

RAN and NAS Release Causes

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Feature Summary Revision History

Summary Data

Table 1: Summary Data

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

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2022.03.0

Feature Description

PCF receives extensive Radio Access Network (RAN) and Network Attached Storage (NAS) release cause code information in the RAN-NAS feature in the access network. Session Management Function (SMF), PCF

or Application Function (AF) helps to set up calls and sessions between RAN and Network Attached Storage NAS. If a failure occurs in RAN and NAS, it reports the cause to the SMF, SMF sends information to PCF, and PCF sends information to the AF.

RAN-NAS feature allows you to:

- Request SMF for Report of RAN and NAS Release Cause
- Reporting RAN and NAS Release Causes to AF
  - PCC Rule Installation and Modification Failures
  - Deletion of Application Session with AF
  - Notify RAN-NAS Cause for Termination of PDU Session
  - Notify RAN and NAS Release Causes for SDF Deactivation

How it Works

This section describes how this feature works.

Call Flows

This section describes the key call flows for this feature.

Request SMF for Report of RAN and NAS Release Causes Call Flow

This section describes the Request SMF for Report of RAN and NAS Release Causes call flow for this feature.

AF enables the RAN-NAS-Cause, creates, and updates a session with the RAN-NAS-Cause feature. PCF requests SMF to report RES_RELEASE for corresponding PCC rules under the following conditions:

- RAN-NAS-Cause feature is enabled for PDU session.
- AF subscribes to a FAILED_RESOURCES_ALLOCATION event.

Figure 1: Requesting SMF for RAN and NAS Release Causes Call Flow

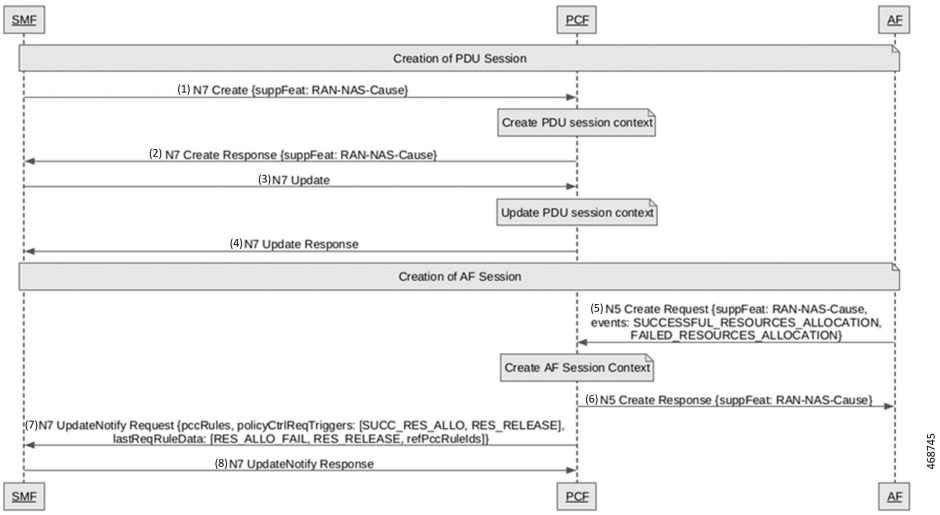


Table 3: Requesting SMF for RAN and NAS Release Causes Call Flow Description

Step	Description
1	The SMF sends a N7 Create PDU session context to the PCF.
2	The PCF sends the N7 Create Response to the SMF.
3	The SMF sends the N7 update PDU session context to the PCF.
4	The PCF sends the N7 update response to the SMF.
5	After Creating the AF Session, the AF sends the N5 update response to the PCF.
6	After Creating AF Session Context, the PCF sends the N7 Create Response to the AF.
7	The PCF sends the N7 Update Notify Request to the SMF.
8	The SMF sends the N7 Update Notify Response to the PCF.

Reporting RAN-NAS Release Causes to AF Call Flows

This section describes the Reporting RAN and NAS Release Causes to AF call flows for this feature.

Note The new attribute **epsCause** broadens the RAN-NAS Cause data type. This attribute provides the EPS specified RAN/NAS Causes for 3GPP EPS and non-3GPP EPS access types.

PCC Rule Installation and Modification Failures Call Flow

This section describes the PCC Rule Installation and Modification Failures call flow for this feature.

If SMF fails to install and modify the PCC rules, RAN-NAS-Cause updates PCF that includes rule reports containing references to the affected PCC rules and the failure code of RES_ALLO_FAIL. If the RAN-NAS-Cause feature supports the PDU session, and if SMF received RAN and NAS release causes in the network, it includes the available RAN and NAS release causes and user access information.

Figure 2: PCC Rule Installation and Modification Failures Call Flow

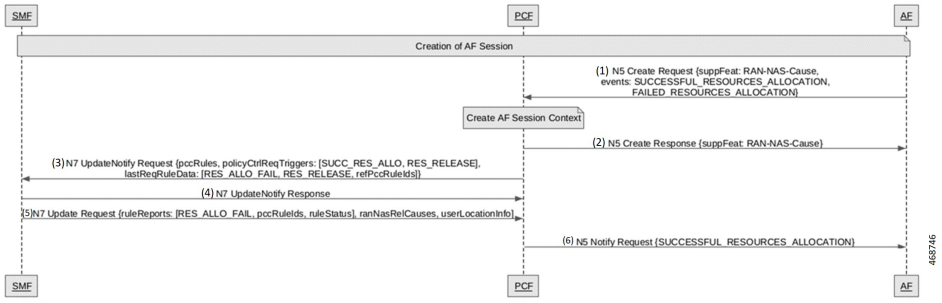


Table 4: PCC Rule Installation and Modification Failures Call Flow Description

Step	Description
1	After creation of AF session, the AF sends a N5 Create Request to the PCF.
2	After Create AF Session Context, the PCF sends the N5 Create Response to the AF.
3	The PCF sends the N7 update Notify Request to the SMF.
4	The SMF sends the N7 update Notify Response to the PCF.
5	The SMF sends the N7 update Request to the PCF.
6	The PCF sends the N5 Notify Request to the AF.

Deletion of Application Session with AF Call Flow

This section describes the Deletion of Application Session with AF call flow for this feature.

If the RAN-NAS-Cause feature supports the session, AF requests deletion of the application session. The PCF needs SMF to report the RAN-NAS release cause with access information for removing the PCC rules.

Figure 3: Deletion of Application Session with AF Call Flow

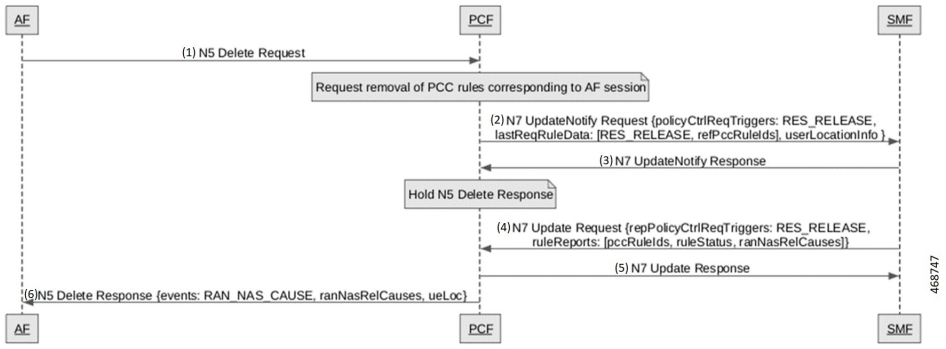


Table 5: Deletion of Application Session with AF Call Flow Description

Step	Description
1	The AF sends a N5 Delete Request to the PCF.
2	After Request removal of PCC rules corresponding to AF Session, the PCF sends the N7 Notify Request to the SMF.
3	The SMF sends the N7 Update Notify Response to the PCF.
4	After Hold N5 Delete Response, the SMF sends the N7 Update Request to the PCF.
5	The PCF sends the N7 Update Response to the SMF.
6	The PCF sends the N5 Delete Response to the AF.

Notify RAN and NAS Release Causes for Termination of PDU Session Call Flow

This section describes Notify RAN-NAS Cause for Termination of PDU Session call flow.

PCF requests AF to terminate all application sessions associated with the PDU session. AF requests for deletion of application session context. PCF deletes the AF session and includes events notification with RAN-NAS release causes along with the user access information and provides the SMF in the delete response.

Figure 4: PCC Rule Installation and Modification Failures Call Flow

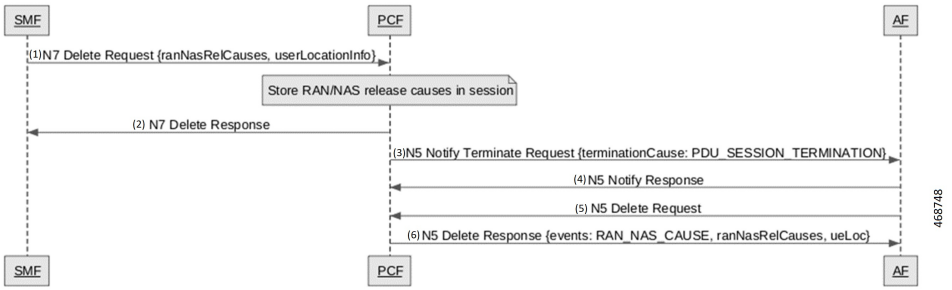


Table 6: PCC Rule Installation and Modification Failures Call Flow Description

Step	Description
1	The SMF sends a N7 Delete Request to the PCF.
2	After Storing RAN and NAS release cause in session, the PCF sends the N7 Delete Response to the SMF.
3	The PCF sends the N5 Notify Terminate Request to the AF.
4	The AF sends the N5 Notify Response to the PCF.
5	The AF sends the N5 Delete Request to the PCF.
6	The PCF sends the N5 Delete Response to the AF.

Notify RAN and NAS Release Causes for SDF Deactivation Call Flow

This section describes the Notify RAN and NAS Release Causes for SDF Deactivation call flow.

The SMF deletes the impacted PCC rules and updates the PCF, which includes rule reports containing identifiers of affected PCC rules, and the failure code RES_ALLO_FAIL. This includes the following conditions:

- RAN initiates deactivation of QoS flow.
- SMF removes and deactivates PCC rules without PCF request due to ineffective resource allocation.

Figure 5: PCC Rule Installation and Modification Failures Call Flow

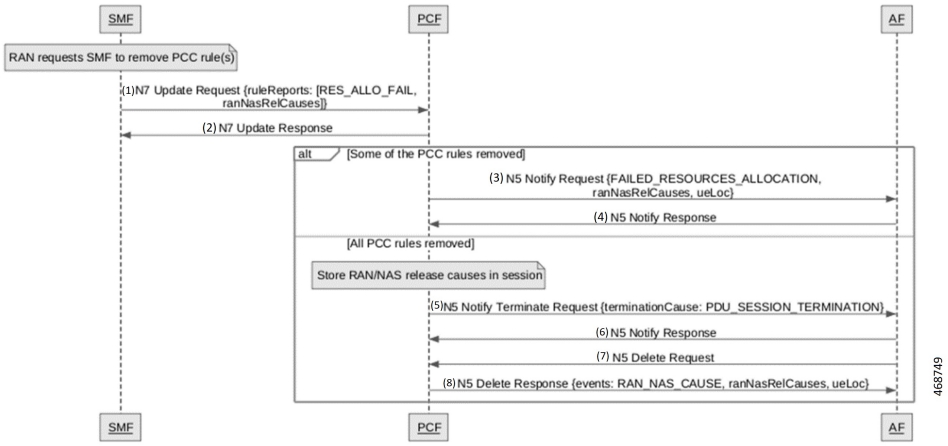


Table 7: PCC Rule Installation and Modification Failures Call Flow Description

Step	Description
1	After RAN requests the SMF to remove the PCC rules, the SMF sends a N7 Update Request to the PCF.

Step	Description
2	The PCF sends the N7 Update Response to the SMF.
3	The PCF sends the N5 Notify Request to the AF.
4	After removing some of the PCC rules, the AF sends the N5 Notify Response to the PCF.
5	After removing all PCC rules and storing RAN-NAS release causes in session, the PCF sends the N5 Notify Terminate Request to the AF.
6	The AF sends the N5 Notify Response to the PCF.
7	The AF sends the N5 Delete Request to the PCF.
8	The PCF sends the N5 Delete Response to the AF.

Standards Compliance

This feature complies with the following standards specifications:

- 3GPP 29.513 "Policy and Charging Control signaling flows and QoS parameter mapping"
- 3GPP 29.514 version 16.7.0 "Policy Authorization Service (PAS)"