3GPP TSG-RAN WG2 Meeting #121 R2-2301972

Toulouse, France, 14th-18th November, 2022

Agenda Item:

Source: Ericsson

**Title: [AT121][103][NR NTN] Neighbour cell measurements (Ericsson)**

Document for: Discussion, Decision

# Introduction

**\* [AT121][103][NR NTN] Neighbour cell measurements (Ericsson)**

Updated scope: continue the discussion neighbour cell measurements

Updated intended outcome: Summary of the offline and/or agreeable CRs

F2F offline time and location:  Wednesday 2023-03-01 16:30-17:00 EET, Brk 1 room (Aphrodite III&IV)

Deadline for companies' feedback:  Thursday 2023-03-02 22:00 EET

Deadline for rapporteur's summary (in R2-2301972): Friday 2023-03-03 08:00 EET

# Neighbour cell measurements

[R2-2300910](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2300910%20-%20R17%20NR%20NTN%20on%20neighborcell%20ephemeris.docx) NR NTN Rel-17 neighbor cell measurements Ericsson discussion Rel-17

* Preliminary discussion in offline 103
1. RAN2 to discuss how to inform UE about PCIs that belong to the serving satellite without ASN1 changes

SIB19:

***ntn-NeighCellConfigList, ntn-NeighCellConfigListExt***

Provides a list of NTN neighbour cells including their *ntn-Config*, carrier frequency and *PhysCellId*. This set includes all elements of *ntn-NeighCellConfigList* and all elements of *ntn-NeighCellConfigListExt*. ~~If~~ *~~ntn-Config~~* ~~is absent for an entry in~~ *~~ntn-NeighCellConfigListExt~~*~~, the~~ *~~ntn-Config~~* ~~provided in the entry at the same position in~~ *~~ntn-NeighCellConfigList~~* ~~applies.~~ The first entries for which ntn-Config is absent, the ntn-Config of the serving cell applies. For any other entry where ntn-Config is absent, the ntn-Config for the previously listed cell with ntn-Config present applies.

MO:

|  |
| --- |
| ***allowedCellsToAddModList***List of cells to add/modify in the allow-list of cells. It applies only to SSB resources. For NTN, if a PCI in that list is not matching to a PCI for which neighbor satellite information is given in SIB19(and SMTC in SIB2/4), UE shall assume that the PCI is associated with the same satellite as serving cell |

[R2-2301137](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2301137%20Clarification%20on%20neighboring%20cell%20measurements%20for%20NTN.docx) Clarification on neighboring cell measurements for NTN ZTE Corporation, Sanechips discussion Rel-17

* Preliminary discussion in offline 103

**Proposal 1: When PCIs are not present in NTN-NeighCellConfig of SIB19 idle/inactive UE shall perform neighboring cell measurements on PCIs indicated by SIB3/4 of the same frequency.**

**Proposal 2: When PCIs are not configured in SIB3/4, idle/inactive UE performs neighboring cell measurements on PCIs that is present in SIB19 with the same frequency (no specs impact).**

**Proposal 3：Include below assisting information in RRM measurement configuration. Connected UE follows MO configuration to perform neighboring cell measurements**

* **Neighboring cell ephemeris**
* **Epoch time of associated assistance information**
* **Validity timer duration**

**Proposal 4: RAN2 to discuss and agree on the CR provided in R2-2301138 and R2-2301139.**

-- ASN1START

-- TAG-MEASOBJECTNR-START

MeasObjectNR ::= SEQUENCE {

 ssbFrequency ARFCN-ValueNR OPTIONAL, -- Cond SSBorAssociatedSSB

 ssbSubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond SSBorAssociatedSSB

 smtc1 SSB-MTC OPTIONAL, -- Cond SSBorAssociatedSSB

 smtc2 SSB-MTC2

 ]]

**\*fields omitted\***

 [[

 epochTime-v17xx EpochTime-r17 OPTIONAL, -- Need R

 ntn-UlSyncValidityDuration-v17xx ENUMERATED{ s5, s10, s15, s20, s25, s30, s35,

 s40, s45, s50, s55, s60, s120, s180, s240, s900} OPTIONAL, -- Need R

 ephemerisInfo-v17xx EphemerisInfo-r17 OPTIONAL, -- Need R

 ]]

}

HW:understand RAN2 does not pursue with more neighor cell info to SIB19. Asking also if we have BC issues. Add satellite ID with each ephemeris, and add that ID to neighbir cel list

QC: SIB19 do not change field descption. No need for satellite ID. Index ofneighbor cell list to MO. QC is ok to add description to MO field description.

Apple: same understanding as HW on SIB19.MO part does not seem essential correction.

Google is ok with field description linking PCI to SIB19 emphemeris. Alos in SIB2,4 for idle mode

Mediatek: satellite ID would be simpler’ For SIB19, support E firs option without removing the previous sentence’.

QC: adding description to SIB19 ok but not removal of sentence.

Possible conclusion:

**Proposal1 Revise SIB19 field description by adding sentence “If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigList*, the *ntn-Config* of the serving cell applies.”**

Option 1

***ntn-NeighCellConfigList, ntn-NeighCellConfigListExt***

Provides a list of NTN neighbour cells including their *ntn-Config*, carrier frequency and *PhysCellId*. This set includes all elements of *ntn-NeighCellConfigList* and all elements of *ntn-NeighCellConfigListExt*. If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigListExt*, the *ntn-Config* provided in the entry at the same position in *ntn-NeighCellConfigList* applies~~.~~ If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigList*, UE may assume the *ntn-Config* of the serving cell applies.

Option 2

***ntn-NeighCellConfigList, ntn-NeighCellConfigListExt***

Provides a list of NTN neighbour cells including their *ntn-Config*, carrier frequency and *PhysCellId*. This set includes all elements of *ntn-NeighCellConfigList* and all elements of *ntn-NeighCellConfigListExt*. If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigListExt*, the *ntn-Config* provided in the entry at the same position in *ntn-NeighCellConfigList* applies. **If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigList*, the *ntn-Config* provided in the previous entry in *ntn-NeighCellConfigList* applies**

**Mediatek, Google, Nokia, Panasonic, LG, Ericsson, Qualcomm supports P1 because it is critical to be able to limit SIB size from the network operator perspective and this is the last moment this can be impacted.**

**Oppo, ZTE, Samsung, Apple, Huawei thinks it is not essential and may have UE implementation issues.**

**Question 1.** **Please state your view on the Proposal 1, Option 1 or Option 2. If your view remains as above, no need to repeat.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/no support | comments |
| ZTE | See comments | Our preference is not to pursue further enhancements. But can accept majority views if there are strong requirement to reducing signalling overhead in SIB19 without ASN.1 impacts. If RAN2 goes for this direction, then we prefer option 2 as it potentially saves more signalling overhead. Assuming two extreme cases as below:* Case 1: All 8 neighboring cells comes from the same neighbor satellite;
* Option 1: NTN-Config of the same neighboring satellite needs to repeat 4 times;

* Option 2: Only one neighboring satellite ephemersi info is provided in the first entry of *ntn-NeighCellConfigList;*

* Case 2: All 8 neighboring cells comes from the serving satellite;
* Option 1: No need to include NTN-config
* Option 2: NTN-Config of serving satellite is only repeated once in first entry of *ntn-NeighCellConfigList*.

Also, as in our observation, more typical scenario for neighboring cell is that when UE is in the coverage edge, in this case more chances most neighboring cells comes from the same neighbor satellite instead of from serving satellite. Therefore in general option 2 can further reduce more signalling overhead. |
| Turkcell |  | It’s not essential. We share the UE implementation concerns.  |
| Intel | yes | Prefer option 2 |
| Qualcomm | Yes | After further checking, doing nothing now could bring more issue for UE and this seems critical to fix, 1. Either clarify that network will not make the ntn-Config absent in ntn-NeighCellConfigList.
2. Or Option1
3. Or ZTE’s proposal on case 1 option 2.
 |
| Lenovo |  | We think it is not that essential. We are OK to consider to reduce signalling overhead in Rel-18 rather than in Rel-17. |
| Panasonic | Yes, support it (option 2 is more generic and hence preferred by us) | As stated yesterday afternoon, a high degree of redundancy is a likely case for – in particular – the ephemerisInfo-r17 IE. That redundancy shall be reduced as much as possible. Only the differences between the serving satellite and the respective neighbouring satellite should be signalled (-> ephemerisDeltaInfo-r18). In the most simple case – neighbouring sat sits in same orbit as serving sat – this would be realized with indicating the angle between the two satellites. Anchor point for the angle is the geocentre. |
|  |  |  |

**Proposal 2 Inform in measurement object level on which satellite this measurement object applies to. Then, whole measurement object/carrier refers to same satellite, serving or one of the neighbors.**

**Question 2.** **Please state your view on the Proposal 2.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/no support | comments |
| Ericsson | yes |  |
| Intel | yes |  |
| Qualcomm | Ok | It should be understood there will not be TN cells and NTN cells deployed in the same frequency in the same area. This must be avoided by the network not to create interference. |
| Lenovo | Yes |  |
| ZTE | No, and the intention needs further clarification | Based on companies’ comments it is for IoT bit introduced. However our understanding on this IoT bit is that UE may not be able to measure due to there is no inter-satellite deployment during initial stage, not due to UE has not such capability. This feature is mandatory for UE to support in NTN. I wonder how this information can be used?  |
| Panasonic | Yes |  |

# conclusions