3GPP TSG-RAN WG2 #119bis-e Tdoc R2-xxxxxxx

Electronic meeting, 10th - 19th Oct. 2022

Agenda Item: 8.13.4

Source: Ericsson (Rapporteur of the offline)

Title: [AT119bis-e][803][R18 SON/MDT] SON of NR-U (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This document is for the following offline discussion focusing on the proposal 3-8 of the summary document R2-2210799.

 **[AT119bis-e][803][R18 SON/MDT] SON of NR-U (Ericsson)**

Discussion on the proposals 3-8 in R2-2210799.

Intended outcome: Report

Deadline: 04:44 UTC, Friday October 14th

Deadline for comments: 18:00 UTC Thursday October 13th

# 2 Contact list

Contact person for each participating company:

|  |  |  |
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# 3 Discussion for enhancing RA Report for NR-U

In this section, we focus on the proposals and summary of the proposals for the NRU related measurements and information to be collected as part of RA report.

Please note that proposals are reshuffled for the offline discussion from the ones which are easy to be agreed to the ones that require more discussion.

New value for raPurpose

Based on the contributions, 6 companies including Lenovo, ZTE, Samsung, CATT, Ericsson and CMCC in [1, 3, 5, 7, 10] proposed to introduce an indication of consistent LBT failure in the RA report. 4 companies proposed to have the consistent LBT failure indication as a new *raPurpose*. Provided that the rapporteur proposes the following:

Proposal 7: Introduce a new *raPurpose* in the *RA-Report* to indicate that the RA was initiated following a “consistent LBT failures” in the SpCell.

* **Q1: Do you agree to introduce a new *raPurpose,* indicating “consistent LBT failure”, as proposed in Proposal 7?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Samsung | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSilicon | No | We see that some new parameters are likely to be introduced in RA report and they are related to “consistent LBT failure”, so “consistent LBT failures” type can be implicitly indicated. |
| CATT | Yes | We think it is necessary to introduce a new *raPurpose* to convey which event triggers the RACH procedure. |
| Ericson | Yes | Concerning Huawei comment: we think even if the UE experience LBT and log LBT information in RA report, such information do not reflect whether the consistent LBT issue was the reason for triggering the RA procedure.  What is logged in the RA report, is what occurs during RA procedure while the raPurpose is what occurred right before the RA procedure |
| CMCC | Yes |  |
| Lenovo | Yes |  |
| NEC | Yes |  |
| Nokia | No | Given RAN3 LS and request to include ‘indications of consistent LBT failures’, we share Huawei view, that this is likely some indication will be there. Though, it might be too premature to agree the new purpose for RA procedure. It might appear that some other indicator on LBT failure can serve the purpose too, resulting in redundancy. |
| ZTE | Yes |  |
| Apple | Yes |  |

9/11 companies agree to have a new raPurpose in the RA report indicating that the RA procedure is triggered due to the consistent LBT failure. 2/11 companies argue that such indication might not be needed as it might be implicitely derived from other LBT related informations. Rapporteur beleives that the other information included in the RA report (mostly proposed to be included in the RA-InformationCommon) provides LBT related information while executing the random access procedure while the proposed raPurpose indicates consistent LBT issue before executing the RA procedure (i.e., the triggering cause of the LBT issue, and not the situation during execution of the random access procedure). Given that raPurpose is a mandatory field and needs to be anyhow set by the UE in the RA report, for the sake of proper setting of this field and based on the view of the majority of the companies, raporteur proposes the following.

**Proposal 1: Introduce a new *raPurpose* in the *RA-Report* to indicate that the RA was initiated following a “consistent LBT failures” in the SpCell.**

New value for numberOfPreamblesSentOnSSB

In addition, Xiaomi proposed that the value 0 should be introduced for the number of preambles sent over selected SSB and CSI-RS. Although this is provided by a single company, rapporteur thinks this is a valid and easily agreeable proposal, hence proposing the following.

**Proposal 8: RAN2 to introduce value 0 for the numberOfPreamblesSentOnSSB and numberOfPreamblesSentOnCSI-RS.**

* **Q2: Do you agree to Proposal 8?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Samsung | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSilicon | Yes |  |
| CATT | Yes |  |
| Ericsson | Yes |  |
| CMCC | Yes |  |
| Lenovo | Yes |  |
| NEC | Yes |  |
| Nokia | Not sure | It requires impact to ASN.1, thus we wonder if this is practical case to consider that no preambles were sent |
| ZTE | Needs clarification | Please note in Q3 majority agrees that an RA attempt is when UE transmits preamble, and existing RA report structure is UE includes information per RA attempt. Therefore the scenario is now confusing to us. Suggest to check in stage 3 after we figure out the information requires for NR-U. |
| Apple | Not sure | OK to discuss this further |

8/11 companies agree to introduce a new value for the numberOfPreamblesSentOnSSBIE, while 3 companies suggested to have further discussion and clarification on the proposal. Therefore, rapporteur proposes the following.

**Proposal 2: RAN2 further discuss whether to introduce value 0 for the numberOfPreamblesSentOnSSB and numberOfPreamblesSentOnCSI-RS.**

Clarification of RA attempt in RA report

Xiaomi in [6] proposed to clarify the definition of the RA attempt. The reasoning is that RA procedure tailored for the NR-U, works slightly different from legacy RA procedure and *PREAMBLE\_TRANSMISSION\_COUNTER* does not increase when UE experience LBT failure (and is configured with the LBT recovery) upon transmitting the preamble. This is shown in the following excerpt from TS 38.331.

1> if LBT failure indication is received from lower layers for this Random Access Preamble transmission:

2> if *lbt-FailureRecoveryConfig* is configured:

3> perform the Random Access Resource selection procedure (see clause 5.1.2).

2> else:

3> increment *PREAMBLE\_TRANSMISSION\_COUNTER* by 1;

In fact, instead of *PREAMBLE\_TRANSMISSION\_COUNTER* UE counts the number of LBT failures experienced along with the attempt to transmit the preambles and concludes the failure of RA procedure upon reaching the maximum number of LBT failure instances configured by the network.

Therefore, rapporteur proposes the following:

**Proposal 6-a: RAN2 clarify that in NR-U:**

1. **An RA attempt is an attempt to transmit a preamble as UE executes section 5.1.3 of TS 38.321**

**or**

1. **An RA attempt is only counted when the PREAMBLE\_TRANSMISSION\_COUNTER increased (i.e., when UE accesses the channel at the PHY layer, and transmits the preamble).**

Based on the above proposal rapporteur would like to ask companies the following question.

* **Q3: Which one of the options proposed in Proposal 6-a is acceptable?**

|  |  |  |
| --- | --- | --- |
| Company | a/b | Comments |
| Samsung | b |  |
| Xiaomi | b | Since preamble transmission with LBT failure will not be counted for PREAMBLE\_TRANSMISSION\_COUNTER, and the list size of RA attempt is equal to the maximum preamble transmission, if we record every preamble transmission with LBT failure, the records of RA attempts will easily reach the maximum value, and easily make UE buffer full. |
| CATT | b |  |
| Ericsson | b |  |
| CMCC | b |  |
| Lenovo | b |  |
| NEC | b |  |
| Nokia | a | We think the Proposal isn’t correct. ‘RA attempt’ in terms of Random Access procedure is equivalent with Random Access Preamble transmission attempt.  We believe the intention isn’t to change generic terms or meaning of RA procedure for NR-U, and such direction shouldn’t be driven by SON/MDT feature.  If we agree the NR-U specific RA attempt is bind to the counter increase, does it mean that e.g. the first successful RA attempt (with no counter increase) isn’t RA attempt?  **[Rapporteur]**  **Rapporteur would like to clarify that the intention for this proposal is not to change the generic terms or concepts of the RA procedure, but to correctly define the granularity of the RA attempt for the sake of SON RA report e.g., if a measurement is supposed to be collected per RA attempt, what is counted as an RA attempt in NRU for SON purpose. This can be looked from two different perspective from MAC or PHY layer: i) when MAC layer sends a MAC PDU including preamble to the lower layer for transmission ii) when PHY layer actually transmit the preamble.**  **But I agree that according to the MAC spec, preamble transmission counter can not be considered as an accurate representation of an RA attempt as it may have different implications under different scenarios (when LBT recovery is (not) configured).** |
| ZTE | See comments | Based on existing behavior, b is only valid when lbt-FailureRecoveryConfig is configured, in case it is absent, UE will increase the counter even LBT indication is received from lower layer. Thus both can be true. A can cover also b while it is impossible to do the other way around. But inthe other hand, to adopt a might have impact on existing RA report structure. Suggest to postpone to have more time to investigate the details. |
| Apple | b |  |
|  |  |  |

8/10 companies agree that for the sake of RA report, an RA attempt is counted when a preamble is transmitted over the air (i.e., UE didn’t experience LBT failure and UE successfully accessed the channel). 2/10 companies argue that preamble transmission counter can increase even if the access to the channel fails i.e., when UE is not configured with LBT recovery configuration. Rapporteur shares the same understanding with these two companies and believes that preamble transmission counter cannot be an accurate metric to measure the number of sent preamble. Therefore, rapporteur proposes the following:

**Proposal 3: RAN2 further discuss that in NR-U:**

* **An RA attempt is counted when UE attempts to transmit a preamble i.e., when UE executes section 5.1.3 of TS 38.321, or**
* **An RA attempt is only counted when UE accesses the channel at the PHY layer, and transmits the preamble.**

Measurement and information concerning LBT failures in RA-InformationCommon

In addition, Samsung and Ericsson in [3 and 8] proposed to include the LBT indication per RA attempt, while Huawei in [4] and CMCC in [7] proposed to include the number of LBT failures and Lenovo [5] proposed to include the time duration of the LBT issue in the RA report. Rapporteur judges that a middle-ground solution between camp (a) and (b) can be the number of LBT failures per selected reference signal e.g., number of LBT failures per SSB. Needless to mention that this solution would be beneficial for the network to configure the SSB beams for the UEs based on the LBT issues.

Therefore, the rapporteur of the offline discussion proposes the following:

**Proposal 6-b: RAN2 discuss which of the following measurement and information to be added to the RA-InformationCommon**

1. **Whether each RA attempt (i.e., preamble transmission) was blocked by LBT,**
2. **Total number of LBT failures during an RA procedure,**
3. **Number of LBT failures per selected beam,**
4. **Time duration of the LBT failures during the RA procedure.**

Based on the above proposal rapporteur would like to ask companies the following question.

* **Q4: Which options proposed in Proposal 6-b is acceptable?**

|  |  |  |
| --- | --- | --- |
| Company | a/b/c/d | Comments |
| Samsung | b | We think that b) provides sufficient granularity. |
| Xiaomi | b | In WI NR above 52.6GHz, directional LBT was discussed, but RAN2 at last do not introduce directional LBT, consistent LBT failure still based on omni-direction. Thus, there is no need to count LBT failure per SSB. |
| Huawei, HiSilicon | b | For a), it may bring significant overhead. For any impacts to the field PerRAAttemptInfo-r16, we should be careful as there are some iterations inside the RA report, e.g.  RA-InformationCommon-r16 ::= SEQUENCE {  perRAInfoList-r16 PerRAInfoList-r16,  }  PerRAInfoList-r16 ::= SEQUENCE (SIZE (1..200)) OF PerRAInfo-r16  PerRAInfo-r16 ::= CHOICE {  perRASSBInfoList-r16 PerRASSBInfo-r16,  perRACSI-RSInfoList-r16 PerRACSI-RSInfo-r16  }  PerRASSBInfo-r16 ::= SEQUENCE {  ssb-Index-r16 SSB-Index,  numberOfPreamblesSentOnSSB-r16 INTEGER (1..200),  perRAAttemptInfoList-r16 PerRAAttemptInfoList-r16  }  PerRAAttemptInfoList-r16 ::= SEQUENCE (SIZE (1..200)) OF PerRAAttemptInfo-r16  PerRAAttemptInfo-r16 ::= SEQUENCE {  contentionDetected-r16 BOOLEAN OPTIONAL,  dlRSRPAboveThreshold-r16 BOOLEAN OPTIONAL,  ...,  [[  fallbackToFourStepRA-r17 ENUMERATED {true} OPTIONAL  ]]  }  For c) and d), we are not clear about the value from network point of view. |
| CATT | b) | a. We think option a) only includes Preamble transmission which is not sufficient.  c. It is a bit of complex and we are wondering how to use the beam information since LBT is performed per BWP.  d. we are wondering how to do the statistic on the time duration of the LBT failures during the RA procedure since LBT is performed for each UL transmission. |
| Ericsson | c | We think just knowing the total number of LBT failure limits the possible optimizations. A finer granularity can be helpful to analyze the RA reports properly and optimize the RA resources.  For example, by logging the number of LBT failures per SSB beam, network can figure out the following information   * How many times the UE successfully transmitted the preambles for the selected beam * How many times UE failed in accessing the channel for the selected beam   This enables the network to understand how much the selected beam was good (interesting bea for the UE) and then distinguish the uplink-downlink coverage mismatch (per SSB beam) from LBT issues.  For example, as shown in the table below, if UE succeeded one time on transmission on SSB1, and 20 times UE experienced LBT failure when trying on SSB1, It would be a better SSB beam compared to the SSB2 that UE succeeded 2 timer to transmit the preamble and UE didn’t failed with LBT issue at all. It can be deduced that once the LBT issue is fixed, the UE succeeded on SSB1, which means SSB1 is a better resource to be configured for UEs e.g., for HO or BFR, etc.   |  |  |  | | --- | --- | --- | | SSB number | Number of preamble transmission | Number of LBT failures per selected SSB | | SSB1 | 1 | 20 | | SSB2 | 2 | 0 | | SSB1 | 1 | 0 | |
| CMCC | b | We think this granularity is enough, but if the finer granularity is required, a or c can be further discussed. |
| Lenovo | a, b, d | For d, time duration for UL LBT per RA procedure is useful for RACH optimization analysis, for example, if too long time duration is spent for UL LBT, it may mean that the failure is mainly caused by channel occupancy rather than unsuitable RACH configuration or radio link quality. |
| NEC | b |  |
| Nokia | a | B could be acceptable if the failure number is above certain number |
| ZTE | a,c | It is beneficial ton know if an RA attempt has been blocked by LBT, and on which beams UE experience most LBTs, which might be beneficial for NW to configure dedicated RA resource.Depends on how c is included perhaps a might be implicitly indicated. |
| Apple | b |  |

a: 3/11 companies

b: 8/11 companies

c: 2/11 companies

d: 1/11 companies

Rapporteur believes time it may not be straightforward to measure the time duration of the LBT failure as the LBT failure may occur intermittently (ON and OFF) during an RA procedure. In addition, mapping the LBT failure to the channel access or the RA attempt or selected beam might give further insight to the network. Therefore, based on the comments rapporteur propose the following.

**Proposal 4: RAN2 further discuss the granularity of the LBT failures in the RA-InformationCommon among the following:**

1. **Per RA attempt**
2. **Per RA procedure (i.e., total number of LBT failures during RA procedure)**
3. **Per selected beam (i.e., Number of LBT failures per selected beam)**

On RSSI and applied EDT values in RA-InformationCommon

Companies (including Huawei, Ericsson [4, 8]) proposed to include the RSSI and EDT in the RA report. Huawei proposed to log the RSSI in the RA-InformationCommon and Ericsson proposed to include the RSSI measurements per RA attempt. Rapporture believes the granularity of the RSSI measurements value can be discussed as FFS, when companies agreed to include the RSSI measurements in the RA-InformationCommon.

**Proposal 3: UE logs RSSI measurement and the applied EDT value in the RA-InformationCommon. FFS on logging granularity.**

Based on the above proposal rapporteur would like to ask companies the following question.

* **Q5: Do you agree with Proposal 3?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Samsung | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSilicon | Yes | We are open to discuss the logging level/granularity, and the signalling overhead should be checked. |
| CATT | Yes for RSSI | We think RSSI can be included in the RA-InformationCommon. But we are wondering whether EDT value is included in RA-InformationCommon since EDT value is set to be less or equal to the maximum EDT threshold which is configured by the network or set by the UE based on some rules. This value is more about optimization of LBT configuration. And even this value is reported to NW, how the NW uses this value is still unclear. |
| Ericsson | Yes |  |
| CMCC | Yes |  |
| NEC | Yes |  |
| Nokia | No | We would see it is useful to understand the usefulness of the metric inclusion from RAN2 pov. |
| ZTE | No, can include RSSI in RLF-report as requested by RAN3 | I wonder if this is relevant to RACH configuration optimization? We shall includes RSSI on RLF-report as agreed by RAN3. |
| Apple | yes |  |
|  |  |  |

8/10 companies agree to include the RSSI measurements in the RA-InformationCommon. While two companies would like to further verify the usefulness of the RSSI measurements for RACH optimization. Beside that 7 companies agree to include the applied EDT values in the RA-InformationCommon. Therefore based on the view of the majority of the companies, rapporteur proposes the following:

**Proposal 5: RAN2 further discuss to log RSSI measurement and the applied EDT value in the RA-InformationCommon. FFS on logging granularity.**

Onlbt-FailureRecoveryConfig inclusion in the RA-InformationCommon

In addition, BWP specific lbt-FailureRecoveryConfig is proposed to be logged in the RA report and in particular in the RA-InformationCommon. However, it is proposed in [2] to consult RAN3 whether it is possible and evaluate the cost for the network nodes to know this information without UE reporting. Therefor rapporteur of the offline discussion proposed the following:

**Proposal 5: RAN2 to**

1. **Include BWP specific lbt-FailureRecoveryConfig in the RA report, or**
2. **Consult RAN3 to whether it is possible and evaluate the cost for the network to know the lbt-FailureRecoveryConfig without UE reporting.**

Based on the above proposal rapporteur would like to ask companies the following question.

* **Q6: Which of the options (a/b) in Proposal 5 is acceptable?**

|  |  |  |
| --- | --- | --- |
| Company | a/b | Comments |
| Samsung | Consult RAN3 |  |
| Xiaomi | b | We should understand whether there is need to report the whole lbt-FailureRecoveryConfig, perhaps in some scenario, network only needs to know whether lbt-FailureRecoveryConfig is configured or not. |
| Huawei, HiSilicon | b |  |
| CATT | b | We think we can consult RAN3 for decision. |
| Ericsson | b |  |
| CMCC | a | As the lbt-FailureRecoveryConfig is configured dedicated per UE, and similar per UE configuration IE *choConfig*, was discussed in r17 and consulted RAN3. RAN3 replied this relies on network implementation. The network may not store this kind of per UE configuration. Besides, lbt-FailureRecoveryConfig contains only two elements which we think will not cause too much overhead if included it in RA report.  If companies have strong preference to consult RAN3, we are also ok. |
| Lenovo | b |  |
| NEC | b |  |
| Nokia | b | Support to investigate what are the NW possibilities before agreeing to any config repetition by the UE |
| ZTE | a | Same view as CMCC that the configuration is dedicated configured, it would be extra burden for NW to memory the configuration for all UEs, it is preferred to let UE reports. But we can go with majority to check with RAN3. |
| Apple | b |  |

Concerning inclusion of LBT recovery configuration in the RA-InformationCommon, there is a convergence among the companies to consult RAN3 requesting to evaluate whether it is possible to know the lbt-FailureRecoveryConfig used when executing a random access procedure and evaluate the cost for the network to know the lbt-FailureRecoveryConfig without UE reporting. Therefore, we have the following proposal:

**Proposal 6: RAN2 consult RAN3 to whether it is possible to know the lbt-FailureRecoveryConfig used for execution of the RA procedure and evaluate the cost for the solution without UE reporting.**

# Conclusion

**Proposal 1: Introduce a new *raPurpose* in the *RA-Report* to indicate that the RA was initiated following a “consistent LBT failures” in the SpCell.**

**Proposal 2: RAN2 further discuss whether to introduce value 0 for the numberOfPreamblesSentOnSSB and numberOfPreamblesSentOnCSI-RS.**

**Proposal 3: RAN2 further discuss that in NR-U:**

* **An RA attempt is counted when UE attempts to transmit a preamble i.e., when UE executes section 5.1.3 of TS 38.321, or**
* **An RA attempt is only counted when UE accesses the channel at the PHY layer, and transmits the preamble.**

**Proposal 4: RAN2 further discuss the granularity of the LBT failures in the RA-InformationCommon among the following:**

1. **Per RA attempt**
2. **Per RA procedure (i.e., total number of LBT failures during RA procedure)**
3. **Per selected beam (i.e., Number of LBT failures per selected beam)**

**Proposal 5: RAN2 further discuss to log RSSI measurement and the applied EDT value in the RA-InformationCommon. FFS on logging granularity.**

**Proposal 6: RAN2 consult RAN3 to whether it is possible to know the lbt-FailureRecoveryConfig used for execution of the RA procedure and evaluate the cost for the solution without UE reporting.**

# References

1. [R2-2209573](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209573.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2209573)[NR-U enhancements for SON](file:///C:\R2-2209573.zip) **CATT**
2. [R2-2209765](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209765.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2209765)[SON enhancements for NR-U](file:///C:\R2-2209765.zip) **Apple**
3. [R2-2209824](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209824.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2209824)[SON/MDT enhancements for NR-U](file:///C:\R2-2209824.zip) **Samsung R&D Institute India**
4. [R2-2209897](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209897.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2209897)[Discussion on SON for NR-U](file:///C:\R2-2209897.zip) **Huawei, HiSilicon**
5. [R2-2209958](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209958.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2209958)[Discussion on MRO for NR-U](file:///C:\R2-2209958.zip) **Lenovo**
6. [R2-2210039](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210039.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2210039)[Discussion on SON for NR-U](file:///C:\R2-2210039.zip) **Xiaomi**
7. [R2-2210148](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210148.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2210148)[SONMDT enhancement for NR-U](file:///C:\R2-2210148.zip) **CMCC**
8. [R2-2210180](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210180.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2210180)[Enhancements of SON reports for NR-U](file:///C:\R2-2210180.zip) **Ericsson**
9. [R2-2210270](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210270.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2210270)[MRO and MDT enhancements for NR-U](file:///C:\R2-2210270.zip) **Nokia, Nokia Shanghai Bell**
10. [R2-2210290](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210290.zip)[M](http://mannerheim.nomadiclab.com/Mannerheim/tdoc/R2-2210290)[Consideration on NR-U related SON](file:///C:\R2-2210290.zip) **ZTE Corporation, Sanechips**