



## Dynamic TAI List

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## Feature Summary and Revision History

### Summary Data

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

### Revision History

| Revision Details   | Release |
|--|---------|
| This release supports Dynamic TAI lists as enhancement to Tracking Area list management. | 21.20   |

## Feature Description

To reduce the signaling message during the location update procedure and to manage the border areas more efficiently, MME maintains the historic TAI list for each UE. If the Dynamic Tracking Area List (DTAL) feature is enabled:

- When UE sends for the first time the Attach/TAU request message, MME saves this TAI in Historic TAI list and sends the TAL with configured values of TAI-mgmt-objs.
- Whenever MME detects TAI change, MME updates the historic list with new TAI details.
- When MME sends the Attach/TAU Accept, the new Dynamic TAL gets filled. This new DTAL will be a combination of Configured TAI-mgmt-objs and historic TAI list. MME saves the TAI to a maximum number of 16. MME uses the same TAL list as sent in ATTACH/TAU Accept message for paging.




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### Important

MME uses the same DTAL as part of paging. Based on the DTAL depth configuration, the number of TAI in the historic list will be more and TAL list will have more TAC, resulting in more than normal level of paging. Based on paging load there will be impact in CPU usage.

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### How it works:

- When MME builds the DTAL, TAI entries from the tai-mgmt-obj takes precedence. If the tai-mgmt-obj already has 16 entries, the Dynamic TAL gets filled with those entries and the TAI entries from historic list is not considered.
- If the number of TAI in tai-mgmt-obj is less than 16, the remaining entries are filled from historic TAI list based on the depth configuration or the remaining empty entries in the TAL List, whichever is the least.
- Historic TAI list contains list of the TAI visited by UE. The entries are sorted by time. When the list reaches the maximum number of entries, the oldest TAI gets removed.
- Each User Equipment (UE) in the same tracking area can have its TAL list because of the difference in dynamic TAI.




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### Note

The Historic TAI List is not recovered as part of Session manager recovery. After the Session manager recovery, MME will build the Historic TAI List for UE from beginning.

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## Limitation

As UE does not perform TAU procedure when moving to dynamically learnt TAL, S-GW will not be reassigned/reallocated as per TAI-mgmt-obj configuration.

# Configuring dynamic-tal in mme-service and call-control-profile

Use the following CLIs to enable or disable and to configure depth of the TAL maintained for each UE.

## Configuring CLI dynamic-tal in mme-service

```
configure
  context context_name
    mme-service service_name
      dynamic-tal depth depth-value
      [ no ] dynamic-tal
    end
```

### NOTES:

- **mme-service** *service\_name*: Specifies the name of the MME service and must be a string of 1-63 characters.
- **dynamic-tal** *depth-value*: Configures the dynamic-tal for MME service users. MME maintains historic TAI list per UE up to the configured depth value.
- **depth** *depth-value*: Number of unique historic entries in TAL up to a maximum of 16.
- **no**: Removes the depth value in an MME Service.

## Configuring CLI dynamic-tal in call-control-profile

```
configure
  context context_name
    call-control-profile profile_name
      dynamic-tal depth depth-value
      [ no ] dynamic-tal
    end
```

### NOTES:

- **call-control-profile** *profile\_name*: Creates an instance of a call control profile.  
*profile\_name* specifies the name of the call control profile and must be a string of 1-64 characters.
- **dynamic-tal** : Configures the dynamic-tal. MME maintains historic TAI list for each UE up to the configured depth value.
- **depth** *depth-value*: Number of unique historic entries in TAL up to a maximum of 16.
- **no** : Removes the depth value.

## show call-control-profile all

The output of the above command is modified to display the Dynamic TAL List for each UE. Last Dynamic TAI History displays up to a maximum of 16 reported TAIs and is not controlled based on the configured depth value in mme-service.

```

UE Tracking Information: Last Dynamic TAI History
|                               Last Reported TAI |           Last Update
-----
(1)  (123,456)                   0x1a7c                Fri Jun 12 09:09:11 2020
(2)  (123,456)                   0x92e                 Fri Jun 12 09:09:11 2020
(3)  (123,456)                   0x22c4                Fri Jun 12 09:09:10 2020

```

## Monitoring and Troubleshooting

### Show Commands and Output

#### show mme-service all

The output of the above command is modified to display the configured dynamic-tal depth value and not configured dynamic-tal depth value in mme-service and call-control-profiles.

For example, when dynamic-tal depth value is configured the following output is displayed:

```

Service name           : mme1
  Context              : ingress
  Status               : STARTED
  Bind                 : Done
..
  Dynamic TAL Depth    : 5

```

When dynamic-tal depth value is not configured the following output is displayed.

```

Service name           : mme1
  Context              : ingress
  Status               : STARTED
  Bind                 : Done
..
  Dynamic TAL Depth    : Not defined

```

#### show mme-service statistics tai

The output of this command includes the following Intra MME TAU Requests:

- Dynamic TAI List Periodic TAU—Displays the number of attempts, successes, and failures of Dynamic TAI list periodic tracking area update (TAU).
- Dynamic TAI List TA Updating—Displays the number of Dynamic TAI List TA updates, attempts, successes, or failures associated with all MME services.

#### show mme-service statistics

When the dynamic TAL list feature is enabled, new TAL statistics and existing TAU statistics gets updated for MME service level EMM and TAI Statistics. The output of this command includes the following TAU sub-group:

| Field                         | Description   |
|-------------------------------|---|
| Dynamic TAI List Periodic TAU | Displays the number of attempts, successes, and failures of Dynamic TAI list periodic tracking area update (TAU). |

| Field  | Description   |
|--|---|
| Dynamic TAI List Normal TAU without SGW Relocation | Displays the number of Dynamic TAI List Normal TAU, without S-GW relocation, attempts, successes, or failures associated with all MME services. |
| Dynamic TAI List TAU with Bearer Activation        | Displays the number of Dynamic TAI list TAU, with bearer activation, attempts, successes, or failures associated with all MME services.         |
| Dynamic TAI List TAU with SGW Relocation           | Displays the number of Dynamic TAI List TAU, with S-GW relocation, attempts, successes, or failures associated with all MME services.           |

## Bulk Statistics

This section provides information on the bulk statistics for the Dynamic TAI feature.

### MME-Schema

The following existing TAU bulk statistics are included in the MME Schema.

| Counters                      | Description  |
|-------------------------------|--|
| dtal-tau-periodic-attempted   | The total number of Dynamic TAI List Periodic TAU requests attempted.  |
| dtal-tau-periodic-success     | The total number of Dynamic TAI List Periodic TAU requests succeeded.  |
| dtal-tau-periodic-failures    | The total number of Dynamic TAI List Periodic TAU requests failed.   |
| dtal-tau-normal-attempted     | The total number of EMM Dynamic TAI List TAU request attempts where the EPS update type is set to TA updating (without S-GW relocation). |
| dtal-tau-normal-success       | The total number of EMM Dynamic TAI List TAU request succeeded.  |
| dtal-tau-normal-failures      | The total number of EMM Dynamic TAI List TAU request failed.   |
| dtal-tau-active-attempted     | The total number of EMM Dynamic TAI List TAU with bearer activation attempts.  |
| dtal-tau-active-success       | The total number of EMM Dynamic TAI List TAU with successful bearer activation.  |
| dtal-tau-active-failures      | The total number of EMM Dynamic TAI List TAU with failed bearer activation.  |
| dtal-tau-sgw-change-attempted | The total number of EMM Dynamic TAI List TAU with S-GW relocation attempts.  |
| dtal-tau-sgw-change-success   | The total number of EMM Dynamic TAI List TAU with S-GW relocation success.   |

| Counters                     | Description   |
|------------------------------|---|
| dtal-tau-sgw-change-failures | The total number of EMM Dynamic TAI List TAU with S-GW relocation failures. |

## TAI Schema

The following existing TAI bulk statistics are included in the MME Schema.

| Counters                        | Description  |
|---------------------------------|--|
| tai-dtal-intra-tau-attempted    | The total number of Dynamic TAI List Intra-MME normal TAU attempted with or without S-GW change. |
| tai-dtal-intra-tau-success      | The total number of Dynamic TAI List Intra-MME normal TAU succeeded with or without S-GW change. |
| tai-dtal-intra-tau-failures     | The total number of Dynamic TAI List Intra-MME normal TAU failed with or without S-GW change.    |
| tai-dtal-tau-periodic-attempted | The total number of Intra-MME Dynamic TAI List Periodic TAU attempted.                           |
| tai-dtal-tau-periodic-success   | The total number of Intra-MME Dynamic TAI List Periodic TAU succeeded.                           |
| tai-dtal-tau-periodic-failures  | The total number of Intra-MME Dynamic TAI List Periodic TAU failed.                              |