

5G Non Standalone

This chapter describes the 5G Non Standalone (NSA) feature in the following sections:

- Feature Summary and Revision History, on page 1
- Feature Description, on page 2

Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	• P-GW • S-GW • SAEGW
Applicable Platform(s)	• ASR 5000 • ASR 5500 • VPC-DI • VPC-SI
Feature Default	Disabled - Configuration Required
Related Changes in This Release	Not applicable
Related Documentation	• *5G Non Standalone Solution Guide* • *AAA Interface Administration and Reference* • *Command Line Interface Reference* • *P-GW Administration Guide* • *S-GW Administration Guide* • *SAEGW Administration Guide* • *Statistics and Counters Reference*

Revision History

The 5G NSA solution for SAEGW supports Secondary RAT Usage IE during GnGp handover.	21.22
The 5G NSA solution for SAEGW supports dcca-custom1, dcca-custom7 and dcca-custom8 dictionaries.	21.11
The 5G NSA solution for SAEGW supports the following functionality: • P-GW Custom Dictionaries support over Gz for extended bitrate • S-GW Custom Dictionaries support over Gz for extended bitrate • P-GW Custom Dictionaries support over Gy and Rf for extended bitrate • S-GW support of Secondary RAT Data Usage Report in Gz CDRs	21.10
The 5G NSA solution for SAEGW supports the following functionality: • P-GW support of Secondary RAT Data Usage Report in Gz CDRs • P-GW support of Secondary RAT Data Usage Report in Rf CDRs • S-GW and P-GW support of statistics for DCNR PDNs	21.9
The 5G NSA solution is qualified on the ASR 5000 platform.	21.5
The 5G NSA solution for SAEGW supports the following functionality: • Feature License • Dedicated Bearers • Gy interface • URLLC QCI	21.8
First introduced.	21.6

Feature Description

Important 5G NSA feature is license controlled from release 21.8 onwards. Contact your Cisco account representative for detailed information on specific licensing requirements.

The 5G NSA solution for SAEGW supports the following functionalists:

- **High Throughput**

  5G NR offers downlink data throughput up to 20 Gbps and uplink data throughput up to 10 Gbps. Some interfaces in EPC have the support to handle (encode/decode) 5G throughput. For example, NAS supports up to 65.2 Gbps (APN-AMBR) and S5/S8/S10/S3 (GTP-v2 interfaces) support up to 4.2 Tbps. The

diameter interfaces S6a and Gx support only up to 4.2Gbps throughput, S1-AP supports only up to 10 Gbps and NAS supports up to 10 Gbps (MBR, GBR). New AVP/IE have been introduced in S6a, Gx , S1-AP, and NAS interfaces to support 5G throughput. See the *How It Works* section for more information.

- **DCNR Support on P-GW:**

  Supports configuration of DCNR feature at the P-GW-service, by configuring “Extended-BW-NR” feature in IMSA service. Advertises the DCNR feature support by sending “Extended-BW-NR” feature bit in “Feature-List-ID-2” towards PCRF. Forwards AVP "Extended-APN-AMBR-UL" and "Extended-APN-AMBR-DL" in CCR messages when it receives APN-AMBR values greater than 4.2Gbps from MME/S-GW. Decodes the extended AVP "Extended-APN-AMBR-UL" and "Extended-APN-AMBR-DL" when it is received from PCRF.

- Sends AVP "Extended-Max-Requested-BW-UL", "Extended-Max-Requested-BW-DL", "Extended-GBR-UL" and "Extended-GBR-DL" when it receives MBR and GBR values greater than 4.2Gbps from MME/S-GW. Decodes the AVP "Extended-Max-Requested-BW-UL", "Extended-Max-Requested-BW-DL", "Extended-GBR-UL" and "Extended-GBR-DL" when received from PCRF. Supports dedicated bearer establishment with extended QoS. Sends AVP Extended-Max-Requested-BW-UL and "Extended-Max-Requested-BW-DL" in Gy records.

- **Ultra Low Latency Support**:

  Supports 5G requirements of Ultra-Reliable and Low Latency Communications (URLLC). 3GPP introduced URLCC QCI 80 (Non-GBR resource type), QCI 82 and 83 (GBR resource type). P-GW establishes default bearers with URLLC QCI 80, which is typically used by low latency eMBB applications. P-GW establishes dedicated bearers with URLLC QCI 82 and 83 (also with QCI 80 if dedicated bearers of Non-GBR type to be established), which is typically used by discrete automation services (industrial automation).

- **ICSR Support**

  With release 21.10 onwards ICSR for 5G NSA on SAEGW is supported.

- **Dynamic S-GW and P-GW selection by MME for DCNR capable UE**

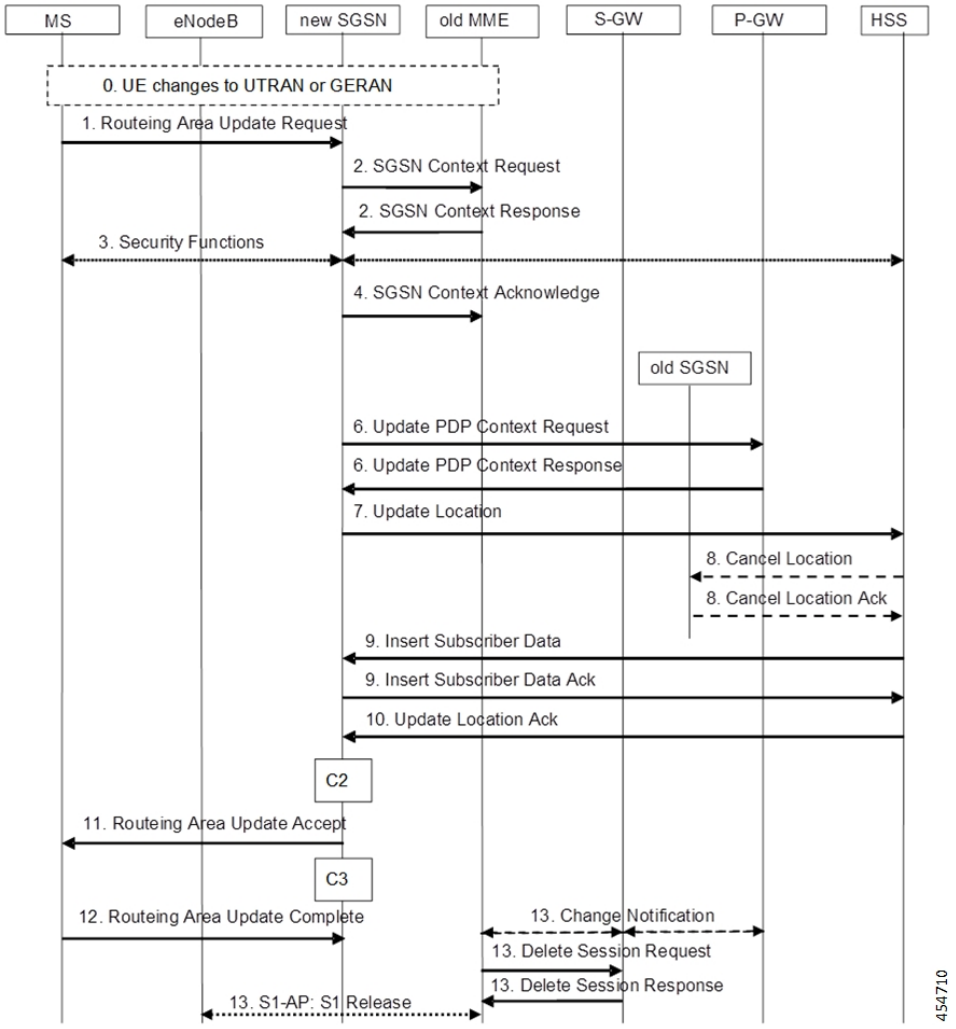
  When DCNR capable UE attempts to register in MME and when all DCNR validations are successful (for example DCNR feature configuration on MME, HSS not sending access-restriction for NR, and son on), the MME sets “UP Function Selection Indication Flags” IE with DCNR flag set to 1 in “Create Session Request” message. This feature is relevant for CUPS architecture to help SGW-C and PGW-C to select SGW-U and PGW-U which supports dual connectivity with NR. When S-GW receives this IE over S11, it sends this IE over S5 to P-GW. S-GW ignores IE if it receives it in Non-CUPS deployment.

- **P-GW Secondary RAT Usage Data Report Handling:**

  P-GW supports custom24 and custom44 for Gz and aaa-custom3, aaa-custom4 and aaa-custom6 dictionaries for Rf to support Secondary RAT Data Usage Report in CDRs.

Support for Secondary RAT Usage During GnGp Handover

This feature supports the Secondary RAT usage reported in change notification request during 4G to 3G handover. The support is for handling the change notification with Secondary RAT Usage during the GnGp handover. Step 13 is added in the following diagram in support of this feature. The usage must be reported in next CDR generation.



IMSI Not Known

If there's no context found for IMSI specified in Secondary RAT Usage IE of change notification request Message, it returns the change notification response with cause value "IMSI/IMEI not known".

Limitations

Following are the known limitations for this feature:

- This feature only supports the handling of the secondary RAT usage IE.
- During the 4G to 3G handover, dedicated bearers are retained and Secondary RAT usage is reported for both Default and Dedicated bearers.

Enabling Secondary RAT Data Usage Report

Use the following configuration to enable Secondary RAT Data Usage Report:

```
configure
  context context_name
    pgw-service service_name
      dcnr
      end
```



Note The GGSN service associated with the P-GW service must have the DCNR enabled using the preceding CLI.

- **Statictics support for DCNR PDNs:**

  S-GW and P-GW statistics support for DCNR PDNs

- **S-GW Secondary RAT Usage Data Report Handling:**

  S-GW supports custom24 and custom6 dictionaries to support Secondary RAT Data Usage Report in CDRs over Gz.

- **P-GW Custom Dictionaries Support over Gz:**

  P-GW supports Custom44 and Custom24 dictionaries to support sending the following AVPs when it receives MBR, GBR and APN-AMBR values greater than 4.2Gbps:

  - Extended-Max-Requested-BW-UL
  - Extended-Max-Requested-BW-DL
  - Extended-GBR-UL
  - Extended-GBR-DL
  - Extended-APN-AMBR-UL
  - Extended-APN-AMBR-DL

- **Multiple Presence Reporting Area Support:**

  S-GW supports Multiple-PRA action and Multiple-PRA Information over S11/S4 and S5/S8 interfaces. P-GW supports Multiple-PRA Action and Multiple-PRA Information over S5/S8 and Gx interfaces.

- **S-GW Custom Dictionaries Support over Gz :**

  S-GW supports custom24 and custom6 dictionaries to support sending the following AVPs when it receives MBR, GBR and APN-AMBR values greater than 4.2Gbps:

  - Extended-Max-Requested-BW-UL
  - Extended-Max-Requested-BW-DL
  - Extended-GBR-UL
  - Extended-GBR-DL
  - Extended-APN-AMBR-UL
  - Extended-APN-AMBR-DL

- **P-GW Custom Dictionaries Support over Gx:**

P-GW supports dpca-custom15, dpca-custom11, dpca-custom23, dpca-custom19 and dpca-custom17, dictionaries to support sending the following AVPs when it receives GBR and APN-AMBR values greater than 4.2Gbps:

- Extended-Max-Requested-BW-UL
- Extended-Max-Requested-BW-DL
- Extended-GBR-DL
- Extended-GBR-UL
- Extended-APN-AMBR-UL
- Extended-APN-AMBR-DL

- **P-GW Custom Dictionaries Support over Gy:**

  P-GW supports dcca-custom1, dcca-custom7, dcca-custom8, dcca-custom13 and dcca-custom26 dictionaries to support sending the following AVPs when it receives GBR and APN-AMBR values greater than 4.2Gbps:

  - Extended-Max-Requested-BW-UL
  - Extended-Max-Requested-BW-DL
  - Extended-GBR-DL
  - Extended-GBR-UL
  - Extended-APN-AMBR-UL
  - Extended-APN-AMBR-DL

- **P-GW Custom Dictionaries Support over Rf:**

  P-GW supports aaa-custom3, aaa-custom4 and aaa-custom6 dictionaries to support sending the following AVPs when it receives GBR and APN-AMBR values greater than 4.2Gbps:

  - Extended-Max-Requested-BW-UL
  - Extended-Max-Requested-BW-DL
  - Extended-GBR-UL
  - Extended-GBR-DL
  - Extended-APN-AMBR-UL
  - Extended-APN-AMBR-DL

Multiple Presence Reporting Area

P-GW supports negotiation of Multiple-Presence Reporting Area feature in Feature-List-ID 2 over Gx interface with PCRF. The CNO-ULI feature will be used only when the P-GW and/or the PCRF does not support Multiple-PRA and both P-GW and PCRF support CNO-ULI.



Note This feature is introduced in release 21.9.1. For more information, refer to the *Presence Reporting Area* chapter in the *P-GW Administration Guide*.