3GPP TSG SA WG5 Meeting 137-e TDoc S5-213123

electronic meeting, online, 10 - 19 May 2021

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **28.531** | **CR** | **0063** | **rev** |  | **Current version:** | **15.7.0** |  |
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| *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 |  | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Clarify misleading information in network slicing use cases | | | | | | | | | |
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| ***Source to WG:*** | S5 | | | | | | | | | |
| ***Source to TSG:*** | Huawei, Orange, Telefónica | | | | | | | | | |
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| ***Work item code:*** | NETSLICE-5GNRM | | | | |  | ***Date:*** | | | 2021-05-10 |
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| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-15 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | Titles of some use cases do not match the content of the use cases.  Some use cases are internally inconsistent.  Some text refers to states which are not described in any specification. | | | | | | | | |
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| ***Summary of change:*** | | Amend clause titles to accurately reflect the content of use cases.  Reword use case goals and post-conditions to reflect the content of the use case descriptions.  Remove any reference to active state and inactive state. | | | | | | | | |
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| ***Consequences if not approved:*** | | Possible incomplete or incompatible implementation of the specification. | | | | | | | | |
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| ***Clauses affected:*** | | 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.7, 5.1.8, 5.1.10, 5.1.11 | | | | | | | | |
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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:*** | | This CR implements SA5 action item 135e.2 and S5-212347 (proposal 7) endorsed by SA5. | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

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| **1st change** |

### 5.1.1 Network slice instance allocation

| Use case stage | Evolution/Specification | <<Uses>> Related use |
| --- | --- | --- |
| **Goal** | To satisfy request for allocation of a network slice instance with certain characteristics, by creation of new or using existing network slice instance; the request includes the network slice related requirements. |  |
| **Actors and Roles** | CSMF, who acts as an example of network slice management service consumer. NOP operator |  |
| **Telecom resources** | Network slice instance Network slice subnet instance Transport network NSMF, who acts as an example of network slice management service provider. NSSMF, who acts as an example of network slice subnet management service provider. |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | N/A |  |
| **Begins when** | NSMF receives the request for allocation of the network slice instance with certain characteristics; the request contains network slice related requirements and the information indicating whether the requested NSI could be shared with other consumers. |  |
| **Step 1 (M)** | If the requested NSI can be shared and if an existing NSI can be used, the NSMF decides to use the existing NSI. Modification of the existing NSI may be needed to satisfy the network slice instance related requirements. Use case is completed go to “Step 8". Otherwise, the NSMF triggers to create a new NSI, for which the following steps 2 – 8 are needed. |  |
| **Step 2 (M)** | NSMF decides on the constituent NSSIs and the topology of the NSI to be created using the information from service profile [6]. For the constituent NSSIs, the NSMF derives network slice subnet related requirements from the network slice related requirements. If reconfiguration of the transport network is needed, the NSMF derives transport network related requirements (e.g. latency, bandwidth) from the network slice related requirements. |  |
| **Step 3 (M)** | For the required NSSI(s), the NSMF sends network slice subnet related requirements to the NSSMF to request allocation of the required NSSI(s). | Network slice subnet instance allocation use case |
| **Step 4 (M)** | NSMF receives the information of the allocated NSSI(s) (e.g. the management identifier of NSSI, service access point information of NSSI, external connection point information of NSSI) from NSSMF. |  |
| **Step 5 (M)** | NSMF, via NSSMF, sends the transport network related requirements (e.g. external connection point, latency and bandwidth) to the TN Manager. The TN manager reconfigures the TN accordingly and responds to the NSMF via NSSMF. |  |
| **Step 6 (M)** | NSMF receives the response from TN Manager via NSSMF. |  |
| **Step 7 (M)** | NSMF associates the NSSI(s) with the corresponding NSI (e.g. allocation of the management identifier of NSI and mapping the management identifier of NSI with the received management Identifier of NSSI(s)) and triggers to establish the links between the service access points of the NSSI(s). |  |
| **Step 8 (M)** | NSMF notifies the network slice instance information of NSI (e.g., the management identifier of NSI). |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | An NSI is ready to satisfy the network slice related requirements. |  |
| **Traceability** | REQ-PRO\_NSSI-FUN-1, REQ-PRO\_NSI-FUN-3. |  |

### 5.1.2 Network slice subnet instance allocation

| Use case stage | Evolution/Specification | <<Uses>> Related use |
| --- | --- | --- |
| **Goal** | Create a new network slice subnet instance or use an existing network slice subnet instance to satisfy the network slice subnet related requirements; provide the provisioning service consumer with identity of the NFVO which the consumer can use for further access to the information of the involved VNFs, PNFs and NSs. |  |
| **Actors and Roles** | NSMF, who acts as an example of network slice subnet management service consumer. |  |
| **Telecom resources** | Network Slice Subnet instance Network Service instance NSSMF, who acts as an example of network slice subnet management service provider. The operator deployed NFVO to manage the lifecycle of VNFs and interconnection between the VNFs and PNFs in terms of the NS instances. |  |
| **Assumptions** | Network slice subnet instance may include network functions which are virtualized. |  |
| **Pre-conditions** | VNF Packages for virtualized network functions to be included in the network slice subnet instance have been already on-boarded. |  |
| **Begins when** | The NSMF sends to the NSSMF a request for a NSSI to be associated with the NSI; the request contains network slice subnet related requirements including the SliceProfile [6].  NSSMF receives request for a network slice subnet instance. The request contains network slice subnet related requirements. The request may include guidance for use of particular NFVO(s) when VNFs and PNFs in certain part of the network are involved. The request may also include query of the identity of the NFVO to be used. |  |
| **Step 1 (M)** | Based on the network slice subnet related requirements received, NSSMF decides to create a new NSSI or use an existing NSSI. |  |
| **Step 2 (M)** | If an existing network slice subnet instance is decided to be used, NSSMF may trigger to modify the existing network slice subnet instance to satisfy the network slice subnet related requirements. Go to “Step 8”. Otherwise, NSSMF triggers to create a new NSSI, the following steps are needed. |  |
| **Step 3 (O)** | If the required NSSI contains constituent NSSI(s) managed by other NSSMF(s), the first NSSMF derives the requirements for the constituent NSSI(s) and sends those requirements to the corresponding NSSMF(s) which manages the constituent NSSI(s).  The first NSSMF receives the constituent NSSI information from the other NSSMF(s) and associates the constituent NSSI(s) with the required NSSI. |  |
| **Step 4 (M)** | Based on the network slice subnet related requirements received and SliceProfile [6], the NSSMF decides that to satisfy the NSSI requirements, the part of the network controlled by certain NFVO should be involved. The NSSMF determines the NS related requirements (i.e. information about the target NSD and additional parameterization for the specific NS to instantiate, see clause 7.3.3 in ETSI GS NFV-IFA013 [3]). |  |
| **Step 5 (M)** | Based on the NS related requirements, NSSMF triggers corresponding NS instantiation request to NFVO via Os-Ma-nfvo interface as described in clause 6.4.3 in TS 28.525 [2], and the NFVO performs NS instantiation. (see note) | TS 28.525 [2] Clause 6.4.3 NS instance use cases |
| **Step 6 (M)** | NSSMF associates the NS instance with corresponding network slice subnet instance (e.g. allocation of the management identifier of NSSI and mapping with the corresponding identifiers). |  |
| **Step 7 (M)** | NSSMF is using the NF provisioning service to configure the NSSI constituents.  In case of RAN NSSI, the configuration contains RRM policy information for individual Radio cells. In the cells shared by multiple NSSIs such policy includes guidance for split of Radio resources between the NSSIs. | NF provisioning service |
| **Step 8 (M)** | NSSMF notifies the provisioning service consumer with the NSSI information (e.g. the management identifier of NSSI) and the NFVO identity when relevant. The NSMF associates the NSSI with the NSI. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | A NSSI is ready to satisfy the network slice subnet related requirements. |  |
| **Traceability** | REQ-PRO\_NSSI-FUN-2, REQ-PRO\_NSSI-FUN-3, REQ-PRO\_NSSI-FUN-4, REQ-PRO\_NSSI-FUN-5, REQ-PRO\_NSSI-FUN-6, REQ-PRO\_NSSI-FUN-14. |  |
| NOTE: According to the TS 28.525 [2], for the PNFs, NS instantiation includes only establishment of interconnection with other NFs. | | |

### 5.1.3 Network slice instance deallocation

| Use case stage | Evolution/Specification | <<Uses>> Related use |
| --- | --- | --- |
| **Goal** | To terminate or modify an existing NSI which was used to support a particular service, but is no longer needed. |  |
| **Actors and Roles** | CSMF, who acts as an example of network slice management service consumer. NOP Operator |  |
| **Telecom resources** | Network slice instance Network slice subnet instances NSMF, who acts as an example of network slice management service provider. NSSMF, who acts as an example of network slice subnet management service provider. |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | N/A |  |
| **Begins when** | NSMF receives the request indicating that an existing NSI is no longer needed to support particular service. The NSI identification is included in the request. |  |
| **Step 1 (M)** | Based on the request, NSMF checks if there are no other services to be supported by the NSI. If there are none the NSMF may decide to terminate the NSI; then proceed to Step 2. Otherwise, NSMF may decide to trigger to modify the NSI or to do nothing. The use case is completed; skip the remaining steps. | NSI modification use case |
| **Step 2 (M)** | If the NSI to be terminated is active, NSMF de-activates the NSI. Then, the NSI to be terminated is inactive. | NSI de-activation use case |
| **Step 3 (M)** | NSMF identifies the network slice subnet instances used by the NSI, and for every such NSSI sends the request to the corresponding NSSMF(s) indicating that the NSSI(s) are no longer needed for the NSI. NSSMF(s) may decide to terminate or modify the NSSI(s) based on the request and disassociates them with the NSI. |  |
| **Step 4 (M)** | NSMF receives the response from NSSMF(s) and terminates the NSI. |  |
| **Step 5 (M)** | NSMF notifies its consumer of the NSI termination. |  |
| **Ends when** | All the steps identified above are successfully completed or skipped per condition in the Step 1. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NSI has been terminated or modified. |  |
| **Traceability** | REQ-PRO\_NSI-FUN-3 |  |

### 5.1.4 Network slice subnet instance deallocation

| Use case stage | Evolution/Specification | <<Uses>> Related use |
| --- | --- | --- |
| **Goal** | To terminate or disassociate an existing NSSI which was used by the NSI or NSSI, but is no longer needed |  |
| **Actors and Roles** | Network slice subnet management service consumer. For example, NSMF plays the role of network slice subnet management service consumer. |  |
| **Telecom resources** | Network slice subnet instance Network slice subnet management service provider. For example, NSSMF plays the role of network slice subnet management service provider. |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | N/A |  |
| **Begins when** | Network slice subnet management service provider receives network slice subnet related request from its authorized consumer indicating that an existing NSSI is no longer needed. |  |
| **Step 1 (M)** | Based on the request, network slice subnet management service provider decides whether the NSSI should be terminated.  If the decision is the NSSI should be terminated, go to the Step 2.  If the decision is the NSSI is not terminated (e.g., the NSSI is shared or network slice subnet management service provider decides to keep the NSSI for later use), network slice subnet management service provider disassociates the NSSI from its consumer and provides feedback to the authorized consumer, maybe with removing its consumer’s configuration or not. Go to Step 5. |  |
| **Step 2 (M)** | If the NSSI consists of constituent NSSIs that are not managed directly by the network slice subnet management service provider, the network slice subnet management service provider sends request to other network slice subnet management service provider indicating that the constituent NSSIs are no longer needed for the NSSI. |  |
| **Step 3 (M)** | If the NSSI is associated with NS instance, network slice subnet management service provider disassociates the NS instance with the NSSI to be terminated, and network slice subnet management service provider may trigger corresponding request to NFVO for terminating or updating (e.g. scaling-in) the NS instance. (see note). |  |
| **Step 4 (M)** | If there exists transport network segment used by the NSSI, the network slice subnet management service provider may indicate that the transport network segment is no longer needed to support the NSSI. |  |
| **Step 5 (M)** | Network slice subnet management service provider sends response to its consumer. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The NSSI has been terminated or disassociated. |  |
| **Traceability** | REQ-PRO\_NSSI-FUN-8, REQ-PRO\_NSSI-FUN-11 |  |
| NOTE: In case where the NS instance is not dedicated for the NSSI, the network slice subnet provisioning management service provider does not terminate the NS instance. | | |

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| **2nd change** |

### 5.1.7 Network slice instance activation

| **Use case stage** | **Evolution/Specification** | **<<Uses>> Related use** |
| --- | --- | --- |
| **Goal** | To activate an existing network slice instance which is inactive. |  |
| **Actors and Roles** | NetworkSliceActivation service consumer. For example, CSMF or CSP providing NSaaS plays the role of NetworkSliceActivation service consumer. |  |
| **Telecom resources** | Network slice instance NetworkSliceActivation service provider. For example, NSMF plays the role of NetworkSliceActivation service provider. |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | An NSI has already been created and it is inactive. |  |
| **Begins when** | The NetworkSliceActivation service provider decides to activate an NSI based on the received network slice related request from its authorized consumer. |  |
| **Step 1 (M)** | NetworkSliceActivation service provider checks whether NSSIs associated with the NSI are all active, if there is an inactive NSSI, NetworkSliceActivation service provider requests NetworkSliceSubnetActivation service provider to activate the corresponding NSSI. | Network slice subnet instance activation use case |
| **Step 2 (M)** | NetworkSliceActivation service provider receives response from NetworkSliceSubnetActivation service provider indicating that the NSSI is active. |  |
| **Step 3 (M)** | NetworkSliceActivation service provider activates the NSI and sends response to the requesting consumer. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | An NSI has been activated. |  |
| **Traceability** | REQ-PRO\_NSI–FUN-4 |  |

### 5.1.8 Network slice instance deactivation

| **Use case stage** | **Evolution/Specification** | **<<Uses>> Related use** |
| --- | --- | --- |
| **Goal** | To deactivate an existing network slice instance which is active. |  |
| **Actors and Roles** | NetworkSliceActivation service consumer. For example, CSMF or CSP providing NSaaS plays the role of NetworkSliceActivation service consumer. |  |
| **Telecom resources** | Network slice instance NetworkSliceActivation service provider. For example, NSMF plays the role of NetworkSliceActivation service provider. |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | NSI has already been created and it is active. |  |
| **Begins when** | The NetworkSliceActivation service provider decides to deactivate an NSI based on the received network slice related request from its authorized consumer. |  |
| **Step 1 (M)** | The NetworkSliceActivation service provider stops the NSI serving its subscribers |  |
| **Step 2 (M)** | NetworkSliceActivation service provider checks whether NSSIs associated with the NSI are all inactive. If there is an active NSSI, NetworkSliceActivation service provider requests NetworkSliceSubnetActivation service provider to deactivate the corresponding NSSI. NetworkSliceSubnetActivation service provider receives the request and decides if the NSSI will be disassociated and deactivated. | Network slice subnet instance deactivation use case |
| **Step 3 (M)** | The NetworkSliceActivation service provider receives response from NetworkSliceSubnetActivation service provider that the NSSI deactivation request has been processed. |  |
| **Step 4 (M)** | NetworkSliceActivation service provider deactivates the NSI and sends response to its authorized consumer. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | An NSI has been deactivated. |  |
| **Traceability** | REQ-PRO\_NSI–FUN-5 |  |

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| **3rd change** |

### 5.1.10 Network slice subnet instance activation

| **Use case stage** | **Evolution/Specification** | **<<Uses>> Related use** |
| --- | --- | --- |
| **Goal** | To activate an existing network slice subnet instance which is inactive. |  |
| **Actors and Roles** | NetworkSliceSubnetActivation service consumer. For example, NSMF or NSSMF plays the role of NetworkSliceSubnetActivation service consumer. |  |
| **Telecom resources** | Network slice subnet instance NetworkSliceSubnetActivation service provider. For example, NSSMF plays the role of NetworkSliceSubnetActivation service provider. |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | An NSSI has already been created and it is inactive. |  |
| **Begins when** | The NetworkSliceSubnetActivation service provider decides to activate an NSSI based on the received network slice subnet related request from its authorized consumer. |  |
| **Step 1 (M)** | The NetworkSliceSubnetActivation service provider identifies inactive constituents (e.g. NSSI, NF) of the NSSI and decides to activate those constituents. |  |
| **Step 2 (M)** | If the constituent of NSSI is managed directly by the NetworkSliceSubnetActivation service provider, NetworkSliceSubnetActivation service provider activates the NSSI constituent directly. |  |
| **Step 3 (M)** | If an NSSI constituent is managed by other NetworkSliceSubnetActivation service provider, NetworkSliceSubnetActivation service provider requests other NetworkSliceSubnetActivation service provider to activate the constituent NSSI. |  |
| **Step 4 (M)** | If an NSSI constituent is an NF managed by NF related management service provider, the NetworkSliceSubnetActivation service provider request NF related management service provider to activate the NF (e.g., activate the NF in sleep mode, turn on the ports). |  |
| **Step 5 (M)** | NetworkSliceSubnetActivation service provider receives response indicating that NSSI constituents are all activated. |  |
| **Step 6 (M)** | NetworkSliceSubnetActivation service provider activates the network slice subnet instance and sends response to its authorized consumer. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | An NSSI has been activated. |  |
| **Traceability** | REQ-PRO\_NSSI–FUN-9 |  |

### 5.1.11 Network slice subnet instance deactivation

| **Use case stage** | **Evolution/Specification** | **<<Uses>> Related use** |
| --- | --- | --- |
| **Goal** | To deactivate an existing network slice subnet instance which is active. |  |
| **Actors and Roles** | NetworkSliceSubnetActivation service consumer. For example, NSMF or NSSMF plays the role of NetworkSliceSubnetActivation service consumer. |  |
| **Telecom resources** | Network slice subnet instance NetworkSliceSubnetActivation service provider. For example, NSSMF plays the role of NetworkSliceSubnetActivation service provider. |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | An NSSI has already been created and is active. |  |
| **Begins when** | The NetworkSliceSubnetActivation service provider decides to deactivate an NSSI based on the received network slice subnet related request from its authorized customer. |  |
| **Step 1 (M)** | The NetworkSliceSubnetActivation service provider identifies the NSSI constituents that need to be deactivated. |  |
| **Step 2 (M)** | If the constituent of NSSI is managed directly by the NetworkSliceSubnetActivation service provider, NetworkSliceSubnetActivation service provider deactivates the NSSI constituent directly. |  |
| **Step 3 (M)** | If an NSSI constituent is managed by other NetworkSliceSubnetActivation service provider, the NetworkSliceSubnetActivation service provider request other NetworkSliceSubnetActivation service provider to deactivate the constituent NSSI. |  |
| **Step 4 (M)** | If an NSSI constituent is managed by NF related management service provider, NetworkSliceSubnetActivation service provider requests NF related management service provider to deactivate the NF. |  |
| **Step 5 (M)** | NetworkSliceSubnetActivation service provider receives response indicating that corresponding NSSI constituents are deactivated or not deactivated (e.g., shared constituents cannot be deactivated). |  |
| **Step 6 (M)** | NetworkSliceSubnetActivation service provider deactivates the network slice subnet instance and send response to its authorized consumer. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | A network slice subnet instance has been deactivated. |  |
| **Traceability** | REQ-PRO\_NSSI–FUN-10 |  |

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| **End of changes** |