3GPP TSG-RAN WG1 Meeting #101-e R1-20xxxxx

e-Meeting, 25th May – 5th June, 2020

Agenda Item: 7.2.2.2.2

Source: Moderator (Nokia)

Title: [101-e-NR-unlic-NRU-InitAccessProc-07] Email discussion/approval

Document for: Discussion, Decision

# 1 Introduction

This document captures discussion related to the following e-mail discussion which has been kicked-off as follows:

[101-e-NR-unlic-NRU-InitAccessProc-07] Email approval of reply LS to R1-2003274 by 5/28, to be managed under 7.2.2.2.2 – Michel (Nokia)

# 2 Discussion

RAN4 has sent a LS to RAN1 on the topic of NR-U SSB monitoring capabilities [1].

In order to formulate a reply LS to RAN4, the moderator would like to receive company feedback on the following questions:

**Question 1:** Provide feedback whether monitoring within a given discovery burst transmission window all candidate SS/PBCH block indexes corresponding to the same SS/PBCH block index is mandatory for UEs.

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| **Company** | **View/Position** |
| Nokia, NSB | In our view, it is mandatory for the UEs to monitor all SS/PBCH blocks with candidate indexes corresponding to the same SS/PBCH block index within a given discovery burst transmission window; it can be up to UE’s implementation to stop SS/PBCH block monitoring for a given SS/PBCH block index in the case the UE has already detected a SS/PBCH block with the same index for a given discovery burst transmission window.  In our understanding, any deviation to this requirement will lead to degraded performances for both RRM and RLM/BFD/CBD measurements.  See also the additional remarks provided within the draft Reply LS. |
| Samsung | As a UE capability, it is mandatory for the UEs to monitor all SS/PBCH blocks with candidate indexes corresponding to the same SS/PBCH block index within a given discovery burst transmission window. It can be up to UE’s implementation to stop monitoring if an SS/PBCH block is detected among the SS/PBCH blocks with candidate indexes corresponding to the same SS/PBCH block index within a given discovery burst transmission window. |
| LG Electronics | Agree with Nokia and Samsung. UE mandatorily monitors all candidate SS/PBCH block indexes corresponding to the same SS/PBCH block index in the DRS transmission window. After a candidate SS/PBCH block index corresponding to a SS/PBCH block index in a given DRS transmission window is detected, UE may stop receiving a candidate SS/PBCH block index corresponding to the SS/PBCH block index in the DRS transmission window. |
| ZTE | RAN1 has agreed that the UE can assume that within a discovery burst transmission window, a number of transmitted SS/PBCH blocks with a same SS/PBCH block index is not larger than one.  So it is mandatory for the UEs to monitor all SS/PBCH blocks with candidate indexes corresponding to the same SS/PBCH block index until the UE has detected one SS/PBCH block within a given discovery burst transmission window. |
| Spreadtrum | Agree with Nokia and Samsung. |
| Qualcomm | We strongly do not agree the UE is mandatory to monitor the whole DRS window. This will hurt the UE power consumption substantially. The early terminiation does not help as well, as the UE does not have the capability to instantly determine the SSB is transmitted or not.  We understand the proposal to mandate the monitoring of whole DRS window and allow early termination is designing the procedure to cover the worst case scenario, that the UE assumes the gNB has difficulty to transmit SSB all the time. As a result, the power consumption is bad no matter gNB has problem accessing the channel or not. We are proposing to address the problem from best case scenario, where the UE assumes the gNB has no problem accessing the channel, and only spends more power monitoring the SSBs if it detects the gNB has problem accessing the channel (say the SSB is not detected for a few instances). In this case, the power consumption is optimized. |
| OPPO | Within a given discovery burst transmission window, multiple candidate SSB positions can be configured to transmit a same SSB index, so that the gNB may have a higher probability for SSB transmission in unlicensed spectrum. Under this circumstance, the gNB may transmit a SSB at any candidate SSB position. Correspondingly, the UE is expected to be able to detect a SSB at any candidate SSB position where the gNB may transmit a SSB. To reduce the implementation complexity, the UE may stop detect the remaining candidate SSB positions after it detects at least one SSB for the same SSB index within a given discovery burst transmission window. **Therefore, we think that the UE should have the capability to monitor all the candidate SSBs in a DRS window. But whether or not the UE will monitor all the candidate SSBs is up to UE’s decision.** |
| Sharp | Agree with Nokia. Introduction of capability signalling will limit the network deployment. |

**Question 2:** Provide feedback on the values of N1 and N2, considering the impact on the network performance if UEs are not monitoring all candidate positions.

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| **Company** | **View/Position** |
| Nokia, NSB | N1 and N2 are not applicable in our view (see Q1) |
| Samsung | N1 and N2 are not applicable, since the UE is monitoring all SS/PBCH blocks with candidate indexes corresponding to the same SS/PBCH block index within a given discovery burst transmission window. |
| LG Electronics | Agree with Nokia and Samsung. |
| ZTE | N1 and N2 are not applicable |
| Spreadtrum | Agree with Nokia and Samsung. |
| Qualcomm | N1=N1=1 is enough, especially in FBE mode |
| OPPO | No need to define N1 and N2 |
| Sharp | Agree with Nokia. |

**Question 3:** Provide feedback on whether differentiation is needed for UEs operating in FBE and LBE modes

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| **Company** | **View/Position** |
| Nokia, NSB | As N1 and N2 are not applicable in our view (see Q1), we see no need for such differentiation |
| Samsung | There is no need to differentiate UEs operating in FBE and LBE modes, and can be up to gNB’s configuration on the discovery burst transmission window to implicitly differentiate FEB and LBE modes. |
| LG Electronics | In our contribution (R1-2004009), we pointed out one potential difference between FBE and LBE that, for FBE case, if location of a candidate SS/PBCH block is (partially) overlapped with idle region of a fixed frame period, UE shall not perform RRM/RLM/BFD/CBD operation for the SS/PBCH block. This comes from the conclusion that we made in previous meeting. However, if the intention of RAN4 on Q3 was to ask N1/N2 capability for FBE and LBE, the answer to Q1 and Q2 shoud be the same both for FBE and LBE. |
| ZTE | There may be some differentiation for UEs operating in FBE and LBE modes. Since the FFP length is dynamically configured by gNB, it could be shorter than DRS window, and SSBs that (partially) fall in the idle region of a fixed frame period should be considered as invalid. No PDSCH rate matching and no RLM/RRM measurement will be done for those candidate SSB positions. Besides, if the LBT passed, within a fixed frame period, the gNB would transmit SSBs in the first 8 positions at most. So I wonder whether it is necessary to mandate UEs to monitor all candidate SSB positions in a DRS window for FBE. |
| Spreadtrum | Agree with Nokia and Samsung. |
| Qualcomm | For FBE, we are talking about controlled environment. The chance for gNB not being able to access the channel is minimum. We don’t see why N1 and N2 should not be 1. |
| OPPO | No need to differentiate LBE and FBE |
| Sharp | Agree with Nokia. |

**Question 4:** Provide feedback for the case when Q is not provided to the UE

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| **Company** | **View/Position** |
| Nokia, NSB | For both RRM and RLM/BFD/CBD measurements, Q is always provided to the UE (see [2]) |
| Samsung | For RLM/BFD/CBD, Q is always provided to the UE. More details of the indication of Q can be found in R1-2003044 [2]. |
| LG Electronics | Share the view with Nokia and Samsung. |
| ZTE | * RAN1 has reached the following agreements, and there is no case that Q is not provided to the UE. * For RRM measurement configuration from *MeasObjectNR* and *SIB2/SIB4*, network always provides a common Q value (*ssb-PositionQCL-Common-r16*) per frequency to UE. * For SCell addition, SCG addition, and reconfiguration with sync, the Q value of the cell to be added is always provided to UE via dedicated RRC signaling, i.e. ssb-PositionQCL-r16 in *ServingCellConfigCommon*. |
| Spreadtrum | Agree with Nokia and Samsung. |
| Qualcomm | Q is always provided |
| OPPO | Question 4 is obsolete. |
| Sharp | Q is always provided for a carrier with shared spectrum channel access. |

# References

1. R1-2003274, “LS on NR-U SSB monitoring capabilities” RAN4, RAN1#101-e, May 2020.
2. R1-2003044, “LS on Signalling of Q Parameter for NR-U”, Charter Communications, RAN1#100bis-e, April 2020