

Handling the Network Provided Location Information Requests

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Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Products or Functional Area	PCF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
Enhancement introduced. PCF supports N5 Interface.	2022.02.0
First introduced.	2020.05.0

Feature Description

The Network Provided Location Information (NPLI) service is responsible for retrieving the access network information in the IMS network architecture. Depending on the service operator's policy configuration and subscription, the NPLI service fetches the UE time zone information and the user location information from the access network.

The PCF provides the NPLI information over the Rx or N5 interface to the Application Function (AF) based on the response that it receives from SMF over the N7 interface.

How it Works

This section describes how this feature works.

The AF initiates a request toward the PCF to provide the network information.

For AF supporting Rx interface, the request is sent over Rx through the Required-Access-Info AVP. When the Access Network Information is available the SMF provides the required Access Network Information to the PCF within the 3GPP-User-Location-Info AVP or 3GPP-MS-TimeZone AVP or both as requested.

For AF supporting N5 interface, the request is sent over N5 interface by subscribing to AF event ANI_REPORT and specifying the required access network information (user location or user time zone information).

Upon receiving the request, PCF triggers an N7 Update Notify request with ‘Access Network Info’ event trigger (if not already subscribed for) towards SMF. The SMF responds to PCF with the required information, which PCF further forwards to the AF.

When the SMF responds with ServingNetwork attribute instead of UserLocationInfo, then to set the Mobile Country Codes (MCC) and Mobile Network Code (MNC) ensure that the NetLoc features is enabled. For information on how to enable the NetLoc, see Enabling the NetLoc Feature, on page 15 .

For Rx interface, PCF provides the following information during an ACCESS_NETWORK_INFO_REPORT event trigger within the Event-Trigger AVP:

- 3GPP-User-Location-Info AVP (If available)
- User-Location-Info-Time AVP (If available)
- 3GPP-SGSN-MCC-MNC AVP (If the location information is not available) or 3GPP-MS-TimeZone AVP or both.

For N5 interface, PCF provides the following information which includes notification for AF event ANI_REPORT:

- 3GPP User Location Information (If available and required)
- Serving Network Identity (If user location is required and not available)
- UE Timezone (If available and required)

Considerations

This section defines the considerations that apply for successful handling of the NPLI requests:

- For Rx Interface, navigate to **Policy Builder > Diameter Clients > Rx Client**, set the **STA Hold Time Ms** parameter to maximum duration of 3000 milliseconds. The parameter indicates the duration by which the STA is held back.
- For N5 Interface, navigate to **Policy Builder > SBA Profiles > N5 Profiles**, set the **N5 Delete Response Hold Time Ms** parameter to maximum duration of 3000 milliseconds. The parameter indicates the duration by which the N5 Delete response is held back.

A lower timer value minimizes the performance impact that occurs when AF and PCF continue to wait for a response from each other and eventually timeout.

Call Flows

This section describes the key call flows for this feature.

NPLI in Rx RAR Call Flow

This section describes the NPLI in Rx RAR call flow.

Figure 1: NPLI in Rx RAR Call Flow

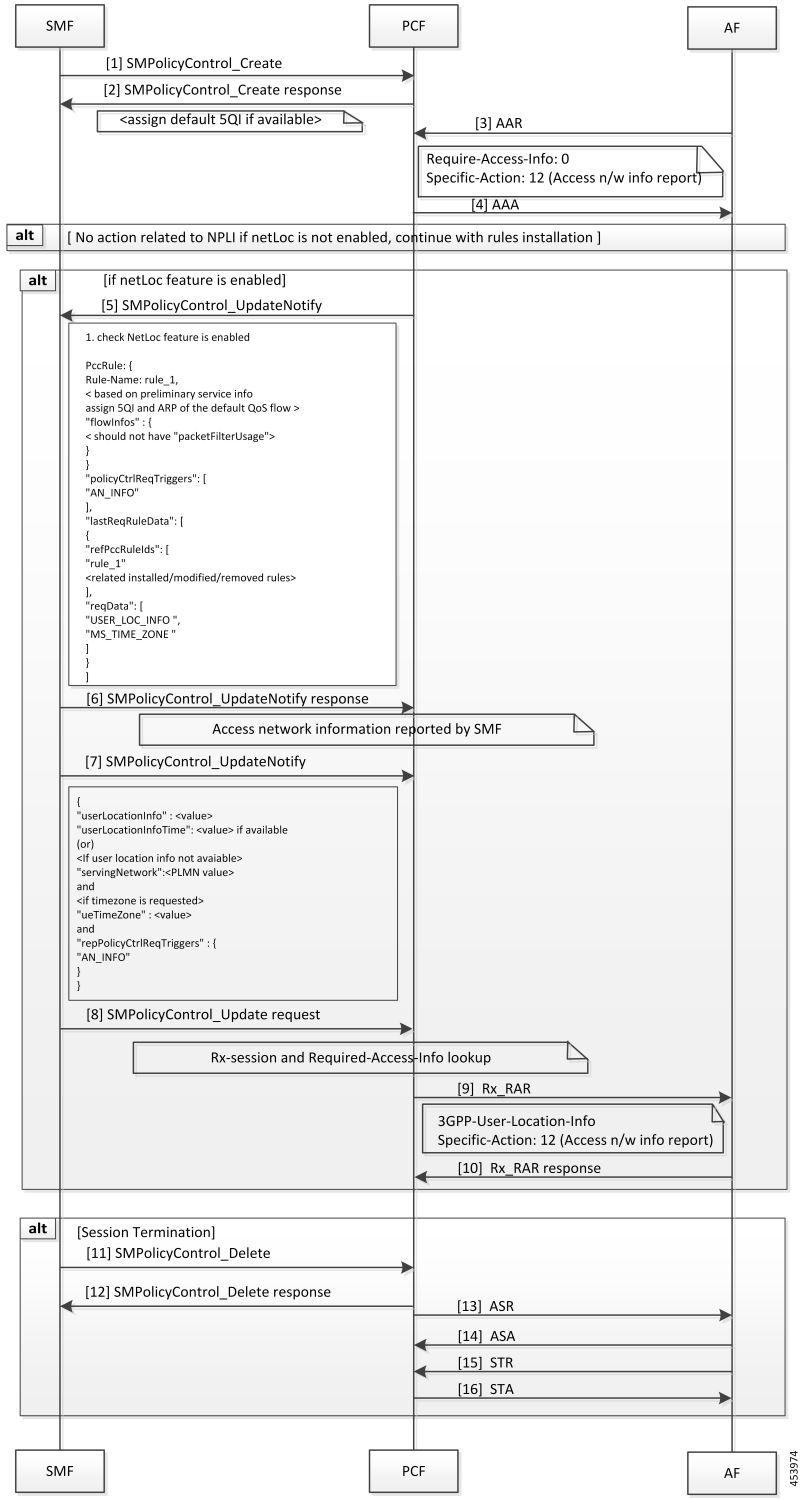


Table 3: NPLI in Rx RAR Call Flow Description

Step	Description
1	The SMF sends a SMPolicyControl_Ceate request to the PCF.
2	The PCF responds to the SMPolicyControl_Create request.
3	The AF sends an Authenticate-Authorize-Request (AAR) message to the PCF. The message contains Required-Access-Info AVP requesting the access network information required for the AF session.
4	The PCF sends the AAA request to the AF.
5	If the NetLoc feature is enabled, then the PCF sends an SMPolicyControl_UpdateNotify request toward the SMF.
6	In response to the SMPolicyControl_UpdateNotify request, the SMF sends the access network information to the PCF.
7	The PCF sends the SMPolicyControl_Update request to the SMF.
8	The SMF sends the SMPolicyControl_Update request to the PCF.
9	After the establishing the Rx-session and the Required-Access-Info lookup, the PCF sends the Rx Re-Authorization Request message to the AF.
10	The AF sends the Rx Re-Authorization Request response containing the 3GPP-User-Location-Info AVP and access network information report to the PCF.
11	If the session terminates, the SMF sends a SMPolicyControl_Delete request to the PCF.
12	The PCF responds to SMF for the SMPolicyControl_Delete request.
13	The PCF sends the Abort-Session-Request message to the AF.
14	The AF responds with the Abort-Session-Answer to the PCF.
15	The AF sends the Session-Termination-Request to the PCF.
16	The PCF responds with the Session-Termination-Answer message to the AF.

NPLI in Rx STA Call Flow

This section describes the NPLI in Rx STA call flow.

Figure 2: NPLI in Rx STA Call Flow

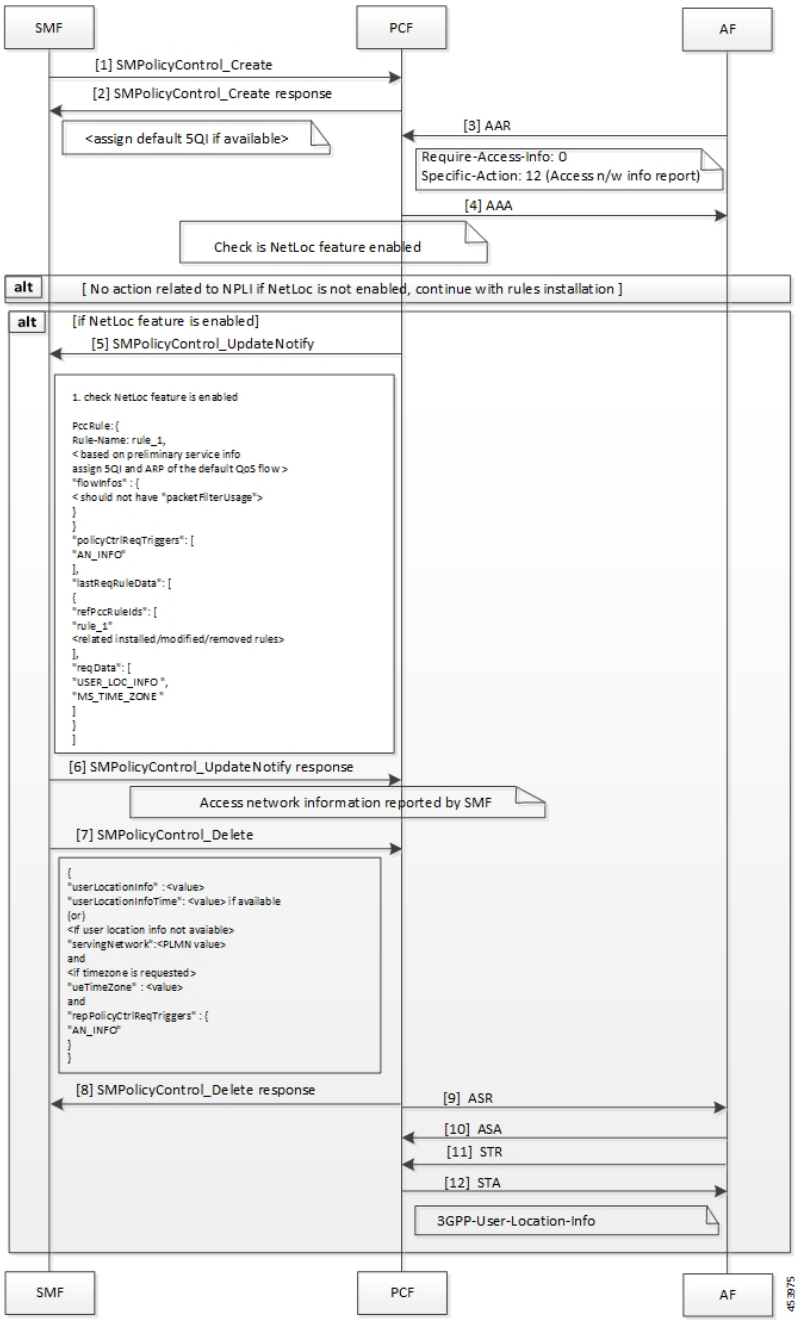


Table 4: NPLI in Rx STA Call Flow Description

Step	Description
1	The SMF sends a SMPolicyControl_Ceate request to the PCF.
2	The PCF responds with the SMPolicyControl_Create response to the SMF.

Step	Description
3	The AF sends an Authenticate-Authorize-Request message to the PCF. The message contains Required-Access-Info AVP requesting the access network information required for the AF session.
4	The PCF responds with an AA-Answer message to the AF.
5	If the NetLoc feature is enabled, the PCF sends the SMPolicyControl_UpdateNotify request to the SMF.
6	The SMF responds with the SMPolicyControl_UpdateNotify message to the PCF. This message contains the access network information.
7	The SMF sends the SMPolicyControl_Delete request to the PCF.
8	The PCF responds to the SMF with the SMPolicyControl_Delete message.
9	The PCF sends the Abort-Session-Request message to the AF.
10	The AF responds with the Abort-Session-Answer to the PCF.
11	The AF sends the Session-Termination-Request to the PCF.
12	The PCF responds with the Session-Termination-Answer message to the AF. This message contains the user location information.

Required Access Information in STR Call Flow

This section describes the Required Access Information in STR call flow.

Figure 3: Required Access Information in STR Call Flow

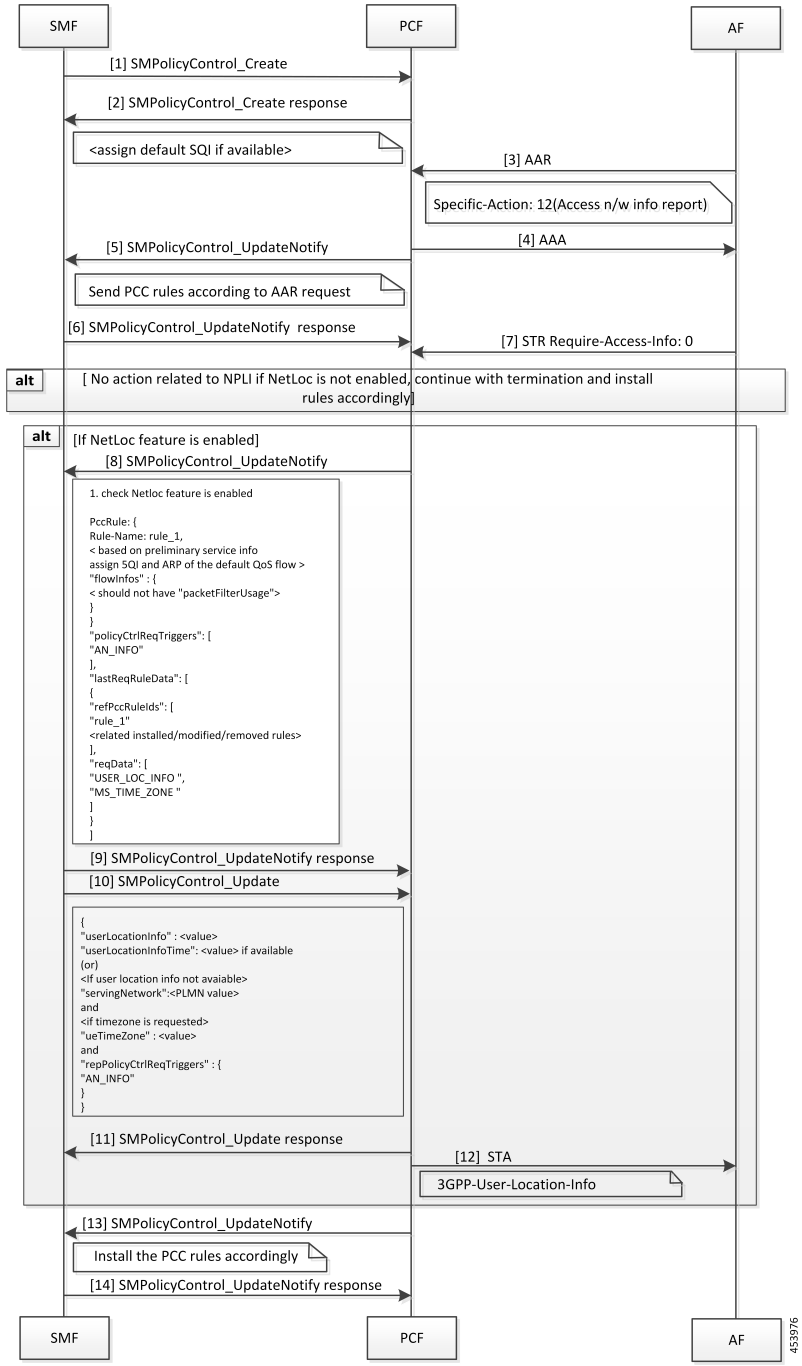


Table 5: Required Access Information in STR Call Flow Description

Step	Description
1	The SMF sends an SMPolicyControl_Create request to the PCF.

Step	Description
2	The PCF responds to the SMF with the SMPolicyControl_Create response.
3	The AF sends the Specific-Action: 12 (Access n/w info. report) message to the PCF.
4	The PCF sends an AA-Answer message to the AF.
5	The PCF sends an SMPolicyControl_UpdateNotify request to the SMF.
6	The SMF sends PCC rules as requested in the Authenticate-Authorize-Request in the SMPolicyControl_UpdateNotify response to the PCF.
7	The AF sends a Session-Termination-Request to PCF to retrieve the Required-Access-Info AVP.
8	If the NetLoc feature is enabled, the PCF sends as SMPOlicyControl_UpdateNotify request to the SMF.
9	The SMF sends an SMPOlicyControl_UpdateNotify response to the PCF.
10	The SMF sends an SMPOlicyControl_Update request to the PCF.
11	The PCF sends a response for the SMPOlicyControl_Update request to the SMF.
12	The PCF sends the Session-Termination-Answer message to the AF with the user location information.
13	The PCF sends the SMPolicyControl_UpdateNotify request to the SMF.
14	On installing the PCC rules, the SMF sends SMPolicyControl_UpdateNotify response to the PCF.

NPLI in N5 Notify Call Flow

This section describes the NPLI in N5 Notify call flow.

Figure 4: NPLI in N5 Notify Call Flow

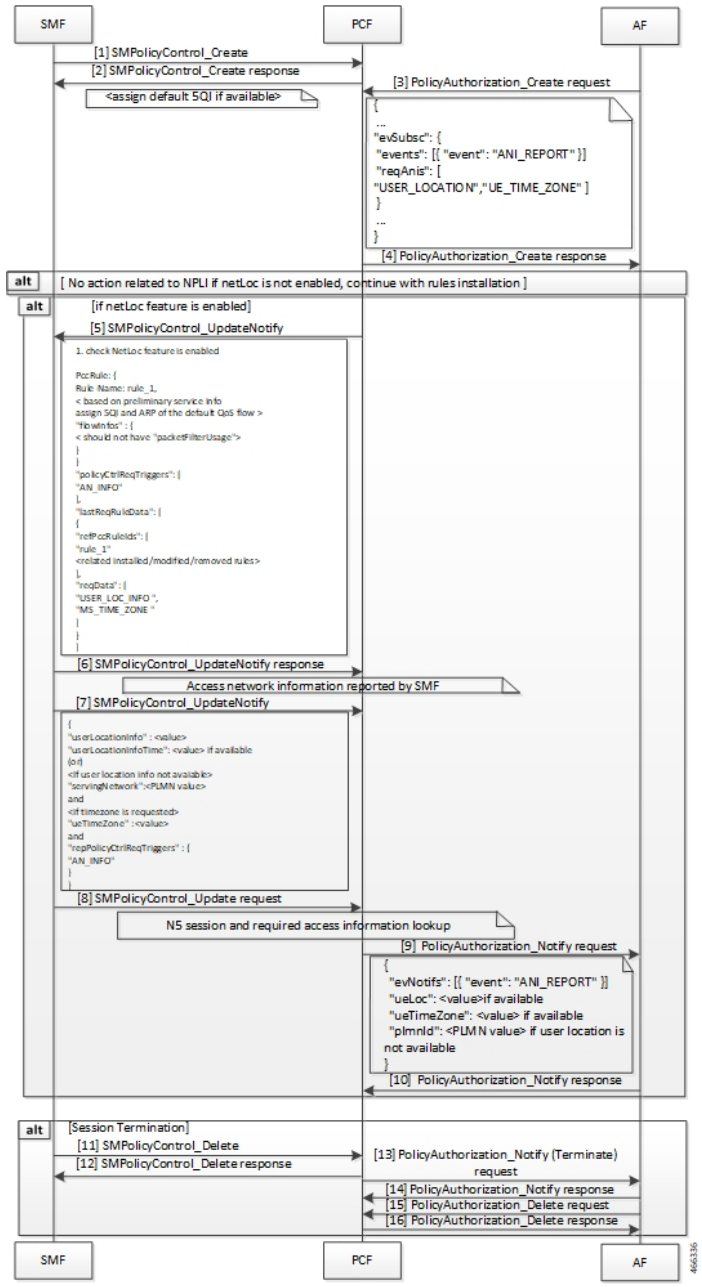


Table 6: NPLI in N5 Notify Call Flow Description

Step	Description
1	The SMF sends a SMPolicyControl_Ceate request to the PCF.
2	The PCF responds to the SMPolicyControl_Create request.

Step	Description
3	The AF sends an PolicyAuthorization_Create request to the PCF. The request contains the access network information required for the AF session.
4	The PCF sends the PolicyAuthorization_Create response to the AF.
5	If the NetLoc feature is enabled, then the PCF sends an SMPolicyControl_UpdateNotify request toward the SMF.
6	In response to the SMPolicyControl_UpdateNotify request, the SMF sends the access network information to the PCF.
7	The PCF sends the SMPolicyControl_Update request to the SMF.
8	The SMF sends the SMPolicyControl_Update request to the PCF.
9	After the establishing the N5 session and the required access information lookup, the PCF sends the PolicyAuthorization_Notify request to the AF containing access network information report with 3GPP user location, UE Timezone and serving network PLMN ID if available
10	The AF sends the PolicyAuthorization_Notify response to the PCF.
11	If the session terminates, the SMF sends a SMPolicyControl_Delete request to the PCF.
12	The PCF responds to SMF for the SMPolicyControl_Delete request.
13	The PCF sends the PolicyAuthorization_Notify (Terminate) request to the AF.
14	The AF responds with the PolicyAuthorization_Notify response to the PCF.
15	The AF sends the PolicyAuthorization_Delete request to the PCF.
16	The PCF responds with the PolicyAuthorization_Delete response to the AF.

NPLI in N5 Delete Response Call Flow

This section describes the NPLI in N5 Delete Response call flow.

Figure 5: NPLI in N5 Delete Response Call Flow

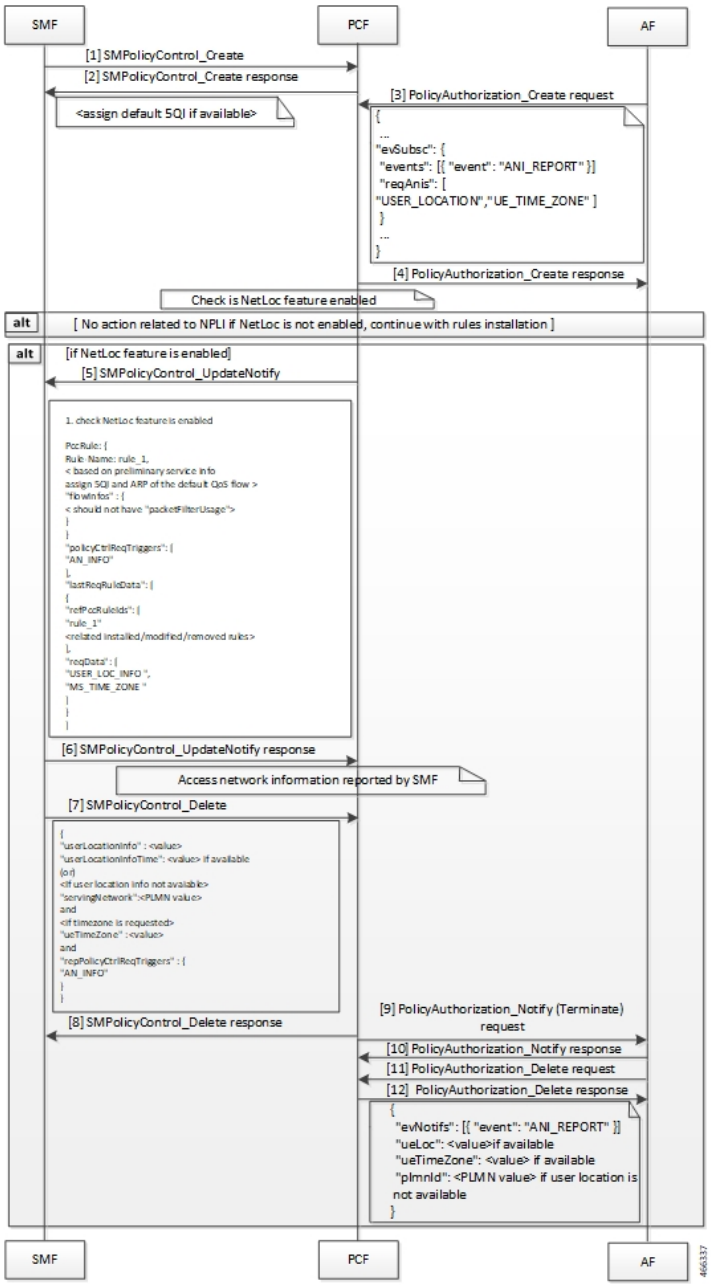


Table 7: NPLI in N5 Delete Response Call Flow Description

Step	Description
1	The SMF sends a SMPolicyControl_Ceate request to the PCF.
2	The PCF responds with the SMPolicyControl_Create response to the SMF.

Step	Description
3	The AF sends a PolicyAuthorization_Create request to the PCF. The request contains the access network information required for the AF session.
4	The PCF responds with an PolicyAuthorization_Create response to the AF.
5	If the NetLoc feature is enabled, the PCF sends the SMPolicyControl_UpdateNotify request to the SMF.
6	The SMF responds with the SMPolicyControl_UpdateNotify message to the PCF. This message contains the access network information.
7	The SMF sends the SMPolicyControl_Delete request to the PCF.
8	The PCF responds to the SMF with the SMPolicyControl_Delete message.
9	The PCF sends the PolicyAuthorization_Notify (Terminate) request to the AF.
10	The AF responds with the PolicyAuthorization_Notify response to the PCF.
11	The AF sends the PolicyAuthorization_Delete request to the PCF.
12	The PCF responds with the PolicyAuthorization_Delete response to the AF. This response contains the user location information.

Required Access Information in N5 Delete Request Call Flow

This section describes the Required Access Information in N5 Delete Request call flow.

Figure 6: Required Access Information in N5 Delete Request Call Flow

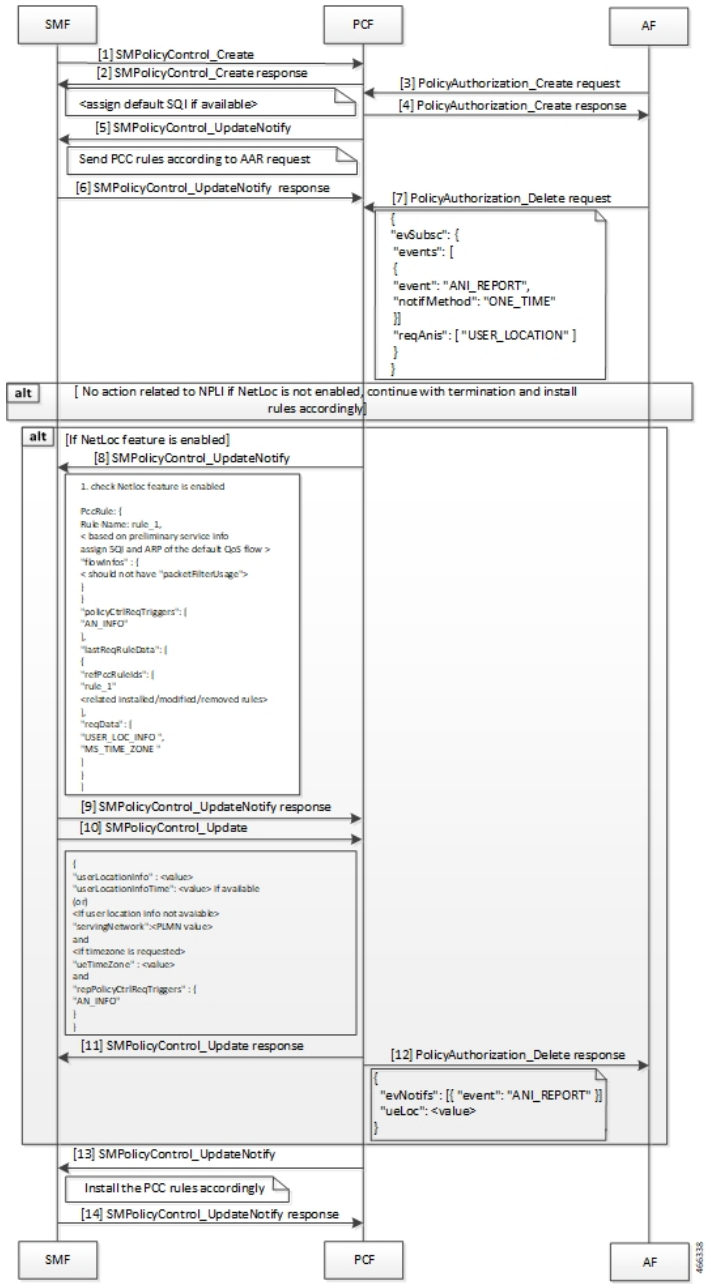


Table 8: Required Access Information in N5 Delete Request Call Flow Description

Step	Description
1	The SMF sends an SMPolicyControl_Create request to the PCF.
2	The PCF responds to the SMF with the SMPolicyControl_Create response.
3	The AF sends a PolicyAuthorization_Create request to the PCF.

Step	Description
4	The PCF sends a PolicyAuthorization_Create response to the AF.
5	The PCF sends an SMPolicyControl_UpdateNotify request to the SMF.
6	The SMF sends PCC rules as requested in the Authenticate-Authorize-Request in the SMPolicyControl_UpdateNotify response to the PCF.
7	The AF sends a PolicyAuthorization_Delete request to PCF to retrieve the required access network information.
8	If the NetLoc feature is enabled, the PCF sends as SMPOlicyControl_UpdateNotify request to the SMF.
9	The SMF sends an SMPOlicyControl_UpdateNotify response to the PCF.
10	The SMF sends an SMPOlicyControl_Update request to the PCF.
11	The PCF sends a response for the SMPOlicyControl_Update request to the SMF.
12	The PCF sends the PolicyAuthorization_Delete response to the AF with the user location information.
13	The PCF sends the SMPolicyControl_UpdateNotify request to the SMF.
14	On installing the PCC rules, the SMF sends SMPolicyControl_UpdateNotify response to the PCF.

Enabling the NetLoc Feature

This section describes how to enable the NetLoc feature that supports the Access Network Information Reporting in 5G.

To enable the NetLoc feature, in the initial N7 request set the "suppFeat" value's 6th binary digit to 1.

Support for NetLocAccessSupport

The PCF supports the NetLocAccessSupport reporting on the N5 and Rx interface. The following describes about the noNetLocSupp:

- Requesting SMF for Report of the requested Access Network Information
- Reporting noNetLocSupp to AF

Note NetLocAccessSupport Enumeration values:

- **ANR_NOT_SUPPORTED**: Indicates that the access network does not support the report of access network information.
- **TZR_NOT_SUPPORTED**: Indicates that the access network does not support the report of UE time zone.
- **LOC_NOT_SUPPORTED**: Indicates that the access network does not support the report of UE location.

Requesting SMF for Report of the requested Access Network Information:

If the NetLoc feature is supported, PCF requests SMF to report the access network information by setting the **AN_INFO** policy control request trigger.

- If the "reqData" attribute indicates the values **MS_TIME_ZONE** and **USER_LOC_INFO**, the SMF notifies the PCF that the access network does not support sharing access network information by including netLocAccSupp in UeCampingRep with **ANR_NOT_SUPPORTED** in the N7 Update Notify response.
- If the "reqData" attribute indicates only **MS_TIME_ZONE** value, the SMF notifies the PCF that the access network does not support sharing UE time zone information reporting by including netLocAccSupp in UeCampingRep with **TZR_NOT_SUPPORTED** in the N7 Update Notify response.
- If the "reqData" attribute indicates only **USER_LOC_INFO** value, the SMF notifies the PCF that the access network does not support sharing UE location information by including netLocAccSupp in UeCampingRep with **LOC_NOT_SUPPORTED** in the N7 Update Notify response.

Reporting noNetLocSupp to AF:

If the NetLoc feature is enabled, AF request the PCF to report the access network information.

- **N5 Interface:** If the SMF notifies the PCF that the access network does not support sharing access network information, then
  - In N5 response to AF subscription, PCF contains noNetLocSupp attribute with NetLocAccessSupport enum as received from SMF and an event of the "AfEventNotification" data type in the "evNotifs" element with the "event" attribute set to the value **ANI_REPORT**.
- **Rx Interface:** If the SMF notifies the PCF that the access network does not support sharing access network information, then
  - PCF sends a RAR command with the Specific-Action AVP set to **INDICATION_OF_ACCESS_NETWORK_INFO_REPORTING_FAILURE** and the NetLoc-Access-Support AVP set to 0 (NETLOC_ACCESS_NOT_SUPPORTED) to the AF requesting access network information in AAR command or STA command by including the NetLoc-Access-Support AVP set to the value of 0 (NETLOC_ACCESS_NOT_SUPPORTED) to the AF requested the access network information in an STR command.

Note If the NetLoc feature is not enabled in SMF, then

- PCF includes noNetLocSupp attribute with **ANR_NOT_SUPPORTED** and an event of the "AfEventNotification" data type in the "evNotifs" attribute with the "event" attribute set to the value "ANI_REPORT" in N5 responses to AF subscription or include NetLoc-Access-Support AVP set to the value of 0 (NETLOC_ACCESS_NOT_SUPPORTED) in Rx responses to AF subscription.