**3GPP TSG-SA WG1 Meeting #98e S1-221097r2**

**Electronic Meeting, 9 – 19 May 2022** *(revision of S1-221097r1)*

**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 without direct connections between the shared access and the core networks of the participating operators

### 5. A.1 Description

As stated in TS 22.261 [x3] the increased density of access nodes needed to meet future performance objectives pose 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 can be considered for 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.

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 (i.e. no N2 connection).

### 5. A.2 Pre-conditions

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

There is an agreement between all the operators to work together and to build a shared network, 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).

The Hosting RAN operator 1, as illustrated below, can share its NG-RAN with the Participating Operators with or without direct connections between the shared access and the core networks of the participating operators.

The following pre-conditions apply:

1. OP1 owns the NG-RAN to be shared with three other operators; OP2, OP3, and OP4.

2. NG-RAN is shared with certain conditions, e.g., within a specific 5G frequency band or within specific area.

3. NG-RAN does not have direct connections between the shared access and the core networks of the participating operators OP2 and OP3.

4. NG-RAN does have direct connections between the shared access and the core network of the participating operator OP4.

5. In this example UE 1 belongs to OP1, UE 2 belongs to OP 2, UE 3 belongs to OP3, and UE 4 belongs to OP4.

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: Different options both with and without direct connections between the shared access and the core networks of the participating operators

### 5. A.3 Service Flows

1. UE1 can successfully attach to NG-RAN, and the display of the network operator name is the name of OP1.

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. UE4 can successfully attach to NG-RAN, and the display of the network operator name is the name of OP4.

5.The service provider of UE 1 is OP1.

6.The service provider of UE 2 is OP2.

7.The service provider of UE 3 is OP3.

8.The service provider of UE 4 is OP4.

### 5. A.4 Post-conditions

The shared network will be able to provide services to the all partner's users.

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. [Peter: I don’t understand this sentence. What is the purpose with it?]

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

Network sharing has been studied 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.

[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.

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