UE Configuration Management Procedures

- Feature Summary and Revision History, on page 1
- Feature Description, on page 2
- How it Works, on page 2
- Configuring Support for UE Configuration Update Command, on page 6
- Configuring Paging, on page 7
- OAM Support, on page 9

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	AMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled - Always-on
Related Documentation	• SMS over the Non-Access Stratum Procedures • AMF Authentication and GUTI Reallocation Configuration Control

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

The AMF supports the generic UE configuration procedure by sending the Configuration Update Command message to the UE when certain parameters are modified. The AMF supports the following parameters in the Configuration Update Command message:

- 5G-GUTI
- TAI list
- SMS indication

For more information, refer to the UCC 5G AMF Configuration and Administration Guide > UE Configuration Management Procedures chapter.

How it Works

This section describes how this feature works.

The AMF initiates the Configuration Update Command procedure when it observes a change in the configuration that was previously sent to a UE. Depending on the nature of the configuration that is modified, the AMF communicates with the UE to send an acknowledgment indicating that the configuration has changed or request the UE to register with AMF again.

The AMF checks for the configuration changes and starts the Configuration Update Command after the following procedures are completed:

- PDU establishment
- Xn-based handover
- N2 handover without the AMF change
- UE-initiated service request in the IDLE state without ICSR or without PDU.
- UE-initiated service request in the IDLE state with ICSR.
- Data change notifications from UDM

Timers

The AMF uses timers to detect configuration changes for UEs in the IDLE mode and UEs in the CONNECTED mode without any signaling activity. If AMF detects changes in configuration for UE in the IDLE mode, the UE is paged. Based on the response, the AMF sends the Configuration Update Command.

- T3555—The AMF transmits the Configuration Update Command message with an acknowledgment request to the UE. While waiting for a response from the UE, AMF starts the T3555 timer. If the timer expires, the AMF retransmits the Configuration Update Command message.
- T3512—When the UE moves to the IDLE mode, the AMF starts an internal timer which is derived from T3512 timer value subtracted by 4 minutes. The resulting value must be greater than 60 seconds. When the timer expires, the AMF checks for any configuration changes and triggers Paging if required.

- Tidle—The tidle timer allows AMF to monitor the UE in the CONNECTED mode without any signaling activity for a defined period. On the expiry of this timer, the AMF performs one of the following actions:
  - If the configuration is modified and the feature is enabled, the AMF initiates the UE Configuration Update Command and restarts the tidle timer.
  - If the configuration has not changed or the feature is disabled, the AMF moves the UE to the IDLE state by sending the respective messages towards gNB and SMF.

TAI List Changes

When the AMF does not receive a response from the UE for the Configuration Update Command triggered due to the changes in the TAI list, then the AMF considers old and new TAI list as valid. When the UE is in the IDLE state, the AMF pages the UE using the old TAI list first. If the UE does not respond and all the paging stages are exhausted, the AMF pages the new TAI list as the final step.

The paging profile for paging the new TAI list is as follows:

```
Action = PAGING_ALL_GNB_ALL_TAI
```

The Action is hardcoded and timeout and MaxPagingAttempts are derived from the T3513 value configured under the call control profile.

Call Flows

This section describes the key call flows for this feature.

Sending the New GUTI to UE Call Flow

This section describes the Sending the New GUTI to UE call flow.

Note The newly allocated GUTI value is sent to the UE using the Configuration Update Command message. The allocation of a new GUTI is possible after the Service Request procedure is complete.

The following call flow describes the 5G GUTI reallocation during the Service Request procedure.

Figure 1: Sending the New GUTI to UE Call Flow

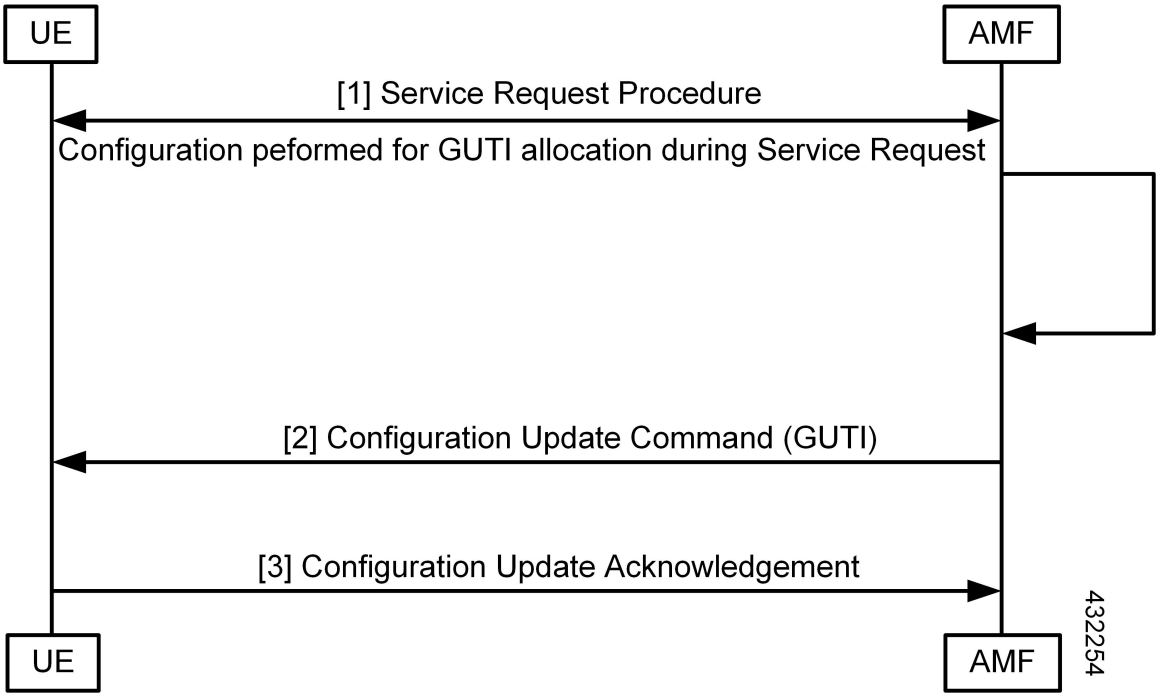

Table 3: Sending the New GUTI to UE Call Flow Description

Step	Description
1	The UE sends the Service Request procedure to the AMF to perform both or one of the following: • Establish the N1 NAS signaling connection. • Establish the UP resources for PDU sessions which are activated without UP resources.
2	After the Service Request procedure is complete, and the AMF is configured to reallocate a new GUTI, then the new GUTI is allocated and sent in the Configuration Update Command message to UE.
3	The UE acknowledges the new GUTI by sending the Configuration Update Acknowledgment message.

UE Configuration Update Call Flow

This section describes the UE Configuration Update call flow.

Figure 2: UE Configuration Update Call Flow

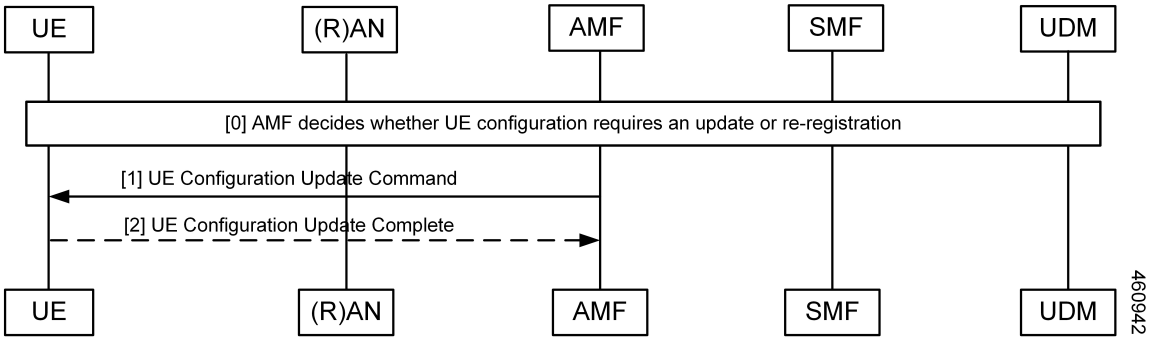

Table 4: UE Configuration Update Call Flow Description

Step	Description
1	When the AMF detects configuration changes for an UE, it sends a UE Configuration Update Command message to the UE. If the UE is in the idle mode, the AMF triggers paging based on the configuration.
2	As a response, the UE acknowledges the request and sends the configuration updates to the AMF.

UDM Notification Interaction Call Flow

The UE Configuration Update command is also triggered when UDM notifies AMF about change in subscription data.

This section describes the UDM Notification Interaction call flow.

Figure 3: UDM Notification Interaction Call Flow

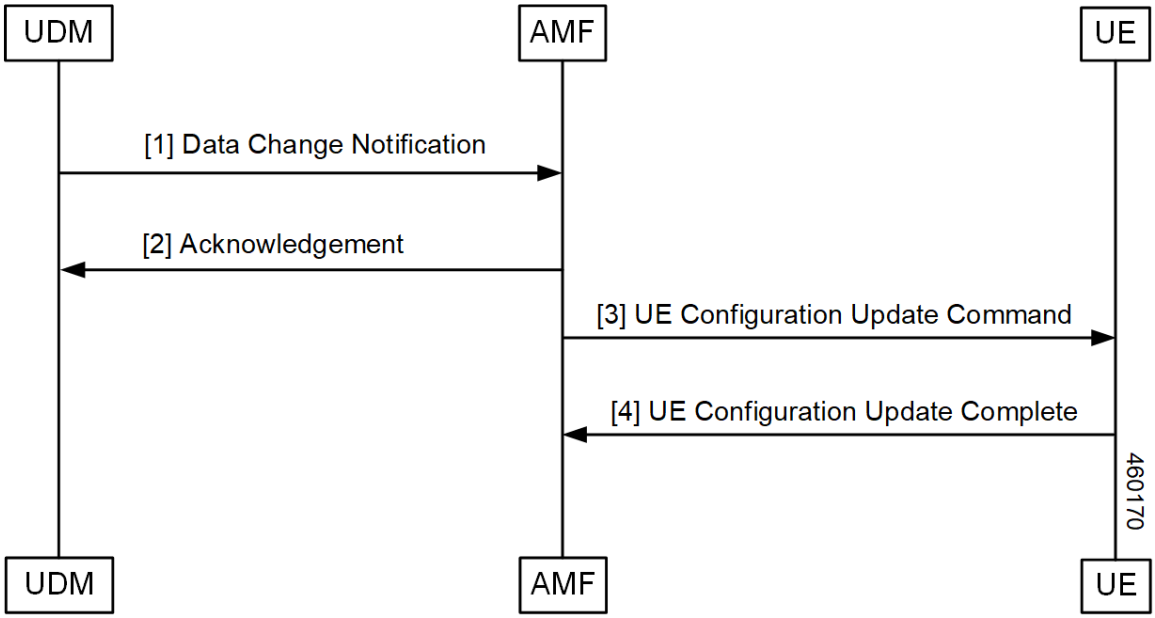

Table 5: UDM Notification Interaction Call Flow Description

Step	Description
1	UDM notifies the subscription data change to AMF. **Note** In this release, AMF only supports detection of changes to SMS subscription data as a part of UDM Data change notification.
2	As a response, the AMF acknowledges the change.
3	AMF compares new subscription data with the existing data. If any change is detected and: • If UE is in CONNECTED mode, AMF triggers UE Configuration Update Command to UE. • If UE is in IDLE mode, AMF triggers paging based on the configuration. Post paging response from UE, AMF may trigger UE Configuration Update command.
4	UE sends UE Configuration Update Complete to AMF.

Standards Compliance

This feature complies with the following standards specifications:

- *3GPP TS 23.501 "System architecture for the 5G System (5GS)"*
- *3GPP TS 23.502 "Procedures for the 5G System (5GS)"*
- *3GPP TS 24.501 "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3"*

Configuring Support for UE Configuration Update Command

Configuring this feature involves the following steps:

- Enable the AMF to send the new GUTI allocation requests. For more information, refer to Configuring New GUTI Allocation, on page 6.
- Enable the AMF to send the UE Configuration Update Command. For more information, refer to Enabling UE Configuration Update, on page 6.

Configuring New GUTI Allocation

To configure the GUTI allocation, use the configuration provided in the AMF Authentication and GUTI Reallocation Configuration Control chapter.

Enabling UE Configuration Update

To enable the UE configuration update feature, use the following configuration:

```
config
   amf-global
      call-control-policy policy
         policy ue-cfg-update { on-sms-change [ true | false ] |
on-tai-change [ true | false ] }
         end
```

NOTES:

- **policy ue-cfg-update**—Enters the UE configuration mode.

  This command includes the follow subcommands:

  - **on-sms-change**—Starts the UE Configuration Update procedure when changes to SMS configuration is detected.
  - **on-tai-change**—Starts UE configuration update procedure when the TAI list is modified.

Configuring Paging

Configuring this feature involves the following steps:

- Configure paging so that when the UE is in the IDLE state, the AMF starts the timer for UE configuration. For more information, refer to Configuring the Paging Feature, on page 7.
- Configure the paging profile specific to UE configuration. The AMF uses this profile for paging. For more information, refer to Configuring the Paging Profile, on page 8.
- Enable AMF to page the new TAI list when UE doesn't respond to AMF when it pages using the old TAI list. For more information, refer to Configuring AMF to Page the New TAI List, on page 8.
- Configure the T355 timer. The AMF starts this timer while waiting for a UE response. For more information, refer to Configuring the T3555 Timer, on page 9
- Enable the tidle timer to monitor if the UE is in the CONNECTED mode without any signaling activity for a defined period. For more information, refer to Enabling the Tidle Timer for Inactive UEs in the Connected Mode, on page 9.

Configuring the Paging Feature

To configure paging, use the following configuration:

```
config
   amf-global
      call-control-policy ccpolicy_name
         policy idle-mode
            paging use-new-tailist
            udm-notification initiate-paging SMS
            ue-cfg-update initiate-paging
            end
```

NOTES:

- **policy idle-mode paging use-new-tailist**—Configures AMF to page using the new TAI list as the last step.
- **policy idle-mode udm-notification initiate-paging**—Configures paging which is triggered when the AMF detects configuration changes as part of the UDM data change notification received for UEs in the IDLE mode.
- **policy idle-mode ue-cfg-update initiate-paging**—Configures the AMF to start the internal timer when the UE moves to the IDLE mode, for detecting configuration changes and trigger paging, if required.

Configuring the Paging Profile

To configure this feature, use the following configuration:

```
config
   amf-global
      paging-map pagingmap_name
         precedence paging_precedence
            trigger-type [ uecfg ]
               paging-profile-name profile_name
               end
```

NOTES:

- **paging-map** *pagingmap_name*—Specify the paging map name. Must be a string in the range of 1–64 characters.
- **precedence** *paging_precedence*—Specify the precedence level. Must be an integer in the range of 1–255, where 1 indicates the highest precedence and 255 indicates the lowest precedence.
- **trigger-type [uecfg]** —Specify the paging trigger type.
- **paging-profile-name** *profile_name*—Specify the paging profile name. Must be a string in the range of 1–64 characters.

Configuring AMF to Page the New TAI List

To configure the AMF to page the new TAI list, use the following configuration:

```
config
   amf-global
      call-control-policy ccpolicy_name
         policy idle-mode paging
            use-new-tailist
            end
```

NOTES:

- **policy idle-mode paging**—Configures the paging for UE configuration for the IDLE mode paging.
- **use-new-tailist**—Configures AMF to page using the new TAI list.

Configuring the T3555 Timer

To configure the timer, use the following configuration:

```
config
  amf-global
    call-control-policy ccpolicy_name
      timers [ t3555 ]
         retry retry_count
         value value
         end
```

NOTES:

- **timers [t3555]**—Configure the t3555 timer for the Configuration Update Command message.
- **retry** *retry_count*—Specify the number of retransmission attempts that AMF must perform on expiry of the timer. Must be an integer in the range of 0-5. The default value is 4.

Note On expiry of the timer, AMF attempts retransmission of the Configuration Update Command message.

- **value** *value*—Specify the timer value in seconds. Must be an integer in the range of 0-30. The default value is 6 seconds.

Enabling the Tidle Timer for Inactive UEs in the Connected Mode

To configure the tidle timer, use the following configuration:

```
config
   amf-global
      call-control-policy ccpolicy_name
         timers [ tidle ]
            value tidle_value
            end
```

NOTES:

- **timers [tidle]** —Configure the tidle the timers. Tidle indicates the duration for which the UE is in the CONNECTED mode without any activity.
- **value** *tidle_value*—Specify the duration for which the UE can stay in the CONNECTED mode without the signaling activity. AMF monitors the UE for the configured amount of time which is the tidle. Must be an integer in the range of 30–25200 seconds.

OAM Support

This section describes operations, administration, and maintenance information for this feature.

Statistics

The following statistics are supported for the User Equipment Configuration Management Procedures feature.

- configuration_update_command—Captures the number of Configuration Update Command messages sent.
- configuration_update_complete—Captures the number of Configuration Update Acknowledgment messages received.