Context Replacement Support

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	cnSGW-C
Applicable Platform(s)	SMI
Feature Default Setting	Enabled - Always-on
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
Introduced support for partial context replacement.	2021.02.0
First introduced.	2020.01.0

Feature Description

The cnSGW-C supports context replacement when it receives Create Session Request (CSReq) with the existing EBI. When the MME node and cnSGW-C are not synchronized, the session gets locally terminated on the MME. The MME sends a CSReq with the EBI that is already present in the cnSGW-C. If the CSReq contains a TEID with value as non-ZERO, then cnSGW-C partially replaces the context. When TEID is zero, cnSGW-C performs full context replacement.

How it Works

This section describes how this feature works.

Call Flows

This section describes the key call flows for this feature.

Full Context Replacement Call Flow

This section describes the full context replacement call flow.

Create Session Request Call Flow

This section describes the Create Session Request call flow.

Figure 1: Create Session Request (Context Replacement – Single or Multi-PDN subscriber) Call Flow

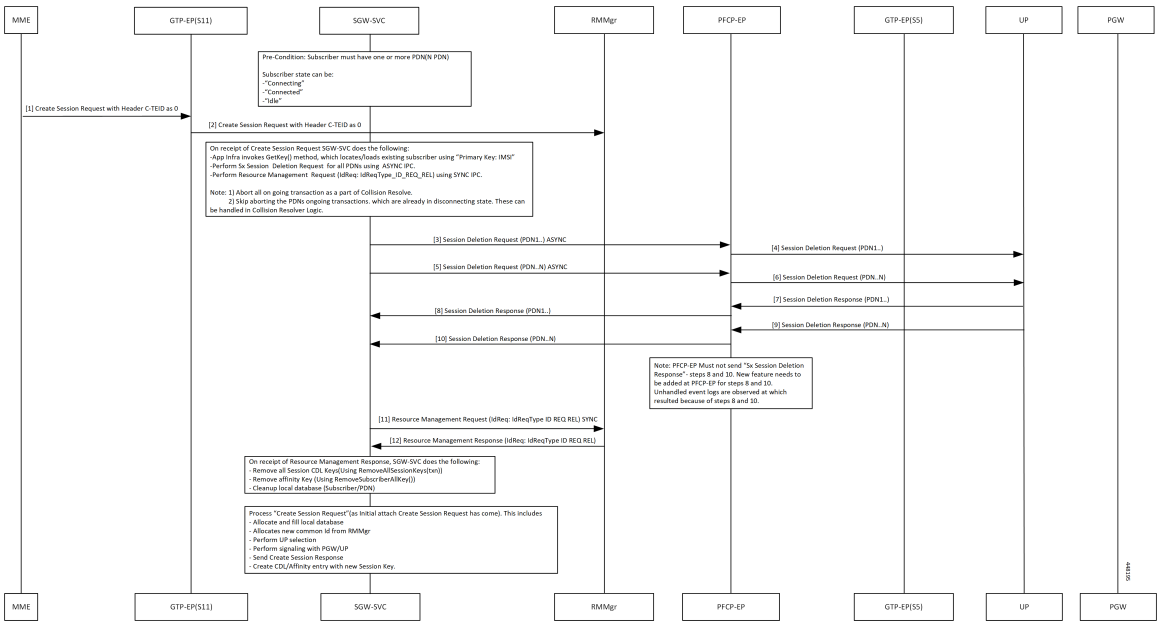

Table 3: Create Session Request (Context Replacement – Single or Multi-PDN subscriber) Call Flow Description

Step	Description
1	MME sends Create Session Request with C-TEID as zero to GTPC-EP ingress.
2	GTPC-EP ingress forwards the Create Session Request to SGW-SVC. Following actions takes place: • App Infra invokes the GetKey() method, which locates and loads the existing subscribers using Primary Key: IMSI. • Performs Sx Session Deletion Request for all PDNs using ASYNC IPC • Performs Resource Management Request (IdReq: IdReqType_ID_REQ_REL) using SYNC IPC
3, 5	The SGW service pod sends the Delete Session Request for PDN 1 - N to PFCP-EP.
4, 6	PFCP-EP forwards Delete Session Request for PDN 1 - N to UPF.
7, 9	PFCP-EP receives Delete Session Response for PDN 1 to N from UPF.
8, 10	PFCP-EP forwards Delete Session Response for PDN 1 - N to SGW service pod.
11	SGW service pod sends Resource Management Request to RMMgr with request ID-type as Request REL.
12	SGW service pod receives Resource Management Response from RMMgr with Req ID-type as REQ REL. The SGW service pod performs following: • Removes all session CDL keys (Using RemoveAllSessionKeys(txn)) • Removes affinity Key (Using RemoveSubscriberAllKey()) • Cleans up the local database (Subscriber/PDN)

Note You can ignore unhandled events for the Deletion Response from UPF.

Partial Context Replacement Call Flow

This section describes the partial context replacement call flow.

When cnSGW-C receives a CSReq with the existing EBI and TEID as non-ZERO, then cnSGW-C performs a partial context replacement by invoking the following call flows:

- EBI received in CSReq is for the existing default bearer.
- EBI received in CSReq is for the existing dedicated bearer.

Create Session Request with Default Bearer EBI Call Flow

This section describes the Create Session Request with Default Bearer EBI call flow.

Figure 2: CSReq with Default Bearer EBI Call Flow

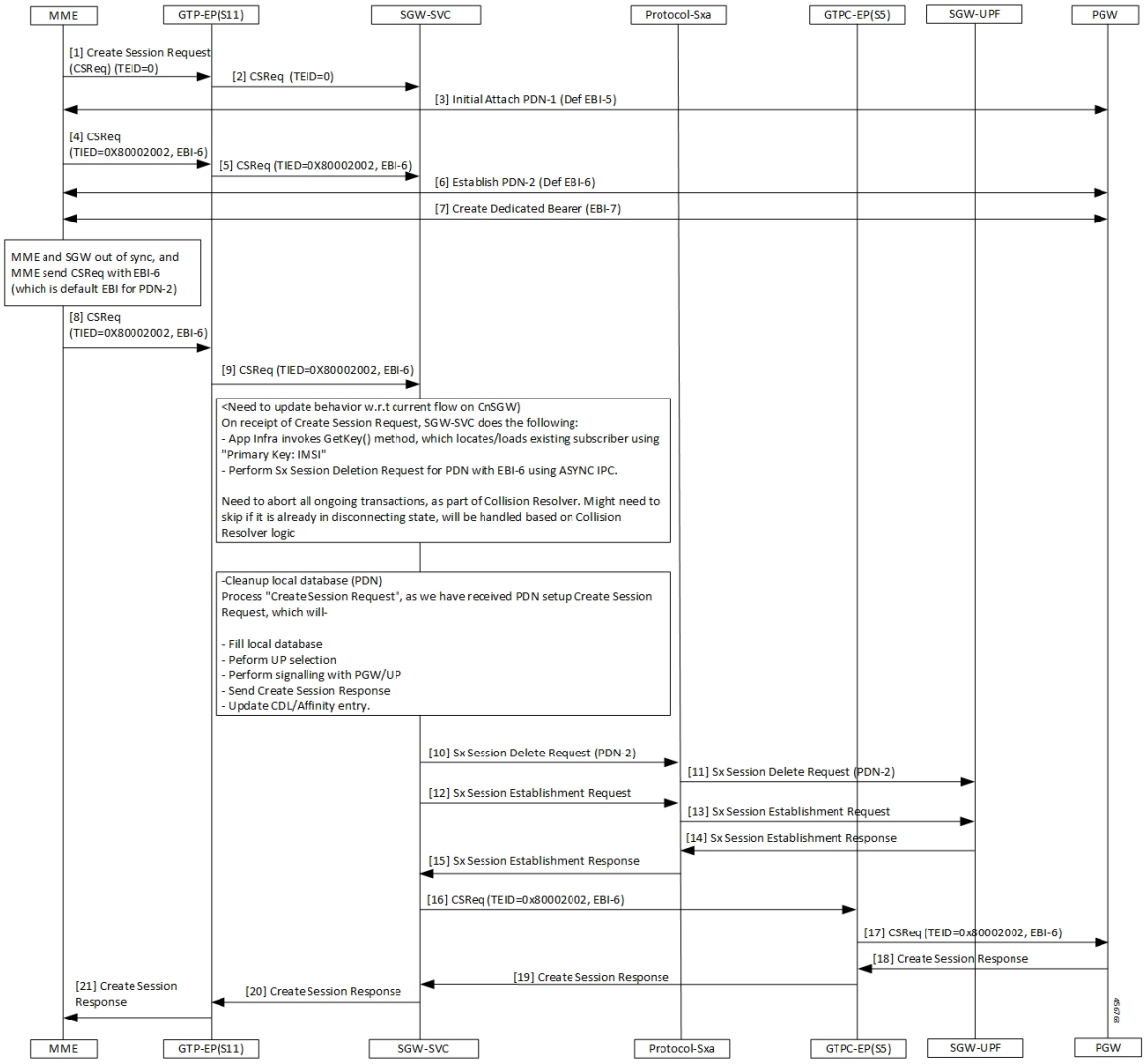

Table 4: CSReq with Default Bearer EBI Call Flow Description

Step	Description
1	The MME sends a Create Session Request with TIED value as 0 to the GTPC-EP(S11).
2	The GTPC-EP(S11) forwards the Create Session Request with TIED value as 0 to the SGW-SVC.
3	The MME and the PGW process the Initial Attach PDN-1 with the default EBI-5 process.
4	The MME sends a Create Session Request TIED=0x80002002 with EBI-6 to the GTPC-EP.

Step	Description
5	The GTPC-EP forwards the Create Session Request TIED=0x80002002 with EBI-6 to the SGW-SVC.
6	The MME and the PGW establish the PDN-2 with default EBI-6 connection.
7	The MME and PGW complete the Create Dedicated Bearer with EBI-7 process.
8	If the SGW and MME are not in sync, the MME sends a Create Session Request with EBI-6 present in the SGW.
9	The GTPC-EP sends a CSReq TIED= 0x80002002 with EBI-6 to SGW.
10	After receiving the Create Session Request, the SGW-SVC performs the following- • Cleans up the PDN with default EBI=6. • Sends the Sx signalling to UPF to clear the session. • Performs the Create Session Request as a new PDN-Setup. The SGW sends an Sx Session Delete Request on PDN-2 to Protocol-SXA.
11	The Protocol-SXA forwards a Sx Session Delete Request to SGW-UPF.
12	The SGW sends a Session Establishment Request to the Protocol-SXA.
13	The Protocol-SXA forwards a Sx Session Establishment Request to SGW-UPF.
14	The SGW-UPF responds to the Protocol-SXA with the Sx Session Establishment Response.
15	The Protocol-SXA sends the Sx Session Establishment Response to the SGW-SVC.
16	The SGW-SVC sends the Create Session Request TIED= 0x80002002 with EBI-6 to the GTPC-EP.
17	The GTPC-EP sends the Create Session Request TIED= 0x80002002 with EBI-6 to the PGW.
18	The PGW sends a Create Session Response to the GTPC-EP.
19	The GTPC-EP responds to the SGW-SVC with the Create Session Response.
20	The SGW-SVC forwards the response to the GTPC-EP.
21	The GTPC-EP sends the Create Session Response to the MME.

Create Session Request with Dedicated Bearer EBI Call Flow

This section describes the Create Session Request with the Dedicated EBI call flow.

Figure 3: CSReq with Dedicated Bearer EBI Call Flow

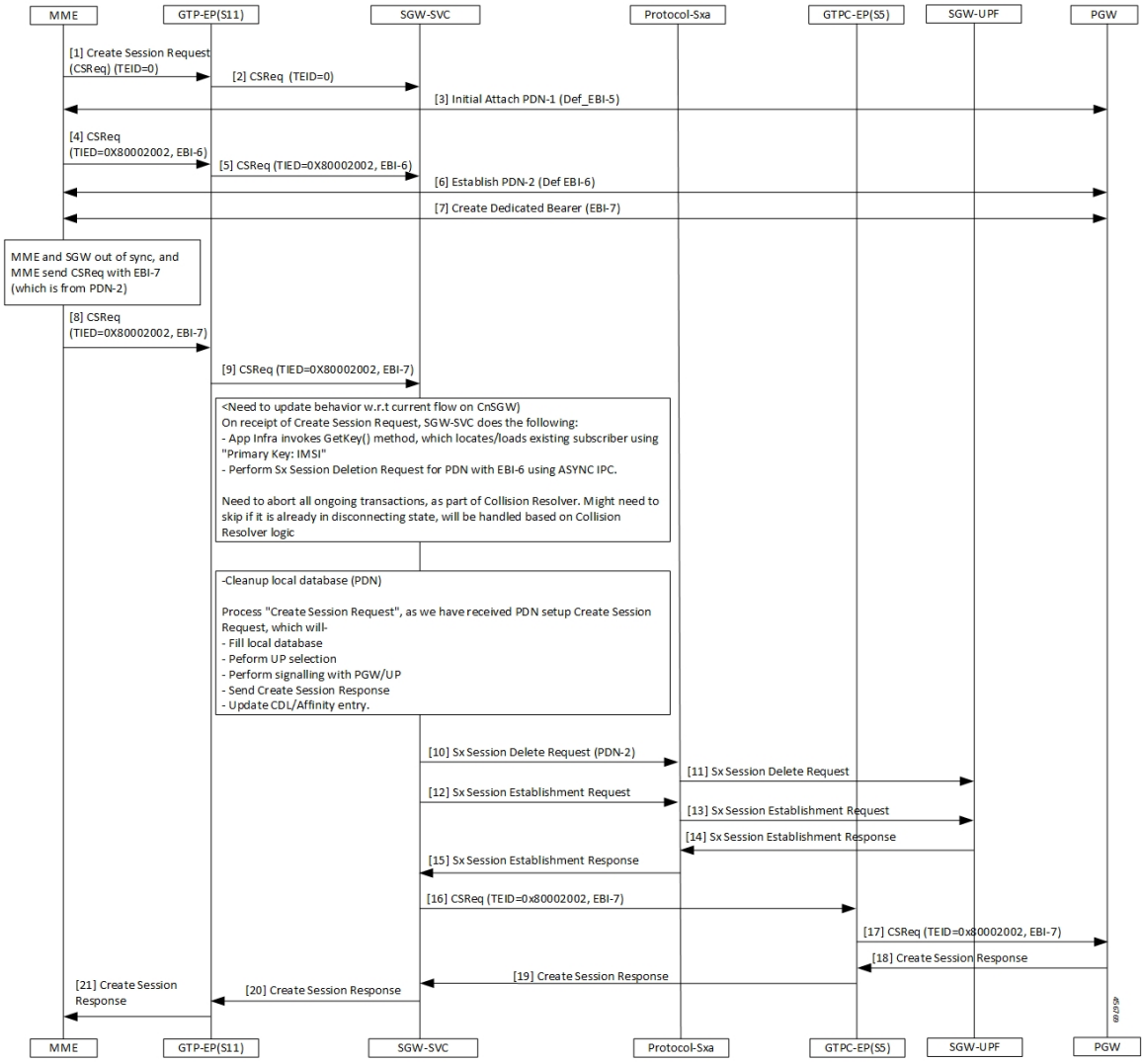

Table 5: CSReq with Dedicated Bearer EBI Call Flow Description

Step	Description
1	The MME sends a Create Session Request with the TIED value as zero to the GTPC-EP(S11).
2	The GTPC-EP(S11) forwards the Create Session Request with TIED value as zero to the SGW-SVC.
3	The MME and the PGW process the Initial Attach PDN with the EBI-5 process.
4	The MME sends the Create Session Request with EBI-6 to the GTPC-EP.
5	The GTPC-EP forwards the Create Session Request with EBI-6 to the SGW-SVC.
6	The MME and PGW establish the PDN with the EBI-6 connection.

Step	Description
7	The MME and PGW complete the Create Dedicated Bearer with EBI-7 process.
8	If the SGW and MME are not in sync, then MME sends a Create Session Request with EBI-6 present in SGW.
9	The GTPC-EP sends a CSReq with EBI-7 to SGW.
10	After receiving the Create Session Request, the SGW-SVC: • Cleans up the PDN with default EBI=6. • Sends the Sx signalling to UPF to clear the session. • Performs the Create Session Request as new PDN-Setup. The SGW sends a Sx Session Delete Request on PDN-2 to Protocol-SXA.
11	The Protocol-SXA forwards the Sx Session Delete Request to SGW-UPF.
12	The SGW sends a Session Establishment Request to the Protocol-SXA.
13	The Protocol-SXA forwards a Sx Session Establishment Request to SGW-UPF.
14	The SGW-UPF responds to the Protocol-SXA with the Sx Session Establishment Response.
15	The Protocol-SXA sends the Sx Session Establishment Response to the SGW-SVC.
16	The SGW-SVC sends the Create Session Request containing TIED=0x80002002, EBI-7 to the GTPC-EP.
17	The GTPC-EP sends the Create Session Request containing TIED=0x80002002, EBI-7 to the PGW.
18	The PGW sends a Create Session Response to the GTPC-EP.
19	The GTPC-EP responds to the SGW-SVC with the Create Session Response.
20	The SGW-SVC forwards the response to the GTPC-EP.
21	The GTPC-EP sends the Create Session Response to the MME.

OAM Support

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

Bulk Statistics

The following statistics are supported for the partial context replacement feature.

- sgw_pdn_disconnect_stats: Captures the total number of SGW PDN in the disconnected status.

  An example of the Prometheus query:

```
sgw_pdn_disconnect_stats{app_name="smf",cluster="cn",data_center=\

"cn",instance_id="0",pdn_type="ipv4",rat_type="EUTRAN",reason="context_replacement",\
service_name="sgw-service"} 1
```