3GPP TSG-RAN WG3 Meeting #113-e R3-214257

E-meeting, 16 – 26 August, 2021

**Agenda item: 9.3.4.1**

**Source: Nokia (moderator)**

**Title: CB: # 106\_MultiPLMNClarification - Summary of email discussion**

**Document for: Approval**

# 1 Introduction

This paper provides summary of discussions at RAN#113-e on:

**CB: # 106\_MultiPLMNClarification**

**- Clarify the scenarios and the issues**

(Nok - moderator)

The discussion was triggered by discussion paper 3269 and associated F1AP CRs (3270, 3271) proposing correction from Rel-15 onwards..

# 2 For the Chairman’s Notes

Companies agree on the intended scenario as described in the SoD.

For the proposed correction:

* two companies are against
* three companies support
* one company neutral.

The following is proposed to be minuted by MCC:

**It is common understanding that if a PLMN or SNPN ID is not available at the gNB-CU, the gNB-DU will not trigger the gNB-DU Configuration Update procedure for the purpose of acknowledgment that the non-available PLMN or SNPN ID is not broadcast.**

**If the gNB-DU triggers the gNB-DU Conf Update procedure, the Served PLMNs IE contains also non-broadcast PLMNs and SNPN IDs.**

# 3 Discussion

## 3.1 Clarify the scenario intended by the specification

The discussion paper 3269 describes example scenarios where a PLMN or SNPN may be unavailable at the gNB-CU. This can happen e.g. in case of introduction or removal of an operator from RAN sharing, or temporary outage of a core network. The list of available PLMNs and SNPN IDs are signalled from the CU to the DU in the *Available PLMN List* IE and the *Available SNPN ID List* IE. F1AP describes action to be taken by the gNB-DU in this case, i.e. only available PLMN(s) or SNPN(s) are broadcast.

For the purpose of making the PLMN again visible to UEs as fast as possible when the PLMN becomes available at the gNB-CU, the discussion paper 3269 further assumes that the gNB-CU informs the gNB-DU when any unavailable PLMN or SNPN again becomes available. This is supported by triggering the gNB-CU Configuration Update procedure, conveying the mentioned IEs (*Available PLMN List* IE, *Available SNPN ID List* IE) including the PLMN/SNPN ID that has newly become available. Upon reception of this information, the gNB-DU will again broadcast the PLMN/SNPN ID.

**Q1: Do you agree that the above description corresponds to the scenario intended by the specification?**

|  |  |
| --- | --- |
| Company | Comment |
| Nokia | Yes |
| Samsung  | We are not sure if this is the current implementation. **F1 Setup procedure**For NG-RAN, the gNB-CU may include *Available PLMN List* IE, and optionally also *Extended Available PLMN List* IE in the F1 SETUP RESPONSE message, if the available PLMN(s) are different from what gNB-DU has provided in F1 SETUP REQUEST message, gNB-DU shall take this into account and only broadcast the PLMN(s) included in the received Available PLMN list(s). For NG-RAN, the gNB-CU may include *Available SNPN ID List* IE in the F1 SETUP RESPONSE message. If the available SNPN(s) are different from what gNB-DU has provided in F1 SETUP REQUEST message, gNB-DU shall take this into account and only broadcast the SNPN(s) included in the received Available SNPN ID list.**gNB-DU Configuration Update procedure**If *Available PLMN List* IE, and optionally also *Extended Available PLMN List* IE, is contained in GNB-DU CONFIGURATION UPDATE ACKNOWLEDGE message, the gNB-DU shall overwrite the whole available PLMN list and update the corresponding system information. If *Available SNPN ID List* IE is contained in GNB-DU CONFIGURATION UPDATE ACKNOWLEDGE message, the gNB-DU shall overwrite the whole available SNPN ID list and update the corresponding system information.**gNB-CU Configuration Update procedure** If *Available PLMN List* IE, and optionally also *Extended Available PLMN List* IE, is contained in GNB-CU CONFIGURATION UPDATE message, the gNB-DU shall overwrite the whole available PLMN list and update the corresponding system information. If *Available SNPN ID List* IE is contained in GNB-CU CONFIGURATION UPDATE message, the gNB-DU shall overwrite the whole available SNPN ID list and update the corresponding system information.From the above text, we have the following understanding:* The gNB-DU provides the broadcast PLMN list to gNB-CU
* The gNB-CU provides the available PLMN list to gNB-DU
* The gNB-DU broadcasts the PLMN list based on the received available PLMN list, i.e., only broadcast the PLMN list in the available list.
* The specification does not indicate the available PLMN list is derived from the broadcast PLMN list from the gNB-DU.

In this sense, the gNB-CU just provides the available PLMN list based on its own situation. Since this IE has been existed since the very beginning of Rel-15. If we change the semantic, and one possible situation between Rel-15 CU and Rel-16 DU as below:* gNB-DU provides the configured PLMN list (a full list), and gNB-CU provides the available list.
* gNB-DU only broadcasts the available list. However, the gNB-DU continue provides the full configured PLMN list to the gNB-CU. Then, the gNB-CU will understand that its available PLMN list is not respected by the gNB-DU, and continue send the available list. This will result in an endless signalling exchange between CU and DU.

As we mentioned, this is a mandatory IE, which may be implemented in Rel-15 product. With this change, we are worry about the backward compatibility issue. On the other, the gNB-CU may maintain the configured PLMN list when the F1 is set up (the PLMN list in the F1 Setup Request message can be considered as full configured list.) In addition, whenever the configured PLMN list is updated to the gNB-DU, the gNB-DU can use such serving PLMN list to update it. At gNB-CU side, whenever it receives a broadcast PLMN list is different from the available list, it can consider the configured list is updated. In this sense, we didn’t see any problem with the current specification.  |
| Huawei | Thanks Samsung for the detailed analysis on the current specs. On one hand, we acknowledge such a case that, during the running of the network, it could happen that the PLMNs connected to gNB-CU may not work, and thus the broadcast PLMN list should reflect such a situation. On the other hand, such a problematic case should be a transient state during which the update procedure over F1 should take effect.With this understanding above, we don’t have strong view if there is a need to update the wording, out concern is whether this may lead further confusions on available, configured, broadcasted. Anyway, in normal case, what broadcasted should be the same as what is available.  |
| CATT | Follow the example raised by Samsung, in F1 SETUP REQUEST message, the reported PLMN LIST from DU to CU should definitely configured not broadcasted. So, at least for F1 setup procedure, the PLMN list reported from DU to CU is always configured not broadcastedBesides, if the gNB is SN only node, it means no PLMN could be included if PLMN list reported from DU to CU is broadcasted not configured. However, the IE *PLMN identity* is mandatory. So, all in all, with above considered, it should be configured not broadcasted. |
| Ericsson | We guess Nokia has described the way how it works today along the specifications pretty well and complete.In response to Samsung, please bear in mind, that the term “available PLMNs” is seized for usage by the CU. The fact that the same coding of an IE is re-used within the Served Cell Information doesn’t change this. So it is true that the DU has to “overwrite” the “available PLMN” information, but this is only the information provided from the CU, it does not overwrite the actual PLMNs to be broadcast. If there are PLMNs that are not “within the plan of the DU to broadcast”, then those PLMNs are not considered by the DU.But, coming back to the context within which all those questions are raised, i.e. the proposed corrections as listed below, those corrections are not acceptable for the reasons we provided at the last meeting, We were rather surprised that this topic came up again.It is very important for us to keep the distinction between the terms “configured” and “broadcast”, as explained last meeting. We believe that the context within which the term “broadcast” is used is clear and does not need further corrections/clarifications.And, it is a fact, as explained at the last meeting, that for the scope of the Served Cell Information IE, the term “configured” is seized and restricted in its usage within this IE. |
| ZTE | We acknowledge the scenario explained by Nokia, if the PLMN seen by the gNB-CU becomes unavailable , the gNB-CU shall trigger a gNB-CU Configuration Update procedure, and the gNB-DU could broadcast the PLMN in the Available PLMN List.After the unavailable PLMN seen by the gNB-CU becomes available, the gNB-CU shall trigger another gNB-CU Configuration Update procedure, and the gNB-DU could broadcast the PLMN in the updated Available PLMN List.While the above scenario does not reflect the modification in the CR. But CATT gives an appropriate example, in the F1 Setup procedure, the Served PLMNs in the F1 Setup Request message should be configured. |

## 3.2 Clarify the issues

### 3.2.1 Issue on gNB-DU side

As per TS 38.473, the *Served PLMNs* IE (contained in the *Served Cell Information* IE) is described as conveying "Broadcast PLMNs in SIB 1 associated to the NR Cell Identity in the *NR CGI* IE". Based on the current specification, following the scenario described in first paragraph of section 3.1, the gNB-DU might trigger a gNB-DU Configuration Update procedure including in the *Served PLMNs* IE only PLMNs/SNPN IDs that are actually broadcast.

**Q2: For the mentioned scenario, in your view, will the gNB-DU will trigger a gNB-DU Configuration Update procedure conveying a *Served PLMNs* IE including only PLMNs/SNPN IDs that are actually broadcast?**

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| --- | --- |
| Company | Comment |
| Nokia | Yes, such risk exists. We believe that a gNB-DU ideally should send *Served PLMNs* IE including all **configured** PLMNs, and not only PLMNs/SNPN IDs that are actually broadcast, to the gNB-CU. However we believe that the semantics text of current specification creates a risk that a gNB-DU implementation only sends actually broadcast PLMNs/SNPN IDs in the *Served PLMNs* IE. This would create a risk for misoperation (see section 3.2.2 below). |
| Samsung | See our comments in Q1 |
| Huawei | See comment to Q1 |
| CATT | See our view in Q1 |
| Ericsson | The CU would not receive new information, as it is very clear what the DU would broadcast, i.e. the intersection between the “broadcast” and “available” PLMNs. So why would the DU need to provide this info to CU. and it would create the issue highlighted below.so, the DU will not trigger the DU config Update. |
| ZTE | As discussed in Q1, in the given scenario, the gNB-DU should only broadcast the PLMNs received from the gNB-CU via the Available PLMN List. |

### 3.2.2 Issue on gNB-CU side

We would also like to clarify the behaviour on gNB-CU upon reception of *Served PLMNs* IE containing only PLMNs/SNPN IDs that are actually broadcast. We believe that the current specification creates a risk for two different interpretations:

* Interpretation 1: the unavailable PLMN/SNPN ID has been deconfigured by the OAM of the gNB-DU. In this case, the gNB-CU **shall not inform** the gNB-DU when the unavailable PLMN/SNPN ID again becomes available.
* Interpretation 2: the unavailable PLMN/SNPN ID is still configured in the gNB-DU, but not broadcast. In this case, the gNB-CU **shall inform** the gNB-DU when the unavailable PLMN/SNPN ID again becomes available.

**Q3: Which interpretation is correct in your view?**

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| --- | --- |
| Company | Comment |
| Nokia | We believe that the current specification is unclear in the sense that no IE permits the gNB-CU to know, in this situation, which PLMNs/SNPN IDs are configured in the gNB-DU. In our view, the gNB-CU shall only inform the gNB-DU about PLMNs/SNPN IDs that are configured in the gNB-DU. We believe that the intention of the *Served PLMNs* IE is to inform the gNB-CU about PLMNS/SNPN IDs configured in the gNB-DU, hence our proposal to correct the semantics description of this IE.Such correction would prevent triggering of signalling from gNB-DU side described in section 3.2.1, and hence any risk of misoperation.Such correction would also allow the gNB-CU side to safely assume interpretation 1. |
| Samsung  | See our comment to Q1.  |
| Huawei | See comment to Q1 |
| CATT | We think the PLMN identity should be configured not broadcasted. |
| Ericsson | with our answer for the previous issue, the issue in this questionnaire does not exist.  |
| ZTE | Interpretation 2 may be correct. |

# 4 Conclusion, Recommendations [if needed]

If needed

# 5 References

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| [R3-213269](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213269.zip) | F1AP correction for multi-PLMN deployments (Nokia, Nokia Shanghai Bell, Orange, CATT) | Discussion |
| [R3-213270](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213270.zip) | Correction for multi-PLMN deployments (Nokia, Nokia Shanghai Bell, Orange, CATT) | CR0723r2, TS 38.473 v15.14.0, Rel-15, Cat. F\*\*\* |
| [R3-213271](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213271.zip) | Correction for multi-PLMN deployments (Nokia, Nokia Shanghai Bell, Orange, CATT) | CR0724r2, TS 38.473 v16.6.0, Rel-16, Cat. A\*\*\* |