**3GPP TSG-SA5 Meeting #134e *S5-206256***

**e-meeting**

**Source: Ericsson**

**Title:** **Proposal on clarification of ServiceProfile representations**

**Document for: Endorsement**

**Agenda Item: 6.3**

# 1 Decision/action requested

**The group is asked to discuss and agree on the proposal.**

# 2 References

[1] 3GPP TS 28.531 V16.7.0 Management and orchestration; Provisioning;

[2] 3GPP TS 28.541 V16.6.0 Management and orchestration; 5G Network Resource Model (NRM);

[3] 3GPP TS 28.530 V16.3.0 Management and orchestration; Concepts, use cases and requirements;

[4] S5-205405 Proposal on updates to network slice model and procedures (Endorsed SA5 #133e)

[5] [S5-205268](https://www.3gpp.org/ftp/TSG_SA/WG5_TM/TSGS5_133e/Docs/S5-205268.zip) Proposal on updates to network slice model and procedures (original proposal, become endorsed S5-205405)

# 3 Rationale

In last SA5 #133e meeting, a discussion paper named, “Proposal on updates to network slice model and procedures” were proposed and discussed [5]. This discussion paper addresses the questions raised in the e-mail tread when it comes to what the ServiceProfile represents, the required updates to operations/procedures and around capabilities. We think that it is important that SA5 can come to a common understanding around the network slice “concept” defined.

The proposal 5 and 6 in the discussion paper to SA5 #133e meeting [5] around the NetworkSlice as well as ServiceProfile are made extendable, that we see as important part of the network slice concept, is not part of this paper (separate contribution).

**Background:**

**Observation 1:** The ServiceProfile and the SliceProfile should best be understood as “requirements”, i.e. what the Communication Service needs/requests. The service needs a particular coverage, latency etc. If the service requires dedicated resources, it may represent Communication Service (CS), or a NetworkSlice-as-a-Service (NSaaS).

**Observation 2:** For the Provider to understand that a network slice shall represent a NSaaS or a CS, an indication is needed. This information may e.g. be used by the Provider to deduce what capabiltities or services shall be exposed to the Consumer (TBD). If the slice represents NSaaS, a dedicated NetworkSlice instance shall be created/allocated

**Observation 3**: Based on the ServiceProfile provided as input in the *allocateNsi* procedure the Producer allocates a NetworkSlice instance identified by a network slice identity nsId. If the NetworkSlice instance can be “shared”, futher information may need to allow the Consumer to remove the communications service without affecting other communications services.

**Observation 4**: Both Consumer and Provider should be able to assign S-NSSAIs associated with the ServiceProfile. For instance, when allocating a network slice instance for a CS it may be the Provider that allocates the associated S-NSSAIs, but in case of NSaaS it may the Consumer that does the assignment.

**Observation 5**: When allocating a network slice subnet, the needs defined by the SliceProfile must be matched against the actual capabilities of available network slice subnet. Not all slice subnets will be able to deliver low latency, subnets will have different coverage etc. An actual network slice subet is defined and constrained by one set of capabilities given by its deployment. Procedures are defined in [1] to query and notify the capabilitities of the slice subnet, but the capabilities of the slice subnet is not modelled as part of the NetworkSliceSubnet IOC [2].

**Based on the above observations we make the following proposals:**

**Proposal 1:** Based on observation 1, the specifications should make it unequivocally clear that the ServiceProfile represents the service requirements on the NetworkSlice instance for a particular requested service (by a customer). It does not represent the actual NetworkSlice instance deployed and its capabilities. With this clarification, there can be a 1: n relation between NetworkSlice and ServiceProfile, as one NetworkSlice can carry more than one service as long as these do not impose conflicting requirements. Similarly, the SliceProfile represents the requirements for the NetworkSliceSubnet.

In the specific case the NetworkSlice itself is the service, as defined for NSaaS [3], there will only be one ServiceProfile defining the input requirements for the NetworkSlice. Thus, for the scenario when the NetworkSlice itself is the service, there is a 1:1 relation between ServiceProfile and NetworkSlice.

**Proposal 2:** Based on observation 2, there is a need to identify the ServiceProfile to represent either a communication service (CS) or a Network Slice as a Service (NSaaS). Propose to add a new attribute serviceProfileType to be either “COMMUNICATIONS-SERVICE” or “NETWORKSLICE-AS-A-SERVICE” into the ServiceProfile. This new attribute defines what the input requirements in the ServiceProfile represents. When the serviceProfileType is equal to “NETWORKSLICE-AS-A-SERVICE”, the ServiceProfile.resourceSharingLevel shall always be set to “non-shared”.

**Proposal 3**: Based on observation 2, the allocateNsi operation/procedure needs to be updated to reflect that a ServiceProfile represents the service requirements on the NetworkSlice instance and that a new slice instance is always created in NSaaS mode.

**Proposal 4:** Based on observation 2, the allocateNssi operation/procedure needs to be updated to reflect that a SliceProfile represents the service requirements on the NetworkSliceSubnet instance and that a new slice subnet instance is always created if *resourceSharingLevel* is equal to “non-shared” if sufficient resouces are available.

**Proposal 5**: Based on observation 3, the allocateNsi procedure returns a serviceProfileId together with the nsId. The deallocateNSi procedure is updated to take serviceProfileId and nsId as input parameters. The Provider removes the ServiceProfile corresponsing to the serviceProfileId in the network slice instance identified by nsId. When the last ServiceProfile is removed from a network slice instance, the Provider may decide to remove the network slice instance. If serviceProfileId is omitted in the deallocateNsi request, the Provider removes the network slice instance identified by nsId*.*

**Proposal 6:** Based on observation 4, to allow for both Consumer and Producer to assign S-NSSAIs, we propose

* to make S-NSSAI(s) configuration in ServiceProfile Optional (today Mandatory), to also support the NetworkSlice instance Producer to allocate S-NSSAI(s), and
* to replace existing sNSSAIList and PLMNId attributes with PLMNInfoList instead to always get the correct S-NSSAI and PLMNId relation. (alignment with NR NRM)

**Proposal 7:** Based on observation 5, the NetworkSliceSubnet is amended with a datatype networkSliceSubnetCapabilities representing the capabilities of the network slice subnet (e.g. minimum latency supported, service coverage supported, etc.), in adherence with the procedures to query and notify capabilities of a NSSI in [1].

# 4 Detailed proposal

Based on the observations above, we ask for endorsement of proposal 1-7, to clarify the representation of the serviceProfile and updates to operations/procedures:

**Proposal 1 and 2**: Add attribute serviceProfileType to the ServiceProfile and mandate resourceSharingLevel being “non-shared” when serviceProfileType is NETWORKSLICE-AS-A-SERVICE in 28.541 [2].

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| serviceProfileType | M | T | T | F | T |

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| serviceProfileType | This parameter specifies whether the ServiceProfile represents a communication service or a NetworkSlice-as-a-Service.  Allowed values:  COMMUNICATIONS-SERVICE, NETWORKSLICE-AS-A-SERVICE. | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  allowedValues: N/A  isNullable: False |
| serviceProfile.resourceSharingLevel | An attribute specifies whether the resources to be allocated to the network slice instance may be shared with another network slice instance(s).  allowedValues: shared, non-shared.  Always set to “non-shared” if serviceProfileType is equal to “NETWORKSLICE-AS-A-SERVICE” | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  allowedValues: Yes  isNullable: True |

**Proposal 3**: Update description of the allocateNsi and deallocate procedures in 28.531 [1]

* Update subclause 6.5.1.1, by adding below text in bold.

This operation is invoked by allocateNsi operation service consumer to request the provider to allocate a network slice instance to satisfy network slice related requirements. The provider may create a new NSI or using existing NSI to satisfy the request. **The requirements in the request are compared/matched against the actual capabilitites of all candidate NSIs. If an NSI can be found e.g. with the right coverage and with good enough latency, it is eligible for allocation. In case not, or if *resourceSharingLevel* is equal to “non-shared”, a new NSI is created with capabilities to host the service, given that required NSSIs can be created.**

* Update subclause 6.5.3.1, by adding below text in bold.

This operation is invoked by deallocateNsi operation service consumer to request the provider to deallocate **a service profile in an NSI or** a network slice instance since the NSI is no longer needed for the consumer. The provider may terminate the requested NSI or modify the requested NSI without termination to satisfy the request.

**Proposal 4**: Update description of the allocateNssi and deallolcateNssi procedures in 28.531 [1]

* Update subclause 6.5.2.1, by adding below text in bold.

This operation is invoked by allocateNssi operation service consumer to request the provider to allocate a network slice subnet instance to satisfy the network slice subnet related requirements. The provider may create a new NSSI or using existing NSSI to satisfy the request. **The requirements in the request are compared/matched against the actual capabilitites of all candidate NSSIs. If an NSSI can be found e.g. with the right coverage and with good enough latency, it is eligible for allocation. In case not, or if *resourceSharingLevel* is equal to “non-shared”, a new NSSI is created with capabilities to host the service, if enough resoures are available.**

* Update subclause 6.5.4.1, by adding below text in bold.

This operation is invoked by deallocateNssi operation service consumer to request the provider to deallocate **a slice profile in the NSSI or** a network slice subnet instance since the NSSI is no longer needed for the consumer. The provider may terminate the requested NSSI or modify the requested NSSI without termination to satisfy the request.

**Proposal 5**: Update the procedures allocateNsi and deallocateNsi in 28.531 [1] according to below.

* Add serviceProfileId as output from the allocateNsi procedure in subclause 6.5.1.3.

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter name | Support Qualifier | Matching Information / Legal Values | Comment |
| serviceProfileId | M | An attribute uniquely identifies the service profile in an NSI. | It specifies the unifique identifier of the service profile in the NSI which has been allocated. |

* Add serviceProfileId as input to the deallocateNsi procedure in subclause 6.5.3.2.

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| serviceProfileId | O | An attribute uniquely identifies the service profile in an NSI. | It specifies the unifique identifier of the service profile in the NSI which is to be deallocated. If omitted, all service profiles in the NSI are in scope and the Provider may decide to remove the NSI. |

* Add sliceProfileId as output from the allocateNssi procedure in subclause 6.5.2.3.

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter name | Support Qualifier | Matching Information / Legal Values | Comment |
| sliceProfileId | M | An attribute uniquely identifies the slice profile in an NSSI. | It specifies the unifique identifier of the slice profile in the NSSI which has been allocated. |

* Add serviceProfileId as input to the deallocateNssi procedure in subclause 6.5.4.2.

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| sliceProfileId | O | An attribute uniquely identifies the slice profile in an NSI. | It specifies the unifique identifier of the slice profile in the NSSI which is to be deallocated. If omitted, all slce profiles in the NSSI are in scope and the Provider may decide to remove the NSSI. |

**Proposal 6**: Replace the attributes PLMNIdList and sNSSAIList with PLMNInfoList in the ServiceProfile in 28.541 [2].

* Modify ServiceProfile in subclause 6.3.3.2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| sliceProfileId | M | T | F | T | T |
| ~~sNSSAIList~~ | ~~M~~ | ~~T~~ | ~~T~~ | ~~F~~ | ~~T~~ |
| ~~pLMNIdList~~ | ~~M~~ | ~~T~~ | ~~T~~ | ~~F~~ | ~~T~~ |
| **pLMNInfoList** | **O** | **T** | **T** | **F** | **T** |

* Modify SliceProfile in subclause 6.3.4.2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| sliceProfileId | M | T | F | T | T |
| ~~sNSSAIList~~ | ~~M~~ | ~~T~~ | ~~T~~ | ~~F~~ | ~~T~~ |
| ~~pLMNIdList~~ | ~~M~~ | ~~T~~ | ~~T~~ | ~~F~~ | ~~T~~ |
| **pLMNInfoList** | **M** | **T** | **T** | **F** | **T** |

* Modify attribute propertiers in subclause 6.4.1.

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| ServiceProfile.pLMNInfoList | It defines which PLMN and S-NSSAI combinations that are served by the ServiceProfile in case of network slicing feature is supported.  allowedValues: Not applicable. | type: PLMNInfo  multiplicity: 1..\*  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| SliceProfile.pLMNInfoList | It defines which PLMN and S-NSSAI combinations that are served by the SliceProfile in case of network slicing feature is supported.  allowedValues: Not applicable. | type: PLMNInfo  multiplicity: 1..\*  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| ~~sNSSAIList~~ | ~~This parameter specifies the S-NSSAI list to be supported by the new NSI to be created or the existing NSI to be re-used.~~  ~~sNSSAList is defined in subclause 4.4.1~~ |  |

* Add to datatype PLMNInfo in subclause 4.3.41

Clarify that the attribute sNSSAI is nullable, to allow the Provider to set the value.

**Proposal 7**: Add a capabilities datatype to NetworkSliceSubnet in 28.541 [2]

* Add an attribute in subclause 6.3.2.2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| networkSliceSubnetCapabilities | O | T | F | F | T |

* Add a new datatype NetworkSliceSubnetCapabilities  
    
  To be defined but should reflect the requiremets set by the SliceProfile.
* Add attribute properties in 6.4.1.

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| networkSliceSubnetCapabilities | It defines the capabilities of an NSSI..  allowedValues: Not applicable. | type: NetworlSliceSubnetCapabilities  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |

# 5 Conclusion

We ask for endorsement of the proposals 1 to 7 above.

Once the endorsement is agreed, the required CRs towards 28.541, 28.530, 28.531 will be produced for the SA5 #135e meeting.