**3GPP TSG-SA5 Meeting #156 *S5-244094***

Maastricht, Netherlands, 19 - 23 August 2024

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **28.530** | **CR** | **0069** | **rev** | **1** | **Current version:** | **16.6.0** |  |
|  |
| *For* [***HE******LP***](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 | **X** | Radio Access Network | **X** | Core Network | **X** |

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|  |
| ***Title:***  | Rel-16 CR TS 28.530 Editorial corrections |
|  |  |
| ***Source to WG:*** | NTT DOCOMO |
| ***Source to TSG:*** | SA5 |
|  |  |
| ***Work item code:*** | TEI16 |  | ***Date:*** | 2024-08-22 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-16 |
|  | *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 canbe 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | As "A" versus "An" are choosed just by the pronounciation of the word after "A" or "An", there are some sections in the TS 28.530 to be corrected. |
|  |  |
| ***Summary of change:*** | Editorial corrections for clause 4.1.5, 4.3, 5.4 to fix incorrect editorial text. |
|  |  |
| ***Consequences if not approved:*** | There will be incorrect editorial text in TS 28.530. |
|  |  |
| ***Clauses affected:*** | 4.1.5, 4.3, 5.4 |
|  |  |
|  | **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 ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

|  |
| --- |
| **1st change** |

4.1.5 NetworkSlice instance Lifecycle and relationship to service instances

A NetworkSlice instance may support multiple service instances if it satisfies their service level requirements or has been modified to support these requirements. When a service instance is to be supported, it may trigger an operation phase of the NetworkSlice instance lifecycle for activation or modification(s) of an existing NetworkSlice instance, or it may trigger a commissioning phase of the NetworkSlice instance lifecycle for creation of a new NetworkSlice instance. When a service instance no longer needs to be supported by a NetworkSlice instance, it may trigger an operation phase of the NetworkSlice instance lifecycle for de-activation or modification(s) of an existing NetworkSlice instance, or it may trigger a decommissioning phase of the NetworkSlice instance lifecycle for termination of an existing NetworkSlice instance.

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| **End of changes** |
| **2nd change** |

##  4.3 Management aspects of network slicing

4.3.1 Introduction

This clause describes management aspects of network slicing, which can be described by the four phases shown in Figure 4.3.1.1, the phases are:

- Preparation

- Commissioning

- Operation

- Decommissioning

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**Figure 4.3.1.1: Management aspects of network slicing**

Each phase, described in subsequent clauses, defines high level tasks and should include appropriate verification of the output of each task.

4.3.2 Preparation

In the preparation phase the NetworkSlice instance does not exist. The preparation phase includes network slice design, network slice capacity planning, on-boarding and evaluation of the network functions, preparing the network environment and other necessary preparations required to be done before the creation of a NetworkSlice instance.

4.3.3 Commissioning

NetworkSlice instance provisioning in the commissioning phase includes creation of the NetworkSlice instance. During NetworkSlice instance creation all needed resources are allocated and configured to satisfy the network slice requirements. The creation of a NetworkSlice instance can include creation and/or modification of the NetworkSlice instance constituents.

4.3.4 Operation

The Operation phase includes the activation, supervision, performance reporting (e.g. for KPI monitoring), resource capacity planning, modification, and de-activation of a NetworkSlice instance.

Activation makes the NetworkSlice instance ready to support communication services.

Resource capacity planning includes any actions that calculates resource usage based on a NetworkSlice instance provisioning, and performance monitoring and generates modification polices as a result of the calculation.

NOTE: Automation of resource capacity planning is out of scope of the present document.

NetworkSlice instance modification could be including e.g. capacity or topology changes. The modification can include creation or modification of NetworkSlice instance constituents. NetworkSlice instance modification can be triggered by receiving new network slice requirements or as the result of supervision/reporting

The deactivation includes actions that make the NetworkSlice instance inactive and stops the communication services.

Network slice provisioning actions in the operation phase involves activation, modification and de-activation of a NetworkSlice instance.

4.3.5 Decommissioning

NetworkSlice instance provisioning in the decommissioning phase includes decommissioning of non-shared constituents if required and removing the NetworkSlice instance specific configuration from the shared constituents. After the decommissioning phase, the NetworkSlice instance is terminated and does not exist anymore.

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| --- |
| **End of changes** |
| **3rd change** |

5.4 High-level use cases

5.4.1 Network slicing supporting communication services

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | A communication service provider (CSP) uses the network slicing service provided by operator to offer communication services to end users. |  |
| **Actors and Roles** | A CSP request a NOP to provide a network slice  |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | The CSP and the operator negotiate and sign the communication service requirements contract a.k.a. Service Level Agreement (SLA). |  |
| **Begins when**  | The CSP declares communication service(s) requirements to the operator. These requirements are called Service Level Specification (SLS). The operator triggers the NetworkSlice instance preparation phase which includes the on-boarding and verification of network function products, feasibility check, preparing the necessary network environment, which are used to support the lifecycle of NetworkSlice instances and any other preparations that are needed in the network. |  |
| **Step 1 (M)** | Based on the SLS (e.g. coverage area, number and distribution of users, traffic demand, mobility, latency, etc.) , the operator prepares the corresponding NetworkSlice instance. |  |
| **Step 2 (M)** | After the NetworkSlice instance preparation phase, the operator triggers the deployment of a NetworkSlice instance.1) If the CSP plans to operate services across multiple operators' administrative domains, this may require cross-country operations. The operator management system will perform cross-domain collaboration with the management systems from other administrative domains for NetworkSlice instance deployment.2) If customization of TN is required, the operator management system and TN management system will first cooperate on network planning of TN. 3) The operator management system performs overall mapping and coordination among different technical domains in order to provide the end-to-end services via the NetworkSlice instance. If CSP uses the NSaaS provided by operator to offer multiple communication services to end users, related operations (e.g., performance monitoring) are performed considering requirements for each communication service. |  |
| **Step 3 (O)** | If requested, the operator provides management data of the NetworkSlice instance to the authorized CSP according to the communication service requirements. Examples of management data that could be provided to CSP include service availability and reliability, UE traffic information, etc. |  |
| **Ends when** | The operator maintains the NetworkSlice instance during the lifecycle of the NetworkSlice instance.  |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NetworkSlice instance(s) is provided by the operator to the CSP to support one or more communication services. |  |
| **Traceability** | REQ-3GPPMS-CON-01, REQ-3GPPMS-CON-02, REQ-3GPPMS-CON-03, REQ-3GPPMS-CON-04, REQ-3GPPMS-CON-05, REQ-3GPPMS-CON-07, REQ-3GPPMS-CON-08, REQ-3GPPMS-CON-09, REQ-3GPPMS-CON-10, REQ-3GPPMS -CON-28, REQ-3GPPMS -CON-29 |  |

5.4.2 Provisioning of a network slice instance

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To perform operations of the provisioning of a NetworkSlice instance. |  |
| **Actors and Roles** | A Network Operator (NOP) plays the role of a Network Slice Provider. |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | None |  |
| **Pre-conditions** | Preparation for the NetworkSlice instance is done.For creation, NetworkSlice instance is not existing. For activation, modification, de-activation, or termination, the NetworkSlice instance is existing. |  |
| **Begins when**  | The 3GPP management system has received a request from the Network Operator.  |  |
| **Step 1 (M)** | The 3GPP management system assesses the feasibility of executing the request, e.g., checks the inventory and the required NetworkSlice instance constituents, and reserves available resources.  |  |
| **Step 2 (M)** | The 3GPP management system performs the LCM operations required according to the request (create, activate, modify, de-activate, or terminate) on one or more NetworkSliceSubnet instance(s). For shared NetworkSliceSubnet(s), the 3GPP management system performs required actions. | 5.4.3 Provisioning of a NetworkSliceSubnet instance |
| **Step 3 (M)** | The 3GPP management system replies to the Network Operator that the requested operation is completed. |  |
| **Ends when** | All the mandatory steps have passed. |  |
| **Exceptions** | In case the feasibility check fails, the use case fails and the 3GPP management system rejects the request with the reason included in the reply.In case any of the LCM operations fail, the use case fails and the 3GPP management system replies to the Network Operator that the requested operation is failed with the reason included in the reply. |  |
| **Post-conditions** | A NetworkSlice instance has been provisioned.  |  |
| **Traceability** | REQ-3GPPMS-CON-04, REQ-3GPPMS-CON-15, REQ-3GPPMS-CON-16, REQ-3GPPMS-CON-17, REQ-3GPPMS-CON-18.  |  |

5.4.3 Provisioning of a NetworkSliceSubnet instance

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To perform operations of the provisioning of a NetworkSliceSubnet instance. |  |
| **Actors and Roles** | A Network Operator (NOP) plays the role of a Network Slice Provider (NSP) responsible for the network slice subnet.  |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | None |  |
| **Pre-conditions** | Preparation for the NetworkSliceSubnet instance is completed.For the creation use case a NetworkSliceSubnet instance does not exist. For activation, modification, de-activation or termination use cases, the NetworkSliceSubnet instance exists. |  |
| **Begins when**  | The 3GPP management system has received a request from the Network Operator.  |  |
| **Step 1 (M)** | The 3GPP management system assesses the feasibility of executing the request, e.g., checks the inventory and the required NetworkSliceSubnet instance constituents, and reserves available resources. |  |
| **Step 2 (M)** | The 3GPP management system performs the LCM operations required according to the request (activate, modify, de-activate, or terminate) on one or more NetworkSliceSubnet instance(s) constituents. In case the required LCM operation is create a new NetworkSliceSubnet instance constituent is created. |  |
| **Step 3 (M)** | The 3GPP management system replies to the Network Operator that the requested operation is completed. |  |
| **Ends when** | All the mandatory steps have passed. |  |
| **Exceptions** | In case the feasibility check fail, the use case fails and the 3GPP management system rejects the request with the reason included in the reply.In case any of the LCM operations fail, the use case fails and the 3GPP management system replies to the Network Operator that the requested operation has failed with the reason included in the reply. |  |
| **Post-conditions** | A NetworkSliceSubnet instance has been provisioned.  |  |
| **Traceability** | REQ-3GPPMS-CON-06, REQ-3GPPMS-19, REQ-3GPPMS-CON-20, REQ-3GPPMS-CON-21, REQ-3GPPMS-CON-22 |  |

5.4.4 Performance management of a NetworkSlice instance

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To report performance measurement data of a NetworkSlice iInstance to the NOP. |  |
| **Actors and Roles** | A Network Operator (NOP) plays the role of a Network Slice Provider (NSP) |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | A NetworkSlice instance has been activated. |  |
| **Begins when**  | The NOP requests performance measurement and monitoring on the NetworkSlice instance. |  |
| **Step 1 (M)** | For each NetworkSliceSubnet instance associated with the NetworkSlice instance the 3GPP management system fetches NetworkSliceSubnet instance-level performance measurement data.  | Performance management of a NetworkSliceSubnet instance |
| **Step 2 (M)** | The 3GPP management system generates the network slice-level performance measurement data and sends the network slice-level performance measurement data to the NOP.  |  |
| **Ends when**  | The performance measurement and monitoring ends as scheduled or when requested by the NOP. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NOP receives the network slice-level performance measurement data from the 3GPP management system. |  |
| **Traceability**  | REQ-3GPPMS-CON-11  |  |

NOTE: Steps 1 and 2 may be executed on demand, or repeatedly according to a schedule.

5.4.5 Performance management of a NetworkSliceSubnet instance

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To report performance measurement data of a NetworkSliceSubnet instance to the NOP.  |  |
| **Actors and Roles** | A Network Operator (NOP) plays the role of a Network Slice Provider responsible for the network slice subnet. |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | A NetworkSliceSubnet instance has been activated. |  |
| **Begins when**  | The NOP requests performance measurement and monitoring on the NetworkSliceSubnet instance. |  |
| **Step 1 (M)** | For each component of the NetworkSliceSubnet instance the 3GPP management system fetches performance measurement data on the components of the NetworkSliceSubnet instance.  |  |
| **Step 2 (M)** | The 3GPP management system generates the network slice subnet-level performance measurement data and sends the network slice subnet-level performance measurement data to the NOP.  |  |
| **Ends when**  | The performance measurement and monitoring ends as scheduled or when requested by the NOP. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NOP receives the network slice subnet-level performance measurement data from the 3GPP management system. |  |
| **Traceability**  | REQ-3GPPMS-CON-12  |  |

NOTE: Steps 1 and 2 may be executed on demand, or repeatedly according to a schedule.

5.4.6 Report fault management data of a NetworkSlice instance

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To report fault management data of a NetworkSlice instance to the NOP. |  |
| **Actors and Roles** | Network Operator (NOP) |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | A NetworkSlice instance is created. |  |
| **Begins when**  | The 3GPP management system detects a fault on the NetworkSlice instance that needs NOP intervention. |  |
| **Step 1 (M)** | The 3GPP management system generates fault management data of the NetworkSlice instance and reports the fault management data to the NOP. |  |
| **Step 2 (M)** | When the fault is recovered, the 3GPP management system updates the fault management data of the NetworkSlice instance to the NOP. |  |
| **Ends when** | The NOP has the fault management data of NetworkSlice instance. |  |
| **Exceptions** | In case any of the mandatory steps fail, the use case fails. |  |
| **Post-conditions** | N/A  |  |
| **Traceability** | REQ-3GPPMS-CON-13  |  |

5.4.7 Report fault management data of a NetworkSliceSubnet instance

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To report fault management data of a NetworkSliceSubnet instance to the NOP. |  |
| **Actors and Roles** | Network Operator (NOP) |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | A NetworkSliceSubnet instance is created.  |  |
| **Begins when**  | The 3GPP management system detects a fault on the NetworkSliceSubnet instance that needs operator intervention.  |  |
| **Step 1 (M)** | The 3GPP management system generates fault management data of the NetworkSliceSubnet instance and reports to the NOP. |  |
| **Step 2 (M)** | When the fault is recovered, the 3GPP management system updates the fault management data of the NetworkSliceSubnet instance to the NOP. |  |
| **Ends when** | The NOP has the fault management data of NetworkSliceSubnet instance. |  |
| **Exceptions** | In case any of the mandatory steps fail, the use case fails. |  |
| **Post-conditions** | N/A  |  |
| **Traceability** | REQ-3GPPMS-CON-14  |  |

5.4.8 Multiple operator support for network slicing

| **Use Case** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | Create a communication service spanning multiple NetworkSlice instance hosted across multiple operators |  |
| **Actors and Roles** | Communication service provider (CSP)Network Operator (NOP) A, Network Operator (NOP) B |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | The business level agreement(s) between CSP and NOPs to support the management system interaction is done |  |
| **Pre-conditions** | None |  |
| **Begins when**  | Communication service provider receives a request to deploy a 5G Communication service  |  |
| **Step 1 (M)** | The CSP requests NOP A to create the NetworkSlice instance and NOP B to create another NetworkSlice instance to support the communication service |  |
| **Step 2 (M)** | NOP A and NOP B's 3GPP management system evaluates if they can support the respective NetworkSlice instances, and, if they can, the 3GPP management systems create the corresponding NetworkSlice instance and respond positively to the CSP |  |
| **Step 3 (M)** | The communication services provider instantiates the service over the multiple NetworkSlice instances  |  |
| **Ends when** | Ends when all mandatory steps identified above are successfully completed or when an exception occurs. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | A communication service across multiple operators is created |  |
| **Traceability** |  REQ-3GPPMS-CON-01, REQ-3GPPMS-CON-02 |  |

5.4.9 Manage network slice with agreed performance

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To manage network slice with agreed performance to CSP |  |
| **Actors and Roles** | A Communication Service Provider (CSP) requests the Network Operator (NOP) to provide a NetworkSlice instance |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** |  |  |
| **Pre-conditions** | The NOP has the capability to manage network slices. |  |
| **Begins when**  | A set of service requirements (e.g. business scenario, isolation, throughput, latency, coverage, etc.) have been provided by the CSP. |  |
| **Step 1 (M)** | NOP creates a customized NetworkSlice instance with performance that meet CSP's requirements. |  |
| **Step 2 (M)** | NOP make use of 3GPP management system to monitor the NetworkSlice instance performance.  |  |
| **Step 3 (M)** | When NOP detects that the monitored NetworkSlice instance performance does not meet the agreed performance requirement, the NOP requests the 3GPP management system to executes some actions (e.g. scale in/out, modification, etc.), so that the NetworkSlice instance performance requirements are fulfilled.NOTE: The step 2 and 3 are executed continuously until the "ends when". |  |
| **Ends when** | The NetworkSlice instance is terminated. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NetworkSlice instance performance requirements requested by CSP are fulfilled. |  |
| **Traceability** |  |  |

5.4.10 Communication services using network with or without slicing

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | A communication service provider (CSP) uses the 5G network and network slicing service provided by operator to offer communication services to end users. |  |
| **Actors and Roles** | Communication Service Provider (CSP) requests the Network Operator (NOP) to support its network requirements |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | CSP derives the network related requirements (e.g. isolation, latency, coverage) from the communication service related requirements. |  |
| **Begins when**  | CSP provides the network related requirements to the NOP. |  |
| **Step 1 (M)** | NOP decides to use network with or without slicing based on the network related requirements received and/or pre-configured network planning or optimization policies. For example, If CSP requires an isolated network, NOP may decide to use a network slice. |  |
| **Step 2 (M)** | In case of using network with slicing, NOP create a NetworkSlice instance or reuse an existing NetworkSlice instance to satisfy the network related requirements.Otherwise, NOP deploys a new network without slicing or utilize the existing network without slicing to satisfy the network related requirements.  |  |
| **Step 3 (M)** | NOP notifies CSP that the network is ready. |  |
| **Ends when** | Ends when all mandatory steps identified above are successfully completed or when an exception occurs. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | Network with or without slicing can be utilized to provide communication service. |  |
| **Traceability** | REQ-5GNS-CON-08 |  |

5.4.11 Exposure of network slice management data for Network Slice as a Service (NSaaS) case

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To expose network slice management data to a Communication Service Provider (CSP) consuming Network Slice as a Service (NSaaS) based on mutual agreement. |  |
| **Actors and Roles** | A Communication Service Provider (CSP) provides limited management data to a Communication Service Customer (CSC) |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | Network slice management data of network slice can be exposed to the CSP consuming NSaaS according to the pre-defined agreements.  |  |
| **Pre-conditions** | 1. NSaaS level exposure has been agreed upon and the CSP offering the NSaaS is aware of it.2. A NetworkSlice instance used for NSaaS is created. |  |
| **Begins when**  | The CSP consuming NSaaS wants to get the management data of the NetworkSlice instance. |  |
| **Step 1 (M)** | The CSP consuming NSaaS sends requests to the 3GPP management system for the exposure management data of NetworkSlice instance. |  |
| **Step 2 (M)** | The 3GPP management system provides the CSP consuming NSaaS of exposed management data for the NSaaS scenario. |  |
| **Ends when** | The network slice management data is provided. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The CSP consuming NSaaS is aware of the management data of the NetworkSlice instance. |  |
| **Traceability** | REQ-3GPPMS-CON-27 |  |

5.4.12 Exposure of network slice management capability

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To expose limited network slice management capability to a Communication Service Customer (CSC) consuming Network Slice as a Service (NSaaS) based on mutual agreement. |  |
| **Actors and Roles** | A Communication Service Provider (CSP) provides limited management capability to a Communication Service Customer (CSC) |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | Network slice management capability of 3GPP management system can be partially exposed to the CSC consuming NSaaS according to the pre-defined agreements.  |  |
| **Pre-conditions** | Level of management exposure has been agreed upon and the CSP offering the NSaaS service is aware of it. |  |
| **Begins when**  | The CSC consuming NSaaS wants to get certain management capability to manage the NetworkSlice instance, e.g., PM, FM, CM, based on the mutual agreement between CSC and CSP. |  |
| **Step 1 (M)** | The CSC consuming NSaaS sends requests to the 3GPP management system for the exposure of management capability of NetworkSlice instance. |  |
| **Step 2 (M)** | The 3GPP management system provides the CSC consuming NSaaS with the requested capability via appropriate methods, e.g., exposing network slice management service to the CSC. |  |
| **Ends when** | The network slice management capability is provided. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The limited network slice management capability has been exposed to the CSC consuming NSaaS. |  |
| **Traceability** | REQ-3GPPMS -CON-30, REQ-3GPPMS -CON-31, REQ-3GPPMS -CON-32 |  |

5.4.13 To modify the network slice instance due to changed demand

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To modify a NetworkSlice instance due to changed demand |  |
| **Actors and Roles** | A Network Operator (NOP) plays the role of a Network Slice Provider (NSP).  |  |
| **Telecom resources** | 3GPP management system  |  |
| **Assumptions** | None |  |
| **Pre-conditions** | A network slice is activated  |  |
| **Begins when**  | The NOP has received a request to modify the capacity of a NetworkSlice instance. For example, in case there is an increased demand in call capacity in specific geographical area, the request indicates the needed capacity increase amount in that specific geographical area |  |
| **Step 1 (M)** | The NOP initiates the 3GPP management system to process the request |  |
| **Step 2 (M)** | The 3GPP management system analyses the request and identifies that one or more supporting network slice subnets need to be modified with X1 amount, X2 amount, X3 amount etc. |  |
| **Step 3 (M)** | 3GPP system derives new TN requirements |  |
| **Step 4 (M)** | The 3GPP management system initiates modification of the capacity of the identified supporting slice subnets with X1 amount, X2 amount, X3 amount etc |  |
| **Step 5 (M)** | 3GPP system communicates new TN requirements |  |
| **Ends when** | All capacity modification activities (of step 3) have been completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NetworkSlice instance capacity is modified according to demand. |  |
| **Traceability** | REQ-3GPPMS-CON-17**,** REQ-3GPPMS-CON-20, REQ-5GNS-CON-9, REQ-5GNS-CON-10, REQ-5GNS-CON-11, REQ-5GNS-CON-12 |  |

5.4.14 Management data analytics for 5G networks

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To provide management data analytics services to authorized customers (e.g., re-configuring for more efficient operation and maintenance) |  |
| **Actors and Roles** | Network Operator (NOP) |  |
| **Telecom resources** | NetworkSlice instance3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | The 3GPP management system has the capability to collect the related network data for analysis. |  |
| **Begins when**  | The 3GPP management system receives network data analytics request. |  |
| **Step 1 (M)** | The 3GPP management system checks if the existing management data is sufficient to generate the network data analytics information.3GPP management system may trigger to obtain more network data for analytics purpose, such as new measurement jobs, subscriptions to alarm notifications.  |  |
| **Step 2 (M)** | For management data analytics purposes, 3GPP management system may request services (e.g., management data analytics, PM, FM) from the related NetworkSlice instance constituents. |  |
| **Step 3 (M)** | 3GPP management system sends the analytics results to the NOP.  |  |
| **Ends when**  | NOP has the required network data analytics information. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NOP receives network data analytics information from the 3GPP management system, the information could be utilized for optimizing the network. |  |
| **Traceability**  | **REQ-5GNS-CON-13,REQ-5GNS-CON-14** |  |

5.4.15 Capacity management of network slice instances and network slice subnet instances

| **Use case stage** | **Evolution/Specification** | **<<Uses>>Related use** |
| --- | --- | --- |
| **Goal**  | To support capacity management of NetworkSlice instances and NetworkSliceSubnet instances.  |  |
| **Actors and Roles** | A Network Operator (NOP) plays the role of a Network Slice Provider responsible for the network slice capacity management. |  |
| **Telecom resources** | 3GPP management system |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | The capacity optimization objectives have been set by the NOP |  |
| **Begins when**  | The NOP requests capacity management process of the NetworkSlice instances and NetworkSliceSubnet instances when the pre-set resource optimization objectives need to be satisfied.  |  |
| **Step 1 (M)** | The 3GPP management system obtains information needed for the optimization process such as network slice provisioning requirements, existing active or non-active NetworkSlice instance and/or NetworkSliceSubnet instance resource information, and performance measurement data by requesting the feasibility check operation.  | Feasibility check |
| **Step 2 (M)** | The 3GPP management system performs resource optimization process based on the information obtained in Step 1. The goal of the process is to find an optimal resource capacity availability against the target objective.  |  |
| **Step 3 (M)** | The 3GPP management system proceeds with network slice (NetworkSlice instance and/or NetworkSliceSubnet instance) provisioning or modification processes until it meets the resource capacity optimization objective.  |  |
| **Step 4 (M)** | The 3GPP management system updates capacity availability information after provisioning or modification processes. |  |
| **Ends when**  | The capacity management ends as it meets the optimization objective. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NOP receives the updated capacity management information from the 3GPP management system. |  |
| **Traceability**  | REQ-3GPPMS-CON-23  |  |

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| **End of changes** |