

# Enhanced Multimedia Priority Service (eMPS)

The MME supports eMPS (Enhanced Multimedia Priority Service) in PS (Packet Switched) and CS (Circuit Switched) domains.


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## Feature Description

This feature is developed to provide MME support for eMPS (Enhanced Multimedia Priority Service) in PS (Packet Switched) and CS (Circuit Switched) domains. If UEs subscription information contains MPS-Priority AVP and the MPS-EPS-Priority bit set, the MME classifies such UEs for Enhanced Multimedia Priority Service (eMPS) in PS domain. The MME includes paging priority IE in S1 AP Paging message if it receives events like DDN/CBR/UBR for users having MPS EPS subscription. The MME also supports priority SRVCC handovers by providing ARP information to the MSC in SRVCC PS to CS Request message.



**Important** This feature is license controlled. Please consult your Cisco Account Representative for information about the specific license.

## How it Works

The MME receives the eMPS subscription information which is indicated by the MPS-Priority IE in HSS subscription data or local configuration for eMPS subscription. Local configuration of eMPS subscription overrides the information received from the HSS.

For PS paging the MME supports Paging Priority in S1AP Paging Messages. A configurable mapping support is provided for ARP to S1AP Paging Priority. The MME includes paging priority for PS paging if corresponding ARP to paging priority is configured and the user has an eMPS PS subscription.

In previous releases (release 19.2) the MME supports paging priority for CS paging (refer to feature chapter "Paging Priority IE Support"). By default the MME sends the received eMLPP priority present in SGs-AP Paging-Request message as the S1 paging priority for CS paging. From this release onwards the MME supports configuration of one to one mapping of eMLPP priority to paging priority. The **paging-priority** command

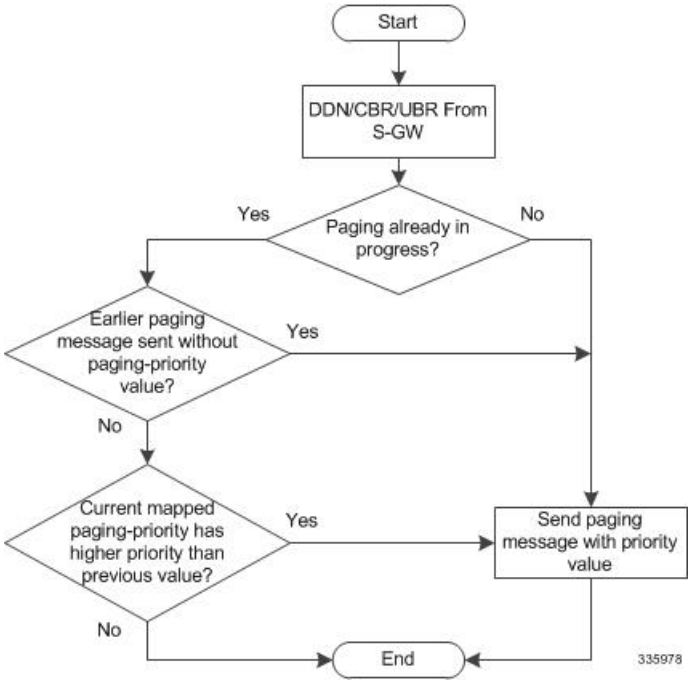
can be configured to map eMLPP priority to paging priority. In earlier releases this mapping was limited to single paging priority value override. The MME by default sends the eMLPP priority as paging priority for CS paging, this functionality does not require a feature license. However the mapping and subscription override functionality for PS and CS paging requires an eMPS license. All the priority PS traffic is completely controlled by the license. Priority CS MT/MO calls are allowed do not require a license in the following scenarios:

- MT calls are allowed always because “paging-priority cs” CLI is enabled by default.
- MO calls are allowed if eMPS CS subscription is received from HSS as subscribed, this functionality is not controlled by CLI configuration.

The **csfb** command is enhanced to configure HO-restriction for csfb MO Emergency calls. When HO-restriction is enabled the MME sets the "Additional CS Fallback Indicator IE" in S1AP UE Context Setup/Modification as "restriction".

Support for ARP based heuristics paging profile selection is added by this feature. This allows differentiated paging treatment based on the ARP of the corresponding PS traffic. ARP based paging profile selection requires a Heuristics paging license. For more information refer to the feature chapter on Heuristic and Intelligent Paging.

This feature adds support for priority SRVCC Handovers. When handover request message with SRVCC HO Indication flag set is received from eNodeB, the UE is subscribed to MPS in the EPS domain and the MME detects the SRVCC HO requires priority handling, the MME provides priority indication in SRVCC PS to CS Request. The MME detection of priority handling is based on the ARP associated with the EPS bearer used for IMS signaling (bearer with QCI 5) and corresponding paging priority mapping configured for this ARP. The priority indication here corresponds to the ARP information element.




Listed below are the various scenarios describing the MME behavior on receiving S11 Downlink Data Notification or Create Bearer Request or Update Bearer Request:

### Scenario 1: DDN is received with ARP

- The MME includes paging priority in the S1 Paging message if the mapping configured for that ARP.
- Heuristics paging enabled, the MME selects the paging profile based on ARP if paging-profile with matching ARP value is configured in paging-map.
- The paging profile with the highest precedence is selected even if both ARP and QCI are configured in the paging-map.

### Scenario 2: DDN received with only Bearer Id (No ARP)

- The MME fetches the ARP for that bearer id and includes paging priority in the paging message if mapping is configured for that ARP
- Heuristics paging enabled, MME selects the paging profile based on ARP if paging-profile with matching ARP value is configured in paging-map.
- The paging profile with the highest precedence is selected even if both ARP and QCI are configured in the paging-map.

### Scenario 3: DDN received without the Bearer id

- The MME fetches the lowest ARP value from all the bearers and includes mapped paging priority for that ARP in the paging message if mapping is configured for that ARP
- Heuristics paging enabled, MME selects the paging profile based on ARP if paging-profile with matching ARP value is configured in paging-map.
- The paging profile with the highest precedence is selected even if both ARP and QCI are configured in the paging-map

### Scenario 4: CBR is received

- MME includes paging priority in the S1 Paging message if the mapping configured for that ARP
- Heuristics paging enabled, MME selects the paging profile based on ARP if paging-profile with matching ARP value is configured in paging-map.
- The paging profile with the highest precedence shall be selected even if both ARP and QCI are configured in the paging-map.

### Scenario 5: UBR is received from SGW for QOS modification

- MME includes paging priority in the S1 Paging message if the mapping configured for that ARP
- Heuristics paging enabled, MME selects paging profile based on ARP if paging-profile with matching ARP value is configured in paging-map.
- The paging profile with the highest precedence shall be selected even if both ARP and QCI are configured in the paging-map

## Limitations

Congestion control is applied to all subscribers irrespective of eMPS subscription.

## Standards Compliance

Enhanced Multimedia Priority Service complies with the following 3GPP standards:

- 3GPP TS 29.272
- 3GPP TS 36.413
- 3GPP TS 23.401
- 3GPP TS 29.280

# Configuring Enhanced Multimedia Priority Service

The following configuration procedures are used to configure this feature:

## Configuring MPS in EPS Domain

The **mps** command under the Call Control Profile Configuration mode has been enhanced to support Multimedia Priority Service (MPS) in the EPS domain. A new keyword **eps-priority** is added to the command; this keyword is used to configure support for MPS in EPS domain.

```
configure
  call-control-profile profile_name
    [ remove ] mps [ cs-priority | eps-priority ] { subscribed | none }
    exit
```

Notes:

- By default MPS in EPS domain is disabled.
- The **remove** keyword deletes the existing configuration.
- The keyword **eps-priority** configures support for MPS in the EPS domain.
- The keyword **subscribed** indicates the UE subscribed to priority service in the CS/EPS domain.
- The keyword **none** indicates the UE not subscribed to priority service in the CS/EPS domain.
- The keyword **mps cs-priority** is used only for Mobile originated calls.
- The operator will be able to prioritize EPS calls for a set of subscribers irrespective of them being subscribed to MPS services.
- This configuration is not configured by default.

# Configuring Paging Priority

The **paging-priority** command has been enhanced to support PS traffic. New keywords are added to configure priority value of enhanced Multi Level Precedence and Pre-emption service, configure the value of paging-priority to be sent to eNodeB and configure the value of allocation and retention priority.

**[ remove ] paging-priority { cs {** *cs_value* **| map emlpp-priority** *emlpp_value* **s1-paging-priority** *priority_value* **} | ps map arp** *arp_value* **s1-paging-priority** *priority_value* **}**

Notes:

- The keyword **cs** is used to configure the value of paging-priority to be sent to eNodeB for Circuit Switched (CS) traffic. The paging priority value can be configured or it can be used to map the received value to the paging-priority. The **cs_value** is an integer in the range “0” up to “7”. Configuring a value of “0” disables sending of paging priority value to eNodeB.
- The keyword **ps** is used to configure the value of paging-priority to be sent to eNodeB for Packet Switched (PS) traffic. The paging priority value can be configured or it can be used to map the received value to the paging-priority.
- The keyword **map** is used to map the received value to paging-priority.
- The keyword **emlpp-priority** is used to configure the priority value of enhanced Multi Level Precedence and Pre-emption service. The **emlpp_value** is an integer in the range “0” up to “7”.
- The keyword **s1-paging-priority** is used to configure the value of paging-priority to be sent to eNodeB. The priority value is an integer in the range “0” up to “7”. Configuring a value of “0” disables sending of paging priority value to eNodeB.
- The keyword **arp** is used to configure the value of allocation and retention priority. The value is an integer in the range “1” up to “15”.
- Mapping is not enabled by default.
- The keyword **remove** deletes the existing configuration.

# Configuring Precedence

The **precedence** command enables the operator to apply a priority for different paging-profiles based on traffic type. The priority value that can be configured for the precedence has been enhanced. The operator can define ARP priority based paging for PS traffic type in the paging-map.

**precedence** *priority* **traffic-type { cs [ voice | sms | other ] | ps [ arp** *arp_value* **| qci** *qci_value* **] | signaling [ detach | idr | lcs | node-restoration ] } paging-profile** *paging_profile_name*
**no precedence** *priority*

Notes:

- The range for precedence priority value is updated from 1 up to 35 , where 1 is the highest priority and 35 is the lowest priority. The numbers of paging-profiles supported are increased from 8 to 16.
- The keyword **arp** is added to the **precedence** command. It is used to define the ARP priority based paging for PS traffic type in the paging-map. The **arp_value** is an integer from 1 up to 15.

# Configuring HO Restriction

The **csfb** command configures circuit-switched fallback options. CSFB is the mechanism to move a subscriber from LTE to a legacy technology to obtain circuit switched voice or short message. This command is updated with the keyword ho-restriction, to enable ho-restriction support for CSFB MO Emergency Calls.

```
csfb { policy { ho-restriction | not-allowed | not-preferred | sms-only
| suppress-call-reject } | sms-only }
remove csfb { policy | sms-only }
```

Notes:

- The keyword **ho-restriction** enables ho-restriction support for priority CS calls. If this keyword is enabled the MME sets the "Additional CS Fallback Indicator IE" in S1AP UE Context Setup/Modification as "restriction".
- HO-Restriction is not enabled by default.

# Sample configuration

```
 config
  apn-profile apn1
    apn-type ims
  exit
  operator-policy name op1
    associate call-control-profile ccp
    apn network-identifier starent.com apn-profile apn1
  exit
  call-control-profile ccp
    csfb policy ho-restriction
    mps cs-priority subscribed
    mps eps-priority subscribed
    paging-priority cs map emlpp-priority 1 s1-paging-priority 2
    paging-priority ps map arp 5 s1-paging-priority 2
  exit
exit
```

# Verifying the Configuration

### show configuration

The following new fields are added to the show configuration command to verify the configured eMPS parameters:

- **mps eps-priority**: Displayed as either “Subscribed” or “None”.
- **paging-priority** *traffic_type*: Displayed as either “PS” or “CS”.
- **map**: Displayed if mapping is configured.
- **emlpp-priority priority_value**: Displays the configured emlpp priority value.

- **s1-paging-priority value**: Displays the configured s1-paging priority value.
- **arp** *arp_value*: Displays the configured ARP value.
- **precedence** *precedence_value*: Displays the configured precedence value.
- **traffic-type** *type*: Displays the traffic type as “CS” or “PS”.
- **paging-profile** *profile_name*: Displays the name of the paging profile.

# Monitoring and Troubleshooting

This section provides information regarding show commands and bulk statistics for this feature.

## Show Command(s) and/or Outputs



**Note** Paging counter includes the S1 paging for priority and non-priority paging requests. Paging CS Priority and Paging PS Priority counters only count the priority S1 paging requests.

### show mme-service *service_name* peer-id *id* statistics

The following new fields are added to the show output to display the configured eMPS parameters:

- Paging CS Priority
- Paging PS priority
- UE Initiated Priority Voice Procedures
- Attempted
- Failures
- Success
- NW Initiated Priority Voice Procedures
- Attempted
- Failures
- Success

### show session subsystem facility mmemgr

The following new parameters are added show output:

- Paging CS Priority
- Paging PS priority

## show lte-policy paging-map name

The following new parameters are added to the show output:

- Precedence
- Packet-Switched(PS)
- ARP
- Paging is performed as per paging-profile *name*

## show mme-service statistics

The following new parameters are added to the show output:

- Paging Initiation for PS ARP-N Events
- Attempted
- Success
- Failures
- Success at Last n eNB
- Success at Last TAI
- Success at TAI List

## show call-control-profile full all

The following new fields are added to the show output to display the configured eMPS parameters:

- MPS EPS priority
- Paging priority to be sent to eNodeB for CS
- Paging priority mapping for CS
- Paging priority mapping for EPS
- Handover Restriction

# Enhanced Multimedia Priority Support Bulk Statistics

The following statistics are included in the MME Schema in support of this feature**:**

- s1ap-transdata-pagingpriocs
- s1ap-transdata- pagingpriops
- csfb-ue-prio-voice-total
- csfb-ue-prio-voice-success
- csfb-ue-prio-voice-failures

- csfb-nw-prio-voice-total
- csfb-nw-prio-voice-success
- csfb-nw-prio-voice-failures
- ps-arp-1-paging-init-events-attempted
- ps-arp-1-paging-init-events-success
- ps-arp-1-paging-init-events-failures
- ps-arp-1-paging-last-enb-success
- ps-arp-1-paging-last-tai-success
- ps-arp-1-paging-tai-list-success
- ps-arp-2-paging-init-events-attempted
- ps-arp-2-paging-init-events-success
- ps-arp-2-paging-init-events-failures
- ps-arp-2-paging-last-enb-success
- ps-arp-2-paging-last-tai-success
- ps-arp-2-paging-tai-list-success
- ps-arp-3-paging-init-events-attempted
- ps-arp-3-paging-init-events-success
- ps-arp-3-paging-init-events-failures
- ps-arp-3-paging-last-enb-success
- ps-arp-3-paging-last-tai-success
- ps-arp-3-paging-tai-list-success
- ps-arp-4-paging-init-events-attempted
- ps-arp-4-paging-init-events-success
- ps-arp-4-paging-init-events-failures
- ps-arp-4-paging-last-enb-success
- ps-arp-4-paging-last-tai-success
- ps-arp-4-paging-tai-list-success
- ps-arp-5-paging-init-events-attempted
- ps-arp-5-paging-init-events-success
- ps-arp-5-paging-init-events-failures
- ps-arp-5-paging-last-enb-success
- ps-arp-5-paging-last-tai-success

- ps-arp-5-paging-tai-list-success
- ps-arp-6-paging-init-events-attempted
- ps-arp-6-paging-init-events-success
- ps-arp-6-paging-init-events-failures
- ps-arp-6-paging-last-enb-success
- ps-arp-6-paging-last-tai-success
- ps-arp-6-paging-tai-list-success
- ps-arp-7-paging-init-events-attempted
- ps-arp-7-paging-init-events-success
- ps-arp-7-paging-init-events-failures
- ps-arp-7-paging-last-enb-success
- ps-arp-7-paging-last-tai-success
- ps-arp-7-paging-tai-list-success
- ps-arp-8-paging-init-events-attempted
- ps-arp-8-paging-init-events-success
- ps-arp-8-paging-init-events-failures
- ps-arp-8-paging-last-enb-success
- ps-arp-8-paging-last-tai-success
- ps-arp-8-paging-tai-list-success
- ps-arp-9-paging-init-events-attempted
- ps-arp-9-paging-init-events-success
- ps-arp-9-paging-init-events-failures
- ps-arp-9-paging-last-enb-success
- ps-arp-9-paging-last-tai-success
- ps-arp-9-paging-tai-list-success
- ps-arp-10-paging-init-events-attempted
- ps-arp-10-paging-init-events-success
- ps-arp-10-paging-init-events-failures
- ps-arp-10-paging-last-enb-success
- ps-arp-10-paging-last-tai-success
- ps-arp-10-paging-tai-list-success
- ps-arp-11-paging-init-events-attempted

- ps-arp-11-paging-init-events-success
- ps-arp-11-paging-init-events-failures
- ps-arp-11-paging-last-enb-success
- ps-arp-11-paging-last-tai-success
- ps-arp-11-paging-tai-list-success
- ps-arp-12-paging-init-events-attempted
- ps-arp-12-paging-init-events-success
- ps-arp-12-paging-init-events-failures
- ps-arp-12-paging-last-enb-success
- ps-arp-12-paging-last-tai-success
- ps-arp-12-paging-tai-list-success
- ps-arp-13-paging-init-events-attempted
- ps-arp-13-paging-init-events-success
- ps-arp-13-paging-init-events-failures
- ps-arp-13-paging-last-enb-success
- ps-arp-13-paging-last-tai-success
- ps-arp-13-paging-tai-list-success
- ps-arp-14-paging-init-events-attempted
- ps-arp-14-paging-init-events-success
- ps-arp-14-paging-init-events-failures
- ps-arp-14-paging-last-enb-success
- ps-arp-14-paging-last-tai-success
- ps-arp-14-paging-tai-list-success
- ps-arp-15-paging-init-events-attempted
- ps-arp-15-paging-init-events-success
- ps-arp-15-paging-init-events-failures
- ps-arp-15-paging-last-enb-success
- ps-arp-15-paging-last-tai-success
- ps-arp-15-paging-tai-list-success

For descriptions of these variables, see "MME Schema Statistics" in the *Statistics and Counters Reference*.

# Troubleshooting

If paging priority information is not being sent to the eNodeb during mobile terminating PS traffic then, verify the following:

- Ensure the licensing is configured for eMPS.
- Verify if ps-priority is received from the HSS in ULA message or “mps ps-priority subscribed” is configured under the call control profile.
- Verify if ARP to paging-priority mapping is configured.

Execute the show command "show call-control-profile full all" to verify the configuration parameters listed above.

If ARP IE is not being sent in Sv PS to CS Request message, verify the following:

- Ensure eMPS PS subscription is configured.
- The apn-type should be ims, it is configured in the apn-profile configuration for IMS PDN.
- IMS signaling bearer uses QCI 5
- ARP for IMS signaling bearer has corresponding paging priority mapping configured.

If Additional CSFB indicator is not included for MO CS emergency call/ traffic, verify the following:

- Ensure the CLI configuration for HO restriction is enabled.