**3GPP TSG-RAN WG4 Meeting #** **104-e R4-2214471**

**Electronic Meeting, Aug. 2022**

**Agenda item:** 9.11.8

**Source:** Moderator (Qualcomm Incorporated)

**Title:** WF on NR NTN RRM requirements

**Document for:** Approval

# Introduction

*The summary covers the contributions submitted under the following Ais*

* *9.11.5 RRM core requirement maintenance*
	+ *9.11.5.1 Measurement procedure requirements*
	+ *9.11.5.2 Others*

# Topic #1: Open Issues

**Issue 1: Capability on the number of Measurement Carriers/Cells/SSBs**

**Agreement:**

* Introduce UE capability for the number of target satellites the UE can monitor per carrier for LEO
* Fill in the following with exact wording (please also clarify the relationship with FG 25-5):
	+ Feature group
	+ Component
	+ Need for the gNB to know if the feature is supported
	+ Consequence if the feature is not supported by the UE
	+ Type

***Agreement:***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Need for the gNB to know if the feature is supported** | **Applicable to the capability signalling exchange between UEs (V2X WI only)”.** | **Consequence if the feature is not supported by the UE** | **Type****(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Note** | **Mandatory/Optional** |
| 25.NR\_NTN\_solutions | 25-7 | The number of target LEO satellites the UE can monitor per carrier including serving satellite | On serving carrier, it indicates the number of target LEO satellites the UE can monitor per carrier including serving satelliteOn non-serving carrier, it indicates the number of target LEO satellites the UE can monitor per carrier |  | yes | No | The number of target satellites UE can monitor per carrier is 2 including serving LEO satellite | Per Band | FDD only | FR1 only | NA | Candidate values for the number of NGSO satellites are 2,3, or 4.The value shall be larger than or equal to the reported value on FG 25-5. | Optional with capability signaling |

**Issue 2: Cell selection and reselection**

***Agreement:***

* Send LS to ask RAN2 to introduce a new signalling for enabling enhancement cell reselection measurement for LEO. Detailed signalling design is up to RAN2.
	+ R4-2214472, “LS to RAN2 on Network indication for applying enhanced cell reselection requirements,” Huawei,

**Issue 3. SMTC collision condition**

**Agreement:**

* For the case where one SMTC is inside MG and the other SMTC is outside the MG, if the proximity distance between the MG and SMTC outside the MG is smaller than or equal to the proximity distance threshold, i.e. 4ms, the two SMTCs are considered as colliding SMTCs.

**Issue 4. Fully Overlapping Concurrent MGs**

***Agreement:***

* Option 1: Do not define requirements for fully overlapping concurrent MGs
* Option 2: For fully overlapped case, gap sharing rule is applied during the collided gap occasions, and the scaling factor is 2
	+ Option 2A:
		- It is applicable only to the case where both of the concurrent MGs have the longest MGRP, i.e. 160ms.
		- A MG with the lowest ID, i.e. 0, gets priority over the other, and the dropping rule starts from SFN=0, i.e. MG-ID#0 is selected and MG-ID#1 is dropped at the first collision instance after SFN=0, and it alternates afterwards.
		- [RAN4 introduce a new UE capability supporting “fully overlapping concurrent MGs” which is limited to NTN-only.]
	+ Option 2B:
		- It is applicable only to the case where both of the concurrent MGs have the longest MGRP, i.e. 160ms.
		- RAN4 introduce a new UE capability supporting “fully overlapping concurrent MGs” which is limited to NTN-only.
	+ Option 2C:
		- It is applicable only to the case where both of the concurrent MGs have the longest MGRP, i.e. 160ms.

**Issue 5. Maximum interruption in paging reception**

**Agreement:**

* For the requirement of maximum interruption in paging reception, if the target cell is unknown, a longer interruption can be expected.
	+ Unknown condition means that UE starts measurement but does not complete the measurement before Tservice.

**Issue 6. Re-establishment**

***Agreement:***

* Define NTN re-establishment requirements as in the tables below.

|  |  |  |
| --- | --- | --- |
| **Serving cell**  | **FR of target NR**  | **Tidentify\_intra\_NR [ms]** |
| **SSB Ês/Iot (dB)** | **Cell** | **Known NR cell** | **Unknown NR cell** |
| ≥ -8 | FR1 | MAX (200 ms, 5 x TSMTC) | Kmulti\_SMTC \* MAX (800 ms, 10 x TSMTC) |
| < -8 | FR1 | N/A | [6400]Note1 |
| Note 1: The UE is not required to successfullyidentify a cell on any NR frequency layer when TSMTC > 20 ms and serving cell SSB Ês/Iot < -8 dB.Note 2: Kmulti\_SMTC is defined in clause 9.2C.5.1. |

|  |  |  |
| --- | --- | --- |
| **Serving cell SSB Ês/Iot (dB)** | **FR of target NR cell** | **Tidentify\_inter\_NR, I [ms]** |
|  |  | **Known NR cell** | **Unknown NR cell** |
| ≥ -8 | FR1 | MAX (200 ms, 6 x TSMTC, i) | K\_satellite \* MAX (800 ms, 13 x TSMTC, i) |
| < -8 | FR1 | N/A | [6400]Note1 |
| Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when TSMTC,i > 20 ms and serving cell SSB Ês/Iot < -8 dB.Note 2: K\_satellite is defined in clause 9.3C.4. |

**Issue 7. RRC Connection Release with Redirection**

***Agreement***

* Define NTN re-direction requirements as below.

|  |  |
| --- | --- |
| **FR of target NR cell** | **Tidentify-NR** |
| FR1 | K\_satellite \* MAX (680 ms, 11 x Trs) |
| Note 1: If the UE has been provided with higher layer signaling of *smtc2*specified in TS 38.331 [2] prior to the redirection command, Trs follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.Note 2: K\_satellite is defined in clause 9.3C.4. |

**Issue 8. UE Uplink Timing Requirements**

***Conclusion:***

*The following issue is not going to be discussed in this email thread at least in the current meeting RAN4#104 e-meeting. The issue can be discussed together with Issue 1-1 in the email thread#215 as needed.*

* Proposal 1: Nokia (R4-2212865)
	+ RAN4 to decide what is the reference point in time for updated values of *N*TA,commonand *N*TA,UE-specific:
		- Option 1: The beginning of a DL frame at the UE side.
	+ Note: Please refer to Nokia’s first round comment if not clear.

**Issue 9. Service Link Distance**

***Conclusion:***

* No further discussion is needed in RAN4#104 e-meeting.

**Issue 10. Satellite access band grouping**

***Agreement:***

* The satellite access bands n255 and n256 are assigned to same band group for applicability of RRM requirements in TS 38.133. NR\_FDD\_SAB\_FR1\_A where SAB stands for satellite access band to distinguish from the terrestrial band group naming
* The band group for n255 and n266 is termed as “NR\_FDD\_SAB\_FR1\_A” where SAB stands for satellite access band to distinguish from the terrestrial band group naming

# References

[1] R4-2214266, “Email discussion summary: Email discussion summary: [104-e][214] NR\_NTN\_solutions\_RRM\_1,” 3GPP TSG-RAN WG4 Meeting #104-e