3GPP TSG-RAN WG3 Meeting #112-e R3-212663

E-meeting, 17 – 27 May, 2021

**Agenda item: 10.2.1.7**

**Source: Nokia (moderator)**

**Title: CB: # 1207\_SONMDT\_RACH - Summary of email discussion**

**Document for: Approval**

# 1 Introduction

**CB: # 1207\_SONMDT\_RACH**

**- Topics to discuss:**

 **- How gNB-DU resolves the RACH conflict**

 **- Neighbor PRACH Configuration in F1AP**

 **- Trigger from gNB-DU to gNB-CU for retrieval of a UE RACH Report?**

 **- RACH failure rate calculation and transfer in F1AP and XnAP**

 **- DU indicates to the CU the occurrence of RACH for cases when the RACH procedure is not known to the gNB-CU?**

 **- gNB-DU/en-gNB to report upon every event of “MSG1 without consecutive MSG3”?**

 **- Any other topic based on contributions submitted**

**- Start with summary of offline, proceed to TPs if there are agreements**

(Nok - moderator)

Summary of offline disc [R3-212663](file:///D%3A%5C3gpp%E4%BC%9A%E8%AE%AE%5CRAN3%5CRAN3%23112%5Coffline%5CCB%20%23%201207_SONMDT_RACH%5CInbox%5CR3-212663.zip)

The discussion is structured in two phases, one before the online sessions and one after. The deadline for the first phase is Thursday 16:00 UTC.

# 2 For the Chairman’s Notes

[To be completed]

# 3 Background

For RACH Optimization Enhancements we have the following agreements:

Support of inter-en-gNB RACH coordination in Rel-17 is beneficial, feasibility to be further evaluated in light of the NG-RAN solution to be defined.

Include neighbor PRACH Configuration in GNB-CU CONFIGURATION UPDATE, GNB-DU CONFIGURATION UPDATE ACKNOWLEDGE messages

FFS whether to include neighbor PRACH Configuration in F1 SETUP RESPONSE message

DU resolves PRACH configuration conflicts locally

Send a high number of Neighbour PRACH Configurations from CU to DU. Maximum value is FFS. The request from DU to CU is FFS.

# 4 Discussion

## 4.1 PRACH conflict detection and resolution

It is agreed that the "DU resolves PRACH configuration conflicts locally". So far, the agreeable outcome goes in the direction of CU assistance based on sending of "a high number of Neighbour PRACH Configurations from CU to DU", listed as option a) below. Other options that can be deduced from the submitted papers are:

* **Option a:** Large number of PRACH configurations from CU without further CU assistance to DU (*DU resolves PRACH configuration conflicts locally*)
* **Option b:** Large number of PRACH configurations from CU with CU assistance (RACH failure rate in neighbour cells) to DU (*DU resolves PRACH configuration conflicts locally*)
* **Option c:** Small number of PRACH configurations from CU to DU (*DU resolves PRACH configuration conflicts after requesting further CU assistance through more PRACH configurations*)
* **Option d:** Large number of PRACH configurations from CU to DU *(DU resolves PRACH configuration conflicts after requesting further CU assistance through more PRACH configurations*)

In your view, which of the options above would be sufficient to detect and resolve PRACH configuration conflicts? Are any options in the submitted proposals missing in your view?

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| --- | --- |
| Company | Comment |
| Huawei | First of all, just to clarify that the small number amd the large number refer to the maximum number of neighbour cells PRACH configurations sending from the CU to the DU. Since a large number was agreed at last meeting, we prefer to set the maximum value to 512 which was proved by the F1 SETP from DU to CU that there is no any messge size issue.Regarding the assistance information, we have two options, the RACH failure rate and the cell ID that is suffering from PRACH configuration conflict.We think that the RACH failure rate doesn't help the CU much more than the cell ID. The DU may indicate the cell ID directly if the failure rate in that cell is beyond a threshold.We can accept to send the cell ID as the assistance information as a compromise by using the gNB DU configuration update procedure. |
| CATT | We prefer Option a, while Option b and d are also acceptable for us.We believe Option a won’t bring much signalling load as it is almost one-shot, thus technically not necessary to introduce any optimisation. Nevertheless if some company prefers to introduce some optimisation, we don’t oppose as it doesn’t harm anyway. |
| Nokia | We also support to send a large (maximum) number of PRACH Configurations from CU to DU according to the previous agreement, but there can't be any mandate that the CU always send the maximum number (if there is no need for such). We support Option b. Sending RACH failure rate of neighbour cells on F1 can help a CU identify/filter PRACH configuration information to be sent to its served DUs. Other acceptable option is Option a.Answering to HW: the benefit of RACH failure rate as opposed to just indicating the Cell ID suffering from PRACH Configuration conflict is that RACH failure rate gives additional information about “how much” conflict there exists in the cells of a DU. Any binary trigger would leave the decision to the DU; a greedy DU policy could define/trigger a conflict at a lower level as opposed to a more fair DU which would lead to non-comparable information at the CU. RACH Failure rate provides a common metric to determine conflict. Unlike usage of Cell ID, RACH Failure Rate could also be used to identify an aggressor cell since latter would typically have a particularly low RACH failure rate compared to its neighbours.For a full solution we would need also to send the RACH failure rate on Xn, but maybe the intra-gNB scenario could be focus for Rel-17. Inter-gNB scenario can be further improved in later releases if needed. |
| China Telecom | We prefer Option a), and can also accept Option b). On the value of the Large number, since the DU can report 512 cells’ PRACH configuration to CU, we propose to set it to 512. |

## 4.2 Trigger of retrieval of UE RACH report

Options under discussion at RAN3#111-e were the following:

1. For RACH events that are visible to the DU but not to the CU, DU triggers the CU to retrieve UE RACH Reports from a UE.

2. No trigger from DU is needed - CU is triggered by the UE to retrieve UE RACH Reports.

No agreement was reached - can further discussion on these mechanisms be left to later release, which means no additional trigger for UE RACH report is provided to the CU?

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| Company | Comment |
| Huawei | We see some benefits to have the trigger from DU to CU. But ok to follow the majority. |
| Nokia | We do not support a trigger from DU to CU, primarily since this would break the fundamental principle of functional split, where a CU should not need to be aware of e.g. intra-cell inter-beam (L2) mobility. But also, such trigger would result in high signaling impact towards the UE. From UE perspective a RACH Report is complete and awaits network retrieval when 8 RACH procedures have been stored. This also reduces the signaling required for the retrieval of the report. Since the gNB-DU cannot know how many RACH procedures a UE has logged (a UE may store RACH procedures from another gNB), it would trigger retrieval every time a new procedure (visible to the DU) is logged. This introduces excessive signaling both over F1 and over Uu interfaces.Thus, it seems more convenient to let the responsibility to retrieve UE RACH reports to the CU. Currently it is optional for a CU to retrieve a RACH Report from a UE; If the CU does not retrieve it within 48h then the UE will discard the RACH Report. It is unclear why this functionality needs to be changed.In the lack of any agreement, we are fine also to postpone this mechanism to a later release. |
| China Telecom | Agree with Nokia. We also prefer Option2. The option 1 may lead to much signalling exchange between CU and DU. CU can decide whether to retrieve UE RACH report according to its local policy. |

## 4.3 Inclusion of PRACH Configuration in F1 SETUP RESPONSE

This proposal was discussed at RAN3#111-e without agreement, and further proposed at this meeting in 1864 with additional clarifications. Please provide your further views:

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| Company | Comment |
| Huawei | If the CU can send the neighbour cells’ PRACH configurations in F1 SETUP response, it will enable the DU to do the first round detection on the PRCH configuration conflict.There are many implementation specific ways to let the CU know where is the new deployed DU and which are its neighours roughly. |
| CATT | We prefer to include it, as shown in 1864. |
| Nokia | Even though we don’t have a strong preference in including neighbour PRACH Configuration information at F1 SETUP RESPONSE, we think that there can be some scenarios where this can be useful. One example is when a DU reconnects to its CU after a failure. Another plausible example may be cell reparenting scenario (cells being reallocated between gNB-DUs) involving gNB-DU restart. These are 2 scenarios that could justify inclusion of PRACH Configuration in F1 SETUP RESPONSE.  |

# 5 Conclusion, Recommendations [if needed]

If needed