARQ and 1736bits TBS for eMTC ZTE Corporation, Sanechips
35. R2-2107764 Remaining issues on 16QAM for NB-IoT ZTE Corporation, Sanechips
36. R2-2107810 Network assistance information for Re-establishment time reduction Nokia, Nokia Shanghai Bell
37. R2-2107811 On the open aspects for connected mode measurements for RLF enhancements Nokia, Nokia Shanghai Bell
38. R2-2107812 Further analysis on solution for coverage level based paging carrier selection Nokia, Nokia Shanghai Bell
39. R2-2107869 Triggering cell selection early Huawei, HiSilicon, MediaTek Inc., Spreadtrum Communications, Lenovo, Motorola Mobility, Fraunhofer, Novamint, CMCC, China Unicom, Reliance Jio
40. R2-2107996 Report of [AT114-e][302][NBIOT/eMTC R17] NB-IoT/eMTC Other ZTE (email discussion rapporteur)
41. R2-2108390 Discussion on connected mode measurement in NB-IoT Ericsson
42. R2-2108391 Paging Carrier Selection Ericsson
43. R2-2108392 Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson
44. R2-2108742 Total L2 Buffer Size for NB-IoT and LTE-M UEs Ericsson
45. R2-2108828 Summary of AI 9.1.3 NB-IoT carrier selection Ericsson
46. R2-2108843 Summary of AI 9.1.2 NB-IoT neighbor cell measurements (Huawei) Huawei
47. R2-2108971 Summary of [301] RLF measurements (Huawei) Huawei
48. R2-2108972 [AT115-e][302][NBIOT/eMTC R17] carrier selection (Ericsson) Ericsson
49. R2-2108973 Summary of AI 9.1.4 NB-IoT/eMTC Other-Phase 2 (ZTE) ZTE (email discussion rapporteur)
50. R2-2109030 [Pre115-e][303][NBIOT/eMTC R17] Summary of AI 9.1.4 Other (ZTE) ZTE Corporation
51. R3-213244 Discussion on Carrier Selection and Carrier Specific Configuration ZTE
52. R3-213245 36.413 (Rel-17) Introduction of CEL based paging carrier selection ZTE
53. R3-213246 38.413 (Rel-17) Introduction of CEL based paging carrier selection ZTE
54. R3-213453 Support of Carrier Selection based on coverage level Nokia, Nokia Shanghai Bell
55. R3-213454 Support of Carrier Selection based on coverage level Nokia, Nokia Shanghai Bell
56. R3-213574 Work plan of Rel-17 enhancements for NB-IoT and LTE-MTC Huawei, Ericsson
57. R3-213575 Consideration on Carrier Selection and Carrier Specific Configuration Huawei
58. R3-213576 Support of CE based carrier selection Huawei
59. R3-213850 Discussion on Rel-17 eMTC/NB-IoT RAN3 impacts Ericsson
60. R3-213978 Support of CE based carrier selection Huawei
61. R3-214178 CB: # NBIoTMTC1\_WorkPlan - Summary of email discussion Huawei - moderator
62. R3-214179 CB: # NBIoTMTC2\_CarrierSelection - Summary of email discussion Nokia - moderator
63. R4-2114088 Discussions on RRM requirements for release 17 WI on eMTC and NB-IoT Ericsson
64. R4-2114148 Discussion on RRM requirements for Rel-17 NB-IoT Huawei, Hisilicon
65. R4-2114201 On NB-IoT neighbor cell measurements in RRC\_CONNECTED Qualcomm Incorporated
66. R4-2115416 Email discussion summary: [100-e][241] NB\_IOTenh4\_LTE\_eMTC6\_RRM Moderator (Huawei)
67. R4-2115374 WF on RRM requirements for Rel-17 NB-IoT and LTE-MTC Huawei, Hisilicon
68. R4-2112280 Proposals on BS RF requirements for support of 16QAM in NB-IoT, Nokia, Nokia Shanghai Bell
69. R4-2113620 MPR for NB-IoT 16-QAM with modified IBE, Nokia, Nokia Shanghai Bell
70. R4-2114002 CR on NB-IoT IBE mask to allow 16-QAM, Nokia, Nokia Shanghai Bell
71. R4-2114216 Discussion on in-band emission requirements for 16QAM NB-IoT Uplink, Huawei, HiSilicon
72. R4-2114217 Further discussion on BS RF requirements for 16QAM NB-IoT Downlink, Huawei, HiSilicon,
73. R4-2114345 BS RF impact analysis on R17 NB\_IoT, Ericsson
74. R4-2114346 UE RF impact analysis on R17 NB\_IoT, Ericsson

 08.08.2021 minor adaptations for RAN #93e

 17.05.2021 minor adaptations for RAN #92e

 28.01.2021 minor adaptations for RAN #91e

 09.11.2020 minor adaptations for RAN #90e

 31.08.2020 minor adaptations for RAN #89e

 20.04.2020 minor adaptations for RAN #88e

 18.02.2020 minor adaptations for RAN #87e

 14.11.2019 minor adaptations for RAN #86

 18.08.2019 minor adaptations for RAN #85

 12.05.2019 minor adaptations for RAN #84

 27.02.2019 minor adaptations for RAN #83

 21.11.2018 completion levels with colours added (for RAN #82)

v04.81 31.07.2018 simplification of template and addition of cross-TSG aspects (for RAN #81)

v04.80 21.05.2018 minor adaptations for RAN #80

v04.79 26.02.2018 minor adaptations for RAN #79

v04.78 18.11.2017 minor adaptations for RAN #78

v04.77 06.08.2017 minor adaptations for RAN #77

v04.76 15.05.2017 minor adaptations for RAN #76

v04.75 31.01.2017 minor adaptations for RAN #75

v04.74 28.10.2016 minor adaptations for RAN #74

v04.73 01.09.2016 adaptations for RAN #73 (time units in extra Excel table, RAN6 reporting included)

v04.72 26.05.2016 adaptations for RAN #72 (introduction of NR & GERAN TUs)

v04.71 10.02.2016 minor adaptations for RAN #71

v04.70 30.10.2015 minor adaptations for RAN #70

v04.69 12.08.2015 minor adaptations for RAN #69

v04.68 21.05.2015 minor adaptations for RAN #68

v04.67 01.02.2015 minor adaptations for RAN #67

v04.66 16.11.2014 minor adaptations for RAN #66

v04.65 16.08.2014 minor adaptations for RAN #65

v04.64 22.05.2014 minor adaptations for RAN #64

v04.63 24.01.2014 restructuring for RAN #63 to cover Core & Perf. in one doc file

v03.62 11.11.2013 section 1.2.3 adapted for RAN #62

v03 11.08.2013 section 1.2.3 added on time budget

v02 07.05.2010 history added, some spelling corrections

v01 13.11.2009 First version of the template