**3GPP TSG-SA WG6 Meeting #52-bis-e S6-230064\_Rev2**

**e-meeting, 11th – 20th January 2023**

**Source: Ericsson**

**Title:** **Enhancements to the network slice optimization based on AF policy**

**Spec: 3GPP TS 23.435 v0.4.0**

**Agenda item: 8.10**

**Document for: Agreement**

**Contact: Gyorgy Rethy (**[**gyorgy.rethy@ericsson.com**](mailto:gyorgy.rethy@ericsson.com)**)**

**1. Introduction**

This pCR introduces enhancements to existing procedures and the addition of new procedures for network slice optimization based on AF policy in draft TS 23.435[1].

**2. Reason for Change**

The network slice optimization based on AF policy depends on the policy for the optimization of the slice. Currently, it has only a policy provisioning procedure defined in clause 9.5.2.1 to create a policy. It lacks ways to update the policy, delete the policy, define priority, pre-emption, and scheduling for the policies, and define default policy and reporting of the policy. These operations are critical to handling the dynamic requirements of the VAL server. Based on the policy profiles defined, the NSCE server optimizes the slice as per the procedure defined in clause 9.5.2.2 and notifies the VAL server about the success or failure of the slice optimization. Based on the current slice optimization procedure, the VAL server cannot configure a fallback policy for the failed slice optimization and find out how much time the NSCE server has taken to optimize the slice. The VAL server cannot request network slice optimization report data from the NSCE server to retrieve the details of slice optimization of the procedure defined in clause 9.5.2.2.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TS 23.435 v0.4.0.

References

[1] 3GPP TS 23.435: “Technical Specification Group Services and System Aspects; Procedures for Network Slice Capability Exposure for Application Layer Enablement Service”

\* \* \* First Change \* \* \* \*

#### 9.5.2.1 AF policy provisioning

Figure 9.5.2.1 illustrates the procedure of AF policy provisioning from the VAL server to the NSCE server.

Pre-conditions:

1. The NSCE server has information about the existing slice/slice profile/slice services which VAL server is using。



Figure 9.5.2.1: AF policy provisioning

1. VAL server sends AF policy provisioning request to NSCE server. The request contains the policy, VAL server ID, Default policy indication, and S-NSSAI. Optionally, the request contains the indicator of policy harmonization.

The VAL server can request the NSCE server to mark the provisioned policy as the default policy using the Default policy indication. The default policy should serve as an AF policy for the slices provisioned without any policy. Either the policy or default policy indication can be provided by the VAL server.

The AF policy is in form of a policy profile which contains list of trigger events associated with the parameters and expected actions. It contains priority and scheduling information with pre-emption capability for the policies. The scheduling information schedules the policy by defining the schedule (start and end time) for the policy. The pre-emption capability provides another, already successfully provisioned policy to pre-empt the scheduled policy in the scheduled period.

The supported policies are:

- Based on monitored performance metric from OAM, when the max number of PDU sessions or max number of UE is reached, trigger the slice modification with expected parameters.

- Based on monitored Network Slice load predictions from NWDAF, when Network Slice load predictions (Predicted Number of PDU Session establishments at the Network Slice) exceeds the threshold with high confidence, trigger the slice modification with expected parameters.

- Based on the monitored the time period, when getting to a certain time period (e.g. summer vacation, spring festival etc.), trigger the slice modification with expected parameters.2. The NSCE server checks whether the policy is conflict with the service profile and other pre-configured policy. One criterion is to translate the network slice parameters in the service profile to see whether it is conflict with that in the AF provided policy. If yes, the request could be rejected. The NSCE server also checks the validity of the policy (policy is valid for the specified time period or until the specified threshold count of trigger events is achieved) to avoid a ping-pong effect of slice modification. If the policy is invalid, the request could be rejected.3. If the policy harmonization is requested, the NSCE server may determine parameters harmonizing the policy if previously authorized.

Editor's note: The detail procedure of the policy harmonization is FFS.

4. NSCE server sends the AF policy provisioning response to the VAL server to indicating whether the request is successful or not. If it is successful, policy ID is provided to VAL server.

\* \* \* Next Change \* \* \* \*

#### 9.5.2.x1 AF Policy Update

Figure 9.5.2.x1 illustrates the AF policy update procedure

Pre-conditions:

1. The NSCE server has information about the existing slice/slice profile/slice services that the VAL server is using
2. The VAL server has created policies using the procedure defined in clause 9.5.2.1



Figure 9.5.2.x1-1: AF policy update

1. VAL server sends AF policy update request to NSCE server. The request shall contain the policy ID and policy modification details for updating the policy in the NSCE server. The request can update the existing default policy or specify a new default policy for the mentioned slice in the request. The policy update procedure can update the scheduling and pre-emption information for the policy.

2. If the VAL server is authorized to update the AF policy, the NSCE server checks the modification with existing policies to avoid conflict and provides the response to the VAL server.

\* \* \* Next Change \* \* \* \*

#### 9.5.2.x2 AF Policy Delete

Figure 9.5.2.x2 illustrates the AF policy delete procedure

Pre-conditions:

1. The NSCE server has information about the existing slice/slice profile/slice services that the VAL server is using
2. The VAL server has created one or more policies using the procedure defined in clause 9.5.2.1



Figure 9.5.2.x2-1: AF policy delete

1. VAL server sends AF policy delete request to NSCE server. The request contains the policy ID, and optionally default policy indication. The default policy indicates the update of the default policy in the case of a delete request for the default policy. The policy delete procedure can be used to delete one or more policies.

2. If the VAL server is authorized to update the AF policy, the NSCE server deletes the policy. In the case of a default policy delete request, the NSCE server first updates the default policy with the policy mentioned in the delete request and then deletes the old default policy. The NSCE server reports the outcome of the deletion of the requested policy with policy ID and priority for the new default policy.

\* \* \* Next Change \* \* \* \*

#### 9.5.2.x3 AF Policy Usage Reporting data

Figure 9.5.2.x3 illustrates the AF policy usage reporting data procedure

Pre-conditions:

1. The NSCE server has information about the existing slice/slice profile/slice services which VAL server is using
2. The VAL server has created one or more policies using the procedure defined in clause 9.5.2.1



Figure 9.5.2.x3-1: AF policy usage reporting data

1. VAL server sends AF policy usage reporting data subscribe request to NSCE server. The request contains the policy ID, reporting interval, and the required duration of the data.

2. The NSCE server responds with an AF policy usage reporting data subscribe response message indicating the success or failure of the subscription.

3. The NSCE server reports the policy reporting data containing the number of times the policy has been used and the duration for which the policy was active in the requested duration and details of the preemption of policies. The reporting interval enables the periodic reporting of the requested report.

\* \* \* Next Change \* \* \* \*

#### 9.5.2.2 Network slice optimization based on AF policy

Figure 9.5.2.2 illustrates the procedure of network slice optimization based on AF policy.

Pre-conditions:

1. The NSCE server is authorized to get network slice management data notification from OAM, and/or NWDAF;

2. The VAL server is authorized to the NSCE server for network slice optimization.

3. There is enough network capacity when the expected action is to expand the network slice.

4. The AF policy has been pre-configured on the VAL server.

5. The AF policy has been provided to the NSCE server as specified in clause 9.5.2.1.



Figure 9.5.2.2: Network slice optimization based on AF policy

1. VAL server sends network slice optimization subscription request to NSCE server. The request contains the policy ID indicating the different policies. Optionally the request contains the Secondary policy ID indicating the fallback policy to be used for the failed network slice optimization. The NSCE server retries the network slice optimization using a Secondary policy in the case of a failed optimization.2. The NSCE server translates the trigger event to service API(s) with necessary parameters, and subscribe to the related service if needed.

- To get the monitored performance metric from OAM, the notifyThresholdCrossing as defined in TS 28.532[7] clause 11.3.1.3 which is filled in with corresponding S-NSSAI in objectInstance could be used.

- To monitor the Network Slice load predictions from NWDAF, the NSCE server subscribe to the NWDAF prediction by using the Nnwdaf\_AnalyticsSubscription\_Subscribe or Nnwdaf\_AnalyticsInfo\_Request as defined in TS 23.288[4] clause 6.1.1, and the procedures are defined in TS 23.288[4] clause 6.3.4, and clause 6.8.

- To monitor the time period, the NSCE server setup the timer.

3. NSCE server sends the network slice optimization subscription response to the VAL server to confirm the subscription of network slice optimization.

4. Upon receiving the notification which indicating the threshold in the trigger event is met or specific time period is arrived, the NSCE server performs the expected action by triggering the slice modification as specified in the AF policy. The network slice modification could be triggered by consuming the Network Slice Provisioning service with the modifyMOIAttributes operation as specified in TS 28.531 [8]. The OAM responds back to NSCE server that the requested slice modification was successful or not. The slice modification requests contain the parameters need to be updated, including at least one of the following, uLThptPerSlice, dLThptPerSlice, maximum number of UEs, maximum number of PDU session as specified in TS 28.541 [z].

NOTE 1: The slice modification could be done by application layer network slice lifecycle management as defined in clause 9.4.

5. The NSCE server provides a network slice optimization notification to the VAL server. The successful response optionally includes the Optimization time and the Enforced policy ID. The optimization time indicates the time the NSCE server has taken to optimize the slice. The Enforced policy ID indicates which secondary policy is used by the NSCE server for slice optimization in the case of a failed attempt for network slice optimization.

NOTE 2: There is no expectation to have constant and exact mapping between slice configuration parameters and actual traffic load of the same slice.

\* \* \* Next Change \* \* \* \*

#### 9.5.2.x4 Network slice optimization report retrieval

Figure 9.5.2.x4 illustrates the Network slice optimization report retrieval procedure

Pre-conditions:

1. The NSCE server has information about the existing slice/slice profile/slice services that the VAL server is using
2. The VAL server has the created policies using the procedure defined in clause 9.5.2.1
3. The VAL server has subscribed for the network slice optimization using the procedure defined in clause 9.5.2.2



Figure 9.5.2.x4-1: Network slice optimization report retrieval

1. The VAL server sends a Network slice optimization report request to the NSCE server. The request shall contain the subscription ID, optimization result window, and optional elements like optimization result filters, sorting rules, and result size. The VAL server creates a filter using the optimization result filter for the NSCE server requesting filtered successful or failed responses. The VAL server can create additional sorting rules for the NSCE server to request sorted results based on optimization time or policy ID or slice optimization event time in ascending or descending order. The result size indicates the number of results or responses for the report.
2. The NSCE server provides the report to the VAL server as per the request of the VAL server containing optimization response, optimization time, policy ID, and Enforced Policy information.

\* \* \* Next Change \* \* \* \*

### 9.5.3 Information flows

#### 9.5.3.1 General

The following information flows are specified:

- AF policy provisioning request and response;- Network slice optimization subscription, response and notification;

- AF policy update request and response;

- AF policy delete request and response;

- AF policy usage reporting data subscribe request, response, and notification; and

- Network slice optimization report retrieval request and response.

\* \* \* Next Change \* \* \* \*

#### 9.5.3.2 AF policy provisioning request

Table 9.5.3.2-1 describes information elements for the AF policy provisioning request from the VAL server to the NSCE server.

Table 9.5.3.2-1: AF policy provisioning Request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor Identifier | M | Unique identifier of the requestor (i.e. VAL server ID). |
| Security credentials | M | Security credentials resulting from a successful authorization. |
| Requested slice information | O | Indication of the slice which is requested. |
| Requested DNN | O | Indication of the DNN which is requested. |
| Indicator of policy harmonization | O | Indicating whether the policy harmonization is requested. |
| Policy | O | The policy profile is defined in Table 9.5.3.2-2. The supported AF policies are listed in Table 9.5.3.2-3 to Table 9.5.3.2-5. |
| Default policy indication | O | Indicates the policy in the request to mark as a default policy for slices provisioned without any policy. |

Table 9.5.3.2-2 describes Policy profile of the AF policy provisioning request.

Table 9.5.3.2-2: Policy profile

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Policy | O | The name of AF policy. |
| Trigger event | M | Indicating the event that should be monitored, associated with the threshold of the monitored parameter. |
| Expected action | M | Indicating the excepted actions associated with the updated parameter. |
| Lifetime or number of events | M | Time duration or number of times the policy can take action. |
| Priority | O | Indicates the priority of the policy. |
| Scheduling period | O | Indicates the scheduling of policy in terms of time. |
| >Start time | M | Indicates the scheduled start time. |
| >End time | M | Indicates the scheduled end time. |
| Preemption | O | Indicates the pre-empt capability of the policy. |
| >Policy ID | M | Indicates the policy ID to be active in pre-empt mode. The policy referred to shall be a previously successfully provisioned policy. |

Editor's note: Whether more policies consisting of trigger events and actions could be supported is FFS.

Table 9.5.3.2-3 to Table 9.5.3.2-5 list the supported policies.

Table 9.5.3.2-3: Policy of Max number of PDU sessions/ max number of UEs

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Policy | O | Max number of PDU sessions/ max number of UEs. |
| >Trigger event | M | Threshold PDU sessions/ Threshold UEs (reached utilization of available capacity in %). |
| >Expected action | M | Modification of PDU sessions / max number of UEs (step for increase in %). |
| Lifetime or number of events | M | Time duration or number of times the policy can take action. |
| Priority | O | Indicates the priority of the policy. |
| Scheduling period | O | Indicates the scheduling of policy in terms of time. |
| >Start time | M | Indicates the scheduled start time. |
| >End time | M | Indicates the scheduled end time. |
| Preemption | O | Indicates the pre-empt capability of the policy. |
| >Policy ID | M | Indicates the policy ID to be active in pre-empt mode. The policy referred to shall be a previously successfully provisioned policy. |

Table 9.5.3.2-4: Policy of Network slice load prediction

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Policy | O | Network slice load prediction. |
| >Trigger event | M | Network Slice load predictions from NWDAF as defined in TS 23.288[4] clause 6.1.1 (exceeding utilization of available capacity in %). |
| >Expected action | M | Modification of related network slice parameters (step for increase in %). |
| Lifetime or number of events | M | Time duration or number of times the policy can take action. |
| Priority | O | Indicates the priority of the policy. |
| Scheduling period | O | Indicates the scheduling of policy in terms of time. |
| >Start time | M | Indicates the scheduled start time. |
| >End time | M | Indicates the scheduled end time. |
| Preemption | O | Indicates the pre-empt capability of the policy. |
| >Policy ID | M | Indicates the policy ID to be active in pre-empt mode. The policy referred to shall be a previously successfully provisioned policy. |

Table 9.5.3.2-5: Policy of Time period

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Policy | O | Time period. |
| >Trigger event | M | Time/day configuration where specific network slice capacity is expected. |
| >Expected action | M | Modification of slice capacity (increase or decrease in %). |
| Lifetime or number of events | M | Time duration or number of times the policy can take action. |
| Priority | O | Indicates the priority of the policy. |
| Scheduling period | O | Indicates the scheduling of policy in terms of time. |
| >Start time | M | Indicates the scheduled start time. |
| >End time | M | Indicates the scheduled end time. |
| Preemption | O | Indicates the pre-empt capability of the policy. |
| >Policy ID | M | Indicates the policy ID to be active in pre-empt mode. The policy referred to shall be a previously successfully provisioned policy. |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x1 AF policy update request

Table 9.5.3.x1-1 describes the information elements for the AF policy update request from the VAL server to the NSCE server.

Table 9.5.3.x1-1: AF policy update request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor Identifier | M | Unique identifier of the requestor (i.e. VAL server ID). |
| Requested slice information | M | Indication of the slice which is requested. |
| Policy ID | M | Identifies the provided policy. |
| Policy modification details (NOTE) | O | Describe the details for the policy update. The policy profile is defined in Table 9.5.3.2-2. The supported AF policies are listed in Table 9.5.3.2-3 to Table 9.5.3.2-5. |
| Priority (NOTE) | O | Indicates the priority of the policy. |
| Default policy indication (NOTE) | O | Indicates the default policy for slices provisioned without any policy. |
| NOTE: At least one of these information elements shall be present. | | |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x2 AF policy update response

Table 9.5.3.x2-1 describes the information elements for the AF policy update response from the NSCE server to the VAL server.

Table 9.5.3.x2-1: AF policy update response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | Indicates the success or failure of the AF policy update request. |
| >Policy ID | O  (see NOTE 1) | Identifies the provided policy. |
| >Updated Default policy indication | O  (see NOTE 2) | Indicates the update of default policy. |
| >Cause | O  (see NOTE 3) | Indicates the cause of the failure. |
| NOTE 1: Shall be present if the result is success and shall not be present otherwise.  NOTE 2: May only be present if the result is success.  NOTE 3: May only be present if the result is failure. | | |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x3 AF policy delete request

Table 9.5.3.x3-1 describes the information elements for the AF policy delete request from the VAL server to the NSCE server.

Table 9.5.3.x3-1: AF policy delete request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Policy ID | M | Identifies the provided policy for delete. |
| Update Default policy indication | O | Indicates the update of default policy. |
| >Policy ID | M | Identifies the provided policy. |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x4 AF policy delete response

Table 9.5.3.x4-1 describes the information elements for the AF policy delete response from the NSCE server to the VAL server.

Table 9.5.3.x4-1: AF policy delete response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | Indicates the success or failure of the AF policy delete request. |
| >Updated default policy | O  (see NOTE 1) | Policies with updated priority values. |
| >>Policy ID | M | Identifies the provided policy. |
| >>Priority | O | Indicates the updated priority values. |
| >Cause | O  (see NOTE 2) | Indicates the cause of the failure. |
| NOTE 1: May only be present if the result is success.  NOTE 2: May only be present if the result is failure. | | |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x5 AF policy usage reporting data subscribe request

Table 9.5.3.x5-1 describes information elements for the AF policy usage reporting data subscribe request from the VAL server to the NSCE server.

Table 9.5.3.x5-1: AF policy usage reporting data subscribe request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor Identifier | M | Unique identifier of the requestor (i.e. VAL server ID). |
| Requested slice information | M | Indication of the slice which is requested. |
| Requested policy reporting data | M | Indicates the request for policy reporting data. |
| >Policy ID | M | Identifies the provided policy. |
| >Start time | M | Indicates start time for the policy reporting data. |
| >End time | M | Indicates end time for the policy reporting data. |
| Reporting interval | O | Indicates the policy report data reporting interval. |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x6 AF policy usage reporting data subscribe response

Table 9.5.3.x6-1 describes information elements for the AF policy usage reporting data subscribe response from the NSCE server to the VAL server.

Table 9.5.3.x6-1: AF policy usage reporting data subscribe response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | Indicates the success or failure of the AF policy usage reporting data subscribe request. |
| >Subscribe ID | O  (see NOTE 1) | Identifies the AF policy reporting subscribe event. |
| >Cause | O  (see NOTE 2) | Indicates the cause of the failure. |
| NOTE 1: Shall be present if the result is success and shall not be present otherwise  NOTE 2: May only be present if the result is failure. | | |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x7 AF policy usage reporting data notification

Table 9.5.3.x7-1 describes information elements for the AF policy usage reporting data notification from the NSCE server to the VAL server.

Table 9.5.3.x7-1: AF policy usage reporting data notification

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Subscribe ID | M | Identifies the AF policy usage reporting subscribe request. |
| Policy reporting data | M | Indicates the requested AF policy reporting data. |
| >Policy ID | M | Identifies the provided policy. |
| >Policy count | M | Indicates the number of times the policy is active. |
| >Policy time spent | M | Indicates the duration for usage of policy. |
| >Pre-empt count | O | Indicates the number of times the policy is premept with another policy. |
| >Pre-empt policy ID | O | Indicates the policy used for pre-emption. |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.4 Network slice optimization subscription request

Table 9.5.3.4-1 describes information elements for the Network slice optimization subscription request from the VAL server to the NSCE server.

Table 9.5.3.4-1: Network slice optimization subscription request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor Identifier | M | Unique identifier of the requestor (i.e. VAL server ID). |
| Security credentials | M | Security credentials resulting from a successful authorization for the NSCE service. |
| Notification Target Address | O | The Notification Target Address (e.g. URL) where the notifications destined for the requestor should be sent to. |
| Requested slice information | O | Indication of the slice which is requested. |
| Requested DNN | O | Indication of the DNN which is requested. |
| Policy ID | O | Identifies the AF Policy. |
| Proposed expiration time | O | Proposed expiration time for the subscription. |
| Secondary policy ID | O | Secondary policy act as a fallback policy for the network slice optimization in the case of a failed network slice optimization. |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.6 Network slice optimization notification

The information elements specified in the table 9.5.3.6-1 is used for the Network slice optimization notification sent from the NSCE server to the VAL server.

Table 9.5.3.6-1: Network slice optimization notification

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Successful response (NOTE) | O | Indicates that the Network slice optimization request was successful. |
| >Subscribe ID | M | Identifies the Network slice optimization subscribe event. |
| >Network slice information | M | Network slice information (i.e. NEST) with network slice identifier(i.e. S-NSSAI) |
| >Optimization time | O | Indicates time spent for slice optimization by the NSCE Server. |
| >Enforced policy ID | O | Indicates the policy used for slice optimization in the case of the failed network slice optimization. |
| Failure response (NOTE) | O | Indicates that the Network slice optimization request failed. |
| >Cause | O | Indicates the cause of Network slice optimization request failure |
| NOTE: One of these IEs shall be present in the message. | | |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x8 Network slice optimization report retrieval request

Table 9.5.3.x8-1 describes information elements for the Network slice optimization report retrieval request from the VAL server to the NSCE server.

Table 9.5.3.x8-1: Network slice optimization report retrieval request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Subscribe ID | M | Identifies the Network slice optimization subscribe event. |
| Optimization result filter | O | Filter for network slice optimization responses (successful or failure). The default value is successful responses. |
| Optimization result sort | O | Sort optimization results based on slice optimization event time or optimization time, or policy ID. The default value is Optimization time. |
| >Sort type | O | Indicate sort type (ascending or descending). The default value is ascending. |
| >Optimization result size | O | Indicate the number of results of network slice optimization responses. The default value is 1. |
| Optimization result window | M | Indicates the time duration window for the report. |
| >Start time | M | Indicates the start time for generating the report. |
| >End time | M | Indicates the end time to finish the capture of the report. |

\* \* \* Next Change \* \* \* \*

#### 9.5.3.x9 Network slice optimization report retrieval response

Table 9.5.3.x9-1 describes information elements for the Network slice optimization report retrieval response from the NSCE server to the VAL server.

Table 9.5.3.x9-1: Network slice optimization report retrieval response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Optimization report results | M | Report results based on the network slice optimization request. |
| >Subscribe ID | M | Identifies the Network slice optimization subscribe event. |
| >Optimization response | M | Indicates network slice optimization response as per the filter in the request. |
| >Optimization time | M | Indicates time spent for slice optimization by the NSCE Server. |
| >Policy ID | O | Identifies the AF Policy. |
| >Enforced policy ID | O | Indicates the policy used for slice optimization in the case of the failed network slice optimization. |

\* \* \* Next Change \* \* \* \*

### 9.5.4 APIs

#### 9.5.4.1 General

Table 9.5.4.1-1 illustrates the API for Network slice optimization based on AF policy.

Table 9.5.4.1-1: Network slice optimization based on AF policy

|  |  |  |  |
| --- | --- | --- | --- |
| API Name | API Operations | Operation  Semantics | Consumer(s) |
| SS\_AFPolicyManagement | AF\_Policy\_Provisioning | Request/Response | VAL server |
| AF\_Policy\_Update | Request/Response |
| AF\_Policy\_Delete | Request/Response |
| AF\_Policy\_Usage\_Reporting\_Data\_Subscribe | Subscribe/Notify |
| AF\_Policy\_Usage\_Reporting\_Data\_Notification |
| SS\_NSOptimization | NS\_Optimization\_Subscription | Subscribe/Notify | VAL server |
| NS\_Optimization\_Notification |
| NS\_Optimization\_Report\_Retrieval | Request/Response |

\* \* \* Next Change \* \* \* \*

#### 9.5.4.2 AF\_Policy\_Provisioning operation

**API operation name:** AF\_Policy\_Provisioning

**Description:** The consumer subscribes for AF Policy Provisioning.

**Inputs:** See clause 9.5.3.2.

**Outputs:** See clause 9.5.3.3*.*

See clause 9.5.2.1 for details of usage of this operation.

#### 9.5.4.6 NS\_Optimization\_Subscribe operation

**API operation name:** NS\_Optimization\_Subscribe

**Description:** The consumer request for Network Slice Optimization.

**Inputs:** See clause 9.5.3.4.

**Outputs:** See clause 9.5.3.5*.*

See clause 9.5.2.2 for details of usage of this operation.

#### 9.5.4.3 NS\_Optimization\_Notification operation

**API operation name:** NS\_Optimization\_Notification

**Description:** The consumer is notified with result of Network Slice Optimization.

**Inputs:** See clause 9.5.3.6.

**Outputs:** None

See clause 9.5.2.2 for details of usage of this operation.

#### 9.5.4.x1 AF\_Policy\_Update operation

**API operation name:** AF\_Policy\_Update

**Description:** Providing the policy update to the NSCE server.

**Inputs:** Refer subclause 9.5.3.x1.

**Outputs:** Refer subclause 9.5.3.x2*.*

See subclause 9.5.2.x1 for details of the usage of this operation.

#### 9.5.4.x2 AF\_Policy\_Delete operation

**API operation name:** AF\_Policy\_Delete

**Description:** Requesting policy delete to the NSCE server.

**Inputs:** Refer subclause 9.5.3.x3.

**Outputs:** Refer subclause 9.5.3.x4*.*

See subclause 9.5.2.x2 for details of the usage of this operation.

#### 9.5.4.x3 AF\_Policy\_Usage\_Reporting\_Data\_Subscribe operation

**API operation name:** AF\_Policy\_Usage\_Reporting\_Data\_Subscribe

**Description:** Subscription to the AF policy usage reporting data.

**Inputs:** Refer subclause 9.5.3.x5.

**Outputs:** Refer subclause 9.5.3.x6*.*

See subclause 9.5.2.x3 for details of the usage of this operation.

#### 9.5.4.x4 AF\_Policy\_Usage\_Reporting\_Data\_Notification operation

**API operation name:** AF\_Policy\_Usage\_Reporting\_Data\_Notification

**Description:** AF policy usage reporting data notification to the existing subscription.

**Inputs:** Refer subclause 9.5.3.x7.

**Outputs:** None

See subclause 9.5.2.x3 for details of the usage of this operation.

#### 9.5.4.x5 NS\_Optimization\_Report\_Retrieval operation

**API operation name:** NSOptimizationReportRetrieval

**Description:** Providing the network slice optimization report to the VAL server.

**Inputs:** Refer subclause 9.5.3.x8.

**Outputs:** Refer subclause 9.5.3.x9*.*

See subclause 9.5.2.x4 for details of the usage of this operation.

\* \* \* End of Changes \* \* \* \*