



# Paging Priority IE Support

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## Feature Description

This feature is developed to provide Paging Priority support on the MME. Paging priority support is provided for Mobile Originating and Mobile Terminating CSFB calls.

**Mobile Terminating CSFB calls:** Mobile terminating CSFB calls are prioritized by providing paging priority information to the eNodeB during CSFB calls; the eNodeB in turn pages the UEs accordingly. If the MME is configured to send paging priority to the eNodeB, when a paging request message is received on the SGs interface with an indication of the eMLPP priority level, the MME sends the paging priority value in the S1AP paging message request to the eNodeB.

**Mobile Originating CSFB calls:** In Mobile originating CSFB calls if the UE is subscribed for eMLPP services, the MME uses the mps-cs-priority received in the subscription to set the priority as "CSFB High Priority" in "CS Fallback Indicator IE". This priority value is sent in the S1AP UE Context Setup/Modification message to the eNodeB, the eNodeB then initiates the CSFB procedure with priority.



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**Important**

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

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**Important**

From release 20.0 onwards, Paging Priority is supported for Packet Switched traffic. The MME also supports eMPS (Enhanced Multimedia Priority Support) for both PS and CS domains. For more information see, feature chapter for Enhanced Multimedia Priority Service.

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## Architecture

Paging priority IE support is implemented in a network which supports CSFB priority call handling. When a call is received with an eMLPP Priority level indication, the VLR/MSC sends this value of priority level indication in the eMLPP priority information element as a part of SGs AP PAGING-REQUEST message to the MME. MME propagates this eMLPP priority as paging priority information element in S1AP paging-request message to eNodeB.

If MPS-Priority AVP is present and the UE is subscribed to the eMLPP or 1x RTT priority service in the CS domain as indicated by the MPS-CS-Priority bit of the AVP, the MME allows the UE to initiate the RRC connection with higher priority than other normal UEs during CS Fallback procedure.

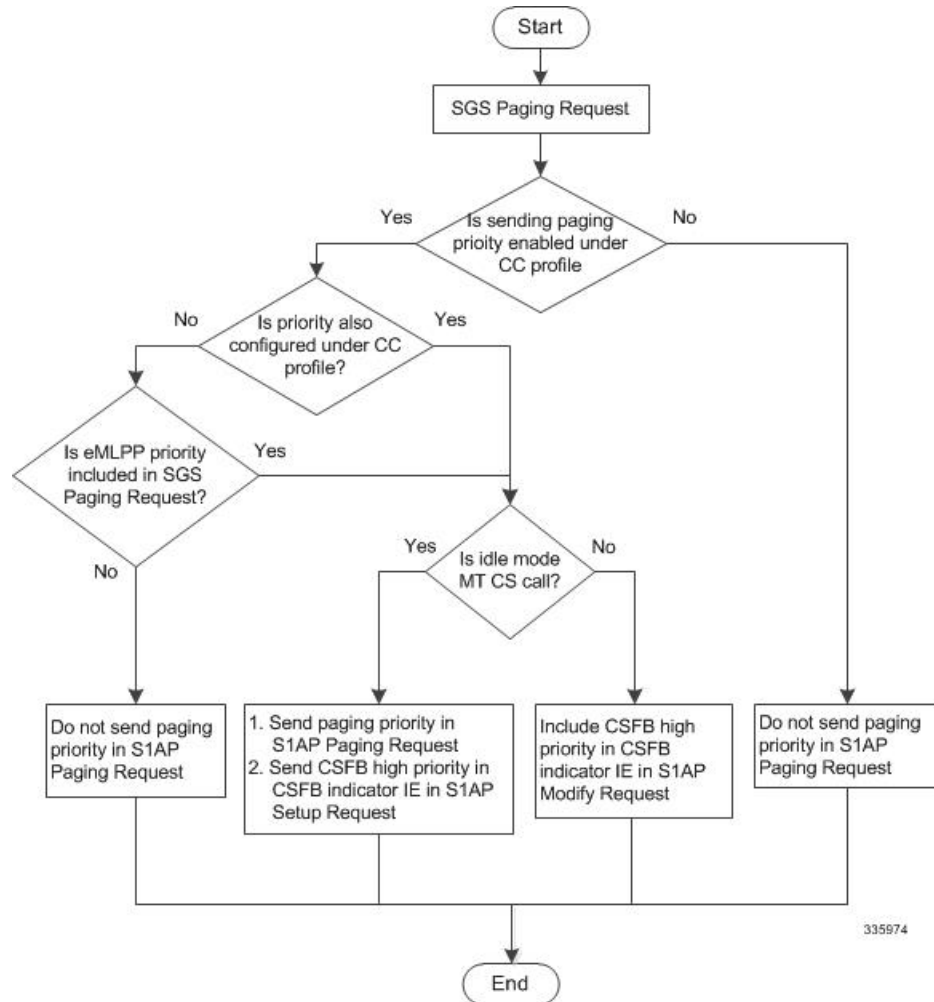
The MME uses the MPS-Priority received in subscription and sets CSFB fallback high priority in "CS Fallback Indicator IE" in the S1AP UE Context Setup/Modification in S1AP UE Context Setup/Modification messages.

## How It Works

The MME relays the eMLPP priority value received from MSC/VLR as paging priority-ie in S1AP paging-request message to eNodeBs. With the implementation of this feature a new CLI command **paging-priority cs** is introduced under the Call Control Profile configuration mode through which the operator can configure the system to control sending of the paging priority value to the eNodeB. The operator can configure the system to ignore the eMLPP priority value received from MSC and configure the MME to send user-defined value as paging-priority to eNodeB. The operator can also choose to completely ignore eMLPP priority and disable sending priority value. Operator can configure the system to send paging priority IE always in S1AP Paging request irrespective of whether MSC/VLR include/supports eMLPP priority or not. This applicable to mobile terminating CS fall back call.

The following flowchart illustrates the paging priority support provided for Mobile Terminating CSFB calls:

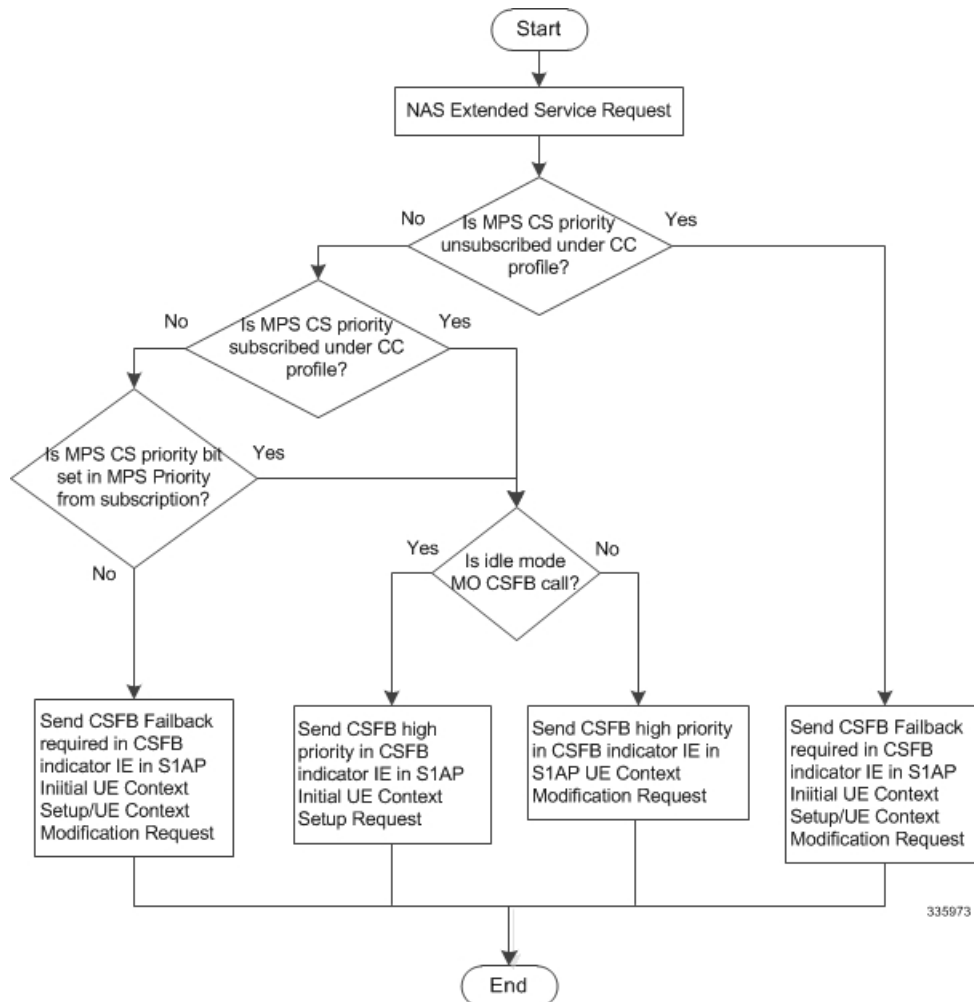
Figure 1: Paging Priority Support for Mobile Terminating CSFB Calls



A new CLI command **mps cs-priority** has been introduced under the Call Control Profile Configuration mode to control the handling of MPS-CS-Priority received in the subscription. If MME receives mps-cs-priority in the subscription, it sets the "CS Fallback Indicator IE" to "CSFB high priority" in the S1AP Context Setup/Modification. The Operator can choose to override the mps cs-priority using this CLI command. The MME shall set "CSFB high priority" in "CS Fallback Indicator IE" if either the subscription contains mps-cs-priority OR the mps cs-priority subscribed CLI is configured. Similarly, MME shall not set "CSFB high priority" in "CS Fallback Indicator IE" if either the subscription does not have mps-cs-priority OR the mps cs-priority none is configured. This is applicable to mobile originated CSFB call.

The following flowchart illustrates the paging priority support provided for Mobile Originating CSFB calls:

Figure 2: Paging Priority Support for Mobile Originating CSFB Calls



For more information see the configuration section for Paging Priority support in this feature chapter.

## Limitations

- For release prior to 20.0, Paging Priority is not supported for PS paging.
- Inclusion of Additional CSFB indicator for CSFB MO Emergency calls is not supported

## Standards Compliance

Paging priority support complies with the following 3GPP standards:

- 3GPP TS 36.413
- 3GPP TS 29.272
- 3GPP TS 29.118

## Configuring Paging Priority Support for CSFB Calls

The following commands are configured to provide paging priority support for Mobile Originating CSFB calls and Mobile Terminating CSFB calls.

### Configuring Paging Priority Support for Mobile Terminating CSFB calls

The following new CLI command under the Call Control profile configuration mode is configured to support sending of paging-priority value in S1AP paging-request message to the eNodeB. This command helps the operator to prioritize the Mobile terminated CSFB voice calls of a set of subscribers irrespective of them subscribed for eMLPP services or not.

```
configure  
  call-control-profile cc_profile_name  
    [remove] paging-priority cs value  
  exit
```

#### NOTES:

- By default, sending of paging priority-ie in S1AP paging-request message to eNodeBs is enabled. The priority value received from the MSC/VLR is relayed to the eNodeB.
- The keyword **cs** is used to configure the value of paging-priority sent to eNodeB for CS paging. The paging 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.
- A lower value of paging priority indicates a higher priority.
- Older values of paging priority are overridden by configuring new values.
- The **remove** keyword deletes the existing configuration.

Usage example:

The following command is issued to disable sending of paging priority value to the eNodeB:

```
paging-priority cs 0
```

The following command enables sending of paging priority value to the eNodeB, a priority value of "5" is configured using this command:

```
paging-priority cs 5
```

### Configuring MPS CS priority subscription override for Mobile Originating CSFB calls

The following new CLI command under the Call Control profile configuration mode is configured to support multimedia priority service in the CS domain. This command helps the operator to prioritize the Mobile originating voice calls of a set of subscribers irrespective of them subscribed for eMLPP services or not.

```
configure  
  call-control-profile cc_profile_name
```

```
[remove] mps cs-priority { subscribed | none }
exit
```

Notes:

- By default MME sets the value of "CS fallback indicator IE" as "CSFB High Priority" in the S1AP UE Context Setup/Modification if the MPS-CS-Priority value is set in "MPS-Priority" in EPS Subscription from HSS
- The keyword **cs-priority** configures support for priority service in the CS domain.
- The keyword **subscribed** configures support for priority service in the CS domain. The "CS Fallback Indicator IE" is set to "CSFB High Priority" in the S1AP UE Context Setup/Modification message.
- The keyword **none** configures disables support for priority service in the CS domain. The "CS Fallback Indicator IE" is set to "CSFB Required" in the S1AP UE Context Setup/Modification message.
- The **remove** keyword deletes the existing configuration.

Usage example:

The following command is issued to set "CSFB High Priority" for "CS Fallback Indicator IE", in the S1AP UE Context Setup/Modification message:

```
mps cs-priority subscribed
```

The following command is issued to set "CSFB Required" for "CS Fallback Indicator IE", in the S1AP UE Context Setup/Modification message:

```
mps cs-priority none
```

## Monitoring and Troubleshooting the Paging Priority Support for CSFB Calls

This section provides information on the show commands available to monitor and troubleshoot paging priority support for CSFB calls.

### Paging Priority Support Show Command(s) and/or Outputs

This section provides information regarding show commands and/or their outputs in support of the Paging priority support in CSFB calls.

#### show call-control profile full all

The following new fields are added to the show output to display the paging priority configuration for Mobile originating and terminating CSFB calls:

- Paging priority to be sent to eNodeB: If paging priority support is enabled this field displays the configured value of paging priority sent to eNodeB for CS paging. For example, if the paging priority value is set to "1", this field is displayed as "Enabled with value: 1". If paging priority support is disabled this field is displayed as "Disabled".
- MPS CS priority: Is displayed as either "Subscribed" or "None" based on the configuration.

## Support and Troubleshooting Information

This section describes trouble shooting information for the Paging Priority support in CSFB calls. If paging priority is not being sent to the eNodeB during mobile terminating CS call, verify the following:

- Verify if eMLPP priority is received from MSC/VLR in SGs-AP Paging-Request message.
- Ensure that sending of paging-priority to eNodeB is not disabled in the call control profile configuration. Execute the show command **show call-control-profile full all** to verify the configuration. The field **Paging priority to be sent to eNodeB** displays the configuration information as either **Disabled** or **Enabled with value <1...7>**.
- Ensure that subscriber under test hits any of the call control profile configured in the system. If the subscriber does not fall under any ccp, then also paging priority will not be sent to eNB.

If CSFB Fall back IE is not set to "CSFB high priority" in S1AP UE context setup/modification during mobile originating CS call, verify the following:

- Verify the configuration; ensure that setting of CSFB high priority is not disabled under Call Control profile. Execute the show command **show call-control-profile full all** to verify the configuration. The field **MPS CS priority** displays the configuration as either **Subscribed** or **None** or **Not Configured**.
- Ensure that the **mpps cs priority** bit is set in MPS Priority AVP in subscription received.

