**3GPP TSG-SA WG1 Meeting #99e draftS1-222024**

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**Source: China Telecom**

**pCR Title: Pseudo-CR on** **International Roaming Based on Network Sharing**

**Draft Spec: 3GPP TR 22.851 V0.1.0**

**Agenda item: 7.5**

**Document for: Approval**

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*Abstract: Use Case for International Roaming Based on Network Sharing is described.*

**1. Introduction**

This study aims to describe the potential scenario for inbound international roaming subscribers to gain service through accessing the shared network.

**2. Reason for Change**

Update the use case section of the new TR 22.851.

**3. Conclusions**

<Conclusion part (optional)>

**4. Proposal**

It is proposed to agree the following changes to TR 22.851 V0.1.0.

\* \* \* 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".
2. 3GPP TS 22.101: "Service principles".
3. 3GPP TS 22.261: "Service requirements for the 5G system".
4. 3GPP TS 22.011: "Service accessibility”".

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

# 5 Use cases

## 5.X Use case of International Roaming Based on Network Sharing

### 5.X.1 Description

There are network sharing scenarios in the process of 5G deployment due to different operators’ business consideration, such as network planning, operation and other factors, which introduce demand for 5G network sharing based on 5G international roaming alike architecture, especially in countries with a wide range of rural areas, where 5G radio coverage is usually not continuous. Benefit from 5G national roaming, an operator can not only save investment for 5G deployment, but also expand 5G coverage in vaster area as well. However, in this case, it is also required to allow inbound international roaming subscribers to use the shared resources of the other operator. Therefore, it is suggested to investigate how to solve the problems in this situation.

### 5.X.2 Pre-conditions

Figure 1 below depicts the signalling interconnection of 5G international roaming based on network sharing. Basically, in coverage available areas, subscribers are served by operator A and B’s own network, known as PLMN ID A and PLMN ID B respectively. In other areas, operator A and operator B share both radio access network and part core network with each other. When it comes to PLMN ownership, operator A owns PLMN ID A. Similarly, operator B owns PLMN ID B and B1. Particularly, PLMN ID B1 is broadcasted for subscribers of operator B by operator A. Correspondingly, network sharing agreement is signed between operator A and operator B.

Without loss of generality, let’s assume that operator C signs international roaming agreement with operator B. Accordingly, subscribers of operator C, can be provided with 5G service when they roam to areas where operator B exists, i.e., the areas where PLMN ID B is broadcasted by operator B and the areas where PLMN ID B1 is broadcasted by operator A. In the visited areas, both gNBs and part core network functions like AMF and V-SMF are shared.



Figure 1: Signalling interconnection of international roaming based on network sharing

When it comes to the user plane, GTP-U interconnection of international roaming based on network sharing is proposed as illustration in Figure 2.



Figure 2: GTP-U interconnection of international roaming based on network sharing

### 5.X.3 Service Flows

As illustrated in Figure 1 and Figure 2, when subscribers of operator C roam to the areas where PLMN ID B1 is broadcasted by operator A, signalling is traversed through SEPP A, SEPP B and SEPP C, while the userplane payload is transferred through BG A, BG B and BG C.

### 5.X.4 Post-conditions

It is the same for the service experience and treatment of subscribers of operator B and subscribers of operator C in the areas where PLMN ID B1 is broadcasted by operator A.

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

TS 22.011 introduces requirements on roaming in shared networks, as described below:

*“When network sharing exists between different operators and a user roams into the shared network it shall be possible for that user to register with a core network operator (among the network sharing partners) that the user’s home operator has a roaming agreement with, even if the operator is not operating a radio access network in that area.”*

Other roaming related requirements are described in TS 22.101:

*“3GPP specifications should be in compliance with the following objectives:*

*e) to provide support of roaming users by enabling users to access services provided by their home environment in the same way even when roaming.*

*The following requirements are applicable to GERAN, UTRAN, E-UTRAN and NG-RAN sharing scenarios:*

*- When network sharing exists between different operators and a user roams into the shared network it shall be possible for that user to register with a core network operator (among the network sharing partners) that the user’s home operator has a roaming agreement with, even if the operator is not operating a radio access network in that area.”*

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

AMF, V-SMF, V-UPF and SEPP in the visited network have to accordingly support different node identifiers corresponding to PLMN ID B1, as well as relevant mobility management strategies, routing information carried, etc, with which international roaming signalling and payload can be routed as shown in the above figures.

[CU]: [PR 5.X.6-001] The 5G system shall be able to enable the shared network to provide services for roaming users of Participating operators with indirect connection between the shared access network and a participating operator’s core network.

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