



# GTPU Path Failure

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## 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                    |                     |

### Revision History

**Table 2: Revision History**

| Revision Details                                                                                         | Release   |
|----------------------------------------------------------------------------------------------------------|-----------|
| Support to clean session or bearer based on reported value in node-report (Node-ID and Peer Information) | 2021.02.3 |
| First introduced.                                                                                        | 2021.02.1 |

## Feature Description

When UPF detects a GTP-U path failure, it sends Node Report Request (with NodeID and GTPU Peer Information) to cnSGW-C. cnSGW-C clears the PDU sessions belonging to the GTP-U peer and UPF node ID.

This feature supports the following:

- Sending Node Report Success
- Cleaning session or bearer based on the reported value in node-report (Node-ID and Peer Information)
- Incrementing the relevant statistics

## How it Works

This section describes how this feature works.

The following table describes various actions on detecting GTPU path failure.

**Table 3: GTPU Path Failure for Node Report**

| Interface | Configuration | TEID      | Action                                                                                                                     |
|-----------|---------------|-----------|----------------------------------------------------------------------------------------------------------------------------|
| s1u/s5u   | Local Purge   | Default   | Send SxSessionDeletion to clean up on UPF<br>Purge PDN locally                                                             |
|           |               | Dedicated | Send SxSessionModification (Remove TrafficEndpoint)<br>Purge Bearer locally                                                |
|           | Signal Peer   | Default   | Send SxSessionModificationRequest (FAR Action=DROP)<br>Send DBReq to MME and DSReq to PGW<br>Send SxSessionDeletionRequest |
|           |               | Dedicated | Send DBReq to MME and DBCmd to PGW (Async)<br>Send SxSessionModificationRequest (Remove Traffic Endpoint)                  |

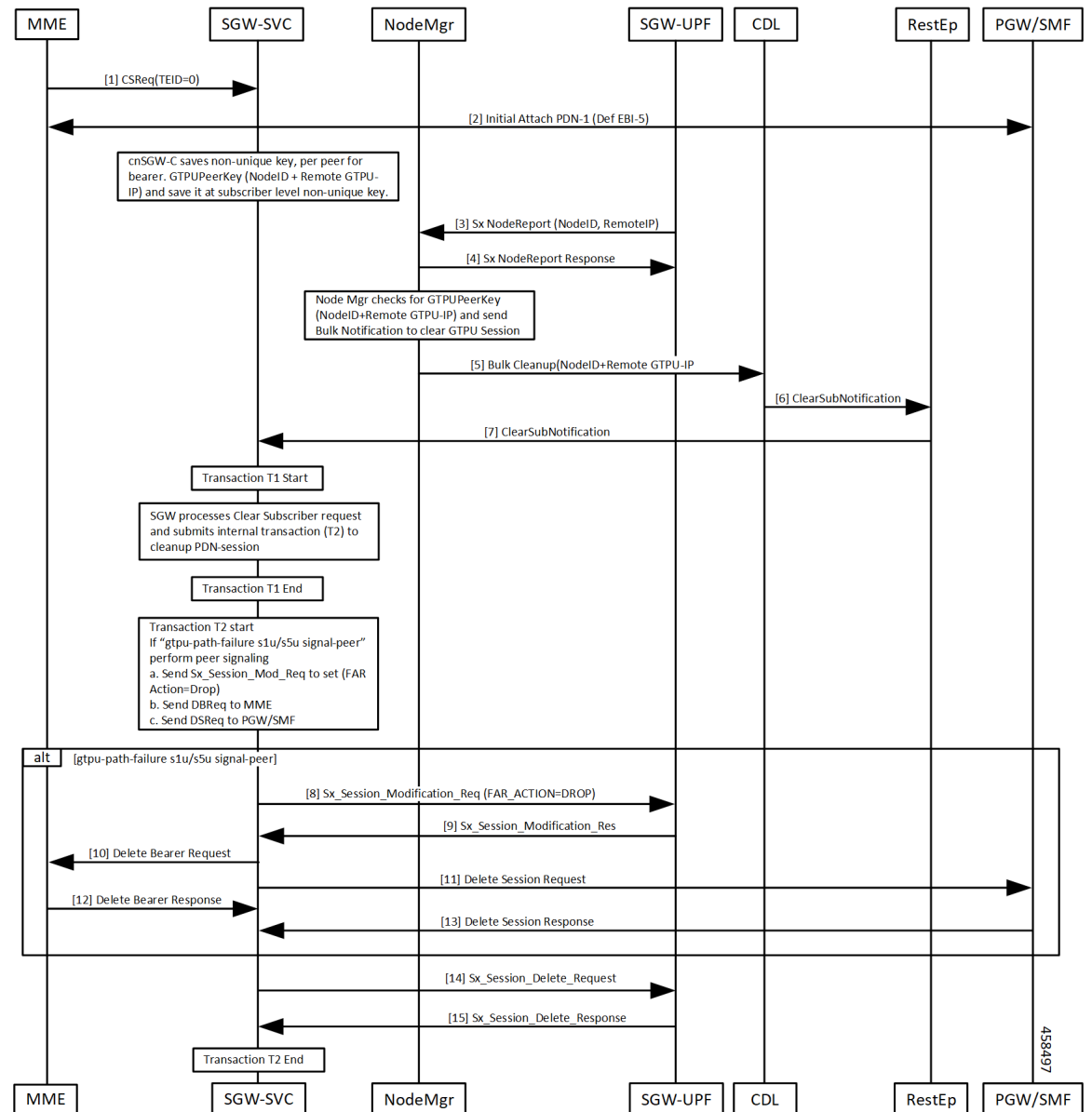
# Call Flows

This section describes key call flows of GTPU Path Failure.

## Path Failure for Default Bearer Call Flow

This section describes the Path Failure for Default Bearer call flow.

**Figure 1: Path Failure for Default Bearer Call Flow**



**Table 4: Path Failure for Default Bearer Call Flow Description**

| Step   | Description                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2   | Initial attach complete. cnSGW-C saves non-unique GTPUPeerKey (NodeID:Remote GTPU-peer-IP) per bearer.                                                                                                                                                                                                                                                                                                                                  |
| 3, 4   | <ul style="list-style-type: none"> <li>• Path failure detected on UPF. UPF sends NodeReportRequest to Node Manager.</li> <li>• Node Manager responds with NodeReportResponse.</li> <li>• Initiate Bulk Cleanup request to CDL.</li> </ul>                                                                                                                                                                                               |
| 6, 7   | <ul style="list-style-type: none"> <li>• CDL sends ClearSubNotification to RestEp.</li> <li>• RestEP forwards it to cnSGW-C.</li> </ul>                                                                                                                                                                                                                                                                                                 |
| 8–13   | <p>cnSGW-C processes Clear Subscriber Request.</p> <p>If GTPU peer IP received is for default bearer, submit internal transaction (T2) to clean up PDN.</p> <p>If CLI <code>gtpu-path-failure slu/s5u signal-peer</code></p> <ul style="list-style-type: none"> <li>• Send Sx_Session_Report_Request to UPF to set FAR ACTION=DROP.</li> <li>• Send Delete Bearer Req to MME.</li> <li>• Send Delete Session Request to PGW.</li> </ul> |
| 14, 15 | <ul style="list-style-type: none"> <li>• Send Sx_Session_Delete_Request.</li> <li>• UPF responds with Sx_Session_Delete_Response.</li> </ul>                                                                                                                                                                                                                                                                                            |

## Path Failure for Dedicated Bearer Call Flow

This section describes the Path Failure for Dedicated Bearer call flow.

Figure 2: Path Failure for Dedicated Bearer Call Flow

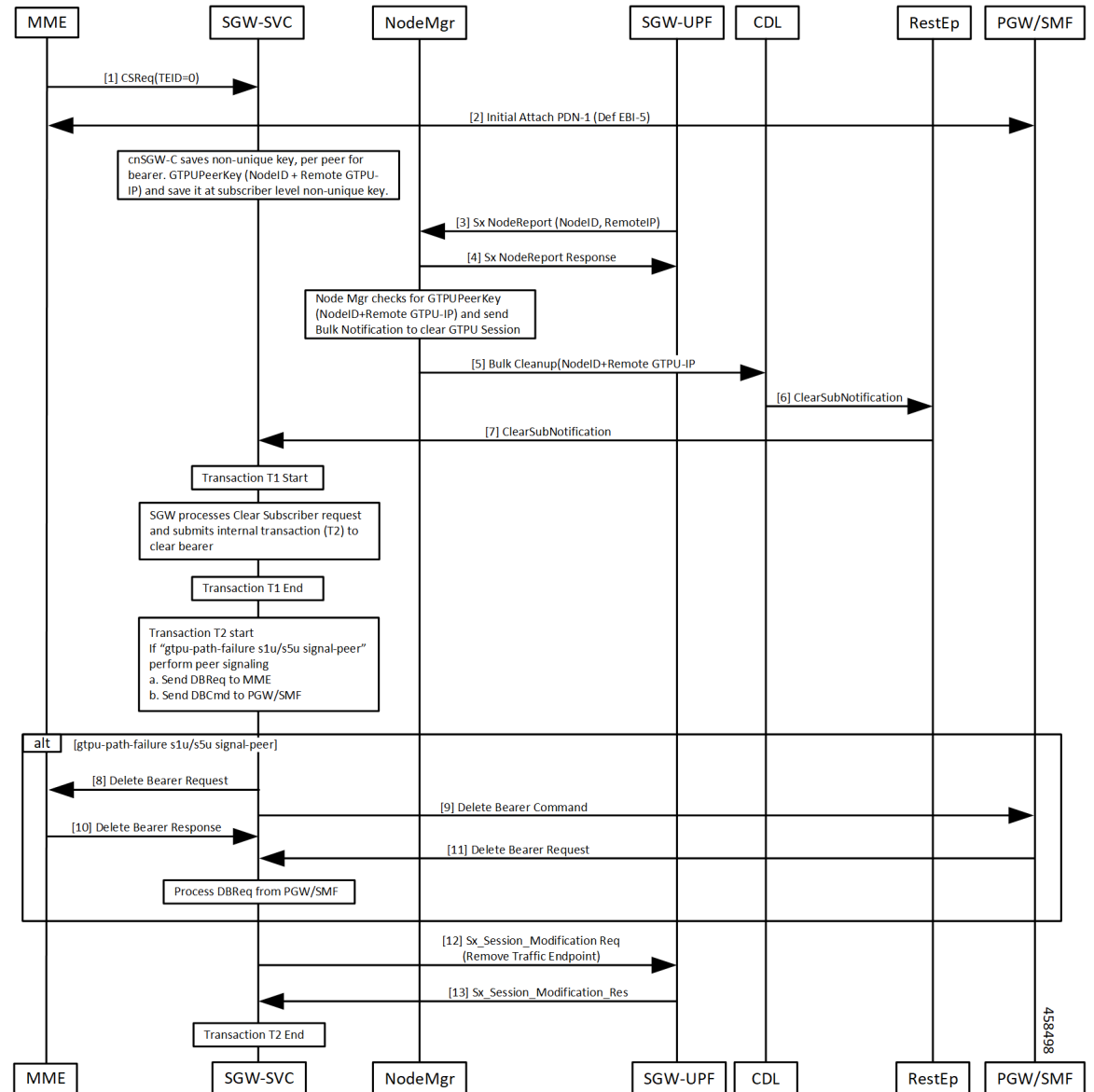


Table 5: Path Failure for Dedicated Bearer Call Flow Description

| Step | Description                                                                                                                                                                                                                         |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2 | Initial attach complete. cnSGW-C saves non-unique GTPUPeerKey (NodeID:Remote GTPU-peer-IP) per bearer.                                                                                                                              |
| 3, 4 | <ul style="list-style-type: none"> <li>Path failure detected on UPF. UPF sends NodeReportRequest to Node Manager.</li> <li>Node Manager responds with NodeReportResponse.</li> <li>Initiate Bulk Cleanup request to CDL.</li> </ul> |

| Step   | Description                                                                                                                                                                                                                                                                                                                                                     |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6, 7   | <ul style="list-style-type: none"> <li>• CDL sends ClearSubNotification to RestEp.</li> <li>• RestEP forwards it to cnSGW-C.</li> </ul>                                                                                                                                                                                                                         |
| 8–13   | <p>cnSGW-C processes Clear Subscriber Request.</p> <p>If GTPU peer IP received is for dedicated bearer, submit internal transaction (T2) to clean up PDN.</p> <p>If CLI <code>gtpu-path-failure s1u/s5u signal-peer</code></p> <ul style="list-style-type: none"> <li>• Send Delete Bearer Req to MME.</li> <li>• Send Delete Bearer Command to PGW.</li> </ul> |
| 14, 15 | <ul style="list-style-type: none"> <li>• Send Sx_Session_Modification_Request (Remove Traffic Endpoint).</li> <li>• UPF responds with Sx_Session_Delete_Response.</li> </ul>                                                                                                                                                                                    |

## Feature Configuration

This section describes how to configure the GTPU Path Failure feature.

To configure this feature, use the following configuration.

```
config
profile sgw sgw_profile_name
  gtpu-path-failure
    s1u [ local-purge | signal-peer ]
    s5u [ local-purge | signal-peer ]
  end
```

### NOTES:

- **s1u**—S1-U interface. Default is local-purge.
- **s5u**—S5-U interface. Default is local-purge.
- **local-purge**—Locally purge the affected bearers or PDNs without informing peer.
- **signal-peer**—Clear the affected bearers or PDNs with signaling towards peer.

## Configuration Example

The following is an example configuration.

```
config
profile sgw sgw1
  gtpu-path-failure s1u local-purge
  gtpu-path-failure s5u local-purge
end
```

## Configuration Verification

To verify the configuration:

```
show running-config profile sgw sgw1
profile sgw sgw1
sgw-charging-threshold threl
sgw-charging-profile chl
locality LOCl
fqdn cisco.com.apn.epc.mnc456.mcc123
charging-mode gtp
subscriber-policy subl
session-idle-timer 86000
ddn failure-action-drop-timer 60
ddn no-user-connect-retry-timer 60
path-failure s11 signal-peer
path-failure s5e signal-peer
gtpu-error-ind s5u signal-peer
gtpu-path-failure slu local-purge
gtpu-path-failure s5u local-purge
```

## GTPU Path Failure OAM Support

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

### Bulk Statistics

- Node Manager Statistics

```
nodemgr_node_report_stats{app_name="smf",backlog_tmr="0",cluster="Local",data_center="DC",
instance_id="0",node_report_no_of_sess="0",node_report_peer_gtpu="209.165.201.20:209.165.201.30",
node_report_type="",service_name="nodemgr",session_tmr="0",status="attempted",
up_ep_key="209.165.201.20:209.165.201.10"} 1
```

```
nodemgr_node_report_stats{app_name="smf",backlog_tmr="1617268831815934340",cluster="Local",
data_center="DC",instance_id="0",node_report_no_of_sess="0",
node_report_peer_gtpu="209.165.201.20:209.165.201.30",node_report_type="origin",
service_name="nodemgr",session_tmr="600",status="success",
up_ep_key="209.165.201.20:209.165.201.10"} 1
```

- SGW Service Statistics

```
sgw_service_stats{app_name="smf",cluster="Local",data_center="DC",fail_reason="",
gr_instance_id="1",instance_id="0",interface="interface_sgw_egress",reject_cause="",
service_name="sgw-service",sgw_procedure_type="s5u_gtpu_path_failure_initiated",
status="attempted",sub_fail_reason=""} 1
```

```
sgw_service_stats{app_name="smf",cluster="Local",data_center="DC",fail_reason="",
gr_instance_id="1",instance_id="0",interface="interface_sgw_egress",reject_cause="",
service_name="sgw-service",sgw_procedure_type="s5u_gtpu_path_failure_initiated",
status="success",sub_fail_reason=""} 1
```

```
sgw_service_stats{app_name="smf",cluster="Local",data_center="DC",fail_reason="",  
gr_instance_id="1",instance_id="0",interface="interface_sgw_ingress",reject_cause="",  
service_name="sgw-service",sgw_procedure_type="s5u_gtpu_path_failure_initiated",  
status="attempted",sub_fail_reason=""} 1
```

```
sgw_service_stats{app_name="smf",cluster="Local",data_center="DC",fail_reason="",  
gr_instance_id="1",instance_id="0",interface="interface_sgw_ingress",reject_cause="",  
service_name="sgw-service",sgw_procedure_type="s5u_gtpu_path_failure_initiated",  
status="success",sub_fail_reason=""} 1
```