3GPP TSG-RAN WG3 #117-e R3-224986

15th – 24th Aug 2022

Online

Agenda Item: 8.1

Source: ZTE (moderator)

Title: Summary of Offline Discussion on R18Redcap

Document for: Approval

# Introduction

**CB: # 3\_R18Redcap**

**- Focus on the LS reply to SA2**

(ZTE - moderator)

[NWM] Summary of offline disc [R3-224986](file:///D:\3GPPmeeting\202208%20RAN3%20117e\Inbox\R3-224986.zip)

The 1st round of discussion is set to deadline on **17th Aug (Wednesday) 23:59 UTC.**

# For the Chairman’s Notes

<TBD>

# Discussion- Second round

<TBD>

# Discussion-First round

## Background

In this meeting, we have received an LS from SA2 [1], it includes two options and 6 questions.

|  |
| --- |
| **1. Overall Description:**  SA2 Rel-18 study FS\_REDCAP\_Ph2 is ongoing and approaching the conclusion phase. The study is focused on one key issue which enables long eDRX>10.24s cycle support for UE in RRC\_INACTIVE state. See more details in latest TR 23.700-68 ([link](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3996)).  SA2 discussed mainly two different types of solutions:  A) NG-RAN provides UE unreachability information (e.g. the eDRX information) to CN when UE enters RRC\_INACTIVE state with long eDRX and CN handles the MT data/signalling while the UE is unreachable. CN triggers MT data/signalling when the UE is considered reachable. For example, see solution#6 in TR 23.700-68 for reference.  B) NG-RAN handles MT data/signalling while the UE is RRC\_INACTIVE state. In case UE moves out of the RNA area during the unreachable time period and performs resume outside the RNA, the UE context retrieval between NG-RAN nodes and data forwarding are supported via CN when there is no Xn interface. For example, see solution#2 in TR 23.700-68 for reference.  SA2 is starting to consider its conclusion and would like to ask RAN2 and RAN3 on their views on the following aspects:   1. NG-RAN providing UE unreachability information to CN for MT data/signalling handling when UE is not reachable in RRC\_INACTIVE state. 2. NG-RAN can handle a new NG\_AP message to trigger RAN paging when UE is in RRC-INACTIVE. 3. Including the UE context retrieval with data forwarding handling between NG-RAN nodes via CN. 4. NG-RAN buffering capabilities of MT data for the duration of the eDRX cycle. 5. NG-RAN’s ability to perform UE context release procedure towards the AMF and locally releases the UE to RRC-IDLE when receiving DL NAS message and the UE is not reachable for a time period longer than 10.28s. 6. Alternative to (5): NG-RANs ability to only provide an indication to AMF when receiving DL NAS message and the UE is not reachable for a time period longer than 10.28s. The UE remains in RRC\_INACTIVE.   **2. Actions:**  **To RAN3, RAN2**  **ACTION:** SA2 kindly asks RAN2 and RAN3 take the above information into consideration and provide their views on the above aspects. |

## Questions in the SA2 LS

|  |
| --- |
| 1) NG-RAN providing UE unreachability information to CN for MT data/signalling handling when UE is not reachable in RRC\_INACTIVE state |

In [6], it think this question is from option A. The motivation of this issue is when eDRX cycle in RRC\_INACTIVE exceeds 10.24s, there occur potential NAS timer timeout issue and UP data buffer issue. It would be helpful if NG-RAN provides UE unreachability information to CN. We note that the whole INACTIVE eDRX configuration by gNB may not be needed since the AMF can only achieve an H-SFN level synchronization instead of SFN level. Thus, only INACTIVE eDRX cycle shall be provided to CN when a long INACTIVE eDRX cycle (>10.24s) is configured.

**Question 1: Do companies agree with the following answer for question 1?**

RAN3 Answer: Yes, it is feasible for NG-RAN to provide UE unreachability information to CN for MT data/signalling handling when UE is not reachable in RRC\_INACTIVE state. It is needed for solution A.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |
| --- |
| 2) NG-RAN can handle a new NG\_AP message to trigger RAN paging when UE is in RRC-INACTIVE. |

[4] thinks it is feasible to re-use the existing NGAP Paging message with new indication of RAN paging

[5] wonders if it is needed to introduce a new NGAP procedure to trigger RAN paging when UE is in RRC-INACTIVE., because in legacy mechanism, the CN can send the MT signalling/data to RAN directly when UE is assumed to be CM\_CONNECTED.

However, some companies think it is needed to introduce a new NGAP procedure for solution A. [8] thinks it is feasible for NG-RAN to trigger RAN Paging based on receiving a NG-AP message from AMF. This can be a DL NAS TRANSPORT message in case of NAS signalling, or a new DATA NOTIFICATION message in case of MT Data.

**Question 2: which answer do you agree with for question 2?**

RAN3 Answer:

A1: Yes, it is feasible for NG-RAN to handle an additional (new/old) NG\_AP message to trigger RAN paging when UE is in RRC-INACTIVE. It is needed for solution A.

A2: No, it is feasible but **NOT** necessary for NG-RAN to handle additional NG\_AP message but reuse legacy mechanism to trigger RAN paging when UE is in RRC-INACTIVE. It is not needed for solution A.

A3: Other, if any

|  |  |  |
| --- | --- | --- |
| **Company** | **A1 or A2 or A3** | **Comment** |
| ZTE | A2 | A1 will increase latency due to additional NGAP message, specially, if the MT data is small than legacy RAN buffering capability, legacy mechanism shall be reused and better than solution A.  First, both RAN and CN reuse legacy mechanism to receive MT data. If the MT data is possible to be larger than RAN buffering capability, RAN notifies CN to buffer MT data. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |
| --- |
| 3) Including the UE context retrieval with data forwarding handling between NG-RAN nodes via CN. |

For solution B, it is needed to retrieval the UE context and data stored in the last serving gNB when there is no Xn interface between the last serving gNB and current serving gNB.

Both [5] and [8] think it is feasible. However, some companies do not think it is feasible, [2] thinks it is invaluable to spend too much TUs to design data forwarding via CN which has already been discussed and excluded in the Rel-15, and [4] thinks it is a significant new enhancement that only seems applicable for a very specific use case.

In [9], it considers that support of UE context retrieval with data forwarding handling between NG-RAN nodes via CN is feasible but has some significant NG-AP specification impacts and needs more discussion. One solution in case of absence of Xn connectivity and RAN buffering is reached, is that the NG-RAN uploads the RAN UE context to CN and asks to switch to CN buffering. When UE resumes to a new NG-RAN node, the CN can send the RAN UE context directly to the new NG-RAN as response to NG-AP context fetch request. RAN3 can continue to assess this solution in case SA2 decides to pursue this option in the normative phase.

**Question 3: Do you agree the following observation and which answer do you agree with for question 3?**

Observation 1: For solution B, it is needed to retrieval the UE context and data stored in the last serving gNB when there is no Xn interface between the last serving gNB and current serving gNB. It has some significant NG-AP specification impacts and needs more discussion in the normative phase if solution B is selected.

RAN3 Answer:

A1: Yes, it is feasible for NG-RAN to include UE context retrieval with data forwarding handling between NG-RAN nodes via CN, it is needed for solution B. More, it has some significant NG-AP specification impacts and needs more discussion in the normative phase if solution B is selected.

A2: No, it is **NOT** feasible for NG-RAN to include UE context retrieval with data forwarding handling between NG-RAN nodes via CN, it is needed for solution B but RAN3 does not want to support it.

A3: Other, if any

|  |  |  |
| --- | --- | --- |
| **Company** | **Observation**  **A1 or A2 or A3** | **Comment** |
| ZTE | Observation: Agree  Answer: A2 | RAN3 does not need to take too much time to design this new mechanism. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |
| --- |
| 4) NG-RAN buffering capabilities of MT data for the duration of the eDRX cycle. |

In one contribution [8], it states that the NG-RAN buffering capability depends on the deployment scenario (UPF collocated with NG-RAN, CU-UP split, etc.), the traffic model, mobility patterns, etc., which cannot be captured in specifications. If the NG-RAN buffering capacity is reached, NG-RAN can request the CN to do buffering instead and both buffering approaches can be supported to avoid data loss.

In another contribution [5], it states that RAN side is not expected to buffer too much. Compared to current Rel\_17 case of INACTIVE eDRX cycle no longer than 10.24, there should be no extra requirement on RAN buffer capability.

In another contribution [4], it states that buffering of data in RAN was discussed in the past and not agreed. The main issue is not buffering as such, but the associated introduction of additional signalling procedures for data forwarding, which can be avoided if CN buffers the data. Since CN buffering is a long-established functionality, RAN buffering is not preferred.

**Question 4: Do you agree the following feedback to SA2 for question 4?**

Observation 2: The NG-RAN buffering capability depends on the deployment scenario (UPF collocated with NG-RAN, CU-UP split, etc.), the traffic model, mobility patterns, etc., which cannot be captured in specifications.

RAN3 Answer:

A1: The current NG-RAN buffering capabilities is enough to satisfy solution B. RAN3 does not support any further enhancement.

A2: If the NG-RAN buffering capacity is reached, NG-RAN can request the CN to do buffering instead and both buffering approaches can be supported to avoid data loss.

A5: Other, if any

|  |  |  |
| --- | --- | --- |
| **Company** | **Observation**  **A1 or A2 or A3** | **Comment** |
| ZTE | Observation: Agree  Answer：A2 | We do not support RAN buffering capability enhancement and wish to keep legacy RAN buffering capability. So that, solution B is not feasible.  So, we prefer to enhance solution A, i.e., if MT data is not large and smaller than RAN buffer capability, both RAN and CN can reuse legacy mechanism, if MT data is larger than RAN buffer capability threshold, RAN shall notify CN to buffer MT data. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |
| --- |
| 5) NG-RAN’s ability to perform UE context release procedure towards the AMF and locally releases the UE to RRC-IDLE when receiving DL NAS message and the UE is not reachable for a time period longer than 10.28s.  6) Alternative to (5): NG-RANs ability to only provide an indication to AMF when receiving DL NAS message and the UE is not reachable for a time period longer than 10.28s. The UE remains in RRC\_INACTIVE. |

[2] indicates that there is no reason to release the UE context in this case because the CN needs to trigger the CN paging for further MT data/signalling. This will cause more latency and reduce the benefit of RRC-Inactive state. So it prefers to alternative 6).

[4] thinks the alternative 5 and 6 are for solution B and thus such functionality would not be needed if Solution A is chosen. [8] thinks that for solution A the legacy behaviour will apply.

[10] prefers alternative 5, but eDRX information should be kept in AMF.

[5] does not expect to release the inactive UE to RRC\_IDLE since releasing the UE to RRC\_IDLE would not achieve the benefits of RRC\_INACTIVE (i.e., fast connection resume) and deviate the benefits of long RRC\_INACTIVE eDRX, and for alternative 6, it wonders the motivation for the indication and how the AMF would respond to the indication.

**Question 5: Do you agree the following observation and which answer do you agree with for question 5/6:**

Observation 3.1: Alternative 5/6 are for solution B and for a failure case where UE is not reachable.

Observation 3.2: Alternative 5/6 are different from legacy mechanism, either alternative 5 or alternative 6 needs signalling/procedure enhancement to support solution A/B.

Observation 3.3: Compared to alternative 6, alternative 5 introduces more latency.

RAN3 Answer:

A1: Alternative 5 is prefered

A2: Alternative 6 is prefered, because alternative 5 introduce more latency.

A3: Both Alternative 5 and Alternative 6 are fine

A4: Neither Alternative 5 nor Alternative 6 is acceptable.

A5: Other, if any

|  |  |  |
| --- | --- | --- |
| **Company** | **Observation, A1 or A2 or… or A5** | **Comment** |
| ZTE | O3.1 : agree  O3:2: agree  O3.3: agree  Answer: A2 |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |
| --- |
| Solution A) NG-RAN provides UE unreachability information (e.g. the eDRX information) to CN when UE enters RRC\_INACTIVE state with long eDRX and CN handles the MT data/signalling while the UE is unreachable. CN triggers MT data/signalling when the UE is considered reachable. For example, see solution#6 in TR 23.700-68 for reference.  Solution B) NG-RAN handles MT data/signalling while the UE is RRC\_INACTIVE state. In case UE moves out of the RNA area during the unreachable time period and performs resume outside the RNA, the UE context retrieval between NG-RAN nodes and data forwarding are supported via CN when there is no Xn interface. For example, see solution#2 in TR 23.700-68 for reference. |

**Question 6: Companies are invited to provide your view on:**

Q 6.1：Do you think which option is feasible, solution A or solution B or both, and which solution do you prefer?

Q 6.2：If either solution A or solution B is selected, do you think it has some shortcoming? Please list them, (e.g., latency, signalling complexity)

Q 6.3: Do you think either solution A or solution B shall be enhanced to address its shortcomings, then it can be selected.

Q 6.4: Do you have any other view on down selection of solution A and solution B?

|  |  |  |
| --- | --- | --- |
| **Company** | **Q6.1,.. Q6.5** | **Comment** |
| ZTE | Q6.1: solution A | Solution A is feasible, Solution B is not feasible because we do not want to support UE context retrieve and data forwarding via CN.  We prefer Solution A with enhancement, to e.g., decrease latency. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Conclusion, Recommendations [if needed]

# References

1. [R3-224219](D:\\会议硬盘\\TSGR3_117-e\\Docs\\R3-224219.zip), LS On FS\_REDCAP\_Ph2 option feasibility (SA2), LS in ,R18
2. [R3-224259](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224259.zip), Solution selection to support long eDRX (ZTE), discussion
3. [R3-224260](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224260.zip), [Draft]reply LS on FS\_REDCAP\_Ph2 option feasibility (ZTE), LS out To: SA2 CC: RAN2
4. [R3-224310](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224310.zip), Draft Reply LS on FS\_REDCAP\_Ph2 option feasibility (Qualcomm India Pvt Ltd), LS out To: SA2 CC: RAN2, CT4, CT1
5. [R3-224593](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224593.zip), Discussion on eDRX support for UE in RRC\_INACTIVE state (Huawei), discussion
6. [R3-224594](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224594.zip), [DRAFT] Relpy LS on FS\_REDCAP\_Ph2 option feasibility (Huawei), LS out To: SA2, RAN2 CC: CT1, CT4
7. [R3-224742](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224742.zip), Discussion on LS on FS\_REDCAP\_Ph2 option feasibility (CATT), discussion
8. [R3-224800](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224800.zip), Propositions for RAN3 feedback to SA2 on Rel-18 RedCap enhancement study (Ericsson), discussion
9. [R3-224801](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224801.zip), [Draft] Reply LS On FS\_REDCAP\_Ph2 TR option feasibility (Ericsson), LS out To: SA2, RAN2 CC: CT4, CT1
10. [R3-224959](file:///D:\会议硬盘\TSGR3_117-e\Docs\R3-224959.zip), [draft] Reply LS on FS\_REDCAP\_Ph2 option feasibility (CATT), discussion