Non-IP PDN Support

This chapter describes the support of Non-IP PDN on P-GW and S-GW.

Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	• C-SGN • P-GW • S-GW
Applicable Platform(s)	• UGP • VPC-DI • VPC-SI
Feature Default	Disabled - License Required
Related Changes in This Release	Not Applicable
Related Documentation	• *Command Line Interface Reference* • *Statistics and Counters Reference*

Revision History

Revision Details	Release
Non IP UE P-GW support for SGi through RADIUS is tested on P-GW. This feature is tested and qualified on VPC-DI platform.	21.22
S-GW CDR support is added for Non-IP PDN subscribers.	21.13
The feature is tested and qualified on the ASR 5500 platform. A new PDP Type, Non-IP, is introduced along with the existing IPv4, IPv6, and IPv4v6 in S-GW CDR. Volume traffic fields are also updated for Non-IP PDN subscribers.	21.3
First introduced.	N5.1 (21.1.V0)

Feature Description

There are specific protocol optimizations already defined for low-power networking (For example, IPv6 over Low-power Wireless Personal Area Networks - 6LoWPAN). These protocol adaptations provided efficient ways of header compression and operation optimization to allow effective transmission of data with small frame size. Due to this, some of the Cellular Internet of Things (CIoT) devices may not use normal IP services. Therefore, it is useful to support a Non-IP PDN connection to allow such protocol to be used by the CIoT UE toward the Non-IP protocols destination node, like Application Server (AS) or a Non-IP gateway. The C-SGN/P-GW, in this case, can act as a transparent passthrough by a direct forwarding interface between itself and the AS or Non-IP gateway, and the CIoT UE can interact with the specific Non-IP destination node directly using appropriate protocols.

As part of this feature, along with Non-IP PDN, support is also added for extended Protocol Configuration Options (ePCO) IE at P-GW, and S-GW. Support is also added for Radius authentication and radius accounting for NoN-IP UE with 3GPP compliant Radius dictionary.

How It Works

Support for the SGi based delivery of Non-IP data can be used by any UE. The P-GW decides at PDN connection establishment, based on pre-configuration, which point-to-point (PtP) tunneling technique is used for the SGi based delivery between the P-GW and the AS.

# SGi PtP tunneling based on UDP/IP

A PtP tunnel is used by the P-GW toward the AS. The tunnel parameters (that is, destination IP address and UDP port) for SGi PtP tunneling based on UDP/IP are pre-configured on the P-GW. The IP address allocation procedure for PDN connections is performed locally by the P-GW based on APN configuration. And, according

to 3GPP defined existing IP address allocation procedures, only single IP address is used (that is, both IPv4 and IPv6 addresses are not allocated).

The P-GW acts as a transparent forwarding node for the payload between the UE and the AS. For uplink Non-IP data, the P-GW forwards the received data to the AS over the SGi PtP tunnel using UDP/IP encapsulation. For downlink Non-IP data, the AS sends the data using UDP/IP encapsulation with the IP address of the UE and the 3GPP defined UDP port for "Non-IP" data. The P-GW decapsulates the received data (that is, removes the UDP/IP headers) and forwards the data to S-GW on the GTP-U tunnel, identified by the IP address of the UE, for delivery to the UE.

The P-GW performs the IP-related operations but the IP address or IP prefix is not provided to the UE. For IPv6, the P-GW assigns an Interface Identifier for the PDN connection. The allocated IP address or IPv6 prefix identifies the PDN connection of the UE.

The following image illustrates the protocol configuration for Non-IP data (user plane) using SGi PtP tunneling.
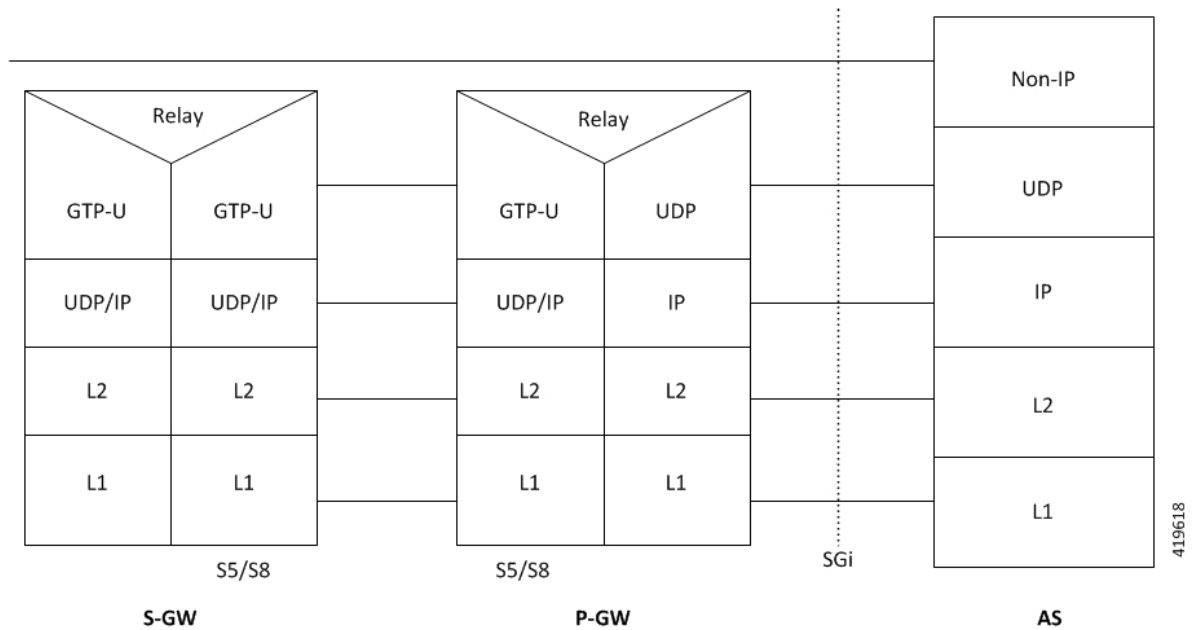

Important	For Non-IP data, IP protocol-related functionalities are not applicable.

SGi based delivery of Non-IP data is used by any UE. The P-GW decides at PDN connection establishment, based on pre-configuration, where a point-to-point (PtP) tunneling technique is used for the SGi-based delivery between the P-GW and the AS. Radius authentication and radius accounting are supported for Non-IP UE with 3GPP compliant radius dictionary.

Radius Authentication and Accounting Support at P-GW

P-GW supports Radius authentication. Following call flow describes Radius authentication workflow.

Figure 1: Call Flow
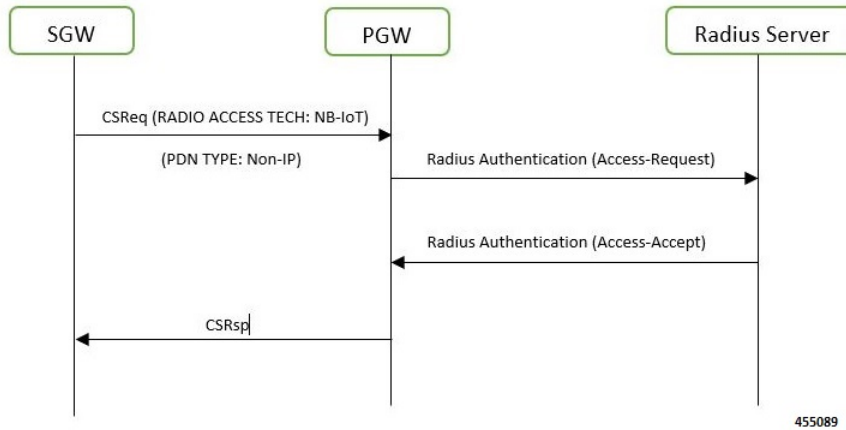
Following call flow describes the radius accouting workflow at P-GW.
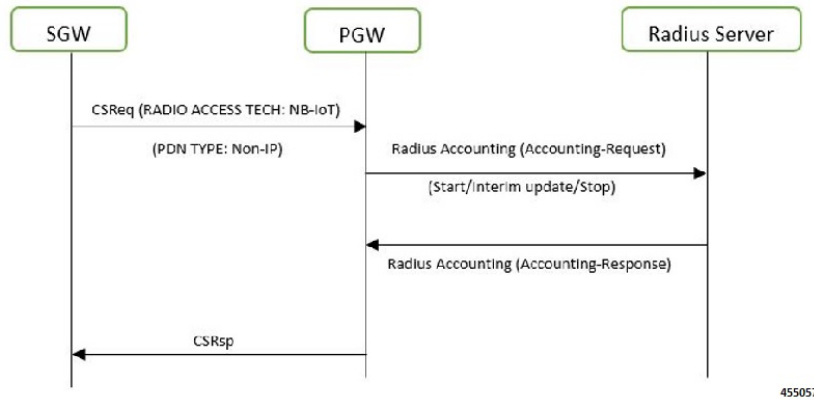
Figure 2: Call flow

Table 1: Procedure

Step	Description
1	P-GW sends radius accounting start to radius server when it receives an NB-IOT/EUTRAN call with PDN type as Non-IP.
2	PGW continously sends radius accounting interim-updates to radius server after configured timer expiration.
3	Finally, it sends a radius accounting stop to radius server when the subscriber is detached

Inter-RAT and Intra-RAT Handovers for Non-IP PDNs

The following table shows the current behavior of Inter-RAT and Intra-RAT Handovers for Non-IP PDNs.

Handover	Type	Non-IP PDNs
S-GW Relocation	Intra/Inter-RAT	Supported (Handover successful).
MME <-> S4-SGSN	Inter-RAT	Supported (Handover successful).
GnGp (4G -> 3G)	Inter-RAT	Not Supported (Handover Reject with cause 'Non-existent' followed by drop of existing 4G call).
LTE -> eHRPD	Inter-RAT	Not Supported (Handover Reject with status code 'Insufficient Resources'. Existing 4G call continues).
LTE -> Wi-Fi (S2a/S2b)	Inter-RAT	Not Supported (Handover Reject with cause 'pdn type not supported'. Existing 4G call continues).

ePCO IE Support

With this feature, ePCO IE for Non-IP PDN is supported at P-GW and S-GW.

ePCO IE Support at P-GW

Following is a gist of requirements supported for the ePCO IE at P-GW:

- Support is added for EPCOSI bit in Indication Flags IE in CSReq and MBReq at the P-GW.

- The P-GW includes PCO in ePCO IE based on EPCOSI bit received in CSReq message.

- Currently supported PCOs in ePCO IE is added.

- Support is added for Non-IP link MTU in both PCO as well as in ePCO. Depending on EPCOSI Indication Flag, the P-GW communicates Non-IP link MTU in PCO or ePCO. The Non-IP link MTU is sent for Non-IP PDNs when requested in CSreq message.

- When EPCOSI is received, requested options in ePCO IE are considered. When EPCOSI is not received, then ePCO IE is ignored at P-GW.

ePCO IE Support at S-GW

Following is a gist of requirements supported for the ePCO IE at S-GW:

- Support is added for EPCOSI bit in Indication Flags IE in CSReq and MBReq at the S-GW.

- The S-GW sets ePCO support for a PDN under following condition:

    1. During new call establishment:

        a. When EPCOSI is received from MME in CSReq.

        b. When ePCO IE is received in CSRsp from PGW.

2. During inter-SGW relocation:

   a. When EPCOSI is received from MME in CSReq toward S-GW.

3. During inter-MME intra-SGW relocation:

   a. When EPCOSI is received from MME in MBReq toward S-GW.

- During inter-MME intra-SGW handover scenario, if S-GW detects any change in ePCO IE support on MME, the S-GW initiates MBReq toward P-GW to notify the change accordingly by setting or re-setting EPCOSI flag in Indication Flags IE.

- The S-GW transparently forwards the received PCO/ePCO IE from the peer. As such, the S-GW does not put any restriction or checks, if ePCO is received for a PDN, for which ePCO is not supported and the other way around.

- For any PDN supporting ePCO IE, if MBReq without EPCOSI is received, the S-GW assumes that the ePCO IE support for the PDN is discontinued at MME and S-GW triggers MBReq toward P-GW without sending EPCOSI flag, or without sending Indication Flag IE. Similarly, if ePCO IE support is indicated in MBReq for an existing PDN not supporting ePCO, the S-GW triggers MBReq toward P-GW with EPCOSI set.

> **Important** During initial PDN establishment messages, it is expected that MME sends the same EPCOSI support in CSReq and the followed MBReq (MBReq for S1 establish). If there is any change, it is considered as a misbehavior by MME and S-GW uses the final value received in MBReq. As such, signaling toward P-GW is triggered to indicate the change.

The ePCO IE supported at P-GW and S-GW has the following limitations:

- Lawful Intercept (LI) is not supported for ePCO IE.

- Currently supported PCO in MBR is not sent in MBRsp for PDN supporting ePCO IE.

- ePCO IE is not supported in DSReq/DSRsp messages. This is in parity with PCO IE.

Limitations

Following are the known limitations or restrictions of Non-IP PDN feature:

- Non-IP PDN connection is not supported on GGSN and SAEGW in this release.

- For Non-IP PDN at P-GW, following interfaces are not supported in this release:

   - S6b

   - LI Interface

   - Gx

   - Gy

   - Gz

 • Rf

> ☞ **Important** We recommend the operator to not configure these interfaces or CLI commands related to these interfaces for Non-IP PDN connections.

• P-GW does not support Local Policy for Non-IP PDN connections in this release.

• P-GW does not support other SGi PtP tunneling mechanisms (like PMIPv6/GRE, L2TP, GTP-C/U) to deliver Non-IP data to AS via SGi.

• P-GW does not support APN-AMBR rate limit for non-IP PDN connections.

• P-GW does not support shaping and policing for Non-IP data in this release.

• P-GW/S-GW does not support session trace for Non-IP PDNs in this release.

• P-GW/S-GW does not support RTT for Non-IP PDNs in this release.

• P-GW does not support NEMO for Non-IP PDNs in this release.

• P-GW does not support VRF for Non-IP PDNs in this release.

• P-GW does not support MPLS for Non-IP PDNs in this release.

• P-GW does not support IPSec for Non-IP PDNs in this release.

• For Non-IP PDNs, P-GW does not support VLAN tagging based on private pool configuration and next-hop address.

• P-GW does not support Framed Route for Non-IP PDNs in this release.

• ICSR upgrade/downgrade is not supported for Non-IP PDN sessions in this release.

• S-GW does not support Local IP Access (LIPA) for Non-IP PDN in this release.

• In-sequence delivery of Non-IP data cannot be guaranteed and data PDUs may be lost, requiring higher protocol layers to ensure guaranteed delivery when needed.

• P-GW supports reassembly of fragmented packets received on SGi UDP-IP tunnel, but currently does not send Internet Control Message Protocol (ICMP) "reassembly time exceeded" error message to the sender.

• Non-IP UE user-plane traffic is not supported on ICUPS.

• Following existing APN configuration are not supported for Non-IP PDNs:

  • accounting-mode gtpp

  > ✎ **Note** The accounting-mode with RADIUS configuration is supported.

  • active-charging

  • apn-ambr

  • authorize-with-hss

- backoff timer-value

- data-tunnel mtu

- ppp mtu

- dcca

- emergency-apn

- fw-and-nat

- gtpp

- ignore-alt-config

- ims-auth-service

- ip hide-service-address

- l3-to-l2-tunnel

- nai-construction

- pco-options

- reporting-action event-record

- ip pool *<pool_name>* *<ip_address/subnet_mask>* private nexthop-forwarding-address *<ip_address>* overlap vlanid *<vlan_id>*.

License Requirements

This feature is license controlled. Contact your Cisco account representative for information on how to obtain a license.

Standards Compliance

The Non-IP PDN feature complies with the following standards:

- 3GPP TS 23.060 - General Packet Radio Service (GPRS); Service description; Stage 2.

- 3GPP TS 23.401 - General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access.

- 3GPP TS 24.008 - Mobile radio interface Layer 3 specification; Core network protocols; Stage 3.

- 3GPP TS 24.301 - Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3.

- 3GPP TS 29.274 - 3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3.

Configuring Non-IP PDN

Enabling Support for Non-IP PDP-Type for APN

Use the following commands under APN Configuration Mode for configuring APN to support Non-IP context types:

```
configure
   context context_name
     apn apn_name
       pdp-type non-ip
      end
```

Notes:

- By default, the command is disabled.

- This CLI command takes effect during new subscriber call creation on S5/S8 interface to the APN.

Configuring UDP-IPv4 or UDP-IPv6 Tunneling Parameters

Use the following commands under APN Configuration Mode to configure UDP-IPv4 or UDP-IPv6 tunneling parameters between the P-GW and an external application server for the APN.

```
configure
  context context_name
    apn apn_name
     tunnel udpip peer-address peer_address peer-port peer_udp_port [ local-port
 <local_udp_port> ]
       end
```

Notes:

- **udpip** - Specifies the per subscriber UDP/IPv4 or UDP/IPv6 tunnel. Based on IPv4/IPv6 peer and local address, tunnel will be UDP/IPv4 or UDP/IPv6.

- **peer-address** *peer_address* - Specifies the Peer address for the tunnel. *peer_address* must be expressed in dotted decimal notation.

- **peer-port** *peer_udp_port* - Specifies the port number of the peer for the tunnel.

- **local-port** - Specifies the local UDP port number. Default value is 49152.

- If previously configured, use the no tunnel udpip CLI command to disable the UDP-IPv4/UDP-IPv6 tunneling for the APN.

- For local and peer UDP port number, it is recommended to use unregistered port number with IANA.

- This CLI command takes effect during new subscriber call creation on S5/S8 interface to the APN.

Enabling Support for Non-IP PDP Type for Radius Accounting and Authentication

Use the following commands for configuring radius accounting:

```
configure
  context context_name
    aaa group default
      radius dictionary 3gpp
      exit
     apn apn_name
      pdp-type non-ip
      tunnel udp peer-address peer_address peer-port peer_UDP_port local-port
 local_UDP_port
      no ims-auth-service service_name
      no active-charging rulebase
      authentication imsi-auth username-strip-apn
      accounting-mode radius
      mediation-device context-name ISP1 delay-GTP-respo
    end
```

Notes:

• By default, the command is disabled.

• This CLI command is applicable only for legacy PDN features.

• **radius dictionary 3gpp**: Configures 3GPP radius dictionary for radius accounting.

Verifying the Non-IP PDN Configuration

Use the **show apn name** *apn_name* command to verify the configuration that you have entered following the steps outlined earlier. The output appears similar to the following:

```
show apn name intershat

access point name (APN):  intershat
authentication context:  ingress
pdp type:  non-ip
emergency: no
.
.
.
Tunnel peers
  udp peer-address 10.0.0.1 peer-port 65535 local-port 49152
.
.
.
```

The following show commands can also be used for verifying the Non-IP PDP-Type and UDP-IP tunnel configurations for the APN:

• **show configuration apn** *apnname*

• **show configuration**

• **show configuration apn** *apnname* **verbose**

• **show configuration verbose**

Monitoring and Troubleshooting the Non-IP PDN

This section provides information regarding show commands and/or their outputs in support of the feature.

Non-IP PDN Show Command(s) and/or Outputs

This section provides information regarding show commands and/or their outputs in support of the feature.

show session progress

The following new field is added to the output of this command to show the number of Non-IP PDN sessions that are in CONNECTED state:

• **In-progress calls @ PDN-TYPE-Non-IP CONNECTED state**

show session subsystem

The following new field is added to the output of this command to show the number of Non-IP PDN sessions that are in CONNECTED state:

• **In-progress calls @ PDN-TYPE-Non-IP CONNECTED state**

show session summary

The following new fields are added to the show output to display the summary information of sessions active or dormant along with total sessions for each access-type:

• **pgw-gtp-non-ip** – Total number of Non-IP subscribers on GTP-PGW.

• **sgw-gtp-non-ip** – Total number of Non-IP subscribers on GTP-SGW.

These new fields are also introduced in the output of following show commands:

• **show subscribers**

• **show subscribers summary**

show subscribers aaa-configuration

The output of this show command displays the following new fields under Access Type and Network Type:

• **Access Type: sgw-pdn-type-non-ip | gtp-pdn-type-non-ip**

• **Network Type: Non-IP | UDP-IPv4 | UDP-IPv6**

Notes:

• **Access Type: sgw-pdn-type-non-ip** is displayed for S-GW sessions, when PDN-type is Non-IP.

• **Access Type: gtp-pdn-type-non-ip** is displayed for P-GW sessions, when PDN-type is Non-IP.

- **Network Type: (N) – Non-IP** is displayed for S-GW sessions with PDN-type Non-IP.

- **Network Type: (x) – UDP-IPv4** is displayed for P-GW sessions with PDN-type Non-IP and IP address allocated to the session is IPv4.

- **Network Type: (X) – UDP-IPv6** is displayed for P-GW sessions with PDN-type Non-IP and IP address allocated to the session is IPv6.

These new fields are also introduced in the output of following show commands:

- **show subscribers activity all**

- **show subscribers full all**

show subscribers pgw-only full all

The output of this show command displays the following new fields under Access Type and Network Type:

- **Access Type: gtp-pdn-type-non-ip**

- **Network Type: UDP-IPv4 | UDP-IPv6**

Notes:

- **Access Type: gtp-pdn-type-non-ip** is displayed for P-GW sessions, when PDN-type is Non-IP.

- **Network Type: (x) – UDP-IPv4** is displayed for P-GW sessions with PDN-type Non-IP and IP address allocated to the session is IPv4.

- **Network Type: (X) – UDP-IPv6** is displayed for P-GW sessions with PDN-type Non-IP and IP address allocated to the session is IPv6.

show subscribers sgw-only full all

The output of this show command displays the following new fields under Access Type and Network Type:

- **Access Type: sgw-pdn-type-non-ip**

- **Network Type: Non-IP**

Notes:

- **Access Type: sgw-pdn-type-non-ip** is displayed for S-GW sessions, when PDN-type is Non-IP.

- **Network Type: Network Type: (N) – Non-IP** is displayed for S-GW sessions with PDN-type Non-IP.

show pgw-service statistics all

The output of this show command displays the following new fields:

1. PDNs By PDN-Type:

    - **Non-IP PDNs:**

        - **Active:**

        - **Setup:**

- **Released:**

2. VAPNs Selected Based on Configured PDP-Type:

  - **Non-IP PDNs:**

    - **Setup:**

    - **Rejected:**

3. Data Statistics Per Interface:

  - **Drop Due To Non-IP Port Violation:**

    - **Packets:**

    - **Bytes:**

  - **Drop Due To Non-IP Protocol Violation:**

    - **Packets:**

    - **Bytes:**

  - **Drop Due To Non-IP Invalid AS Source Address:**

    - **Packets:**

    - **Bytes:**

4. Data Statistics Per Interface:

  - **Non-IP Reassembly Statistics:**

    - **Packets:**

    - **Bytes:**

5. IP Address Allocation Statistics:

  - **Non-IP PDN:**

    - **Total IPv4 addrs allocated:**

      - **Local pool assignment:**

    - **Total IPv6 addrs allocated:**

      - **Local pool assignment:**

6. SGi tunneling statistics:

  - **UDP-IPv4 Tunnels:**

    - **Active:**

- • **Setup:**

- • **Released:**

- • **UDP-IPv6 Tunnels:**

  - • **Active:**

  - • **Setup:**

  - • **Released:**

7. Data Statistics Per PDN-Type:

  - • **Non-IP PDNs:**

    - • **Uplink:**

      - • **Total Pkts:**

      - • **Total Bytes:**

    - • **Downlink:**

      - • **Total Pkts:**

      - • **Total Bytes:**

Where:

1. Number of Active, Setup and Release session counters for Non-IP PDN type.

2. Setup and Rejected counters for Virtual APN selection based on Non-IP PDP type.

3. Packets and bytes drop counters for invalid port, invalid protocol and invalid application server source address.

4. Packets and bytes reassembled counters for Non-IP downlink data on UDP-IPv4/UDP-IPv6 tunnel.

5. Counters for locally allocated IPv4/IPv6 address for Non-IP PDN type UEs.

6. SGi tunneling statistics for UDP-IPv4 and UDP-IPv6.

7. Data statistics (uplink/downlink) for Non-IP PDN types.

show sgw-service statistics all

The output of this show command displays the following new fields:

1. PDNs By PDN-Type:

  - • **Active:**

  - • **Setup:**

  - • **Released:**

  - • **Rejected:**

2. Data Statistics Per PDN-Type:

- **Non-IP PDNs:**

    - **Uplink:**

        - **Total Pkts:**

        - **Total Bytes:**

    - **Downlink:**

        - **Total Pkts:**

        - **Total Bytes:**

Where:

1. Number of Active, Setup, Release, and Rejected session counters for Non-IP PDN type.

2. Data statistics (Uplink and Downlink) for Non-IP PDN types.

show subscribers network-type

The output of the show subscribers network-type udp-ipv4 | udp-ipv6 | non-ip command displays the following new fields:

1. Access Type:

    - **(B) - pgw-gtp-non-ip**

    - **(J) - sgw-gtp-non-ip**

2. Network-Type:

    - **(N) - NON-IP**

    - **(x) - UDP-IPv4**

    - **(X) - UDP-IPv6**

Where:

1. Non-IP PDNs for GTP-PGW and S-GW based on Access Type.

2. Non-IP network type for S-GW and UDP-IPv4/UDP-IPv6 network type for P-GW.

show subscribers pgw-only summary

The following new field is added to the output of this command which displays the summary information for P-GW subscribers, based on defined parameters:

- **gtp-pdn-type-non-ip**

show subscribers sgw-only summary

The following new field is added to the output of this command which displays the summary information for S-GW subscribers, based on defined parameters:

- **gtp-pdn-type-non-ip**

show subscribers pgw-only

The following new field is added to the output of this command to display Non-IP PDN Access Type:

- **(B) - pgw-gtp-non-ip**

show subscribers sgw-only

The following new field is added to the output of this command to display Non-IP PDN Access Type:

- **(J) - sgw-gtp-non-ip**

show apn statistics

The output of this show command displays the following new fields:

1. Data Statistics:

   - **Non-IP port violations drop:**

   - **Non-IP protocol violation drop:**

   - **Non-IP invalid AS src addr drop:**

2. Data Statistics:

   - **Non-IP reassembled pkts:**

3. Total PDN-Type stats:

   - **PDN-Type Non-IP sessions:**

     - **Active:**

     - **Setup:**

     - **Released:**

Where:

1. Non-IP drop statistics for port violation, protocol violation, and application server source address violations for the APN.

2. Number of reassembled packets from fragmented downlink packets on SGi UDP-IP tunnel for Non-IP PDNs for the APN.

3. Number of Active, Setup and Release session counters for Non-IP PDN type.

show apn statistics name

Use the **show apn statistics name** *apn_name* command to verify the Non-IP UE APN statistics. The output appears similar to the following:

```
show apn name intershat

access point name (APN):  intershat
authentication context:  ingress
pdp type:  non-ip
emergency: no
.
.
.
Tunnel peers
  udp peer-address 10.0.0.1 peer-port 65535 local-port 49152
.
.
.
```

Monitor Protocol

When using the monitor protocol command, enable the following options::

- 26 (GTPU)and 33 (L3 Tunnel)

- 12 (RADIUS Auth),13 (Acct),31(RADIUS COA) for RADIUS messages

Show Configuration Errors

The following APN configuration error is displayed when APN pdp-type is Non-IP and UDP-IP tunnel is not configured under APN:

```
#######################################################
          Displaying APN-configuration errors
#######################################################
Error   : UDP tunnel not configured in Non-IP APN <apn_name> in the context <context>
Total 1 error(s) in this section !
```

Non-IP PDN Bulk Statistics

The following statistics are introduced in support of the feature:

APN Schema

- invalid-dst-port-pkt-drop – This statistics indicates the total number of downlink packets dropped due to invalid destination port for a Non-IP APN PDN.
- pdn-non-ip-actsess – This statistics indicates the total number of active Non-IP sessions at APN.
- pdn-non-ip-setupsess – This statistics indicates the total number of Non-IP session setup at APN.
- pdn-non-ip-relsess – This statistics indicates the total number of Non-IP session release at APN.
- invalid-tun-proto-pkt-drop – This statistics indicates the total number of downlink packets dropped due to invalid SGi tunnel protocol for a Non-IP APN PDN.
- invalid-as-src-pkt-drop – This statistics indicates the total number of downlink packets dropped due to invalid application server source address for a Non-IP APN PDN.

P-GW Schema

- sessstat-pdn-non-ip-active – This statistic indicates the total number of active Non-IP PDNs at P-GW.
- sessstat-pdn-non-ip-setup – This statistic indicates the total number of Non-IP PDNs setup at P-GW.
- sessstat-pdn-non-ip-rel – This statistic indicates the total number of Non-IP PDNs released at P-GW.
- sessstat-non-ip-ipv4addaloc – This statistic indicates the total number of times IPv4 address is allocated for Non-IP P-GW PDNs.
- sessstat-non-ip-ipv6addaloc – This statistic indicates the total number of times IPv6 address is allocated for Non-IP P-GW PDNs.
- sessstat-non-ip-addaloc-ipv4loacalpool – This statistic indicates the total number of times IPv4 address is allocated from local pool for Non-IP P-GW PDNs.
- sessstat-non-ip-addaloc-ipv6loacalpool – This statistic indicates the total number of times IPv6 address is allocated from local pool for Non-IP P-GW PDNs.
- udptunstat-ipv4sessact – This statistic indicates the total number of active UDP-IPv4 SGi tunnel.
- udptunstat-ipv4sesssetup – This statistic indicates the total number of UDP-IPv4 SGi tunnel setup at P-GW.
- udptunstat-ipv4sessrel – This statistic indicates the total number of UDP-IPv4 SGi tunnel setup at P-GW.
- udptunstat-ipv6sessact – This statistic indicates the total number of active UDP-IPv6 SGi tunnel.
- udptunstat-ipv6sesssetup – This statistic indicates the total number of UDP-IPv6 SGi tunnel setup at P-GW.
- udptunstat-ipv6sessrel – This statistic indicates the total number of UDP-IPv6 SGi tunnel released at P-GW.
- non-ip-pdn-to-user-pkt – This statistics indicates the total number of downlink packets sent on Non-IP P-GW PDNs.
- non-ip-pdn-to-user-byte – This statistics indicates the total number of downlink bytes sent on Non-IP P-GW PDNs.
- non-ip-pdn-from-user-pkt – This statistics indicates the total number of uplink packets received for Non-IP S-GW PDNs.
- non-ip-pdn-from-user-byte – This statistic indicates the total number of uplink bytes with Non-IP S-GW PDNs.
- sessstat-invalid-port-dnlkpktdrop – This statistics indicates the total number of downlink packets dropped due to invalid destination port for a Non-IP P-GW PDN.
- sessstat-invalid-port-dnlkbytedrop – This statistics indicates the total number of downlink bytes dropped due to invalid destination port for a Non-IP P-GW PDN.
- sessstat-invalid-tun-proto-dnlkpktdrop – This statistics indicates the total number of downlink packets dropped due to invalid SGi tunnel protocol for a Non-IP P-GW PDN.
- sessstat-invalid-tun-proto-dnlkbytedrop – This statistics indicates the total number of downlink bytes dropped due to invalid SGi tunnel protocol for a Non-IP P-GW PDN.
- sessstat-invalid-as-src-dnlkpktdrop – This statistics indicates the total number of downlink packets dropped due to invalid application server source address for a Non-IP P-GW PDN.
- sessstat-invalid-as-src-dnlkbytedrop – This statistics indicates the total number of downlink bytes dropped due to invalid application server source address for a Non-IP P-GW PDN.

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- sessstat-totcur-pdn-non-ip – This statistic indicates the total number of current Non-IP S-GW PDN.
- sessstat-pdnsetuptype-non-ip – This statistic indicates the total number of Non-IP PDNs setup at S-GW.
- sessstat-pdnrel-non-ip – This statistic indicates the total number of Non-IP PDNs released at S-GW.
- sessstat-pdnrej-non-ip – This statistic indicates the total number of Non-IP PDNs rejected by S-GW.

- non-ip-pdn-to-user-pkt – This statistic indicates the total number of downlink packets with Non-IP S-GW PDNs.
- non-ip-pdn-to-user-byte – This statistic indicates the total number of downlink bytes with Non-IP S-GW PDNs.
- non-ip-pdn-from-user-pkt – This statistic indicates the total number of uplink packets with Non-IP S-GW PDNs.
- non-ip-pdn-from-user-byte – This statistic indicates the total number of uplink bytes with Non-IP S-GW PDNs.