**3GPP TSG-SA3 Meeting #107-e *S3-220802r3***

**e-meeting, 16 - 20 May 2022**

**Source: Huawei, HiSilicon, Lenovo, CATT, CAICT, China Mobile, China Unicom, InterDigital, NEC, Nokia, DT, ZTE**

**Title: New SID on enhanced security for network slicing Phase 3**

**Document for: Approval**

**Agenda Item: 6 New Study/Work item proposals**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

# Title: Study on enhanced security for network slicing Phase 3

## Acronym: FS\_eNS3\_SEC

## Unique identifier:

Potential target Release: {Rel-18}.

Note that this field above indicates the proposed Release at the time of submission of the WID to TSG approval. It can later be changed without a need to revise the WID. The updated target Release is indicated in the Work Plan.

## 1 Impacts *{ For Normative work, identify the anticipated impacts. For a Study, identify the scope of the study.}*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  | X |  | X |  |
| **No** |  |  |  |  |  |
| **Don't know** | X |  | X |  | X |

## 2 Classification of the Work Item and linked work items

### 2.1 Primary classification

This work item is a …

|  |  |
| --- | --- |
|  | Feature |
|  | Building Block |
|  | *Work Task* |
| X | Study Item |

### 2.2 Parent Work Item

*{Not applicable for a* **Study Item***}*

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| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
|  |  |  |  |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work Items (if any) |
| Unique ID | Title | Nature of relationship |
| 940063 | Study on Enhancement of Network Slicing Phase 3 | Rel-18 Stage-2 study item in SA2 |
| 940016 | Study of privacy of identifiers over radio access | Coordination if privacy of identifiers are applicable |

## 3 Justification

SA2 had its study on network slicing phase 3 approved for Rel-18 in December 2021. As of the end of April 2022, SA2 has approved fourteen solutions addressing six key issues that covered all its planned work tasks in the study. Amongst them, the following issues and/or solutions are observed to have security implications and should be studied in SA3.

**Providing VPLMN slice information to a roaming UE:** In order to address the following requirement in TS 22.261, SA2 has approved a key issue and solutions on investigating the required information for a roaming UE and how it is delivered to the UE, so that the UE can select and register one amongst other VPLMNs.

*For a roaming UE activating a service/application requiring a network slice not offered by the serving network but available in the area from other network(s), the HPLMN shall be able to provide the UE with prioritization information of the VPLMNs with which the UE may register for the network slice*

It is expected that the security procedures may be required (e.g. security procedures for Steering of Roaming) with the introduction of slice information.

**Temporary slices, slice service areas, Rejected S-NSSAI:** SA2 is studying two key issues that encompass supporting network slices authorized with a limited lifetime, allowing mismatch between slice service areas and TA boundaries, and supporting slices for a RA but not available in some TAs within the RA. The UE registration procedures will be affected, and it includes how a UE is authorized to a network slice to get allowed NSSAI. It is also likely that the NSSAA procedure will be impacted, e.g. whether and how to allow an NSSAA for a rejected S-NSSAI in a RA (one TA of the RA), which may be available in another TA of the RA. SA3 needs to investigate the potential impact to the security procedures (UE authentication and authorization to a slice).

**Network Slice Admission control (NSAC) for multiple service areas and network controlled UE behaviour:** two key issues on UE admission control to a network slice are also being studied. One is to support deploying multiple NSACFs, while the other is to support controlling the UE behaviour for NSAC. In both cases, better UE admission control is aimed to match the allocated quota. However, potential issues of Denial of service (DoS) attacks to legitimate UEs need to be addressed by SA3, when the additional features are added to the access control mechanism. The information of actual UE / PDU session usage by a slice, or misinformation provided by malicious UEs or mischievous NFs may not be reflected based on current solutions. For example, a NSACF in a VPLMN updating the number of registered UEs or PDU sessions independently may not provide trusted information to the home NSACF. Another example is when a UE not using a network slice is still counted against quota usage of S-NSSAIs where it is registered. It is notable that an attacker can use legitimate UEs to launch such attacks.

## 4 Objective

The objectives of this study are to identify key issues, potential security and privacy requirements and solutions with respect to Rel-18 network slicing phase 3. Specifically,

* Study the security procedures (e.g. Steering of Roaming) in order to support the HPLMN to provide a roaming UE the VPLMN slice information
* Study enhanced authorization procedures for a UE to access network slices which support temporary slices, slice service areas mismatched with TA boundaries, and slices where S-NSSAI not available in partial TAs of RA.
* Study secured NSAC procedures to prevent DoS in the cases of NSAC for multiple service areas and network controlled UE behaviours.

NOTE: Potential p~~P~~rivacy issues, if any, ~~aspects~~ raised for the above objectives are within the scope of this study. To avoid duplication of work, this study ~~that are~~ where applicable, will be coordinated with the ID Privacy Study in TR 33.870.

## 5 Expected Output and Time scale

|  |
| --- |
| **New specifications** *{One line per specification. Create/delete lines as needed}* |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| *Internal TR* | *33.xxx* | Study on enhanced security for Phase 3 network slicing | *SA#98**(Dec 2022)* | *SA#99*(Mar 2023) | *Lei, Zander, Huawei, lei.zhongding@huawei.com* |

|  |
| --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |

## 6 Work item Rapporteur(s)

*Zander Lei, Huawei, lei.zhongding@huawei.com*

## 7 Work item leadership

*SA3*

## 8 Aspects that involve other WGs

SA2 works on system architecture and procedure.

## 9 Supporting Individual Members

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| --- |
| Supporting IM name |
| Huawei |
| HiSilicon |
| Lenovo |
| CATT |
| CAICT |
| China Mobile |
| China Unicom |
| InterDigital |
| NEC |
| Nokia |
| DT |
| ZTE |