**3GPP TSG-SA5 Meeting #133eS5-205254**

**e-meeting, 12 – 21 October 2020**

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| *CR-Form-v11.4* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.530** | **CR** | **0033** | **rev** | **-** | **Current version:** | **16.3.0** |  |
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| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Decouple communication service and network slice | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | EMA5SLA | | | | |  | ***Date:*** | | | 2020-09-28 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | A communication service and network slice are not the same thing, also communication service is not business representation of network slice. The purpose of defining a network slice is not limited to offering a specific communication service, but may include operational efficiencies, providing PNI-NPNs, and any number of other reasons.  However, network slice is tightly coupled with communication service, or even mixed the two concepts in some places. | | | | | | | | |
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| ***Summary of change:*** | | Change description about relationship between communication service and network slice | | | | | | | | |
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| ***Consequences if not approved:*** | | Limit deployment options and implementation of network slice | | | | | | | | |
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| ***Clauses affected:*** | | 4.1.6, 4.1.7, 4.4.1, 4.8 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
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| ***Other comments:*** | |  | | | | | | | | |

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| **Start of 1st modification** |

### 4.1.6 Network Slice as a Service (NSaaS)

Network Slice as a Service (NSaaS) can be offered by a NOP to its customer in the form of a service. This service allows CSC to use the network slice as the end user or optionally allows CSC to manage the network slice as manager via management interface exposed by the CSP. In turn, these CSC can play the role of CSP and offer their own services (e.g. communication services) on top of the network slice obtained from the CSP. For example, a network slice customer can also play the role of NOP and could build their own network containing the network slice obtained from the CSP as a "building block". In this model, both CSP offering NSaaS and CSC consuming NSaaS have the knowledge of the existence of network slices. Depending on service offering, CSP offering NSaaS may impose limits on the NSaaS management capabilities exposure to the CSC, and the CSC can manage the network slice according to NSaaS management capabilities exposed and agreed upon limited level of management by the CSP.

The NSaaS offered by the NOP could be characterized by certain properties (capabilities to satisfy service level requirements), e.g.

- radio access technology,

- bandwidth,

- end-to-end latency,

- reliability,

- guaranteed / non-guaranteed QoS,

- security level, etc.

Figure 4.1.6.1 illustrates some examples on how network slices can be utilized to deliver communication services, including network slice as a Service. For simplicity this figure omits the details of how NFs are being managed and does not show their groupings into network slice subnet:

a) A Network Slice as a Service (NSaaS) is provided by NOP-A to its customers. Unlike the communication service delivered to end customers, in NSaaS, the offered service is the actual network slice.

b) CSC-A can use the network slice obtained from CSP-A to support own Communication Services or may add additional network functions to the obtained NSaaS and offer the resulting combination as a new network slice to CSP-B. In this case, CSC-A plays the role of NOP-B and builds his own network. The network slice obtained by CSC-A from CSP-A becomes a "building block" or a network slice subnet of CSC-A in its role of NOP-B. The NOP-B (a.k.a. CSC-A) combines this network slice subnet with other network slice subnets and offers the new network slice subnet as network slice to CSP-B.

c) CSP-B can use the network slice obtained from CSC-A / NOP-B to deliver communication services to its end customers (as CSC-B).



Figure 4.1.6.1: Examples of Network Slice as a Service (NSaaS) being utilized to deliver communication services to end customers

NOTE: In Figure 4.1.6.1, NS represents network slice, CS represents communication service

### 4.1.7 Network slices as NOP internals

In the "network slices as NOP internals" model, network slices are not part of the NOP service offering and hence are not visible to its customers. However, the NOP, to provide support to communication services, may decide to deploy network slices, e.g. for internal network optimization purposes. This model allows CSC to use the network as the end user or optionally allows CSC to monitor the service status (assurance of the SLA associated with the internally offered network slice).

The CSP should be able to provide the service status information (e.g. service performance, fault information, traffic data, etc) to CSC via the management exposure interface.

Figure 4.1.7.1 illustrates an example on how network slices can be utilized to deliver communication services:

a) A network slice is used as NOP internal, and CSP delivers communication services to end customers (CSC).

b) The CSC should be able to monitor the network and service status information (e.g. service performance, fault information, traffic data, etc.) provided by CSP.

DN

NF

NF

Network Slice

Network view

Management view

CSP

NOP

CSC

offer

Figure 4.1.7.1: Examples of network slice as NOP internals

NOTE: In Figure 4.1.7.1, NS represents network slice, CS represents communication service

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| **End of 1st modification** |

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| **Start of 2nd modification** |

## 4.4 Managed network slice concepts

### 4.4.1 General

From a management point of view a network slice is complete in the sense that it includes all the network function instances, with their supporting resources, to provide service for certain business purpose (e.g. to support a certain set of communication services, provide PNI-NPNs, etc. in NSaaS model) or operational efficiencies purpose (e.g. to optimize operator internal O&M procedures in network slice as NOP internals model). In other words, the network slice is complete because it completely satisfies the associated SLS.

The following concepts are related to network slicing management:

a. Services which are supported by network slices (services whose service level requirements are satisfied by the SLS associated with the network slices).

b. Network slice subnet instances and networks composed of PNF, VNF or both and offered as network slices.

c. Network function (PNFs, VNFs) grouped into network slice subnets.

d. Resources which support the network (e.g. virtualized resource, non-virtualized resource)

The management aspects of the network slice are represented by management of the CN part, and AN part which are directly managed by the 3GPP management system, and management of non-3GPP part which is not directly managed by the 3GPP management system. The non-3GPP part includes TN parts. The 3GPP management system provides the network slice requirements to the corresponding management systems of those non-3GPP parts, e.g. the TN part supports connectivity within and between CN and AN parts. For the TN part, the 3GPP management system provides the TN topology requirements and individual TN links' QoS attributes requirements to the TN management system.

The 3GPP management system maintains the network topology and the related QOS requirements.



Figure 4.4.1.1: Example of a network slice

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| **End of 2nd modification** |

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| **Start of 3rd modification** |

## 4.8 Roles related to 5G networks and network slicing management

In the context of next generation networks, responsibilities regarding operations have to be clearly defined and assigned to roles. The roles related to 5G networks and network slicing management include:

- Communication Service Customer (CSC): Uses communication services.

- Communication Service Provider (CSP): Provides communication services. Designs, builds and operates its communication services. The CSP provided communication service can be built with or without network slice.

- Network Operator (NOP): Designs, builds and operates networks and provides related services, including network services and network slices.

- Network Equipment Provider (NEP): Supplies network equipment to network. For sake of simplicity, VNF Supplier is considered here as a type of Network Equipment Provider. This can be provided also in the form of one or more appropriate VNF(s).

- Virtualization Infrastructure Service Provider (VISP): Provides virtualized infrastructure services. Designs, builds and operates its virtualization infrastructure(s). Virtualization Infrastructure Service Providers may also offer their virtualized infrastructure services to other types of customers including to Communication Service Providers directly, i.e. without going through the Network Operator.

- Data Centre Service Provider (DCSP): Provides data centre services. Designs, builds and operates its data centres.

- NFVI Supplier: Supplies network function virtualization infrastructure to its customers.

- Hardware Supplier: Supplies hardware.

Depending on actual scenarios:

- each role can be played by one or more organizations simultaneously;

- an organization can play one or several roles simultaneously (for example, a company can play CSP and NOP roles simultaneously).

Communication Service Customer

Communication Service Provider

Network Operator

Virtualization Infrastructure Service Provider

Client

E.g.: End user,

Small & Medium Entreprise,

Large entreprise,

Vertical,

Other CSP, etc.

Provider

Client

Client

Provider

Provider

Data Center Service Provider

Client

Provider

Network Equipment Provider

(incl. VNF Supplier)

NFVI Supplier

Hardware Supplier

Client

Provider

Client

Provider

Client

Provider

Figure 4.8.1: High-level model of roles

In case of Network Slice as a Service (NSaaS) (cf. clause 4.1.6), the Communication Service Provider (CSP) role can be refined into NSaaS Provider (NSaaSP) role – or, in short, Network Slice Provider (NSP) - and the Communication Service Customer (CSC) role can be refined into NSaaS Customer (NSaaSC) role – or, in short, Network Slice Customer (NSC). A NSC can, in turn, offer its own communication services to its own customers, being thus CSP at the same time. A tenant might take the role of a NSC.

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| **End of 3rd modification** |