3GPP TSG-RAN WG2 Meeting #115 Tdoc R2-2108900

Electronic, August 9th - 13rd 2021

Agenda: 8.10.3.3

Source: Ericsson

Title: [AT115-e][103][NTN] CHO and NTN -TN mobility aspects (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

* [AT115-e][103][NTN] CHO and NTN -TN mobility aspects (Ericsson)

Scope: Continue the discussion on the proposals in [R2-2109025](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2109025.zip)

Intended outcome: Summary of the offline discussion with e.g.:

* + - List of proposals for agreement (if any)
		- List of proposals for further discussion
		- List of proposals that should not be pursued (if any)

Initial deadline (for companies' feedback): Thursday 2021-08-19 1000 UTC

Initial deadline (for rapporteur's summary in [R2-2108890](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2108890.zip)): Thursday 2021-08-19 1600 UTC

Proposals marked "for agreement" in [R2-2108890](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2108890.zip) not challenged until Friday 2021-08-20 0800 UTC will be declared as agreed via email by the session chair (for the rest the discussion will further continue offline until the CB session in Week2).

Updated scope: Continue the discussion on the remaining proposals from [R2-2109056](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2109056.zip)

Intended outcome: Summary of the offline discussion with e.g.:

* + - List of proposals for agreement (if any)
		- List of proposals for further discussion
		- List of proposals that should not be pursued (if any)

Updated deadline (for companies' feedback): Monday 2021-08-23 1400 UTC

Updated deadline (for rapporteur's summary in [R2-2108900](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2108900.zip)): Monday 2021-08-23 1600 UTC

Proposals marked "for agreement" in [R2-2108900](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2108900.zip) not challenged until Tuesday 2021-08-24 0800 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online during the CB session).

Updated scope: Continue the discussion on the remaining proposals from [R2-2109056](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2109056.zip)

Intended outcome: Summary of the offline discussion with e.g.:

* + - List of proposals for agreement (if any)
		- List of proposals for further discussion
		- List of proposals that should not be pursued (if any)

Updated deadline (for companies' feedback): Monday 2021-08-23 1400 UTC

Updated deadline (for rapporteur's summary in [R2-2108900](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2108900.zip)): Monday 2021-08-23 1600 UTC

Proposals marked "for agreement" in [R2-2108900](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2108900.zip) not challenged until Tuesday 2021-08-24 0800 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online during the CB session).

Final scope: Continue the discussion on p5 from [R2-2108900](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2108900.zip)

Intended outcome: Summary of the offline discussion with e.g.:

* + - List of proposals for agreement (if any)
		- List of proposals for further discussion

Final deadline (for companies' feedback): Thursday 2021-08-26 1000 UTC

Final deadline (for rapporteur's summary in R2-2108904): Thursday 2021-08-26 1500 UTC

Proposals marked "for agreement" in R2-2108904 not challenged until Friday 2021-08-27 0300 UTC will be declared as agreed via email by the session chair.

SMTC and measurement gap related discussion is not in this summary.

# 3 TN NTN mobility

### Idle mode

It is noted that the previous question did not address well the earlier RAN2 agreement

Related agreement from RAN2114:

1. For idle mode reselection, based on configuration NTN UE can prioritise TN over NTN. Configuration details FFS

Agreement from this meeting:

In order to try to progress for prioritizing TN over NTN and finding exact solutions we list here some suggestions. These are principle direction and not exact solutions. Exact solutions can be discussed towards, or in next meeting.

Option 1 It is ”hard” coded in the specification, e.g. in 38.304, that UE always prioritizes TN cell in cell reselection FFS, if prioritizing happens in measurement stage, cell ranking, or prior to selecting the suitable cell.

Option 2 Indicate in system information of TN or NTN cell or both, the need to prioritize TN in the area the NTN/TN cells are covering. FFS, if prioritizing happens in measurement stage, cell ranking, or prior to selecting the suitable cell.

Option 3 Broadcast in system informtion a TN or NTN specific offset to be applied to RSRP measurement result for cell quality.

Option 4 UE’s relaxed measurement mode is impacted to prioritize TN. For example, if UE detects TN cell UE stops any relaxed measurement mode for TN UE might have applied. Or, UE is in relaxed mode only if it meets relaxed criteria in both TN and NTN.

**Question 1 Please preference which option as principle direction RAN2 continues to discuss? More than one direction can be chosen for FFS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Company** | **Option 1** | **Option 2** | **Option 3**  | **Option 4** | **Comments** |
| MedaTek | No | No | Yes | No | We think existing R-16 priorities for inter-frequency can be used, as mentioned in our Tdoc R2-2108329. |
| Lenovo | No | No | No | No | Prioritising TN over NTN can be implemented by legacy cell reselection mechanism. If NTN and TN operate on different frequency, NW can configure the frequency used by TN cells with higher priority.If NTN and TN may operate on the same frequency, NW can configure TN and NTN cells with different values of offsets for the neighboring cell measurement triggering or cell rangking.For now we see no necessity to introduce additional enhancements. |
| OPPO | Yes | No  | No (already supported by the existing spec) | No  | For option 1, prioritizing TN cells in cell ranking phase is the simplest. Otherwise, we can go with option 3, which we believe is already supported by the existing spec, i.e. cell individual offset. |
| Ericsson | yes | yes | yes | yes | We are ok to continue discussion on any of these options |
| Nokia | No | No | Yes | No | We believe TN versus NTN prioritization can be addressed using the existing cell reselection principles (priorities per carrier frequency) |
| Xiaomi | No | No | Yes | No | The existing cell reselection mechanism can be reused, for example, network can configure the different offset or different frequency priority. |
| vivo | No | No | No | No | Same view as Lenovo. We think the TN and NTN deployed on different bands is the scenario focused on by this release. In this case, existing cell reselection priority is sufficient for prioritizing TN over NTN. |
| Samsung | No | No | No | No | We agree with Lenovo. Unless the same frequency is shared between NTN and TN the current cell reselection mechaism would be sufficient.  |
| Apple | No | No | No | No | We agree with Lenovo and Samsung that the existing frequency based reselection mechanism can be used unless someone really has plans to deploy TN and NTN on the same frequencies in the same area.  |
| Qualcomm | No | Yes | No | No | Using existing priorities, UE will search the high priority frequency all the time even when there is no TN coverage.Some mechanism will be needed for UE power saving. |
| Intel | No | No | See comment | No | We share the view that this prioritization can be done via legacy mechanisms. |
| NEC | Maybe No  | Maybe No  | Maybe No  | Maybe No | For inter-frequency NTN/TN deployment, we share the same understanding that frequency priority can be reused.If intra-frequency NTN/TN deployment is not excluded, we think current per-cell offset can not be used because too many TN neighbours and is not distinguishable.But we are open to discuss if real issue is identified |
| ITRI | No | Yes | No | No | We share the same view with Qualcomm.  |
| CATT | No | No | No | No | We agree with Lenovo that the legacy reselection mechanism. It seems no strong motivation to discuss enhancement in this stage. |
| BT | No | No | Yes | No | Once the UE knows it is under TN and NTN coverage, we can rely on legacy mechanisms for cell reselection.For option 1, inter-frequency should be enough.Option 2 over engineers the network.Option 3 can be used for intra-frequency. |
| ETRI | No | No | No | No | We agree with Lenovo.  |
| Huawei, HiSilicon | Yes | No | No | No | It is unclear whether intra-frequency NTN/TN deployment is a valid scenario. For inter-frequency cases, we agree with other companies that the current frequency priority can serve the purpose.If any enhancement is to be pursued, Option 1 has the minimum spec impact. |
| ZTE | Yes | Yes | Yes | No | --Option 1 can be achieved by having a fixed reselection priority value in specs to be added to the broadcast priority value for TN frequencies or a fixed offset in specs to be added to the R value of TN cells so that TN cells will always be prioritized as the reselection priority value or the R value will always be higher than NTN frequencies or cells.--Option 2 offers more flexibility compared to option 1 and NW can indicate the network type to be prioritized, e.g. TN or NTN. With the priority offset or R value offset mentioned above, if NW indicates “prioritize TN“, UE can add them to the TN frequnecies or cells. If NW indicates ”Prioritize NTN“, UE can add them to NTN frequencies or cells.--Option 3: The offset for the R value can be used to prioritize TN cells for intra-frequnecy case. In addition to the offset for the R value, NW can also broadcast offset for the reselection priority to be added to the broadcast reselection priority values of the TN frequencies to get them all prioritized over NTN frequencies. |
|  |  |  |  |  |  |

Another topic that has been raised is UE power consumption especially if TN has spotty coverage in an NTN area.

Here again, we present prinsiple direction that can be chosen with details FFS. More than one direction can be chosen.

Option1 UE is informed in system informtion about coverage of TN network e.g. in similar manner as NTN Ephemeris.

Option2 UE applies measurement relaxations if spotty coverage of TN is found. FFS how it is known.

**Question 2 Please preference which option as principle direction RAN2 continues to discuss? More than one direction can be chosen for FFS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Option 1** | **Option 2** | **Other comments**  |
| MediaTek | No | Yes | Network can inform the UE about such coverage problems.  |
| Lenovo | No | No | In the case of TN spotty coverage in an NTN area, legacy mechanism is sufficient for power saving as NW has knowledge of its deployment.To avoid too frequent neighbouring cell measurement, relaxed monitoring can be applied with proper threshold configured.Or, to avoid too frequent cell reselection, offsets in cell ranking can be adjusted to lower down the ranking of TN cells with spotty coverage. |
| OPPO | No | No | Option 1 will drastically increase the SIB size. Option 2 has RAN4 impact on RRM relaxation requirement which we believe cannot be completed in R17. |
| Ericsson | yes | yes | Option 2 is preference even RAN4 involvement is needed |
| Nokia | No | Yes | We are OK to discuss the Option 2 direction. However, we are afraid this may not be feasible in R17. |
| Xiaomi | Yes | No | We are fine to Option 1. And option 2 needs to involve other WG.  |
| vivo | No | No | For option 1, GNSS is needed for the UE to estimate whether it is in the TN coverage to determine whether to evaluate TN cells. It is unclear whether using GNSS consumes more power or TN cell evaluation reducing saves more power. For Option 2, similar view as Lenovo. Other power saving mechinism may be further discussed, but not necessarily towards the cell (re)seleciton/NW selection purpose. |
| Samsung | No | No | We agree with Lenovo.  |
| Apple | No | No | Agree with Lenovo that proper configuration can take care oft he spotty coverage issues. |
| Qualcomm | Yes | No | Option 2 seems complex. For option 1, we can check if there is SIB overhead issue. |
| Intel | FFS | Yes | For NTN deployments, we understand that it can be benefitical if UE can relax measurements when in spotty coverage of TN. We understand that option 1 may be a way for UE to be aware of those spotty areas but further discussion/clairification of the solution would be needed. |
| NEC | Yes  | May be | As we understand, the reasons of having extra power consumption: * one is spotty TN deploynent under a NTN cell as mentioned here, hence UE would scan TN cells unnecessarily even it is in a no TN coverage area,
* another one is unncessarily scan TN frequencies/cells which is deployed at a far away region from UE position.

There may be more reasons. we are not sure how existing relaxed measurement can be configured and used to solve these issues. so we support to continue discussion in general. Maybe within the direction of option1, the simplified solution is neighbouring frequencies/cells grouping as we indicated before: we can devide all neighbouring frequencies/cells into groups , each one is corresponding a smaller geo-area /a TN spot(NOTE: it is better to indicate the linked geo-area as option1 , however it works without Geo-area info). In general, we think it is too short time to conclude anything and propose to continue more discussion in a post email discussion or driven by companies’ tdocs in the next meeting. |
| ITRI | Yes | Yes | Option 2 measurement relaxation benefits UE power saving, but may be an optimization in next release.  |
| CATT | No | No |  |
| BT | Yes | Yes | We are fine to discuss option 1 and option 2 since both have pros and cons.  |
| ETRI | No | Yes | Option 2 can be beneficial. |
| Huawei, HiSilicon | No | Yes | For NTN deployments, it is common for UE to find spotty coverage of TN upon camping on the NTN cell, especially for GEO.Option 1 leads to too much overhead. Whether option 2 will involve other WGs depends on the solution. We prefer to further study option2. |
| ZTE | UE can be informed of the TN cell coverage via the neighbour cell info in SIB2-5 with indication showing the network type, e.g. TN or NTN, of each neighbour cell or frequency | No | We understand the existing neighbour cell info broadcast in SIB2-5 can be reused for this purpose with some enhancements.Now the neighbour cell info is categorized into intra-frequency/inter-frequnecy and inter-RAT. If NW can also indicate whether a neighbour cell or frequency broadcast in SIB2-5 is a TN cell or NTN cell, UE would be able to identify the TN cell coverage and prioritize them when needed. |

# 4 Conclusions

RAN2 has agreed to further work with the following principle to TN prioritization: