UDM Integration

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Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Product(s) or Functional Area	SMI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2020.02.2

Feature Description

The Unified Data Management (UDM) is responsible for primarily storing the subscriber data, which SMF accesses for managing the user sessions on the network. The SMF explicitly subscribes to receive the notifications about the events that occur in the subscriber data such session terminate.

The N10 interface is between Unified Data Management (UDM) and SMF (Session Management Function). The UDM provides the following services to SMF via the Nudm interface:

- Nudm_SubscriberDataManagement Service
- Nudm_UEContextManagement Service

How it Works

This section describes how this feature works.

When the SMF skips UDM subscription, then it stops sending the following messages:

- Fetch-Subscription during session establishment
- Subscribe-for-Notification during session establishment
- Unsubscribe-to-Notification during session release and when the UDCM receives the UECM messages

The SMF allows any dynamic changes to the UDM subscription skip configuration. That is, new value is applicable for the new session being established. The existing sessions continue to use the old values.

Configuring UDM

This section provides all the configurations related to UDM:

Configuring Options for Controlling SDM Messages

This section describes how to configure controlling Subscription Data Management (SDM) messages over the N10 interface.

Configuring RAT Type

To configure the RAT type with the local authorization under the DNN profile, use the following sample configuration:

```
config
   profile dnn dnn_profile
      authorization local rat-type [ nr | eutra | wlan ]
      end
```

NOTES:

- **authorization local**: This command skips the SDM messages for EPS sessions only. Upon configuring this command under the selected DNN profile, the SMF skips the UDM interaction for fetch subscription. The SMF uses the values received in the Create Session Request message. The SMF skips the UDM interaction to receive 'Subscribe-for-Notifications' from the UDM.
- **rat-type [nr | eutra | wlan]**: This keyword skips the following SDM messages based on the specified RAT type.
  - udm subscription-fetch
  - subscribe-to-notifications
  - unsubscribe-to-notifications

  Upon configuring the RAT type with **authorization local** command in the selected DNN profile, then for sessions on that RAT-type, the SMF skips the UDM interaction for the following messages:
  - udm subscription-fetch during session establishment
  - subscribe-for-notifications during session establishment
  - unsubscribe-for-notifications during session release
- **no authorization local rat-type [nr | eutra | wlan]**: Disables the local authorization under the DNN profile.

Configuration Verification

To verify the configuration, use the **show running-config profile dnn** *dnn_profile_name* command.

The output of this show command displays all the configurations including the RAT type information that is configured within the specified DNN profile.

```
[smf] smf# show running-config profile dnn intershat
profile dnn intershat
network-element-profiles chf chf1
network-element-profiles amf amf1
network-element-profiles pcf pcf1
network-element-profiles udm udm1
charging-profile chgprf1
virtual-mac b6:6d:47:47:47:47
ssc-mode 2 allowed [ 3 ]
session type IPV6 allowed [ IPV6 ]
authorization local rat-type nr
upf apn intershat
dcnr true
exit
```

Configuring Session Type

The SMF uses both subscription type data from UDM response and the session type configuration in DNN profile to allow or reject the call. The SMF selects the session type based on the initial look up of UE-requested PDN type in the UDM subscription data. Then, the SMF provisions session type for the session based on the selected session type and the session type configured in the DNN profile.

To configure the PDU session type in DNN profile, use the following sample configuration.

```
config
   profile dnn dnnprofile
```

```
      session type { IPV4 | IPV4V6 | IPV6 } allowed [ IPV4 | IPV4V6 |
IPV6 ]
      end
```

NOTES:

- **session type { IPV4 | IPV4V6 | IPV6 } allowed [IPV4 | IPV4V6 | IPV6]**: Specify the IP type for the PDU session. The **allowed** keyword allows you to specify two IP types other than the default session type.
- The SMF uses this session type configuration to process the call. For example, if the UE requested type is IPv4 and the UDM subscription type is IPv4v6, the SMF selects IPv4 in the first pass and subsequently checks against the session type configuration. If the configured session type is IPv6, then the SMF rejects the call with a cause "#51 - PDU session type IPv6 only= IPV4 allowed".
- If the IPAM configuration includes the IP address pool that is different from the finally selected PDU session type, the SMF rejects the call with a cause "#31 - request rejected, unspecified". For example, this cause value will be generated under the following conditions:
  - UeReq-PdnType = V4
  - UdmSubscription-PdnType = V4V6
  - SessionType-Config = V4V6
  - IP-Pool = V6

Configuration Verification

To verify the configuration, use the **show running-config profile dnn** *dnn_profile_name* command.

The output of this show command displays all the configurations including the session type information that is configured within the specified DNN profile.

```
[smf] smf# show running-config profile dnn intershat
profile dnn intershat
network-element-profiles chf chf1
network-element-profiles amf amf1
network-element-profiles pcf pcf1
network-element-profiles udm udm1
charging-profile chgprf1
virtual-mac b6:6d:47:47:47:47
ssc-mode 2 allowed [ 3 ]
session type IPV6 allowed [ IPV6 ]
upf apn intershat
dcnr true
exit
```

Configuration-based Control of Subscription Messages

Feature Description

The Unified Data Management (UDM) is responsible for primarily storing the subscriber data, which SMF accesses for managing the user sessions on the network. The SMF explicitly subscribes to receive the notifications about the events that occur in the subscriber data such session terminate. When the SMF wants

to stop receiving the notifications, it initiates the Unsubscribe-to-Notification messages to UDM. Upon receiving these messages, the UDM cancels the subscription by removing the notification subscription for the subscribed session.

Note The SMF does not receive notification when the UDM-triggered subscription change is observed. However, for UDM-triggered session terminations, the SMF receives notifications from UDM.

How it Works

This section provides a overview of how the SMF and UDM communicate over the Unsubscribe-to-Notifications message:

1. The NF, such as SMF, sends an Unsubscribe-to-Notifications request to the resource identified by the URI to the UDM. The SMF transacts the request to the UDM over the N10 interface. The Unsubscribe-to-Notifications request allows the SMF unsubscribe from notifications for a specific subscriber session. The SMF receives the URI details during the subscription creation process.

   The Unsubscribe-to-Notifications request contains the ‘SUPI’ and ‘subscriptionId’ in the URI.

2. The UDM processes the request, and based on the response; it sends a response code to the SMF. For example, if the unsubscription is successful, then UDM sends 204 code. If the request is not processed, then the appropriate HTTP status code indicating the error is returned in the response body along with the additional error information.

3. The SMF handles the timeout and failure that occurs when sending the Unsubscribe-to-Notifications messages to the UDM. In case the Unsubscribe-to-Notifications request fails, the SMF continues to purge the corresponding sessions.

   The Unsubscribe-to-Notification message is required for sessions that are hosted on the EUTRA network. Being on this network may not be a requirement for sessions that are released on the NR and WLAN network. For these access types, the SMF sends the UDM registration and deregistration messages that include subscription to notifications through implicit-unsubscribe during the deregistration.

Standards Compliance

The Support for the Unsubscribe-To-Notifications Messages feature complies with the following standards:

- *3GPP TS 29.503 - 5G System; Unified Data Management Services*

Call Flows

This section describes the call flow for the Unsubscribe-To-Notifications message support.

Unsubscribe-to-Notifications Call Flow

This section describes the call flow on how the SMF sends a request to the UDM to unsubscribe from notifications of data changes.

Figure 1: Unsubscribe-to-Notifications Communication with UDM

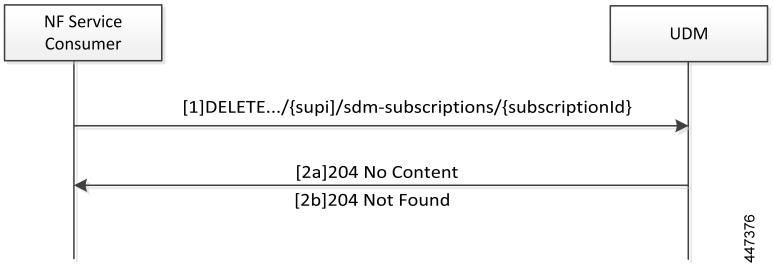

Table 3: Unsubscribe-to-Notifications Communication Call Flow Description

Step	Description
1	The NF service consumer, such as SMF, sends a request to the UDM to unsubscribe from notifications. By unsubscribing, the UDM no longer sends notifications to SMF when the data modifications occur in the respective subscriber session. The NF service consumer sends a DELETE request to the resource identified by the URI. The NF service consumer receives the URI when the subscription gets created.
2a	If the deletion of request is successful, the UDM responds with "204 No Content".
2b	If the subscription is invalid, which can be due to an unknown subscriptionId value, then the HTTP status code "404 Not Found" is returned along with the additional error information in the response body (as part of the "ProblemDetails" element). If the request is not processed, then the appropriate HTTP status code indicating the error is returned in the DELETE response body along with the additional error information.

OAM Support for the Unsubscribe-To-Notifications Messages

This section describes operations, administration, and maintenance information for this feature.

Statistics Support

The SMF maintains the following labels on the smf-rest-ep pod for monitoring the number of unsubscribe-to-notifications messages that are initiated towards UDM:

- nfType – “udm”
- messageDirection – “outbound”
- apiName – “sdm_unsubscription_req”
- nfUri – “nf_uri”
- respStatus – “response_status”
- rspCause – “response_cause”