



Packet Data Unit Sessions Establishment from 4G-Only and Option 3x Capable Devices

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Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	5G-SMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2020.03.0

Feature Description

The dual connectivity enabled UEs support 4G-LTE and 5G-NR. Such UEs send a signal to the 4G Core Network, indicating that it is a dual connectivity enabled device.

When the Dual Connectivity New Radio (DCNR) capable UE attempts to register in MME, the MME sets “UP Function Selection Indication Flags” IE with DCNR flag set to 1 in the “Create Session Request” message. After the S-GW receives this IE over S11, it sends this IE over S5 to P-GW. This IE transmission helps the SGW-C and PGW-C to select SGW-U and UPF, which supports dual connectivity with NR.

The SMF/PGW-C supports Packet Data Unit (PDU) sessions from only 5G capable UE in 4G radio. Now, the SMF/PGW-C extends support for the PDU sessions from the 4G-only capable device and Option 3x Capable device (NR & LTE radio connected to the EPC).

How it Works

The SMF generates a PDU session ID (pdu-session-id) upon receiving a Create Session Request from the 4G-only UE. The SMF validates if the request has the 5G-IWK indication without the PDU session ID in the Protocol Configuration option. The UDM provides the IWK indication to the SMF per DNN. The SMF does not use this indication for deciding whether the UE is 5G capable.

The SMF generates a pdu-session-id based on lbi. For the 4G Create Session Request, the SMF generates pdu-session-id=lbi+64 and for WiFi sessions it generates pdu-session-id=lbi+80.

The SMF allows you to configure the default NSSAI under the profile DNN, which it includes in sliceInfo IE in the Policy Create Request directed towards the PCF during session creation from 4g-only UEs. If the default slice is not configured, then SMF selects one of the configured slices. When the UE is DCNR capable, and the DCNR is enabled for the session, the SMF considers the UE capable of supporting dual connectivity. You can configure DCNR per DNN and other NFs, such as UPF.

The SGW notifies the DCNR support to PGW through the 'UPF Selection Indication Flags IE'.

Standards Compliance

The Packet Data Unit Sessions Establishment from 4G-Only and Option 3x Capable Devices feature complies with the following standards:

- *3GPP TS 23.003 [2]*
- *3GPP TS 24.301 [23]*
- *3GPP TS 29.272 [70]*
- *3GPP TS 29.274*

Configuring Support for Packet Data Unit Sessions Establishment from 4G-Only and Option 3x Capable Devices

This section describes how to configure the support for PDU sessions establishment from the 4G-only and Option 3x capable devices.

Configuring the NSSAI

This section describes how to configure the default NSSAI in SMF, which it includes in sliceInfo IE in the Policy Create Request message. The SME sends this message towards the PCF during the session creation from 4g-only UEs.

To configure the default NSSAI in the SMF, use the following configuration:

```
configure  
  profile dnn profile_name  
    nssai  
      sd sd_value  
      sst sst_value  
    end
```

NOTES:

- **profile dnn** *profile_name* – Specifies the DNN profile name. *profile_name* must be an alphanumeric string.
- **nssai**– Enters the NSSAI configuration.
- **sd** *sd_value* – Specifies the slice descriptor (sd). The *sd_value* accepts a 6-digit hex string ([0-9a-fA-F]{6} - 000000 – ffffff). For example, 1A2B3c
- **sst** *sst_value* – Specifies the slice type (sst) value. The accepted range is 0–255.

Configuring the Sessions as Dual Connectivity New Radio

This section describes how to mark the sessions as DCNR enabled for SMF and UPF.

To enable SMF to consider the sessions as DCNR capable, use the following configuration:

```
configure  
  profile dnn profile_name  
    dcnr boolean_value  
  end
```

NOTES:

- **profile dnn** *profile_name* – Specifies the DNN profile name. *profile_name* must be an alphanumeric string.
- **dcnr** *boolean_value* – Enable this command by configuring the dcnr to true. The SMF marks the session as “dcnr enabled session” only when the UE is DCNR capable, and the DCNR is configured under profile DNN.

Verifying the Dual Connectivity New Radio Capability Configuration

This section describes how to validate if the UE is DCNR capable.

To view if the UE is DCNR enabled, use the following configuration:

```
show subscriber supi supi_id
```

The show output for DCNR support displays any one of the following options:

- dcnr: Enabled
- dcnr: None
- dcnr: UE Requested and Enabled

The following configuration is a sample output of the **show subscriber supi** command:

```
unknown] smf# show subscriber supi imsi-123456789012345
subscriber-details
{
  "subResponses": [
    {
      "status": true,
      "genericInfo": {
        .....
      },
      "sScMode": 1,
      "chargEnabled": true,
      "uetimeZone": "+00:15+1",
      "allocatedIp": "12.0.4.0",
      "eUtranLocation": {
        "ecgi": {
          "mcc": "123",
          "mnc": "456",
          "eutraCellId": "1234567"
        },
        "tai": {
          "mcc": "123",
          "mnc": "456",
          "tac": "1820"
        }
      },
      "alwaysOn": "None",
      "dcnr": "Enabled",    -> The possible values are None, UE Requested and Enabled
    }
  ]
}
.....
```

Packet Data Unit Sessions Establishment from 4G-Only and Option 3x Capable Devices OA&M Support

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

Statistics Support

The SMF uses the “dcnr” label in the session gauge “smf_session_counter” and “smf_service_stats” for collecting the DCNR session count. Only when the SMF session is a DCNR supported, then the “dcnr” label value is enabled. The label does not support non-dcnr sessions.

The following is a sample query to count the DCNR active SMF session:

```
smf_session_counter: sum (smf_session_counters{dcnr_on="enable"}) by (dcnr)
smf_service_stats: sum (smf_session_stats{dcnr_on="enable"}) by (dcnr, status, reason)
```

For DCNR session this counter derives the following values:

- Attempt Statistics - dcnr= "enable" and status= "attempted"
- Success Statistics – dcnr= "enable" and status= "success"
- Failure Statistics - dcnr= "enable" and status= "failures"

Bulk Statistics

The following bulk statistics are modified for this release:

- smf_session_counters: Indicates the total number of currently active SMF sessions. You can filter the active session based on the labels such as "dcnr=enable" for the DCNR session count.
- smf_session_stats: Indicates the statistics for call flow states such as attempted, success, and failures. You can filter the statistics based on labels such as "dcnr=enable" for only DCNR statistics.

