



# SMF Deregistration with NRF

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## Feature Summary and Revision History

### Summary Data

*Table 1: Summary Data*

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

### Revision History

*Table 2: Revision History*

Revision Details	Release
First introduced.	Pre-2020.02.0

## Feature Description

The SMF supports the deregistration of Network Function (NF) Repository Function (NRF), wherein the NF deregister service operation of the SMF removes the profile of a network function that is registered in the NRF.

The SMF starts the NF deregister service operation in the following scenarios:

- When the Service Based Interface (SBI) endpoint is not configured and all the rest endpoints stop functioning.
- When all the configured SBI endpoints VIP IP and N11 VIP IPs are offline.

## How it Works

The NF deregister service operation deletes the specific resource based on its NF instance ID. The NF deregistration starts when the Uniform Resource Identifier (URI) receives a request to delete a specific NF instance.

The recommended SMF shutdown process involves the following steps:

1. All N11 and SBI VIP IPs are marked as offline. After these endpoints appear offline, the NF deregistration request is sent to the NRF. The NRF notifies the peer NFs, such as AMF, about the SMF shutdown and its unavailability for traffic.
2. Wait for a grace period to allow convergence and perform a "system mode shutdown" to stop all the pods.

When the endpoint SBI is not configured, the system deletes the rest-ep pod immediately and avoids proper convergence. Implementing the system mode shutdown without taking the SBI and N11 VIP IPs offline also avoids convergence.

## Call Flows

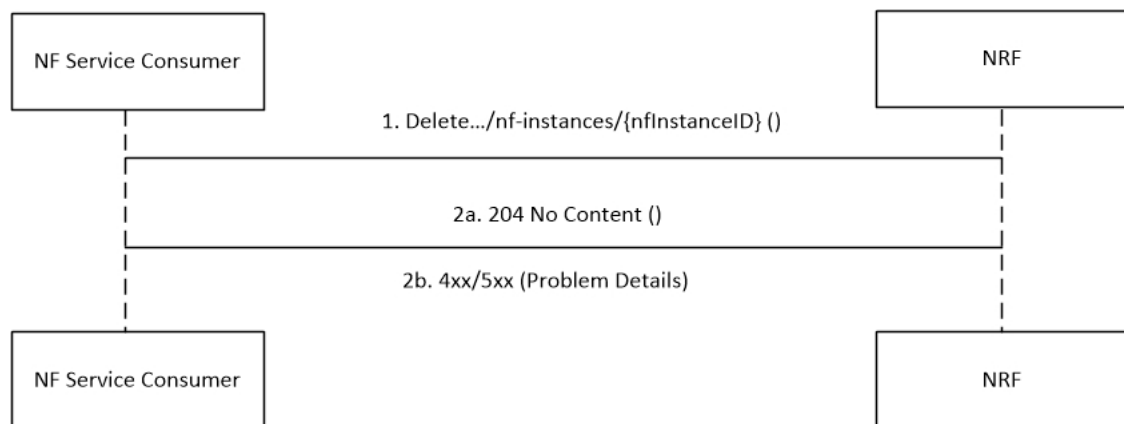
This section describes the following call flows:

- NRF deregistration call flow
- NRF deregistration trigger events call flow

### NF Deregistration Call Flow

This section describes the NF deregistration call flow.

**Figure 1: NRF Deregistration Call Flow**



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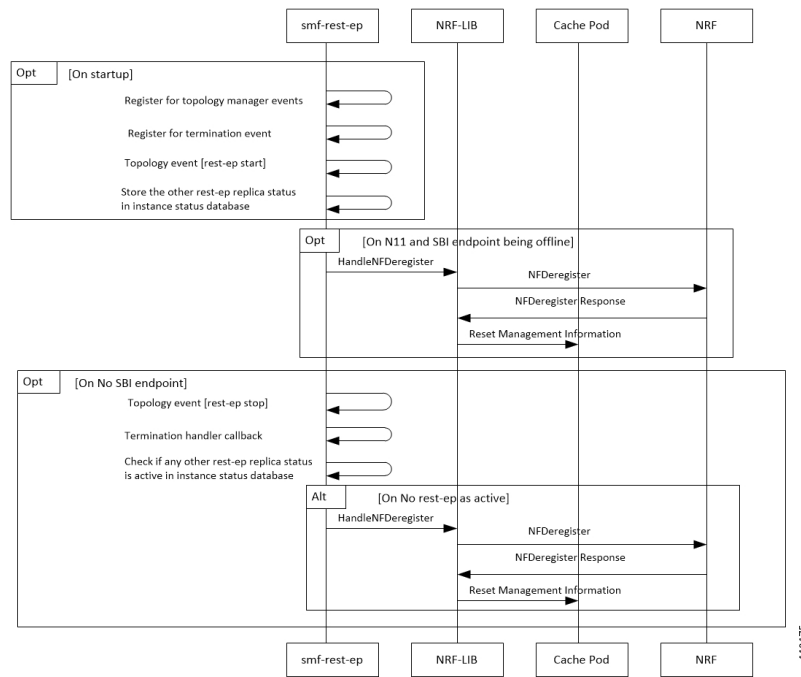
**Table 3: NRF Deregistration Call Flow Description**

Step	Description
1	The NF Service Consumer sends a Delete request to the resource URI that indicates the NF instance. The request body is empty.
2a	If the deletion of the specified resource is successful, the “204 No Content” message appears. The response body remains empty.
2b	If the NF instance, which is identified with the NF instance ID, does not exist in the list of registered NF instances in the NRF database, the NRF sends the “404 Not Found” status code with the problem details.

**NF Deregistration Trigger Events Call Flow**

This section describes the NF deregistration trigger events call flow.

**Figure 2: NF Deregistration Trigger Events Call Flow**



**Table 4: NF Deregistration Trigger Events Call Flow Description**

Step	Description
On startup	
1	The SMF rest-ep registers for topology manager events to identify the state of other rest-ep instances and keeps a track of these instances in an instance state database.
2	The SMF rest-ep registers for the termination handler with the application infrastructure for receiving notification when the application infrastructure stops functioning. As part of the termination handler, the SMF rest-ep monitors the instance state database for any other working rest-ep.
3	The SMF rest-ep starts the topology event.

Step	Description
4	The SMF rest-ep saves the status of other rest-ep replicas in the instance state database.
When the N11 and SBI endpoints are offline	
5	The SMF rest-ep sends the Handle NF deregister message to the NRF-Lib.
6	When all the SBI and N11 VIP IP endpoints are offline, the SMF rest-ep sends the deregistration request to the NRF.
7	The NRF sends the NF deregister response to the NRF-Lib.
8	The NRF-Lib resets all the management information that is configured in the cache pod.
When no SBI endpoint exists	
9	The SMF rest-ep starts the topology event to stop the other rest-ep.
10	The SMF rest-ep starts the termination handler callback.
11	The SMF rest-ep checks the instance status database for any other working rest-ep.
When no rest-ep is functional	
12	The SMF rest-ep sends the Handle NF deregister message to the NRF-Lib.
13	The SMF rest-ep sends the deregistration request to the NRF.
14	The NRF sends the NF deregistration response to the NRF-Lib.
15	The NRF-Lib resets all the management information that is configured in the cache pod.

## Standards Compliance

The SMF deregistration with NRF feature complies with the *3GPP TS 29.510 V15.2.0 (2018-12)*.

## Limitations

The SMF deregistration with NRF feature has the following limitation:

- When N11 and SBI VIP IPs are not marked offline, the NF deregistration is not sent for the system mode shutdown because there is no specific order for pod deletion. Also, no monitoring procedure exists to check if the rest-ep pods are working.