3GPP TSG-RAN WG2 Meeting #109e R2-200xxxx

Online, 24 February – 6 March 2020

**Agenda item: 7.2.7**

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

**Title: Report of [AT109e][304][NBIOT R16] NRS presence on non-anchor paging carrier (Huawei)**

**Document for: Report**

# 1 Scope of the offline email discussion

This document contains the summary of the offline email discussion ‘[AT109e][304][NBIOT R16] NRS presence on non-anchor paging carrier (Huawei)”, as indicated below:

* [AT109e][304][NBIOT R16] NRS presence on non-anchor paging carrier (Huawei)

 Scope: Discuss and review the CRs

 Intended outcome: Endorsed TP for main CRs, or decision to e.g. postpone/not agree.

 Deadline: 06-03-2020, 12:00 CET

 Timeline:

* + - Companies input: Wednesday, Mar 04th 12:00 CET
		- Rapporteur summary and updated TPs (if needed): Wednesday, Mar 04th 17:00 CET
		- Wording comment, if any, on updated TPs: Thursday, Mar 05th 12:00 CET
		- Final check, e-mail discussion stops, Mar 06th 12:00 CET

# 2 Offline email discussion

## 2.1 Introduction of NRS presence on non–anchor carrier in TS 36.331

[R2-2000624](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e%5CDocs%5CR2-2000624.zip) NRS presence on non-anchor paging carrier Huawei, HiSilicon discussion Rel-16 NB\_IOTenh3-Core

***Proposal 1:*** *The parameter nrs-NonAnchorConfig is signalled in systemInformationBlockType2-NB.*

***Proposal 2:*** *Adopt the Text Proposal in section 5.1 for TS 36.331*

Companies are requested to provide comments in the table below (one row for each new comment to better keep track of the discussion – please don’t edit the previous comments).

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree with proposal 1?** | **Detailed comments on TP in section 5.1** |
| Qualcomm | **Yes** | Prefer the following wording for the field description:“For FDD: ~~This field i~~Indicates ~~if~~whether NRS ~~are~~is present on non-anchor paging carrier~~s~~ even when no paging NPDCCH is transmitted, see TS 36.211 [21], clause 10.2.6.” |
| Huawei | **yes** | We are fine with Qualcomm’s wording except that we want to keep that it applies to all paging carriers.“For FDD: ~~This field i~~Indicates ~~if~~whether NRS ~~are~~is present on non-anchor paging carriers even when no paging NPDCCH is transmitted, see TS 36.211 [21], clause 10.2.6.” |

Conclusion: TBC

Proposal: TBC

## 2.2 Introduction of NRS presence on non–anchor carrier in TS 36.304

[*R2-2000624*](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e%5CDocs%5CR2-2000624.zip) *NRS presence on non-anchor paging carrier Huawei, HiSilicon discussion Rel-16 NB\_IOTenh3-Core*

***Proposal 3:*** *Introduce a new subclause in TS 36.304 clause 7 Paging to specify the POs associated with NRS.*

***Proposal 4:*** *Adopt the Text Proposal in section 5.2 for TS 36.304.*

Companies are requested to provide comments in the table below (one row for each new comment to better keep track of the discussion – please don’t edit the previous comments).

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree with proposal 3?** | **Detailed comments on TP in section 5.2** |
| Qualcomm | **No** | The determination of when the PO occurs should be done as per legacy specification. The new procedure is to determine whether this PO has NRS or not. Therefore, all the parameters that go into determining whether there is NRS or not is the same as legacy except DRX cycle, T, is always the default cycle.We think the following text can be integrated into sub-clause 7.1 because when physical layer is configured with PO information, it also includes indication whether NRS is present or not. Therefore, we propose the following to be added to the end of section 7.1.For NB-IoT FDD, when *nrs-NonAnchorConfig* is signalled in system information, the POs associated with NRS are determined using the DRX parameters broadcast in *systeminformationBlockType2-NB*.For the PO determined according to subclause 7.1, the presence of NRS is determined as follows: - if nB is equal to 4T, 2T, T or T/2:POs for which R = 1 have associated NRSwhere:R = (PO\_Index + offset) mod 2where:- PO\_Index = (SFN/ T \* nB + i\_s) mod nB- Offset = (FLOOR ((SFN + 1024\*H-SFN) / T)) mod 2- SFN, H-SFN and i\_s, corresponding to the PO, see subclause 7.1.- nB is determined using the default value for T, see subclause 7.1. - else:all POs have associated NRS. |
| Nokia | **May be** | Further discussion is required on whether the UE should refer to NRS for channel estimation only on its PO or in any valid subframes having NRS transmission. If the UE behaviour is left to implementation, then 36.304 only needs to include information about where NRS symbols can be found. In that case HW TP is acceptable. If the UE only need to use NRS of its own PO, the benefit is minimum.. because the UE attempting to decode this PO will assume always NRS is present for decoding. So refering to NRS of own PO for channel estimation is not clear. |
| Huawei, Hisilicon  | **Yes** | Section 7.1 describes the PO from the UE point of view (i.e. both the SFN and i\_s are function of the UE-ID), so incorporating in this section would be OK if the UE only needed to know if if its own PO has associated NRS. However, this is not our understanding of RAN1 agreements. In case of high PO density (nB >= T/2), not all POs have associated NRS. In that case, the UE uses the NRS of a nearby PO (which is not its PO). ee RAN1 agreement at RAN1#96bis:**Agreement**The *decimation pattern* (i.e., the pattern that determines which POs have subframes with NRS even when no NPDCCH is transmitted) is designed at least with the following principles:* P1: The decimation pattern shall be fair across UEs, i.e., all UEs see the same/similar percentage of POs with NRS.
	+ FFS: the case for eDRX
* P2: A UE belonging to a given UE group (being a UE group the group of UEs that monitor paging in the same PO) can use NRS belonging to a PO of a different group in addition to the NRS of its own UE group.
	+ The maximum gap between the PO with NRS and the PO the UE monitors is not larger than X (to ensure that the UE can reliably estimate the SNR for NPDCCH early termination)
* P3: The POs with NRS are quasi-uniformly/uniformly distributed from UE perspective.
* P4: The POs with NRS are quasi-uniformly/uniformly distributed from network perspective.

This is why we have proposed to introduce a new section, which specifies the position of the POs from the NW point of view and which POs have NRS. This is similar to 7.2 which specifies the paging subframe form NW point of view. By combining the description in TS 36.304 and TS 36.211, the UE knows the subframes carring NRS and then it is up to the UE implementation to use or them of not. |

Conclusion: TBC

Proposal: TBC

# 3 Conclusions

**Conclusions:**

TBC

**Agreed CRs:**

TBC – agreed TPs for 36.331 and 36.304 running CRs (with Tdoc numbers).

# 4 List of referenced documents

[1] [R2-2000624](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e%5CDocs%5CR2-2000624.zip) NRS presence on non-anchor paging carrier Huawei, HiSilicon discussion Rel-16 NB\_IOTenh3-Core