3GPP TSG-RAN WG2 #112e Tdoc R2-20xxxxx

Electronic meeting, November 2nd – 13th 2020

Agenda Item: 9.1.3

Source: Ericsson

Title: [AT112-e][302][NBIOT R17] Carrier selection (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

The document aims to collect the views for below email discussion and to provide summary

* [AT112-e][302][NBIOT R17] Carrier selection (Ericsson)

 Scope: Discuss what coverage information to use and whether DRX information can be used.

 Intended outcome: Report in R2-2010906

 Deadline: Tuesday 10th 1200 UTC

# 2 Discussion

In Rel-17 one of the objectives in the WID is:

* Introduce support for NB-IoT carrier selection based on the coverage level, and associated carrier specific configuration (e.g. maximum repetitions UL/DL, DRX configurations, etc.). [NB-IoT] [RAN2, RAN3]

In RAN2-111e it was decided that the scope or focus area is as below:

Agreements

* Paging carrier selection Improvements based on CE level is considered
* Paging carrier selection Improvements based on DRX cycle may be considered
	+ whether DRX cycle is considered as part of CE level (Rmax) or can be also considered separately
* Enhancements for NPRACH Carrier selection carrier may be considered
* Paging carrier selection Improvements solely based on WUS or GWUS is not considered
* FFS service based

In RAN2-112e companies briefly discussed that the term CE level terminology as such is coverage level and not directly related to NPRACH CE level.

## 2.1 Coverage Information

In order to support paging improvements based upon coverage level information, RAN2 need to first decide on what metric the coverage should be based upon. The UE coverage level is a dynamic attribute, and this may change if NRSRP changes. How the UE should detect the intra-cell coverage condition change and how to decide if the current paging carrier is no longer good enough and needs to be changed. How the coverage level is judged? This should be discussed. There may be number of alternatives for example:

* based on NRSRP
* an estimated BLER for decoding NPDCCH considering a certain paging Rmax being above a certain percentage threshold, e.g. 1 or 10%, similar to what is already done for Msg3 CQI reporting.

Companies are invited to provide their view on coverage level definition.

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| Company | Comments |
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## 2.2 DRX Information for Paging

There has been suggestion to make use of the DRX cycle that the UE is supposed to use for Paging carrier selection [1,2, 5, 6]. Considering an example; for a paging carrier supporting normal coverage level or power boosted carrier where the Rmax is configured with small *NumRepetitionPaging,* in such casethe UE with short UE specific DRX cycle can be configured or UE may select such carrier. Similarly, UEs that do not support short DRX cycle may be configured or UE may select the paging carrier supporting extended coverage level configured with large *NumRepetitionPaging*.

Further, observation has been provided that the benefits may be marginal for UE already in eDRX configuration which achieves the major power saving due to deep sleep for longer duration [4]. It has also been observed that paging carrier solely based upon DRX cycle may not be appropriate and Rmax or coverage level should be considered [2, 3].

Note: RAN2 have not yet discussed whether eNB will assign paging carrier or UE will select. This is not part of current email discussion. It is just to gather input on DRX usage for paging.

Companies are invited to provide their view on DRX Information for Paging; whether UE specific DRX information should/can be used or not. Further, can solely based upon DRX cycle the paging carrier be decided i.e

* whether DRX cycle is considered in addition to coverage level (Rmax) or
* can be considered indepenednt of Rmax

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# Conclusion

# References

[1] [R2-2010470](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2010470.zip) Carrier selection enhancement MediaTek Inc.

[2] [R2-2009059](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009059.zip) Further consideration on multi carriers configuration and selection ZTE Corporation, Sanechips

[3] [R2-2009147](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009147.zip) Discussion on enhanced paging carrier selection and multi carrier configuration Spreadtrum Communications

[4] [R2-2009269](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009269.zip) Analysis on carrier selection options for NB-IoT Nokia, Nokia Shanghai Bell

[5] [R2-2009732](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009732.zip) Paging carrier selection based on CEL and on DRX Huawei, HiSilicon discussion

[6] [R2-2009790](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009790.zip) Support for NB-IoT carrier selection based on the coverage level Qualcomm Incorporated

[7] [R2-2009180](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009180.zip) NB-IoT carrier selection and configuration based on coverage level Ericsson