3GPP TSG SA WG5 Meeting 137-e S5-213424rev3

electronic meeting, online, 10 - 19 May 2021

**Source: Telefónica S.A.**

**Title: Add NG-RAN related management requirements**

**Document for: Approval**

**Agenda Item: 6.4.1**

# 1 Decision/action requested

***Discuss and approve on the proposal.***

# 2 References

[1] TS 28.557 Management of non-public networks; Stage 1 and stage 2 v0.4.1

[x] TS 38.413 NG Application Protocol (NGAP); v16.5.0

[y] TS 28.541 5G Network Resource Model (NRM); Stage 2 and stage 3 v17.2.1

[z] TS 38.473 F1 Application Protocol (F1AP); v16.5.0

[a] TS 38.331 NR; Radio Resource Control (RRC); Protocol specification

[b] TS 23.501 System architecture for the 5G System (5GS)

# 3 Rationale

Different identifiers are used for SNPN and PNI-NPN:

* A SNPN is identified by the combination of a PLMN ID and a Network identifier (NID). A cell may support up to 12 NIDs. There can also be an optional human-readable network name per NID.
* ForPNI-NPNs, a CAG is identified by a CAG identifier which is unique within the scope of a PLMN ID. A cell may have a list up to 12 CAG identifiers. A CAG cell may optionally have human-readable network name per CAG identifier.

A NG-RAN node can serve multiple NPNs, including SNPNs and PNI-NPNs. To that end, the NG-RAN node needs to be configured (via OAM) with lists of NID(s) and CAG(s) it supports, for SNPN and PNI-NPN, respectively. NG-RAN node communicates this information to AMF in NG SETUP REQUEST and RAN CONFIGURATION UPDATE NG-AP messages. For NG-RAN split deployments, the situation is a bit different: which CAGs and NIDs are supported is configured (via OAM) in the gNB-DU, however the gNB-CU still mantains the control over which CAGs/NIDs are currently active. The reason is that not all distributed gNB-DUs under the same gNB-CU may necessarily support all CAGs and NIDs. Therefore, exchange of this information over the F1 interface is needed:

* gNB-DU is preconfigured (via OAM) with list of NID(s) and CAG(s) it supports, for SNPN and PNI-NPN, respectively
* gNB-DU communicates this information to gNB-CU using F1 SETUP REQUEST and GNB-DU CONFIGURATION UPDATE message
* the gNB-CU may activate/deactive certain CAGs/NIDs, for which cells to be activated list in F1 Setup Response, gNB-CU Configuration Acknowledge and gNB-CU Configuration Update can be extended with this information.

This document proposes to capture the above in clause 4, NG-RAN related management requirements. The considerations on RAN sharing are also incorporated in this draft contribution.

# 4 Detailed proposal

This document proposes the following changes in TS 28.557 [1].

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| **1st Change** |

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### 4.3.3 NG-RAN related management aspects

A NG-RAN node can serve multiple NPNs, including SNPNs and PNI-NPNs. To that end, the NPN-OP shall configure the NG-RAN node accordingly, using the 3GPP management system. For NG-RAN non-split deployments, the gNB needs to be configured (via 3GPP management system) with lists of NID(s) and CAG(s) it supports, for SNPN and PNI-NPN, respectively. In the NG Application Protocol (NGAP), this information is used as follows.

* The gNB communicates supported NID(s) to AMF in the following NGAP messages: NG SETUP REQUEST (see clause 9.2.6.1 of TS 38.413 [x]) and RAN CONFIGURATION UPDATE (see clause 9.2.6.4 of TS 38.413 [x]).
* The gNB does not communicate supported CAG(s) to the AMF; instead, it keeps this cell-level information internally. The gNB uses information on supported CAG(s) to accept/reject handover requests from AMF in the following NGAP message: HANDOVER REQUEST (see clause 9.2.3.4 of TS 38.413 [x])

*Editor’s note: Whether modifications in NR NRM fragment [y] are needed or not is FFS*

For NG-RAN split deployments, individual gNB-DU needsto be configured (via 3GPP management system) with lists of NID(s) and CAG(s) it supports, for SNPN and PNI-NPN, respectively. In the F1 Application Protocol (F1AP), this information is used as follows:

* Each gNB-DU communicates supported NID(s) to the gNB-CU in the following F1AP messages: F1 SETUP REQUEST (see clause 9.2.1.4 of TS 38.473 [z]) and gNB-DU CONFIGURATION UPDATE (see clause 9.2.1.7 of TS 38.473 [z]). With this information, the gNB-CU knows NPN support information about the cells configured in this gNB-DU.
	+ Upon receiving the above information from individual gNB-DUs, the gNB-CU knows which NID(s) are available for use. The reason is that not all distributed gNB-DUs under the same gNB-CU may necessarily the same NIDs. The gNB-CU can then decide
	+ Based on this information, the gNB-CU can decide on which specific cells need to be activated on individual gNB-DUs. The gNB-CU communicate this information in the following F1AP messages: F1 SETUP RESPONSE (see clause 9.2.1.5 of TS 38.473 [z]) and gNB-DU CONFIGURATION ACKNOWLEDGE (see clause 9.2.1.8 of TS 38.473 [z]).
* gNB-DUs do not communicate supported CAG(s) to the gNB-DU; instead, they keep this cell-level information internally.

*Editor’s note: Whether modifications in NR NRM fragment [y] are needed or not is FFS*

There could be scenarios where the NG-RAN node supporting NPNs is shared using 5G MOCN. In all these NPN sharing scenarios, each Cell Identity as specified in TS 38.331 [a] is associated with one of the following configuration options:

* one or multiple SNPNs
* one or multiple PNI-NPNs (with CAG)
* one or multiple PLMNs only.

For more details on these configuration options, see clause 5.18 of TS 23.501 [b].

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| **End of change** |