**3GPP TSG RAN WG1 Meeting #101-e                     R1-200xxxx**

**e-Meeting, May 25 – June 5, 2020**

**Agenda Item: 7.2.2.2.2**

**Source: Charter Communications**

**Title: Draft [101-e-NR-unlic-NRU-InitAccessProc-03]**

**Document for: Discussion and Decision**

# Introduction

Four email discussions have been sanctioned in RAN1#101-e on initial access procedures for NR-U based on contributions submitted to this meeting [1]-[13]. This third discussion that aims to converge by 5/29 has the following scope:

[101-e-NR-unlic-NRU-InitAccessProc-03] Email discussion/approval on the following issue from R1-2003306 until 5/29 – Amitav (Charter)

* (#4.4) Choose between following alternatives for RSSI measurement duration in RAN1#101-e:
  + Alt 1: {sym1, sym14or28or56or48, sym28or56or112or96, sym42or84or168or144, sym70or140or280or240}
    - “sym14or28or56or48” refers to 14 symbols for 15 kHz SCS, 28 symbols for 30 kHz SCS, 56 symbols for 60 kHz SCS with NCP, and 48 symbols for 60 kHz SCS with ECP, respectively, and so on
    - Inform RAN2 of this decision (can be within updated RRC parameter spread sheet that we send to RAN2, not necessarily a separate LS)
  + Alt 2: {sym1, sym14or12, sym28or24, sym42or36, sym70or60}
    - “sym14or12” refers to 14 symbols for NCP and 12 symbols for ECP, respectively, and so on
    - Inform RAN2 of this decision (can be within updated RRC parameter spread sheet that we send to RAN2, not necessarily a separate LS)

Note 1: If measured bandwidth of RSSI overlaps with the active DL BWP, UE performs RSSI measurement with the SCS of the active DL bandwidth part during the measurement duration derived from combination of measDuration-r16 and rmtc-ref-SCS-CP.

Note 2: The UE expects an integer number of symbol(s) with respect to the SCS of the active DL BWP to be configured for RSSI measurement.

These issues have been selected based on the preparatory discussion summarized in [14].

# Discussion

FL Observations

All contributions on this topic generally recognize that Alt. 2 offers more flexibility and Alt. 1 values are a subset of those in Alt. 2, since Alt. 1 absolute measurement durations do not scale with the reference numerology. However, proponents of Alt. 1 observe that Alt. 1 is the only option that provides 5 ms measurement duration for all reference numerologies.

The FL believes that the current Alt. 2 formulation is not consistent with the intermediate agreement “Measurement duration can be no more than 5 ms for each numerology (requires sym70, sym140, sym280/sym240 respectively)” in the last meeting, which should be applicable to both alternatives.

Therefore, companies are requested to consider a modified proposal for Alt. 2 to address the above:

* Alt 2b: {sym1, sym14or12, sym28or24, sym42or36, sym70or140or280or240}
  + - “sym14or12” refers to 14 symbols of the reference numerology for NCP and 12 symbols for ECP, respectively, and so on
    - “sym70or140or280or240” refers to 70 symbols for 15 kHz SCS, 140 symbols for 30 kHz SCS, 280 symbols for 60 kHz SCS with NCP, and 240 symbols for 60 kHz SCS with ECP, respectively

And potential ensuing discussion is:

Choose between following alternatives for RSSI measurement duration:

* + Alt 1: {sym1, sym14or28or56or48, sym28or56or112or96, sym42or84or168or144, sym70or140or280or240}
    - “sym14or28or56or48” refers to 14 symbols for 15 kHz SCS, 28 symbols for 30 kHz SCS, 56 symbols for 60 kHz SCS with NCP, and 48 symbols for 60 kHz SCS with ECP, respectively, and so on
    - Inform RAN2 of this decision (can be within updated RRC parameter spread sheet that we send to RAN2, not necessarily a separate LS)
  + Alt 2b: {sym1, sym14or12, sym28or24, sym42or36, sym70or140or280or240}
    - “sym14or12” refers to 14 symbols of the reference numerology for NCP and 12 symbols for ECP, respectively, and so on
    - “sym70or140or280or240” refers to 70 symbols for 15 kHz SCS, 140 symbols for 30 kHz SCS, 280 symbols for 60 kHz SCS with NCP, and 240 symbols for 60 kHz SCS with ECP, respectively
    - Inform RAN2 of this decision (can be within updated RRC parameter spread sheet that we send to RAN2, not necessarily a separate LS)

Note 1: If measured bandwidth of RSSI overlaps with the active DL BWP, UE performs RSSI measurement with the SCS of the active DL bandwidth part during the measurement duration derived from combination of measDuration-r16 and rmtc-ref-SCS-CP.

Note 2: The UE expects an integer number of symbol(s) with respect to the SCS of the active DL BWP to be configured for RSSI measurement.

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| **Company** | **Views** |
| Samsung | We don’t have strong preference between the two alternatives, and a little bit preferable to Alt 2, but we didn’t see Alt 2 is not consistent with the previous agreement that “Measurement duration can be no more than 5 ms for each numerology (requires sym70, sym140, sym280/sym240 respectively)”. Alt 2 satisfies “the maximum duration can be no more than 5 ms for each numerology” and the values in the bracket in Alt 2 are just examples of symbol values that achieves 5 ms for each numerology. We believe this interpretation is aligned with Ericsson’s change of wording from “up to” to “no more than”.  Based on above, we still slightly prefer Alt 2, and we believe no change to Alt 2 is needed. |
| ZTE | We prefer Alt2.  The agreement we made last meeting “Measurement duration can be no more than 5 ms for each numerology (requires sym70, sym140, sym280/sym240 respectively)” only guarantees the maximum measurement duration for each reference numerology is not longer than 5ms, both Alt1 and Alt2 satisfy that. If we want to achieve 5ms duration, no matter what the SCS of active BWP is, we can choose the combination of “sym70or60” and reference numerology “15kHz”, the actual measurement symbols in active BWP can be derived from that, e.g., 140sym for SCS 30kHz, 280sym for SCS 60kHz NCP.  Actually, we don’t understand in Alt1 why we need different reference numerology, the measurement duration is the same for each reference numerology except the 1 symbol length.  In all, we prefer Alt2 and the change is not needed. |
| LG Electronics | Agree with FL’s observations on pros and cons of each alternative. Regarding whether Alt 2 can be consistent with the previous agreement or not, we share the view with Samsung and ZTE. Therefore, we also support Alt 2. |
| Nokia, NSB | For my own understanding about Alt2: except for “sym1”, does the notation “symXorY” mean that X and Y have to be understood as referring to SCS = 15kHz, meaning e.g. that for SCS = 60 kHz the actual duration is 4X symbols (NCP) and 4Y symbols (ECP) ?  The ZTE comments seems to be in line with such understanding.  In such a case we agree that symb70or60 has to be kept, as per the original proposal.  Could Alt2 proponents clarify this point ?  [LG Electronics] The reference numerology is independently configured with RRC parameter *ref-SCS-CP-r16*. If *ref-SCS-CP-r16* is configured as 15 kHz SCS, then symXorY means X symbols for 15 kHz SCS. If *ref-SCS-CP-r16* is configured as 30 kHz SCS, then symXorY means X symbols for 30 kHz SCS. If *ref-SCS-CP-r16* is configured as 60 kHz SCS with ECP, then symXorY means Y symbols for 60 kHz SCS with ECP.  If my understanding is confirmed then I believe that Alt1 and Alt2 provide exactly the same set of durations, so I would like to understand the benefit brought by Alt2 before making up my mind.  On the other hand:  - We disagree with Note 1, as we do not understand how the RSSI measurement BW can “overlap” with the active DL BWP – either the RSSI measurement BW is contained within the active DL BWP or they have no RB in common.  [LG Electronics] I agree with Nokia that it would be desirable that RSSI measurement BW can be confined within the active DL BWP or RSSI measurement BW and active DL BWP doesn’t have any RB in common. However, we agreed 20 MHz as RSSI measurement BW while the bandwidth of active DL BWP corresponding to that LBT bandwidth may be smaller than 20 MHz (e.g., 50 or 51 PRBs for 30 kHz SCS).  - We are not sure about the meaning of note 2. For us the SCS to be taken into account by the UE is the SCS provided by the network as par of the RSSI measurements parameters, and then as per Alt1 or Alt 2 the number of symbols is mandatorily an integer.  [LG Electronics] It should be noted that SCS for RSSI measurement is different from SCS for active DL BWP. For example, if SCS for an active DL BWP is configured as 15 kHz and *ref-SCS-CP-r16* is configured as 30 kHz SCS for RSSI measurement BW overlapped with the active BWP, the question is that, could it be possible for RSSI measurement duration to be configured with 1 symbol? The answer is NO. This is the intention of note 2. |
| Ericsson | We prefer Alt-2. Similar with Samsung, we don’t believe the addition of sym70or140or280or240 is needed. The reason is that if one wants 5 ms, one simply configures sym70or60 as per the original proposal, and then configure the reference subcarrier spacing to be 15 kHz, independent of the numerology used for the serving cell.  I still don’t understand why Note 1 is needed. What is the intention? I am still confused by the meaning of “…UE performs RSSI measurement with the SCS of the active DL bandwidth part…” since the reference SCS is configured as an arbitrary value.  [LG Electronics] It’s correct that reference SCS can be an arbitrary value. However, especially for intra-frequency measurement, what happens if reference SCS of RSSI measurement is configured to be different from that of active DL BWP? Should the UE change SCS just to perform RSSI measurement? I believe the answer is NO. That’s why we need Note 1. Regardless of configured SCS for RSSI, UE would perform RSSI based on SCS configured for active DL BWP, only for intra-freq. measurement case, but keep it consistent to average every symbol duration based on reference SCS configured for RSSI.  For Note 2, what about an inter-frequency measurement where there is a measurement gap? Does the SCS of the active DL BWP matter in this case?  [LG Electronics] From my understanding, Note 2 is not for inter-freq. measurement case. We can clarify that perspective. |
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# References

1. R1-2003371 Remaining issues on initial access procedure for NR-U vivo
2. R1-2003451 Remaining issues on the initial access procedure for NR-U ZTE, Sanechips
3. R1-2003513 Maintenance on the initial access procedures Huawei, HiSilicon
4. R1-2003657 Remaining issues on initial access procedure for NR-U operation MediaTek Inc.
5. R1-2003729 Enhancements to initial access and mobility for NR-unlicensed Intel Corporation
6. R1-2003844 Enhancements to initial access procedures Ericsson
7. R1-2003861 Initial access procedures for NR-U Samsung
8. R1-2003973 Remaining issues on initial access procedure for NR-U ETRI
9. R1-2004001 Remaining issues on initial access procedure Spreadtrum Communications
10. R1-2004014 Remaining issues of initial access and mobility for NR-U LG Electronics
11. R1-2004086 Discussion on the remaining issues of enhancements to initial access procedure OPPO
12. R1-2004444 TP for Initial access and mobility procedures for NR-U Qualcomm Incorporated
13. R1-2004526 On Enhancements to Initial Access Procedure for NR-U Nokia, Nokia Shanghai Bell
14. R1-2003306 Feature lead summary on for initial access procedures enhancements Charter Communications