

SCP integration for indirect communication with delegated discovery

- Feature Description, on page 1
- How it works, on page 1
- Configuration, on page 2
- OAM Support: Bulk Statistics, on page 3

Feature Description

This feature enables the Policy Control Function (PCF) to support indirect communication using the Service Communication Proxy (SCP) based on the 3GPP-defined Model D (delegated discovery).

When this feature is enabled, PCF sends requests to SCP instead of directly communicating with target Network Functions (NFs). The SCP performs NF discovery using NRF, selects the appropriate NF instance, and routes the request.

By default, PCF continues to use direct communication with NRF-based discovery (Model B). SCP-based communication can be configured per interface. If SCP is not available, PCF falls back to Model A direct communication. This feature enables centralized routing and reduces NF discovery handling within PCF.

- PCF acts as Producer for SMF (N7)
- PCF acts as Consumer for BSF (Nbsf_Management)
- SCP performs discovery, selection, and routing

Note Current release support is limited to SMF and BSF only.

How it works

- Delegated Discovery: PCF sends requests to the SCP with discovery parameters. The SCP performs the NRF discovery and selects the target NF.

- Header Handling: Per 3GPP TS 29.500, the SCP removes `3gpp-Sbi-Target-apiRoot` and all `3gpp-Sbi-Discovery-*` headers before forwarding requests to the PCF.
- Binding Persistence: PCF receives and stores `3gpp-Sbi-Routing-Binding`, `3gpp-Sbi-Binding`, and `3gpp-Sbi-NF-Peer-Info` to maintain session stickiness for subsequent requests and callbacks.

SMF Flow (Model D – N7)

- Callback Strategy (Model D – SMF): PCF utilizes the stored `3gpp-Sbi-Routing-Binding` for precise routing.
- Response Binding Header: PCF includes `3gpp-Sbi-Binding` in all responses (for N7 Create/Update procedures).
- Enhanced Routing Logic: PCF utilizes the stored `3gpp-Sbi-Routing-Binding` or `3gpp-Sbi-Target-apiRoot` (derived from the SMF notification-URI) for precise routing.

BSF Flow (Model D – Nbsf_Management)

- Register Request Handling: PCF sends `3gpp-Sbi-Binding` along with `3gpp-Sbi-Discovery-*` headers in Register requests via SCP.
- Binding Storage: PCF stores the `3gpp-Sbi-Producer-Id` or `3gpp-Sbi-Binding` received in the SCP response.
- De-Register Routing: PCF utilizes the stored `3gpp-Sbi-Producer-Id` or `3gpp-Sbi-Binding` for routing subsequent De-Register requests.

Configuration

1. Enable Model D and SCP profile:

```
config
          rest-endpoint model-d enabled
            rest-endpoint model-d scp-profile <scp_profile_name>
```

Example:

```
profile nf-client nf-type scp

 scp-profile prof1

  locality localscp

   service name type nscp-routing

    endpoint-profile ep1

     endpoint-name ep1_prof1

      primary <ip-address> ipv4 192.168.14.51

      primary <ip-address> <port> 9051

     exit

    exit
```

```
    exit
   exit
  exit
 exit
```

2. Enable Interfaces for Model-D

```
rest-endpoint model-d interfaces <NF-name> true/false
```

Example:

```
rest-endpoint model-d interfaces nbsf-management true
rest-endpoint model-d interfaces n7-callbacks true
```

OAM Support: Bulk Statistics

The following counters are implemented to monitor Model-D routing performance and fallback events. All metrics are of type **Counter** (Unit: Int64).

Table 1: Bulk Statistics Support for Model-D

Metric Name	Description	Label names
outgoing_request_routing_total	Total Outgoing Request Count by Routing Mode (Model D)	interface_name, service_name, operation_name, command, routing_mode, result_code
outgoing_request_routing_time	Total Response Time for Outgoing Requests by Routing Mode (Model D)	interface_name, service_name, operation_name, command, routing_mode, result_code
model_d_fallback_total	Total Model D fallback events from SCP to direct routing	interface_name, operation_name, reason