**3GPP TSG-SA WG1 Meeting #98e S1-221097r1**

**Electronic Meeting, 9 – 19 May 2022** *(revision of S1-221097)*

**Source: ZTE Corporation, China Unicom**

**pCR Title: Pseudo-CR on non-N2 Network Sharing**

**Draft Spec: 3GPP TR 22.851 V0.0.0**

**Agenda item: 7.5**

**Document for: Approval**

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Abstract:

Use Case scenario for non-N2 sharing network is described. Potential requirements are defined and the Reference part updated in TR 22.851.

**1. Introduction**

This is a basic use case. After analyzing the existing specifications, including TS 22.101, the study point out a potential way of network sharing.

**2. Reason for Change**

Update the “Use Cases” section 5 of the new TR 22.851.

**3. Conclusions**

<Conclusion part (optional)>

**4. Proposal**

It is proposed to agree the following changes to 3GPP TR 22.851 V0.0.0.

\* \* \* First Change \* \* \* \*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

* References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.
* For a specific reference, subsequent revisions do not apply.
* For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[x1] 3GPP TS 22.101: "Service principles".

[x2] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[x3] 3GPP TS 22.261: "Service requirements for the 5G system".

\* \* \* Next Change \* \* \* \*

# 5 Use cases

## 5.A Use case of Non-N2 scenario

### 5. A.1 Description

As stated in TS 22.261 [x3] the increased density of access nodes needed to meet future performance objectives poses considerable challenges in deployment and acquiring spectrum and antenna locations. RAN sharing is seen as a technical solution to these issues.

Sharing networks and network infrastructure has become more important part of 3GPP systems.

When two or more operators acquire 5G licenses and have respectively deployed or plan to deploy 5G access networks and core networks, a MOCN configuration is considered for a network sharing between these operators, i.e. a Multi-Operator Core Network (MOCN) in which multiple CN nodes are connected to the same radio access and the CN nodes are operated by different operators.

When 5G networks are built with network sharing as the infrastructure, one of the challenges for the partners’ network operators is the maintenance generated by the interconnection (e.g. number of network interfaces) between the shared RAN and two or more core networks, especially for a large number of shared base stations。

For these reasons it is suggested to investigate other type of network sharing scenarios, where a 5G RAN is shared among multiple operators without necessarily assuming a direct connection between shared access and the core networks of the participating operators (e.g. no N2 connection).

### 5. A.2 Pre-conditions

Two (or more) operators provide 5G coverage with their respective radio access networks different parts of a country but together cover the entire country.

Negotiation agreement between all the operators to work together and to build a network sharing, but utilizing the different operator’s allocated spectrum appropriately in different parts of the coverage area (for example, Low Traffic Areas, LTA and High Traffic Areas, HTA).

Different from the R16 access network sharing, the Hosting RAN operator 1, as illustrated, shares NG-RAN with the partner's core networks, as Participating Operators (Operators 2 and 3) , which may not have N2 connection. The sharing network will still be able to provide services to the partner's users.

The following pre-conditions apply:

1. OP1 owned the NG-RAN to be shared with other operators.

2. The resources of NG-RAN is allowed to be shared within specific area, e.g., within a specific 5G frequency band.

3. UE 1 belongs to OP1, UE 2 belongs to OP 2, UE 3 belongs to OP3, and UE 4 belongs to OP4.

4. NG-RAN does not have N2 connection with the core networks of OP 2 and OP3.

5. NG-RAN has N2 connection with the core network of OP4.

6. A PLMN ID dedicated to network sharing is published on shared NG-RAN, may be identified by the participating Operators as Shared PLMN ID, which can be distinguished from existing HPLMN ID of any operator. The PLMN ID may not belong to any operator.

If there are more than two Participating Operators of NG-RAN without N2 connection, each Participating Operator may identify a Shared PLMN ID broadcast from NG-RAN.

NOTE 1: Shared PLMN ID is different from the existing PLMN of OP1, OP2, OP3 and OP4.

NOTE 2: Shared PLMN ID of OP2 is different from the Shared PLMN ID of OP3.

7. OP1 deploying the NG-RAN publishes the home PLMN ID of OP4 (with N2 connection), shared PLMN ID for OP1 and OP2 at the same time. (without N2 connection).

OP 2 network

OP 3 network

OP 4 network

OP 1 network

no N2

no N2

N2

N2

UE 2 of OP2

UE 3 of OP3

UE 4 of OP4

UE 1 of OP 1

UE's screen:

name of

OP 2

Figure 5.A.2-1: Non-N2 scenarios in network sharing

### 5. A.3 Service Flows

1.UE2 and UE3 identify the shared network ID published by NG-RAN (Shared PLMN IDs of OP2 and OP3).

2.UE2 can successfully attach to NG-RAN, and the display of the network operator name is the name of OP2.

3.UE3 can successfully attach to NG-RAN, and the display of the network operator name is the name of OP3.

4.If 4G of OP2 and OP3 exists in the shared NG-RAN coverage area, UE2 and UE3 select shared NG-RAN to attach.

5.The service provider of UE 2 is OP2.

6.The service provider of UE 3 is OP3.

7.User 4 identifies HPLMN of OP4 published by NG-RAN and can successfully attach to NG-RAN with the existing technology.

### 5. A.4 Post-conditions

An SLA (Service level Agreement) between all operators sharing the NG-RAN to use services of two or more operators using different connections shall be provided.

### 5. A.5 Existing feature partly or fully covering use case functionality

SA1 has performed various studies on network sharing in previous releases, where related normative stage 1 requirements are introduced in 3GPP TS 22.101 [x1] and 22.261[x3].

3GPP TS 22.101 [x1] introduces general requirements of network sharing, stated as follows:

*Network sharing shall be transparent to the user.*

*The specifications shall support both the sharing of:*

*(i) radio access network only;*

*(ii) radio access network and core network entities connected to radio access network.*

*NOTE: In a normal deployment scenario only one or the other option will be implemented.*

The provisioning of services and service capabilities is described in 3GPP TS 22.101 [x1].

*The provision of services and service capabilities that is possible to offer in a network shall not be restricted by the existence of the network sharing It shall be possible for a core network operator to differentiate its service offering from other core network operators within the shared network.*

*It shall be possible to control the access to service capabilities offered by a shared network according to the core network operator the user is subscribed to.*

As described in 3GPP TS 22.261 [x3] the UE uses the list of PLMN/RAT combinations for PLMN selection, if available, typically during roaming situations. In non-roaming situations, the UE and subscription combination typically matches the HPLMN/EHPLMN capabilities and policies, from a SST(slice/service type) perspective. That is, a 5G UE accessing its HPLMN/EHPLMN should be able to access SSTs according to UE capabilities and the related subscription.

Furthermore the 5G system shall support selection among any available PLMN/RAT combinations, identified through their respective PLMN identifier and Radio Access Technology identifier, in a prioritised order. The priority order may, subject to operator policies, be provisioned in an Operator Controlled PLMN Selector lists with associated RAT identifiers, stored in the 5G UE.

The 5G system shall support, subject to operator policies, a User Controlled PLMN Selector list stored in the 5G UE, allowing the UE user to specify preferred PLMNs with associated RAT identifier in priority order.

### 5. A.6 Potential New Requirements needed to support the use case

[PR 5.A.6-001] The 5G system shall support both the sharing of: (iii) radio access network and core network entities indirectly connected to radio access network.

NOTE: the above is intended to augment the existing requirement in 22.101 with a 5G specific enhancement for indirect network connection to the shared radio access network.

[PR 5.A.6-002] 3GPP shall support broadcasting of the participating Operator’s PLMN IDs in the shared radio access network.

[PR 5.A.6-003] The end users shall not notice that they are entering a region covered by a shared network infrastructure managed by another operator.

*Rev 1[PR 5.A.6-003]: Once entering a region covered by a network sharing infrastructure the end users shall not notice that they are registered in a shared network and shall be able to use services as if they are on their own network.*

[PR 5.A.6-004] 3GPP shall support multiple sharing methods at the same time of one regional 5G coverage.

[PR 5.A.6-005]: 3GPP system shall enable each participating operator to control PLMN and RAT selection between shared NG-RAN and an operator´s own RAN independently. This includes when the shared NG-RAN and operators own RAN overlaps geographically.

*Rev 1: [PR 5.A.6-005] 3GPP system shall enable the Participating Operators to provide services for their subscribers, independent from the radio access technology of the Hosting Operator’s PLMN.*

\* \* \* End of Changes \* \* \* \*