3GPP TSG|WG-SA5 Meeting #139e S5-215277

e-Meeting, Country, 11 Oct – 20 Oct 2021 (revision of xx-yyxxxx)

**Source: Samsung, Telefonica, CMCC, Nokia, Orange, Ericsson, Deutsche Telekom**

**Title: New WID on network slice provisioning enhancement**

**Document for: Approval**

**Agenda Item: 6.2**

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: New WID on network slice provisioning enhancement

Acronym: eNETSLICE\_PRO

Unique identifier:

Potential target Release: *{Rel-17}*

# 1 Impacts

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

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a

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

## 2.2 Parent Work 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

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| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 760065 | NETSLICE | The related slicing management solution which may need improvements. |
| 800014 | NETSLICE\_PRO | The related slicing management solution which may need improvements. |

# 3 Justification

The slice provisioning mechanism defined in 3GPP TS 28.531 needs enhancement as per the following issues:

### 3.1 Network slice reservation and feasibility check

The procedures of reservation and feasibility check defined in 3GPP TS 28.531 are having several concerns as follows:

* It is not clear what reservation interface is being used here? Where is the reservation request/response defined? Is it expected for NSSMS\_Provider to expose that reservation interface?
* It is not clear what reservation interface is being used here? Where is the reservation cancellation request/response defined? Is it expected for NSSMS\_Provider to expose that reservation interface?
* It is not clear how the optional step of “option resource discovery and update” can be achieved. There is not operations define for the same.
* The operation “feasibility Ack()” and “feasibility Nak” are not defined. We need both stage 2 and 3 for this to be implementable.
* The concept of feasibility check may refer to either a step in extended bulk provisioning use case such as allocate or modify, or as a separate check that only provides feedback to consumer about feasibility but doesn’t actually change the network, see TS 28.531 clause 5.1.6 and 5.1.21. The procedures need to be clarified.

### 3.2 Network Slice Subnet MnS producer Capability

As per the NSSI allocation procedures the allocation request shall contain SliceProfile providing requirements for the requested subnet. It is a known fact that SliceProfile is derived from ServiceProfile. NSSMS\_Consumer has to derive related subnet requirements (SliceProfile) from slice requirements (ServiceProfile). It is beneficial for NSSMS\_Consumer to know the capabilities of the MnS producer. To support determining the subnet requirements, NSSMS\_Consumer can discover/query the capabilities of the MnS producer and based on these decide the requirements for the subnet(s). The following examples explains it in more details:

* Attribute “Latency” in ServiceProfile: Assuming NSMS\_P receives E2E latency requirement of 10ms for a slice (6.4.1 of TS28.541). The latency requirement for RAN (RANSliceSubnetProfile.latency) and CN (CNSliceSubnetProfile.latency) need to be derived from this slice latency requirement. The RAN and CN MnS producer may be capable to support the latency of 6 and 4ms respectively. This information can be utilized by NSMS\_P to decide on the latency requirement for RAN and CN subnets, which together will achieve 10ms latency. This will not fail the subnets allocation, due to inability of MnS producer to deliver the required requirement, and will greatly improve the efficiency of slice management.
* Attribute “Energy Efficiency” in ServiceProfile: Assuming the Energy Efficiency capability requirement of an eMBB slice is 1000 bits/joule. The performance of an eMBB slice is measured in terms of data volume (bits) as defined in 6.7.2 of TS 28.554. A NSMS\_P should be able to derive this requirement for RAN subnet and Core subnet in such a way that it can meet end to end EE requirement of eMBB slice. Hence, a NSMS\_P must have latest knowledge of EE capability of MnS producer. Suppose at best the RAN and core MnS producer can provide EE of 400 bits/joule and 800 bits/joule respectively. Then NSMS\_P can decide RANSliceSubnetProfile.energyEfficiency as 300 bits/joule & CNSliceSubnetProfile.energyEfficiency as 700 bits/joule because what matters is meeting end to end requirement of EE for requested slice and the allocation will be successful.

Alternatively, NSSMS\_Consumer can decide subnet requirements randomly and then request for feasibility check before sending subnet allocation request. However, this will reduce the efficiency as several feasibility check procedures would be executed to find the optimal requirements for the subnet.

New procedures are needed to actually expose the capabilities of the MnS producer capabilities with respect to the aggregated slice subnet(s) capabilities it manages

The existing procedure for obtaining network slice subnet capability is not implementable. The procedure need to be assessed and fixed accordingly.

### 3.4 Relationship between slice-specific operations and the slice NRM

Slice management is covered by multiple specifications. TS 28.541 contains a definition of the slice NRM in clause 6. TS 28.531 additionally defines a number of dedicated operations for slice management, e g allocateNsi, see clause 6.5. How these slice-specific operations interacts with the slice NRM needs some further clarifications.

One example is that we have the concept of naming objects with DNs. That is followed in the Slice NRM as in any other NRM. But some operations in TS 28.531 use parameters with names like nSId or nSSId. It is not clear from operation and parameter descriptions if these identifiers are the DNs from TS 28.541 or something different. How is the mapping provided? Note: In the corresponding allocate procedure descriptions it is already stated that the DN of the corresponding NSI or NSSI is returned, see clause 7.2 step 4 and clause 7.3 step 5. There may also be other areas where clarifications related to interaction between slice-specific operations and the slice NRM are needed. This will be further investigated during the WI.

### 3.5 RESTful Solution Set Issues

TS 28.531 includes a RESTful solution set for the operations defined in clause 6.5 in the same specification. However, this solution is currently not fully aligned with the design rules in TS 32.158 for REST:

* URIs do not exactly follow format specified in clause 4.4.3 (‘URI structure for resources not representing managed object instances’)
* Some parts from the REST SS template in TS 32.158 clause 8 are missing, e g figure with resource structure. There is also no annex with OpenAPI definition for these operations.

### 3.6 Asynchronous Procedures

Many procedures in TS 28.531 are asynchronous by nature. It may take a long time until a response can be returned. However, procedure descriptions and corresponding operations are currently assuming a synchronous response. No asynchronous design patterns are currently used in TS 28.531.

### 3.7 Missing Solutions

Many functions that are described with procedures and use cases have no stage 2 and stage 3 solution at all. These functions should be removed or at least tagged with a remark that a stage 2 and 3 solution is still missing.

# 4 Objective

The objective of this WID includes:

1. Enhancing the network slice and network slice subnet provisioning related to the following functionalities
	1. Network slice reservation and feasibility check.
	2. Supporting network slice subnet MnS producer capabilities with respect to the aggregated slice subnet(s) capabilities it manages.
	3. Update procedures and operations in TS 28.531 to support asynchronous mode of operation.
2. Fixing inconsistencies in the specification and aligning of Stage 2 and Stage 3 solutions.
	1. Clarify relationship between nSID and nSSID operation parameters and instance DNs in TS 28.531 and the slice NRM in TS 28.541. If needed make corresponding stage 2 and stage 3 updates.
	2. *Provide a RESTful solution (based on the design rules in 32.158) or describe how existing definitions can be used, make any required changes and/or additions to TS 28.531 and TS 28.541*
	3. Ascertain the need of use case for which there is no solution defined. Depending on the assertion define the appropriate solutions.
	4. Add or update stage 3 OpenAPI and YANG solution sets where needed.

# 5 Expected Output and Time scale

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| --- |
| 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 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 28.531 | Enhanced network slice and network slice subnet provisioning solutions | Mar 2022 (SA#95) |  |
| 28.541 | Required Slice NRM enhancement | Mar 2022 (SA#95) |  |

# 6 Work item Rapporteur(s)

Deepanshu Gautam (deepanshu<dot>g<at>samsung<dot>com).

# 7 Work item leadership

SA WG 5

# 8 Aspects that involve other WGs

None

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Samsung |
| Telefonica |
| CMCC |
| Nokia |
| Orange |
| Ericsson |
| Deutsche Telekom |