



Roaming Support for Monitoring Events

- [Feature Summary and Revision History, on page 1](#)
- [Feature Description, on page 2](#)
- [How it Works, on page 2](#)
- [Configuring Monitoring Events Profile , on page 6](#)
- [Monitoring and Troubleshooting, on page 10](#)

Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	MME
Applicable Platform(s)	<ul style="list-style-type: none">• ASR 5500• VPC-DI• VPC-SI
Feature Default	Disabled - Configuration Required
Related Changes in This Release	Not applicable
Related Documentation	<ul style="list-style-type: none">• <i>MME Administration Guide</i>

Revision History

Revision Details	Release
This release supports Roaming feature for monitoring events:	21.20

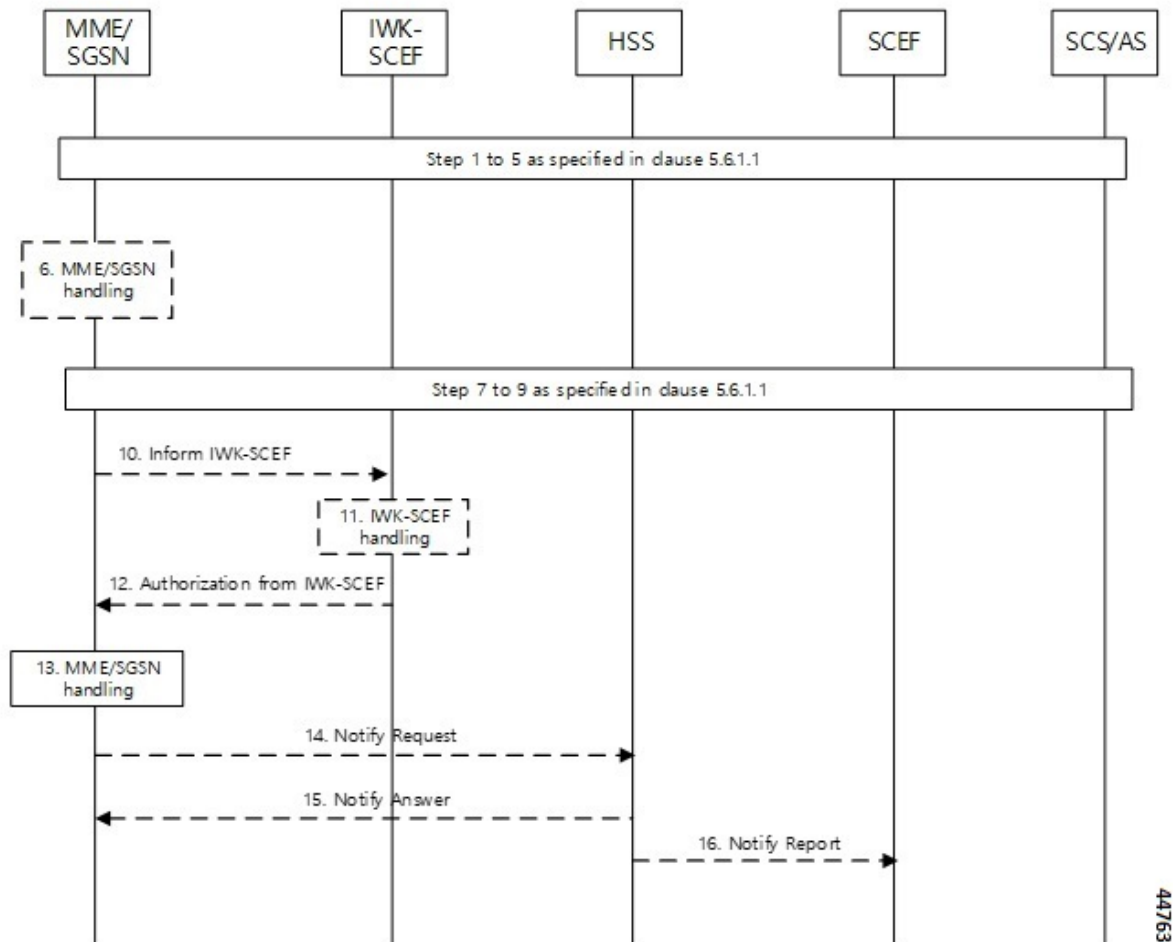
Feature Description

MME supports Roaming functionality for monitoring events through Interworking (IWK) SCEF by communicating monitoring information to the SCEF.

How it Works

This section describes how monitoring events work for the following event:

Figure 1: Monitoring Events Call Flow through Interworking (IWK) SCEF



447633

Table 1: Monitoring Event Configuration through IWK-SCEF Procedure

Step	Description
1 through 9	<p>MME establishes a UE connection and learns the monitoring event configuration parameters from HSS through S6a interface.</p> <p>Note HSS S6a subscription data contains Monitoring event configuration AVPs that MME need to parse to learn the event.</p>
10	<p>MME checks:</p> <ul style="list-style-type: none"> • for the roaming subscribers who have received monitoring event configuration in ULA/ISDR from HSS • whether roaming support and IWK SCEF details are configured as part of monitoring event profile. <p>MME then constructs a Configuration Information Request message (CIR), which includes monitoring event configuration as received from HSS and Supported Features AVP. MME starts a timer for 6 seconds after sending CIR.</p> <p>When DSDR / ISDR with 'scef ref id for deletion' is received, MME deletes the respective config locally and also sends CIR with details of events to be deleted, with corresponding scef reference id filled as part of "SCEF-Reference-ID-for-Deletion" AVP.</p>
11	IWK-SCEF either accepts or rejects events.

Step	Description
12 through 15	

Step	Description
	<ul style="list-style-type: none"> • If there is no response, MME considers timeout as failures and does not apply new monitoring configurations and for each rejected events MME sends NOR towards HSS separately. • If CIA is received from MME, MME passes through the message and checks if IWK-SCEF has sent any of the below failure causes and it takes necessary action accordingly. <ul style="list-style-type: none"> At Message level , <ul style="list-style-type: none"> Experimental code AVP : <ul style="list-style-type: none"> DIAMETER_ERROR_UNAUTHORIZED_REQUESTING_ENTITY (5510) DIAMETER_ERROR_UNAUTHORIZED_SERVICE (5511) • If Experimental code AVP is not present, MME checks for Result code AVP. • If MME receives any of the above failure causes or result code is not success, MME does not apply any of the new monitoring events configuration sent in CIR and for each rejected events MME sends NOR towards HSS separately. • If message level IWK SCEF responds as success, MME checks for contents filled with Service-result-code AVP for every configuration sent. • If Service-result-code AVP is filled with Experimental Result Code values, MME checks for below causes, else MME considers it as Result-code values and takes action accordingly: <ul style="list-style-type: none"> Experimental code values checked by MME: <ul style="list-style-type: none"> DIAMETER_ERROR_UNAUTHORIZED_REQUESTING_ENTITY (5510) DIAMETER_ERROR_UNAUTHORIZED_SERVICE (5511) DIAMETER_ERROR_CONFIGURATION_EVENT_STORAGE_NOT_SUCCESSFUL (5513) DIAMETER_ERROR_CONFIGURATION_EVENT_NON_EXISTANT (5514) • If MME receives any of the above failure causes or result code is not success, MME does not apply those failed monitoring events configuration and for each rejected events MME sends NOR towards HSS separately. MME applies for the monitoring configurations which IWK SCEF had returned success and start reporting. • MME applies the monitoring events configuration that is accepted by IWK-SCEF. • MME continues to monitor for the events, triggers events, and sends the report to IWK-SCEF through Reporting Information Request (RIR). <p>Important Unless IWK-SCEF rejects with any of the above failure causes,</p>

Step	Description
	MME considers the same as success and monitoring events configuration are applied for subscribers.

**Note**

- MME does not include Monitoring Event Report as part of CIR to IWK SCEF. Instead, MME sends the available reports as part of RIR. No reports are filled in ISDA for roaming subscribers.
- When current location is requested in ISDR as part of monitoring events configuration, paging or location reporting control gets triggered based on UE state. RIR with location report is sent only after receiving response for paging or location reporting and CIA from IWK SCEF.
- Number of UEs in geographical area is a node level messages and behavior will be the same for both roaming and home subscribers.

Configuring Monitoring Events Profile

This section describes how to configure monitoring events profile in a lte-policy mode.

Configuring monitoring-event-profiles

Use the following command to configure monitoring event profiles to enable list of event types that MME can support.

```
configure
  lte-policy
    monitoring-event-profile profile_name
      events
    end
```

NOTES:

- **lte-policy** *profile_name*: Creates an instance of the lte-policy for monitoring events configuration.
- **monitoring-event-profile** *profile_name* *profile_name*: Creates a monitoring events profile name under the lte-policy mode.
- **events** : Specifies the event types that MME supports. Options include:
 - loss-of-connectivity
 - ue-reachability
 - location-reporting
 - communication-failure
 - availability-after-ddn-failure
 - idle-status-indication
 - pdn-connectivity-status

- number-of-ue-in-geo-area
- Roaming Support



Note If the user configures with Idle Status Indication under the monitoring event profile, then it allows enabling of the following events:

- If UE Reachability (1) is configured, enables UE Reachability and Idle Status Indication(8) events.
- If Availability after DDN failure (6) is configured, enables Availability after DDN Failure and Idle Status Indication (9) events.

Enabling Additional CLI Parameters under number-of-ue-in-geo-area

Use the following CLI configuration to enable or disable SCEF IDs to list authorized SCEFs that can request number of UEs present in a geographical area:



Note Since this a node-level message, ensure to enable this CLI command and associate at mme-service level as number of UE events.

```

configure
  lte-policy
    monitoring-event-profile profile_monte
      [ no ] events number-of-ue-in-geo-area authorized-scef-id scef_id
    end

```

NOTES:

- **lte-policy** : Creates an instance of a lte-policy for monitoring events configuration.
- **monitoring-event-profile** *profile_monte* : Creates a monitoring events profile name under the lte-policy mode.
- **events number-of-ue-in-geo-area** : Lists the event type instance to enable the authorized SCEFs.
- **authorized-scef-id**: Enables SCEF IDs to list authorized SCEFs who can request this events.
- [**no**]: Disables authorized SCEF ID.

Configure RAT-Type Filter

Use the following CLI configuration to list number of UEs that are calculated based on access types.

```

configure
  lte-policy
    monitoring-event-profile profile_monte
      events number-of-ue-in-geo-area { nb-iot | wb-eutran }

```

```

    default events number-of-ue-in-geo-area
  end

```

NOTES:

- **lte-policy** : Creates an instance of a lte-policy for monitoring events configuration.
- **monitoring-event-profile***profile_monte* : Creates a monitoring events profile name under the lte-policy mode.
- **events number-of-ue-in-geo-area** : Lists the event type instance to enable the access type.
- **nb-iot**: Counts only UEs with Access type as NB-IOT.
- **wb-eutran**: Counts only UEs with Access type as EUTRAN.

Enabling Additional CLI Parameters under ue-reachability

Use the following CLI configuration to enable or disable the HSS provided values for active timer t3224 and subscribed periodic time t3412_E.

```

configure
  lte-policy
    monitoring-event-profile profile_monte
    [ no ] events ue-reachability hss-requested-psm-timers
  end

```

NOTES:

- **lte-policy** *profile_name*: Creates an instance of a lte-policy for monitoring events configuration.
- **monitoring-event-profile***profile_monte* : Creates a monitoring events profile name under the lte-policy mode.
- **no events ue-reachability**: Disables UE reachability events.
- **hss-requested-psm-timers**: MME applies t3324 and t3412_e timers from subscription data received from HSS. Overrides values defined in PSM policy.

edrx-reporting-occasions

Use the following LTE policy configuration to send the UE Reachability report on every paging occasions.

```

configure
  lte-policy
    monitoring-event-profile profile_monte
    events ue-reachability edrx-reporting-occasions
    minimum-cycle-value value reporting-offsetvalue
  end

```

NOTES:

- **lte-policy** *profile_name*: Creates an instance of a lte-policy for monitoring events configuration.
- **monitoring-event-profile***profile_monte* : Creates a monitoring events profile name under the lte-policy mode.
- **events ue-reachability** : Creates an instance of ue-reachability events.

- **edrx-reporting-occasions**: Triggers report on paging occasion for eDRX enabled UEs.



Note By default, the minimum-edrx-value is 13 and the reporting offset is 2 seconds.

- **minimum-cycle-value**: The minimum eDRX cycle value, above which the UE reachability reporting on paging occasions gets triggered.
- **reporting-offset**: Indicates how early the report will be sent before eDRX paging window occurs in seconds.

Track Area Code in Reporting Information Request

Use the following command to fill the Tracking Area Code (tac) value in every event reporting (RIR message) that is sent to SCEF. By default, the TAC in RIR feature is disabled..

```
configure
lte-policy
  monitoring-event-profile profile_name
    no events tac-in-rir
  end
```

NOTES:

- **lte-policy *profile_name***: Creates an instance of a lte-policy for monitoring events configuration.
- **monitoring-event-profile *profile_name*** : Creates a monitoring events profile name under the lte-policy mode.
- **no events tac-in-rir**: Disables or fills TAC in all RIR messages sent to SCEF.

Enabling Roaming Support

Use the following CLI configuration to enable Roaming support:



Note It is mandatory to configure both host and realm of IWK-SCEF for roaming subscribers. Otherwise, MME considers roaming subscribers as home subscribers and routing of messages will happen accordingly.

```
configure
lte-policy
  monitoring-event-profile map
    [no]roaming-support dest host scef_id
    [no]roaming-support dest realm realm.com
  end
```

NOTES:

- **lte-policy** : Creates an instance of a lte-policy for monitoring events configuration.
- **monitoring-event-profile *map*** : Creates a monitoring events profile name under the lte-policy mode.

- **[no]roaming-support dest host** : Enables roaming support destination host name to communicate to SCEF through Interworking (IWK).
- **[no]roaming-support dest realm**: Enables roaming support destination realm name to communicate to SCEF through Interworking (IWK).
- **no** : Removes roaming support destination host or destination realm.



Note Make sure to configure both the parameters for roaming subscribers. Otherwise, routing happens like home subscribers.

Monitoring and Troubleshooting

This section provides information regarding show commands and bulk statistics available to monitor and troubleshoot the Monitoring Events feature.

Show Commands and Outputs

show lte-policy monitoring-event-profile

Monitoring Event Profile mon

The output of this command includes the following fields:

- Loss of connectivity—Indicates the enabled events of Loss of connectivity event configuration.
- UE Reachability—Indicates the enabled events of UE Reachability event configurations.
- Location Reporting—Indicates the enabled events of reporting location event configurations.
- Communication Failure—Indicates the current session statistics of Radio connection status failure events.
- Availability after DDN Failure—Indicates the current session statistics of Availability after DDN Failure event configuration.
- Idle Status Indication Failure—Indicates the enabled events of Idle status indication event configurations.
- PDN Connectivity Status Report—Indicates that the enabled events of PDN connectivity status event configuration.
- Number Of UE's in Geo Area—Indicates the received Number of UEs present in a geographic area event configuration
- Roaming Support—Indicates whether roaming support is enabled or disabled for Interworking SCEF destination host or realm.

show mme-service statistics

show mme-service statistics

The output of this command includes the following fields:

- Loss of connectivity—Indicates the current session statistics of Loss of connectivity event configuration.
- UE Reachability—Indicates the current session statistics of UE Reachability event configurations.
- Location Reporting—Indicates the current session statistics of reporting location event configurations.
- Communication Failure—Indicates the current session statistics of Radio connection status failure events.
- Availability after DDN Failure—Indicates the current session statistics of Availability after DDN Failure event configuration.
- UE Reachability and Idle status indication—Indicates the current session statistics of UE Reachability and Idle status indication event configurations.
- Availability after DDN Failure and Idle Status indication—Indicates the current session statistics of Availability after DDN Failure and Idle Status indication event configuration.
- PDN connectivity status—Indicates that the current session statistics of PDN connectivity status event configuration.



Note In the StarOS 21.20 and later releases, After the UE Detach procedure, **Total Terminated** and **Total Current Sessions** counters in Statistics are updated only after purge timeout (purge time out + 10% of purge timeout) seconds. Whereas for releases on or before StarOS 21.19, **Total Terminated** and **Total Current Sessions** counters are updated immediately after the successful UE Detach Procedure.

show mme-service statistics-monte

The output of this command includes the following fields:

Monitoring Report Config Rx Count

- Loss of connectivity—Indicates that the number of Loss of connectivity event configuration received.
- UE Reachability—Indicates that the number of UE reachability event configurations received
- Location Reporting—Indicates that the number of reporting location event configurations received.
- Communication Failure—Indicates that the number of Radio connection status failure events received.
- Availability after DDN Failure—Indicates that the number of Availability after DDN Failure event configuration received.
- Number of UE in a geographic area—Indicates the received Number of UEs present in a geographic area event configuration.
 - Progress—Indicates the number of ‘Number of UE in a geographic area’ events under progress.
 - Pending—Indicates the number of ‘Number of UE in a geographic area’ events queued.

- Drop— Indicates the number of ‘Number of UE in a geographic area’ events dropped.
- Idle status indication—Indicates that the number of Idle status event configurations received.
- PDN connectivity status—Indicates that the PDN connectivity status event configuration received.

Monitoring Report Config Tx Count: The output includes the following fields:

- Loss of connectivity—Indicates the number of loss of connectivity reports sent.
- UE Reachability—Indicates the number of UE reachability reports sent.
- Location Reporting—Indicates that the number of Location reports sent.
- Communication Failure—Indicates that the number of communication failure reports sent.
- Availability after DDN Failure—Indicates that the number of Availability after DDN Failure reports sent.
- Number of UE in a geographic area—Indicates that the number of UE in a geographical area report responded.
 - Success—Indicates the number of Number of UE in a geographic area event success responses.
 - Failure—Indicates the number of Number of UE in a geographic area event failure responses.
 - Drops—Indicates the number of ‘Number of UE in a geographic area’ event responses dropped
- UE Reachability and idle status indication—Indicates that the number of UE Reachability and idle status indication report sent.
- Availability after DDN Failure and idle status indication—Indicates that the Availability after DDN Failure and idle status indication report sent.
- PDN connectivity status—Indicates that the number of PDN connectivity statuses report sent.

Monitoring Event Configuration Deleted Count: The output includes the following fields:

- Loss of connectivity—Indicates the number of deleted loss of connectivity monitoring events.
- UE Reachability—Indicates the number of deleted UE Reachability monitoring events.
- Location Reporting—Indicates the number of deleted location reporting monitoring events.
- Communication Failure—Indicates the number of deleted communication failure monitoring events.
- Availability after DDN Failure—Indicates number of deleted availability after DDN failure monitoring events.
- UE Reachability and idle status indication—Indicates the number of deleted UE reachability and idle status indication monitoring events.
- PDN connectivity status—Indicates the number of deleted pdn connectivity status monitoring events.
- ULA received without monte cfg—Indicates the number of deleted monitoring events configurations when ULA received with updated set of configurations.
- HSS update received with different scsf ref id—Indicates the number of deleted monitoring events with HSS update received with different SCEF Reference Id.

- HSS update received with same scsf ref id—Indicates the number of deleted monitoring events with HSS update received with same SCEF Reference Id.

Monitoring Event Roaming statistics: The output includes the following fields:

- CIR sent —Indicates the number of CIR messages sent for roaming subscribers.
- CIA received—Indicates the number of CIA message received from roaming subscribers.
- CIR timeout—Indicates the CIR timeout value if there is no response for the CIR messages sent.
- RIR sent—Indicates the number of RIR messages sent for roaming subscribers.
- CIR denied by IWK-SCEF—Indicates the number of CIR messages denied through IWK-SCEF.

show mme-service statistics