3GPP TSG-RAN WG3 #117-e R3-225006

Online, 15. – 24.08 2022

Agenda Item: 10.2

Source: Nokia (moderator)

Title: Summary of Offline Discussion on SON corrections (CB #SONMDT1)

Document for: Approval

# Introduction

**CB: # SONMDT1\_SONMDT**

**- Identify the issues to be solved in RAN3 for each use case under the scope of R18 WID**

**- Capture agreements and open issues**

# For the Chairman’s Notes (1st round)

Following problems will be addressed in RAN3:

1. SHR for intra-system inter-RAT
2. SPCR for NR-DC, including SN- and MN-initiated CPC and including intra-SN CPC; CPA and HO with SN change are not prohibited, but possibly addressed once the basic solution for SPCR is known.
3. Since RAN3 is the host for the above topics, RAN3 will send a single general LS asking RAN2 to start working on the above two topics (1 and 2).
4. MRO for CPC in EN-DC based on the NR-DC solution; MRO for CPA for NR-DC and EN-DC, if time allows.
5. MRO for the fast MCG recovery:
   * SCG fails or is deactivated soon after MCG,
   * the signalling delay is longer than the time the UE waits for the response (T316);
   * *other problem are not precluded, but are of lower priority.*
6. RACH enhancements:
   * RACH optimization for feature or feature combinations involving RACH partitioning (SDT, RedCap, Coverage Enhancement, network slicing, …)
   * RACH report retrieval
   * SN RACH report in MR-DC
   * *other problem are not precluded, but are of lower priority.*
7. SON/MDT enhancements for Non-Public Networks
   * support of Signaling based MDT and Management based MDT for NPNs
   * support both immediate MDT and logged MDT for NPN
   * user consent handling for NPNs, in particular SNPNs
   * area scope for NPNs
   * support of NPNs in RLF Report and other UE reports used for SON and MDT
   * *other problem are not precluded, but are of lower priority.*

For the 2nd round:

Draft of the LS to RAN2

Proposals for the split of the agenda topics for future meetings

Propose the following:

R3-20xxxa, R3-20xxxc merged

R3-20xxxc rev [in xxxg] – agreed

R3-20xxxd rev [in xxxh] – agreed

R3-20xxxe rev [in xxxi] – agreed

R3-20xxxf rev [in xxxj] – endorsed

Propose to capture the following:

**Agreement text…**

**Agreement text…**

**WA: carefully crafted text…**

Issue 1: no consensus

**Issue 2: issue is acknowledged; need to further check the impact on xxx. May be possible to address with a pure st2 change. To be continued…**

# Discussion (1st round)

## Successful HO Report (SHR)

Nearly all companies contributing to the meeting ([4396, 4412, 4548, 4605, 4744, 4824, 4922]) on this topic agree to address the intra-system inter-RAT SHR. Furthermore, [4548] proposes to wait with the work for RAN2 progress and [4824] proposes an LS to RAN2 to ask them to start it. In addition, [4922] indicates that only in case of a HO from NR to LTE the report is needed.

**Question 1: Please, confirm it is all right to work on the intra-system inter-RAT SHR and possibly comment on the scope of work on SHR (e.g. related to one-direction of the HO).**

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Fine to work on the intra-system inter-RAT SHR.  Indeed, in case of a HO from LTE to NR, the existing SHR should be enough. |
| Qualcomm | Even if we want to focus only on intra-5GC inter-RAT SHR (NR to LTE) in Rel-18, what is the optimization goal here? Are we just looking to optimize RLM configuration (T310/T312 timer values) in case of successful HO from NR to LTE? Wouldn’t the intra-RAT SHR be enough for optimizing these timers?  As mentioned in our paper [4605], we are trying to understand the main objective here. Also, we should avoid LTE impacts and cross-RAT SHR retrieval (SHR is not time critical and can be retrieved on the same RAT later). |
| CATT | Fine to work on the intra-system inter-RAT SHR.  We think two direction of HO shall be discussed, but optimization for NR shall be prioritized. |
| China Telecom | Agree to work on the intra-system inter-RAT SHR. |
| Lenovo | From RAN3 point of view, it is ok to work on the intra-system inter-RAT SHR in priority.  Considering source node or target node may need to configure trigger conditions for inter-RAT SHR, it may have impacts on LTE specification, we may need to check with RAN2 about the inter-RAT HO direction, e.g. whether to support both inter-RAT HO from NR to LTE and inter-RAT HO from LTE to NR, or only support one-direction. |
| Samsung | Fine to work on the intra-system inter-RAT SHR.  We think two directions of HO shall be discussed.  For inter-system, if there is no additional impact on RAN2 and the only thing needed on top of intra-system inter-RAT is extending the Xn message to NG/S1, then we are fine to support it as well. |
| Huawei | Agree to work on the intra-system inter-RAT SHR.  Agree with Lenovo on leaving the direction decision to RAN2 |
| CMCC | We are fine to prioritize the scenario of intra-system inter-RAT SHR. But if there is no additional impact to support inter-system in RAN2, we can support inter-system as well. Both directions should be discussed. |
| Ericsson | Fine to work on intra-system inter-RAT SHR. Discussion should focus on scenarios improving NR mobility, without impact on LTE specifications |
| ZTE | Fine to work on the intra-system inter-RAT SHR. |
| Verizon | Okay to work on the intra-system inter-RAT SHR |

**Question 2: Please, indicate your preference, if RAN3 shall send an LS to RAN2 already at this meeting?**

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| --- | --- | --- |
| Company | Yes / No | If the answer is negative, please, explain why not. |
| Nokia | Yes | The sooner we ask RAN2 for help, the better. We may indicate scope limits. |
| Qualcomm | Yes | We can LS RAN2 based on what we identify in Q1 and also mention things like avoid LTE impacts or cross-RAT SHR retrieval etc. |
| CATT | Yes | We can LS to RAN2 for the scope of SHR. |
| China Telecom | Yes |  |
| Lenovo | Yes | Check with RAN2 about which scenario to be supported:  - inter-RAT HO from NR to LTE;  - inter-RAT HO from LTE to NR. |
| Samsung | Yes | As indicated in our paper R3-224824, it’s better to send LS to RAN2 at this meeting. RAN3 can send LS to RAN2 about the issues and RAN3 understanding on those issues. Then RAN2 can have further discussion and decision based on that. This issues include:   * + The scenario to be supported   + The parameters for inter-RAT SHR   + Whether SHR is in the source RAT format or the target RAT format   + Whether sends LTE SHR to a gNB and whether sends NR SHR to a eNB |
| Huawei | Yes | Send the LS to indicate the scope of intra-system inter-RAT SHR and ask RAN2 to further clarify the HO direction |
| CMCC | Yes | We could LS to RAN2 on our findings, especially if CGI is needed outside the SHR report, we should inform RAN2 about this. |
| Ericsson | For 2nd round | How could we agree on an LS now? We first need to have agreements to communicate. We should discuss the need of an LS during the 2nd round |
| ZTE | Seems unnecessary | RAN2 should initiate corresponding work and will inform RAN3 when ready, and we should keep in mind RAN2 starts August meeting later than RAN3 and it is possible RAN2 does not able to response in this meeting. |
| Verizon | Yes | Share the same view as Nokia. It won’t hurt to ask. |

## Successful PSCell change report (SPCR)

It seems that majority of the companies contributing to the discussion ([4397, 4411, 4548, 4605, 4744, 4824, 4922]) consider that CPA and CPC (both, MN- and SN-initiated) should be supported by the SPCR. Furthermore, in [4744] it is emphasized that both, EN-DC and MR-DC should be prioritised, while [4922] includes, in the CPC scope, also a HO with SN change and intra-SN PSCell change. In [4824], it is proposed to send an LS to RAN2.

**Question 3: Please, confirm that CPA, MN-initiated CPC and SN-initiated CPC shall be addressed; possibly, please, comment on the prioritization.**

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| --- | --- |
| Company | Comment |
| Nokia | Fine to address the 3 cases – if CPC is addressed, CPA is “for free”; if SN-initiated CPC is covered then MN-initiated is also included.  Regarding prioritisation, we think RAN2 should be involved in the decision. |
| Qualcomm | Firstly, we should prioritize only NR PSCells (both source and target PSCell should be NR) and NR-DC scenarios to avoid facing issues like MN being unable to read SPCR.  We should also consider SPCR for ordinary PSCell change/addition as well (not just CPC/CPA as mentioned in Q3). |
| CATT | We prefer to consider CPA, MN-initiated CPC and SN-initiated CPC at the same time. We believe it is RAN3 to decide the scenario and prioritization, and then inform RAN2 the result. |
| China Telecom | Agree to address CPA, MN-initiated CPC and SN-initiated CPC cases.  For prioritization, we think that EN-DC and MR-DC scenario should be prioritised. |
| Lenovo | Successful PSCell change report in NR-NR DC should be prioritized. Other MR-DC scenarios can be discussed later if time allows.  Following cases should be considered for SPCR in priority:  - MN initiated PSCell change;  - SN initiated PSCell change;  - MN initiated CPC;  - SN initiated CPC.  PSCell addition or CPA can be discussed later after PSCell change or CPC is addressed. |
| Samsung | Agree to address CPA, MN-initiated CPC and SN-initiated CPC cases.  We should also consider normal PSCell change/addition as well.  We are fine to discussion both NR-DC and MR-DC. NR-DC can be discussed firstly. For MR-DC，Once the decision is made for Inter-RAT SHR, the same principle can be used for successful inter-RAT PSCell change report |
| Huawei | We prefer to address the legacy PSCell change cases initiated by MN or SN in case of NR-DC.  For other scenarios, we prefer down-selection. |
| CMCC | Normal PScell change/addition should be the starting point and we are also fine to include SPCR for CPA, MN and SN initiated CPC. |
| Ericsson | CPC (MN-initiated and SN-initiated) and CPA shall be discussed together. CPA is a “simplified” case of CPC. The WID says: “The objective of this work item is to specify data collection enhancement in NR for SON/MDT purpose”. Therefore, NR-DC should be prioritized |
| ZTE | In general, Rel 17 SHR does not cover CHO. While regarding CPA/CPC, the feature will be handed in MR-DC CPAC topic. In order to have an uniform solution among topics, it is proposed to study PScell change user case at first and wait the progress in MR-DC CPAC topic.  And the scope needs RAN2 involved. |
| Verizon | Agree to treat both CPA and CPC. NR-DC is the priority. |

**Question 4: Please, comment if the additional scenarios shall be included: HO with SN change and intra-SN PSCell change.**

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| --- | --- |
| Company | Comment |
| Nokia | HO with SN change: yes (as well as a HO with DC added at the target; this should be addressed similarly like CPA).  Intra-SN CPC: possibly yes, but is there any RAN3 impact? If not, RAN2 could decide. |
| Qualcomm | HO with SN change: Yes  Intra-SN PSCell change without MN involvement: Yes, there are RAN3 impacts. Say we still use SRB1 to report SPCR, but MN does not even know there was a PSCell change. So how MN should forward SPCR to the right SN for root cause analysis needs to be studied. |
| CATT | HO with SN change and intra-SN PSCell change shall be included. How to fetch Successful PSCell change report during intra-SN PSCell change needs more consideration since MN is not aware of that and cannot trigger fetching procedure. |
| China Telecom | If TU allowed, we are fine to study the above two scenarios. |
| Lenovo | We prefer to consider the scenarios as commented in Q3 firstly. |
| Samsung | intra-SN PSCell change: yes. This should be included.  HO with SN change: this is a combination of SHR and SPCR. Maybe it is better to firstly make SPCR clearly, then consider this combination. |
| Huawei | HO with SN change: deprioritized  Intra-SN PSCell change wo MN involvement can be included. |
| CMCC | Focus on the scenarios in Q3 first |
| Ericsson | Both scenarios are relevant and will benefit from SPR |
| ZTE | Yes, but the potential impact on RAN3 needs further check. |
| Verizon | Fine with both scenarios. |

**Question 5: Please, indicate your preference, if RAN3 shall send an LS to RAN2 already at this meeting?**

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| --- | --- | --- | --- |
| Company | Yes / No | | If the answer is negative, please, explain why not. |
| Nokia | Yes | | The sooner we ask RAN2 for help, the better. We may indicate scope limits.  The LS shall be combined with the one above (chapter 3.1). |
| Qualcomm | Yes | |  |
| CATT | Yes | | RAN3 shall first confirm the available scenarios and related prioritization, and then inform RAN2 the result. |
| China Telecom | Yes | |  |
| Lenovo | Yes | |  |
| Samsung | Yes | | Yes. As indicated in our paper R3-224824. We also think the LS include both SHR and Successful PSCell Change Report. |
| Huawei | yes | |  |
| CMCC | Yes | |  |
| Ericsson | Wait 2nd round | | Same as previous LS proposal. We can decide to send an LS when we have something to share |
| ZTE | Seems unnecessary | | RAN2 should initiate corresponding work and will inform RAN3 when ready, and we should keep in mind RAN2 starts August meeting later than RAN3 and it is possible RAN2 does not able to response in this meeting. |
| Verizon | Yes | Share the same view as Nokia. It won’t hurt to ask. | |
|  |  | |  |

## MRO enhancements

Two mobility scenarios are proposed to be included in MRO analysis:

In [4410, 4547, 4604, 4743, 4821, 4903] it is proposed to work on MRO for CPAC. However, while most proponents are interested in both, CPA and CPC (MN- and SN-initiated), in [4410] it is proposed to limit the scope to the CPC (at least as the first priority).

**Question 6: Please, comment on the scope of the MRO for CPAC**

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| --- | --- | --- |
| Company | CPA, CPC, both | Possibly, please, explain why some option should be excluded. |
| Nokia | Both | Also, both cases of CPC should be addressed: SN- and MN-initiated, though the latter may be included in SN-initiated CPC MRO. |
| Qualcomm | Both |  |
| CATT | Both | CPA and CPC are both essential procedures. |
| China Telecom | Both |  |
| Lenovo | See comments | R17 MRO for PSCell change failure in NR-DC can be taken as baseline for CPC. We can find that only MRO for SCG failure in PSCell change procedure is specified in R17, but SCG failure in PSCell addition procedure is excluded. That is why we propose that MRO for CPC should be prioritized, and CPA can be discussed after CPC is addressed. |
| Samsung | Both | CPA may be covered if CPC is resolved. |
| Huawei | Both, but CPC first | We prefer to address CPC, which may take the R17 SCG failure related scheme as baseline |
| CMCC | Both |  |
| Ericsson | Both |  |
| ZTE | Both |  |
| Verizon | Both | CPA is the priority. |

In [4413, 4547, 4604, 4745, 4823, 4922] it is proposed to work on MRO for fast MCG recovery. Among the detailed problems, following cases are mentioned:

1. the SCG fails or is deactivated soon after MCG
2. the signalling delay is longer than the time the UE waits for the response (T316)
3. the recovery HO fails
4. the resulting re-establishment fails.

**Question 7: Please, comment on the scope of the MRO for fast MSC recovery**

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| --- | --- | --- |
| Company | Preferred option | Possibly, please, explain why some option should be excluded. |
| Nokia | (a) and (b) | (c) and (d) are part of the classic MRO, aren’t they? |
| Qualcomm | 1. for SCG failure and (b) | Regarding a, is it even possible that SCG gets deactivated after sending MCGFailureInformation? The whole point is to inform MN via SN, why would we want to do SCG deactivation at this point?  Regarding c and d, we actually deprioritized the CHO-HO mixed scenarios in Rel-17 e.g., CHO is configured 🡪 ordinary HO command is received 🡪 ordinary HOF 🡪 reselected cell is CHO recovery cell 🡪 CHO recovery failure.  So, we should study that first if at all before considering the interoperability with fast MCG recovery. |
| CATT | (a) and (b) | (a) and (b) are related to fast MCG recovery.  But SCG deactivated for (a) should be MCG failed and SCG has already been deactivated. The SCG deactivate is controlled by MN. |
| China Telecom | (a) and (b) | (a) and (b) are related MRO for fast MCG recovery which need to be further discussed in R18 WI. |
| Lenovo | (a) for SCG fails while T316 is running;  (b) | For a), does it include the following two cases?  - SCG fails or is deactivated before sending MCG Failure Information message;  - SCG fails or is deactivated while T316 is running;  For c), it should be de-prioritized.  For d), it seems like legacy MRO. |
| Samsung | (a) (b) (c) (d) | For c) and d), there are consecutive failures. It will bring more serious issues for the UE and the network e.g. long interruption of the data transmission. The MN shall have proper measure to solve this. |
| Huawei | (a), (b) and (c) | For c), in legacy, the UE will delete the RLF report upon successful recovery. There may not be enough information for the MN to identify the issue. If there is additional connection failure, it’s preferred to include the first failure related info into the new RLF report. |
| CMCC | 1. and (b) | T316 expiry and SCG failure and SCG deactivation are the main causes of fast MCG recovery failure |
| Ericsson | (a), (b) | 1. may also be reworded e.g.: “SCG is suspended or deactivated when UE initiates fast MCG recovery procedure”   (c) Not relevant, because once T316 stops (i.e. Fast MCG Recovery is successful), the scenarios become similar to legacy MRO scenarios. The optimizations that can be done at the MN are similar if HO is legacy HO or an HO subsequent to a fast MCG recovery  (d) No difference with legacy MRO |
| ZTE | a) And b) |  |
| Verizon | 1. and (b) | The other two seem to be covered by classic MRO. |

## RACH enhancements

The papers [4607, 4698, 4745, 4848, 4901, 4923, 4929] contain proposals related to Rel-18 RACH enhancements in the following areas:

1. RACH optimization for feature or feature combinations involving RACH partitioning (SDT, RedCap, Coverage Enhancement, network slicing, …)
2. Random Access for SDT
3. RACH report retrieval
4. SN RACH report in MR-DC
5. RACH configuration conflicts between public networks and SNPN (may also be commented under section 3.5)

**Question 8: Please comment on the scope of Rel-18 RACH optimisation - is it OK to start working on the topics listed in RAN3, or e.g. should an LS be sent to RAN2 at this meeting? Are any additional topics needed?**

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| --- | --- |
| Company | Comment |
| Nokia | We agree with the listed topics for further work in Rel-18. RAN3 could further work on problem statements for these topics, and depending on this analysis, solutions for some problems could be asked from RAN2. |
| Qualcomm | Except (b), this is not in WID scope (RACH partitions with SDT can be considered though).  Also, clarification needed for e). Is it even an actual deployment option to use the same frequency band for NPN and PN? Even so and if there is no Xn interface between the NPN and PN, what can we even do? |
| CATT | We agree to discuss the above topics in R18.  For d), it only impacts RAN2 spec. hence we should send a LS to RAN2 as soon as possible. |
| China Telecom | Agree with the listed topics for further work in Rel-18. |
| Lenovo | Fine with a), c), d).  For b), it is not clear about what we need to do for RACH enhancements for SDT.  For e), same view as QC that further clarification is needed. |
| Samsung | Fine with a), b).  For b), it is in the scope of the WI because the objective description is “RACH optimisaiton”. RA-SDT is a RACH feature defined in Rel-17.  For d), it should be decided by RAN2 whether to support.  For e), same view as QC that further clarification is needed. |
| Huawei | Agree on the listed topics a)~d)  For e), same view as QC |
| CMCC | Since during the WID drafting phase, there is no specific objectives achieved, we agree on a) b) c) d), e was not mentioned during RAN plenary discussion ,needs further clarification |
| Ericsson | We are fine to address the issues related to a, c, d, e. With respect to b, it is unclear what the problem is and what RAN3 could do to solve it, so we propose companies to clarify problem statement and relevance to RAN3. |
| ZTE | Agree the list as start point and it seems too early to send LS to RAN2. |
| Verizon | Agree to start with (a) and (c) (the least controversial ones), and send out a LS to RAN2 for inputs and clarification. |

## SON/MDT enhancements for Non-Public Networks

In [4606, 4697, 4744, 4924, 4928] it is proposed to work on SON-MDT enhancements for Non-Public Networks (NPN). Rel-18 support is proposed for the following areas:

1. support of Signaling based MDT and Management based MDT for NPNs
2. support both immediate MDT and logged MDT for NPN
3. user consent handling for NPNs, in particular SNPNs
4. area scope for NPNs
5. support of NPNs in RLF Report and other UE reports used for SON and MDT
6. mitigation of mobility issues and RACH configuration conflicts between public networks and non-public networks

**Question 9: Please, comment on the scope of SON-MDT support for NPNs - is it OK to handle the topics listed? Are any additional topics needed?**

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| --- | --- |
| Company | Comment |
| Nokia | we agree with the listed topics for further work in Rel-18. |
| Qualcomm | Comment on k) provided in previous question. |
| CATT | We are OK to handle the topics listed. |
| China Telecom | Agree with the listed topics for further work in Rel-18. |
| Huawei | Agree on the listed topics and decide the priority.  For k), comments is provided in Q8 |
| CMCC | Fine with these topics |
| Ericsson | We agree with the list of topics for Rel18 |
| Samsung1 | Fine for f) to i).  For j, if RLF is due to no suitable target NPN cell to handover, gNB does not need to update the configuration. Thus, in such case, it is better not to send RLF report.  For k, same as Q8. Further clarification is needed |
| ZTE | Agree the list . |
| Verizon | Agree the list. |

# Conclusion, Recommendations [if needed]

If needed

# References

[4396] R3-224396, Discussion on inter-RAT Successful Handover Report (China Telecommunication)

[4397] R3-224397, Discussion on Successful PScell change report (China Telecommunication)

[4410] R3-224410, SON enhancements for CPC (Lenovo)

[4411] R3-224411, SON enhancements for successful PSCell change report (Lenovo)

[4412] R3-224412, Successful Handover Report for inter-RAT HO (Lenovo)

[4413] R3-224413, MRO for fast MCG link recovery (Lenovo)

[4461] R3-224461, Discussion related to RACH Report retrieval methods (Nokia, Nokia Shanghai Bell)

[4463] R3-224463, Initial discussion on performing MDT in NPN networks (Nokia, Nokia Shanghai Bell)

[4547] R3-224547, MR-DC CPAC and Fast MCG recovery (Huawei)

[4548] R3-224548, Successful PScell change report and Successful Handover Report (Huawei)

[4604] R3-224604, MRO enhancements for CPAC and fast MCG recovery (Qualcomm Incorporated)

[4605] R3-224605, Successful PSCell change and successful handover scenarios (Qualcomm Incorporated)

[4606] R3-224606, SON MDT for Non-Public networks (Qualcomm Incorporated)

[4698] R3-224698, Further enhancement for RACH optimisation (Huawei)

[4743] R3-224743, Discussion on SON enhancements for MR-DC CPAC (CATT)

[4744] R3-224744, Discussion on SON Enhancements for Successful PScell change report, SHR, NPN and NR-U (CATT)

[4745] R3-224745, Discussion on SON enhancements for RACH report and fast MCG recovery (CATT)

[4746] R3-224746, LS on SON enhancement for RA report and fast MCG recovery (CATT)

[4821] R3-224821, SON enhancements for CPAC (Samsung)

[4823] R3-224823, SON enhancement for MCG failure recovery (Samsung)

[4824] R3-224824, SON enhancement for Successful Handover Report (Samsung)

[4848] R3-224848, Discussion on SON for RACH (Samsung)

[4900] R3-224900, SONMDT enhancement for fast MCG recovery (CMCC)

[4901] R3-224901, SONMDT enhancement for RACH report (CMCC)

[4903] R3-224903, SONMDT enhancement for MR-DC CPAC (CMCC)

[4922] R3-224922, Initial consideration on SON related features (ZTE)

[4923] R3-224923, Initial consideration on RACH enhancement (ZTE)

[4924] R3-224924, Initial consideration on MDT support in NPN (ZTE)

[4928] R3-224928, SON enhancements for Non-public networks (Ericsson)

[4929] R3-224929, SON enhancements for RACH Optimization (Ericsson)

[4931] R3-224931, SON enhancements for Mobility Robustness (Ericsson)

[4697] R3-224697, Support of MDT in NPN and the continuation of NR-U SON (Huawei)

[4607] R3-224607, SON enhancements for NR-U and RACH optimization enhancements (Qualcomm Incorporated)