Network Trigerred Service Restoration

Feature Description

The Network Triggered Service Restoration (NTSR) feature detects an MME failure when enabled on the S-GW. If the subscriber served by the failed MME receives any downlink data packets, then the S-GW selects an alternate MME from the NTSR pool in round-robin fashion. The S-GW then sends a Downlink Data Notification (DDN) to the selected MME. This round robin selection of an MME is per session manager instance and not system wide.

The NTSR feature improves load balancing of DDN messages in the network during an MME failure.

In CUPS mode, bearers which are applicable for restoration, the corresponding downlink data is buffered on User Plane. For bearers that are not configured for restoration, the corresponding traffic endpoints are removed from the User Plane.

If S-GW detects that dedicated bearers are retained from a particular PDN, the S-GW retains the default bearer as well for this PDN. In this case, Downlink data will be dropped on default bearer.

On receiving any downlink data/Update Bearer Request/Create Bearer Request in restoration pending state, the SGW initiates a DDN request event towards MME or S4-SGSN.

Upon receiving Modify Bearer Request from MME, Control Plane sends Sx Session Modification Request to User Plane with UPDATE FAR:APPLY ACTION:FORW=1 for all bearers which are applicable for restoration.

Configuring NTSR

The NTSR feature involves the following configurations:

- APN Profile Configuration
- Peer Profile Configuration (Ingress)
- NTSR Pool Configuration
- S-GW Service Access Peer Map Association

- MME Restoration Timer Configuration

APN Profile Configuration

In this configuration, the QCI and ARP values are configured in the APN profile. When path failure is detected on the ingress side of the S-GW, bearers are retained or released based on the configured ARP/QCI values. S-GW can configure a maximum of two QCI and ARP-watermark combination per APN-profile.

Use the following commands to configure the ARP and QCI values in the APN profile.

```
configure
  apn-profile profile_name
    ntsr { all | qci qci_value | arp-priority-watermark arp_value }
    end
```

NOTES:

- **ntsr**: Specifies the NTSR configuration.
- **qci**: Specifies the QCI value for NTSR.
- **arp-priority-watermark**: Specifies the ARP value for NTSR.
- **all**: Identifies for all bearers with QCI or ARP values for MME restoration.

Peer Profile Configuration (Ingress)

In this configuration, the Peer Profile is configured on the ingress side of S-GW. The peer profile contains an associated pool-id, which is used to detect MME/S4-SGSN pool after MME failure.

Use the following commands to configure peer-profile on the ingress side at S-GW.

```
configure
  peer-profile service-type sgw-access name name
    ntsr pool-id pool_id
    end
```

NOTES:

- **sgw-access**: Configures the profile for peer nodes of S-GW towards S4/S11 interfaces.
- **ntsr**: Specifies the NTSR configuration.
- **pool-id**: Specifies the pool ID to detect MME/S4-SGSN pool after MME failure. The *pool_id* is an integer in the range of 1 to 10.

NTSR Pool Configuration

The NTSR pool configuration is used to configure pool of IP addresses associated with a pool-id and a peer type. One pool ID can be used for one peer-type. The NTSR pool can have combination of IPv4 or IPv6 address. S-GW can be configured with a maximum of 10 NTSR pools, and with at maximum of 5 IPv4v6 IP address pairs.

Use the following configuration to configure the NTSR Pool.

```
configure
  ntsr-pool pool-id pool_id peer-type [ mme | s4-sgsn ]
     [ no ] peer-ip-address { ipv4-address ipv4_address | ipv6-address
ipv6_address }
     end
```

NOTES:

- **pool-id**: Specifies the NTSR pool ID.
- **peer-type**: Specifies the NTSR Pool ID peer type. The peer type is either MME or S4-SGSN.
- **peer-ip-address**: Configures the IPv4 address or IPv6 address as a part of the MME or S4-SGSN pool.

S-GW Service Access Peer Map Association

In this configuration, the peer map on the Access side or Ingress side of S-GW service is configured.

Use the following configuration to associate a peer map to an S-GW service.

```
configure
  context context_name
    sgw-service service_name
      associate access-peer-map peermap_name
      end
```

NOTES:

- **access-peer-map**: Configures the Access/Ingress side peer map for an S-GW service.

Monitoring and Troubleshooting

Show Commands Input and/or Outputs

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

show apn-profile full all

The output of this command displays the following fields in support of this feature:

- NTSR
  - QCI
  - ARP-priority-watermark

show apn-profile full name *apn_name*

The output of this command displays the following fields in support of this feature:

- NTSR
  - QCI

- ARP-priority-watermark

show ntsr-pool all

The output of this command displays the following fields in support of this feature:

- SGW NTSR pools
- NTSR pool-id
- NTSR Pool type
- NTSR pool-id
- NTSR Pool type

show ntsr-pool full all

The output of this command displays the following fields in support of this feature:

- NTSR pool-id
- NTSR Pool type
- peer-address-pair(s)

show ntsr-pool full pool-id *pool_id*

The output of this command displays the following fields in support of this feature:

- NTSR pool-id
- NTSR Pool type
- peer-address-pair(s)

show ntsr-pool pool-id *pool_id*

The output of this command displays the following fields in support of this feature:

- NTSR pool-id
- NTSR Pool type

show sgw-service statistics all

The output of this command displays the following fields in support of this feature:

- Peer Failure
  - Retained
  - Restored
  - Released

- Peer Restart
  - Retained
  - Restored
  - Released

show subscribers sgw-only full all

The output of this command displays the following fields in support of this feature:

- NTSR state
- Bearer capable restoration