



## Session Timers

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## 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	Not Applicable

### Revision History

*Table 2: Revision History*

Revision Details	Release
The following enhancement was introduced: <ul style="list-style-type: none"><li>• Timer T3346</li></ul>	2022.04.0
The following enhancements were introduced: <ul style="list-style-type: none"><li>• Non-3GPP timer configurations</li></ul>	2022.01.0
First introduced.	2021.04.0

# Feature Description

AMF supports the following timers:

- **T3346** (t3346): It operates in NAS-CONGESTION state. AMF uses this timer value to encode t3346 IE in Registration / Service reject, and to encode back-off timer IE for rejection of session management message.
- **T3502** (t3502): It operates in the 5GMM-DEREGISTERED and 5GMM-REGISTERED states. AMF provides this timer value to UE in the Registration Accept and Registration Reject messages.
- **T3512** (t3512): It operates in the 5GMM-REGISTERED state. AMF provides this timer value to UE in the Registration Accept message.
- **T3513** (t3513): It operates in the 5GMM-REGISTERED state. It starts when the Paging procedure is initiated (with default paging algorithm) and stops when the Paging procedure ends (with the reception of paging response).
- **T3522** (t3522): It operates in the 5GMM-DEREGISTERED-INITIATED state. It starts with the transmission of Deregistration Request message and stops after receiving Deregistration Accept message.
- **T3550** (t3550): It operates in the 5GMM-COMMON-PROCEDURE-INITIATED state. It starts with the transmission of Registration Accept message and stops after receiving the Registration Complete message.
- **T3555** (t3555): It operates in the 5GMM-REGISTERED state. It starts with the transmission of Configuration Update Command message with the ACK bit set in the Configuration Update Indication IE. Stops with the Configuration Update complete message.
- **T3560** (t3560): It operates in the 5GMM-COMMON-PROCEDURE-INITIATED state. It starts with the transmission of Authentication Request message and Security Mode Command. Stops after receiving the following messages:
  - Authentication Response
  - Authentication Failure
  - Security Mode Complete
  - Security Mode Reject
- **T3570** (t3570): It operates in the 5GMM-REGISTERED state. It starts with the transmission of Identity Request message and stops after receiving the Identity Response message.
- **UE Context Transfer** (context-transfer-guard): AMF uses this timer to keep the individual UE Context resources until the timer expires. AMF starts this timer when UeRegStatusUpdateReqData message contains transferStatus as TRANSFERRED. Upon expiry, it clears the PDUs locally.
- **Tidle** (tidle): When the UE moves to the CONNECTED state, tidle timer is started and it's reset when any signalling occurs for the subscriber.

On expiry of tidle timer, AMF checks:

- If the UE Configuration Update is enabled and if new configuration is available to send to the UE, AMF triggers the UE Config Update Command to UE and resets the tidle timer.

- If the UE Configuration Update isn't enabled or there's no configuration update to send to the UE, the UE is moved to the IDLE state. AMF triggers the Context Release Command towards the gNB and the SM Context Update towards the SMF accordingly.
- **HO Supervisory** (ho-supervisory): It supervises PDU responses from SMF during N2, N26, and Xn handovers.
- **Tidt** (tidt): It starts after four minutes of T3512 timer expiry. The subscriber gets Deregistered implicitly upon this timer expiry.
- **Tn2** (tn2): It functions in AMF-initiated N2 messages, specifically for the AMF that waits for the response.
- **Tpurge** (tpurge): It starts when the Tidt timer expires. AMF sends a request to the UDM to Deregister (purge) the UE from the UDM for 3GPP access upon this timer expiry.
- **Procedural Timeout** (proc-timeout): It starts when AMF receives Registration Request. After expiry, AMF sends the Registration Reject message to the UE.

For information on the timer configurations, refer to [Feature Configuration, on page 14](#).

## How it Works

This section describes how this feature works.

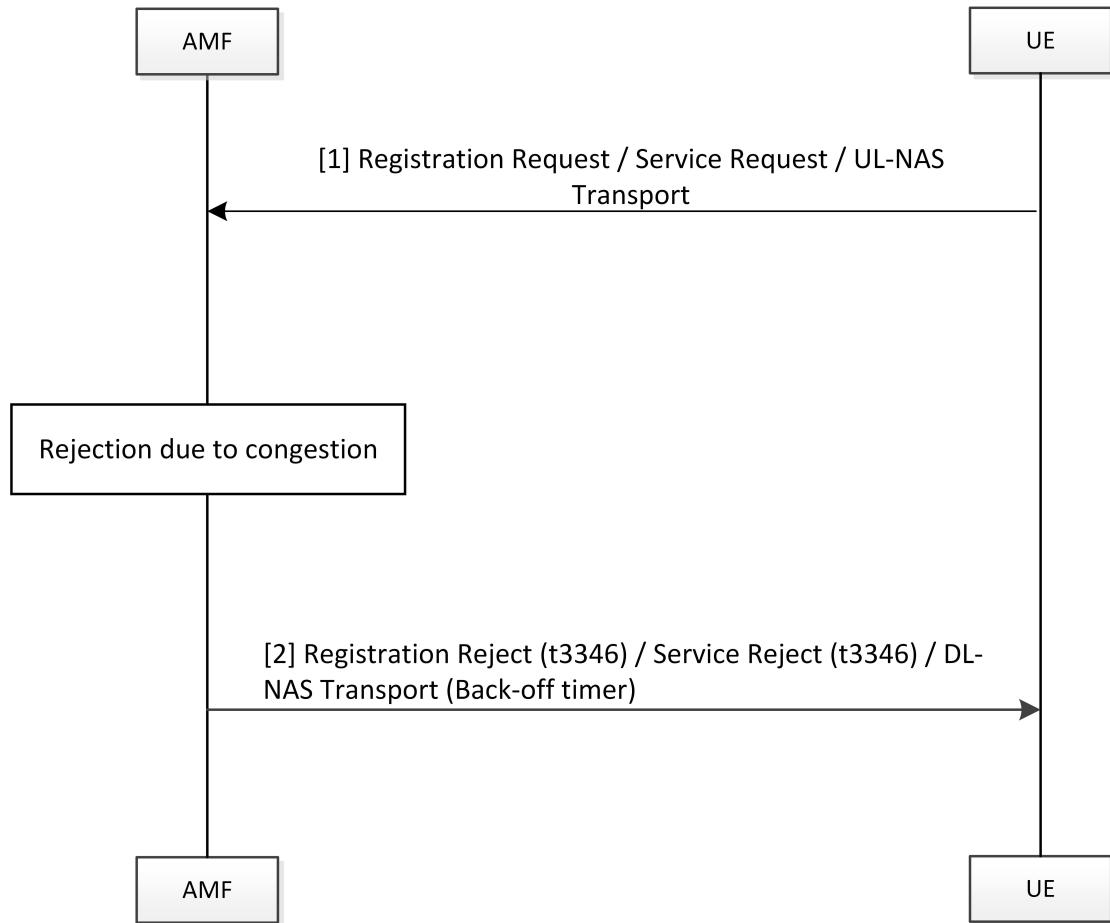
## Call Flows

This section describes the key call flows for the AMF timers.

### T3346 Call Flow

This section describes the T3346 call flow.

Figure 1: T3346 Timer Call Flow



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Table 3: T3346 Timer Call Flow Description

Step	Description
1	The UE sends registration request/service request.
2	With AMF in congestion state: <ul style="list-style-type: none"> <li>• For registration request, AMF rejects the message with cause as congestion and includes t3346 timer.</li> <li>• For UL-NAS transport (Payload container type: N1 SM information), AMF sends DL-NAS message with cause as congestion and includes back-off timer.</li> </ul>

## T3502 Call Flow

This section describes the T3502 timer call flow.

Figure 2: T3502 Timer Call Flow

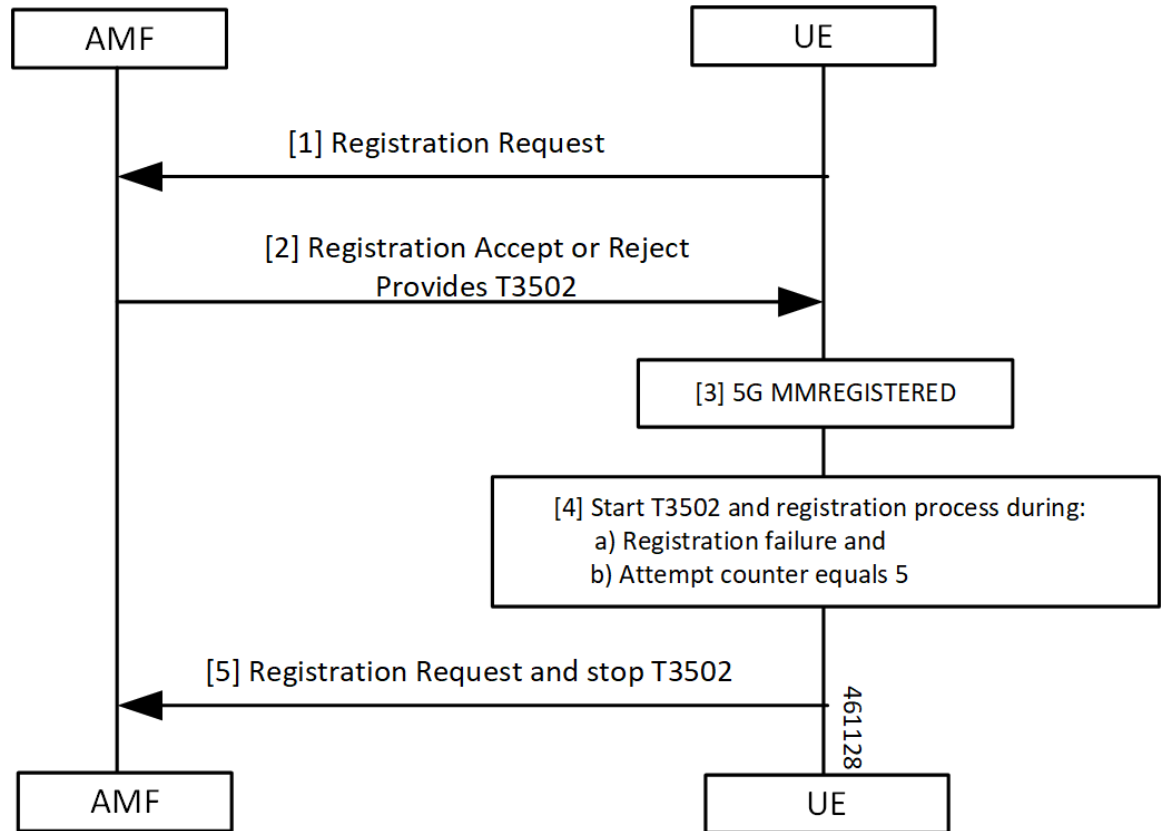


Table 4: T3502 Timer Call Flow Description

Step	Description
1	The UE sends the Registration Request to the AMF. The UE starts the T3502 timer.
2	The UE receives a response of reject or accept from the AMF.
3	The UE performs the 5G MM registration procedure.
4	The UE starts the T3502 timer and the registration process during one of the following: <ul style="list-style-type: none"> <li>• Registration failure</li> <li>• Attempt counter equals 5</li> </ul>
5	The UE sends the Registration Request to the AMF and stops the T3502 timer.

## T3512 Call Flow

This section describes the T3512 timer call flow.

Figure 3: T3512 Timer Call Flow

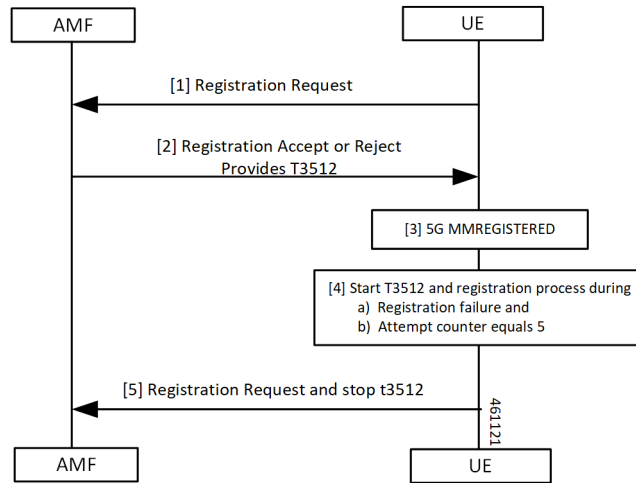


Table 5: T3512 Timer Call Flow Description

Step	Description
1	The UE sends the Registration Request to the AMF.
2	The UE receives a response of reject or accept from the AMF. The UE starts the T3512 timer.
3	The UE performs the 5G MM Registration procedure.
4	The UE starts the T3512 timer and the registration process during one of the following: <ul style="list-style-type: none"> <li>• Registration failure</li> <li>• Attempt counter equals 5</li> </ul>
5	The UE sends the Registration Request to the AMF and stops the T3512 timer.

## T3522 Call Flow

This section describes the T3522 timer call flow.

Figure 4: T3522 Timer Call Flow

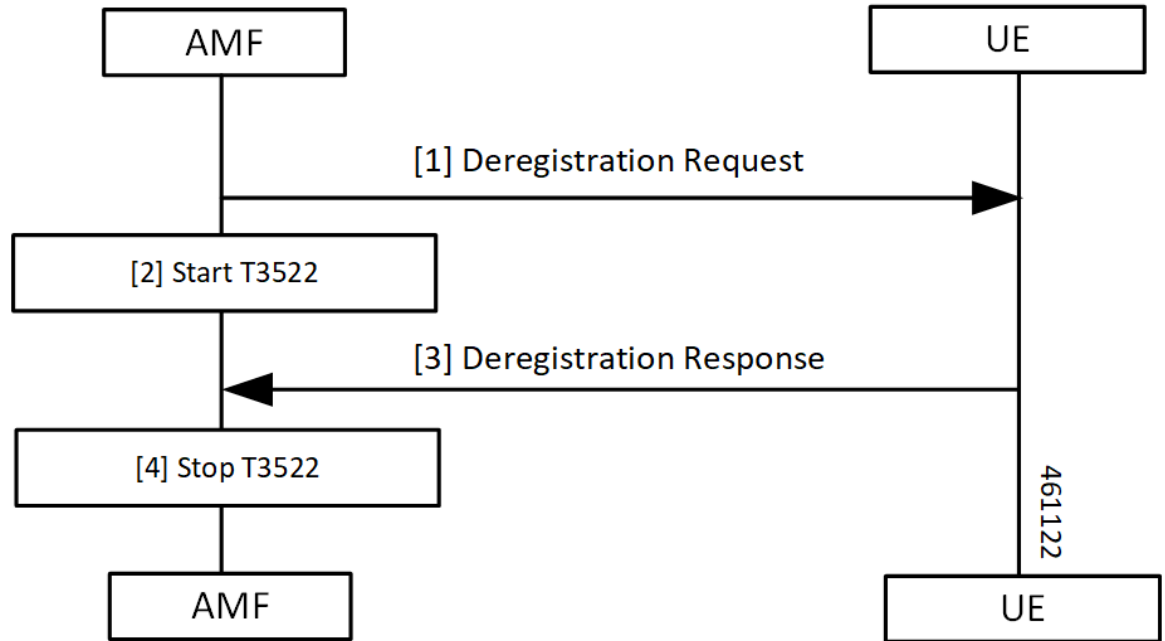


Table 6: T3522 Timer Call Flow Description

Step	Description
1, 2	The AMF sends the Deregistration Request to the UE and starts the T3522 timer.
3, 4	The AMF receives the Deregistration Response from the UE and stops the T3522 timer.

### T3550 Call Flow

This section describes the T3550 call flow.

Figure 5: T3550 Timer Call Flow

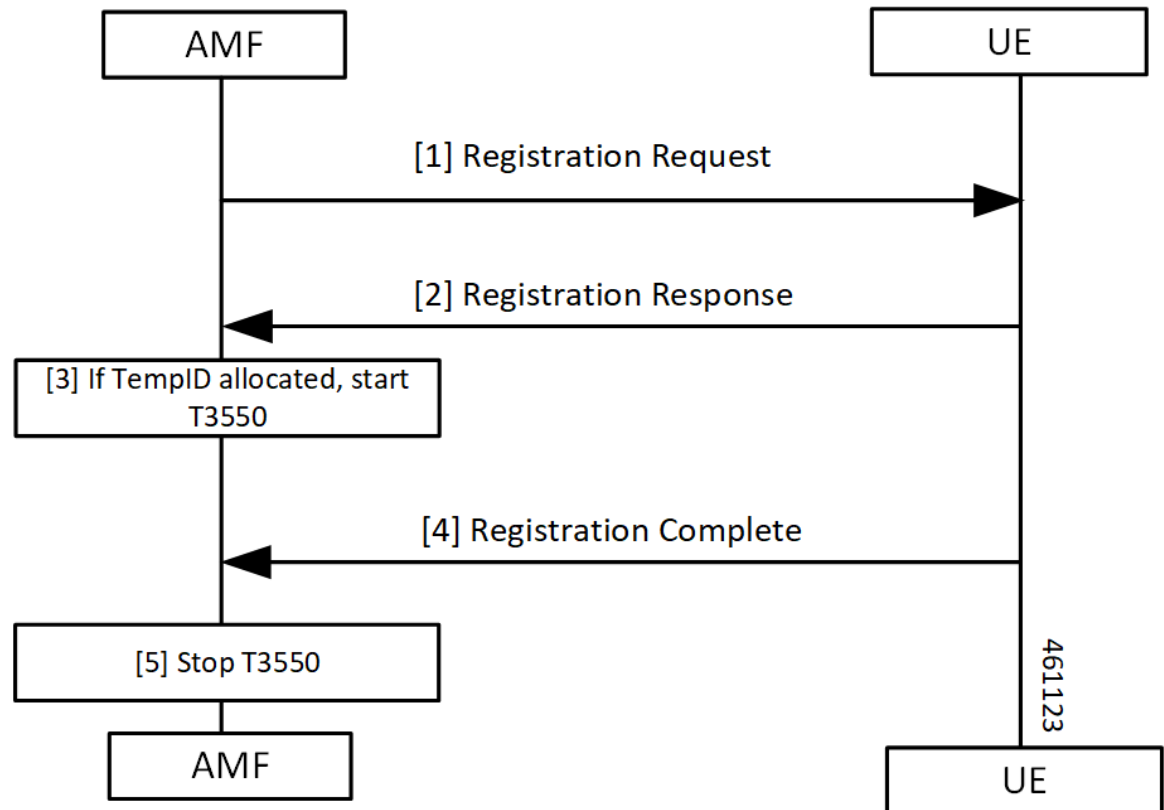


Table 7: T3550 Timer Call Flow Description

Step	Description
1, 2	The AMF sends the Deregistration Request to the UE and receives the response.
3	The AMF starts the timer T3550 when temporary ID is allocated.
4, 5	AMF receives Deregistration Response from the UE and stops the T3550 timer.

## T3555 Call Flow

This section describes the T3555 call flow.



Figure 6: T3555 Timer Call Flow

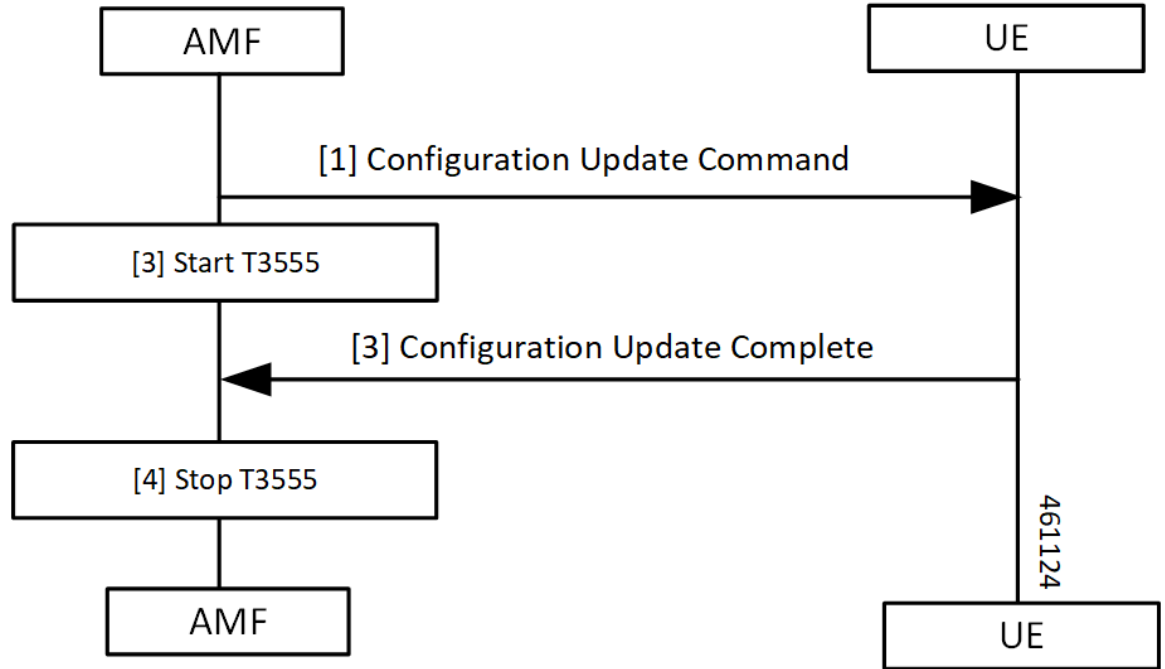


Table 8: T3555 Timer Call Flow Description

Step	Description
1, 2	The AMF sends the Configuration Update Command to the UE and starts the T3555 timer.
3, 4	The AMF receives the Configuration Update Complete from the UE and stops the T3555 timer.

### T3560 Call Flow

This section describes the T3560 timer call flow.

Figure 7: T3560 Call Flow

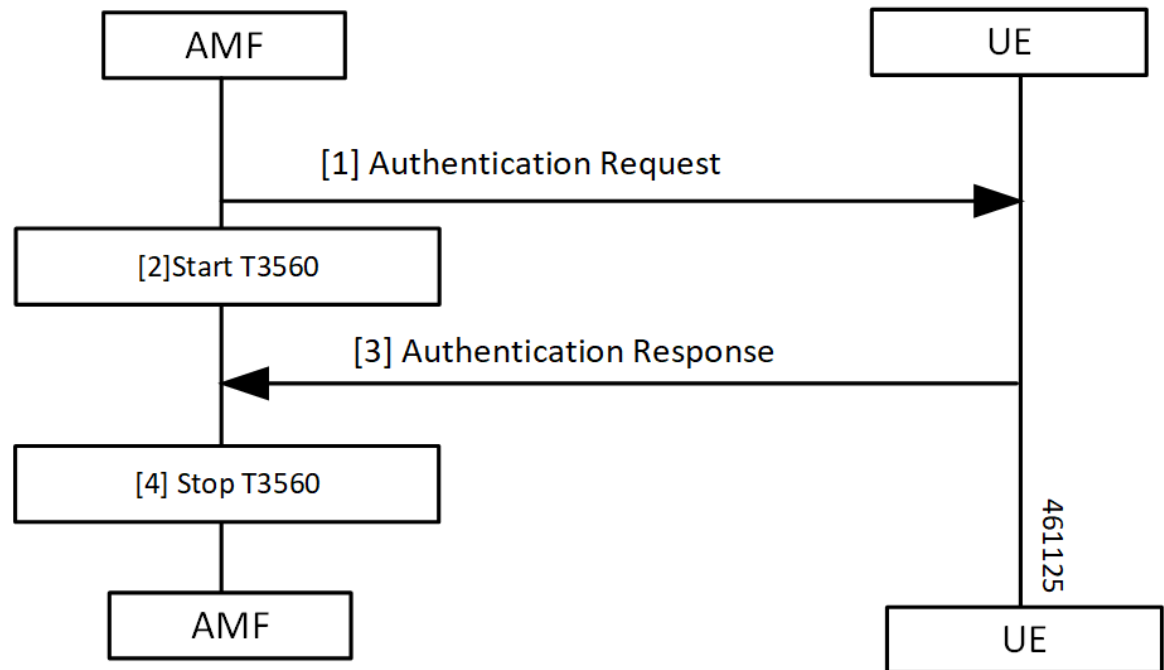


Table 9: T3560 Timer Call Flow Description

Step	Description
1, 2	The AMF sends the Authentication Request to the UE and starts the T3560 timer.
3, 4	The AMF receives the Authentication Response from the UE and stops the T3560 timer.

## T3570 Call Flow

This section describes the T3570 timer call flow.

Figure 8: T3570 Call Flow

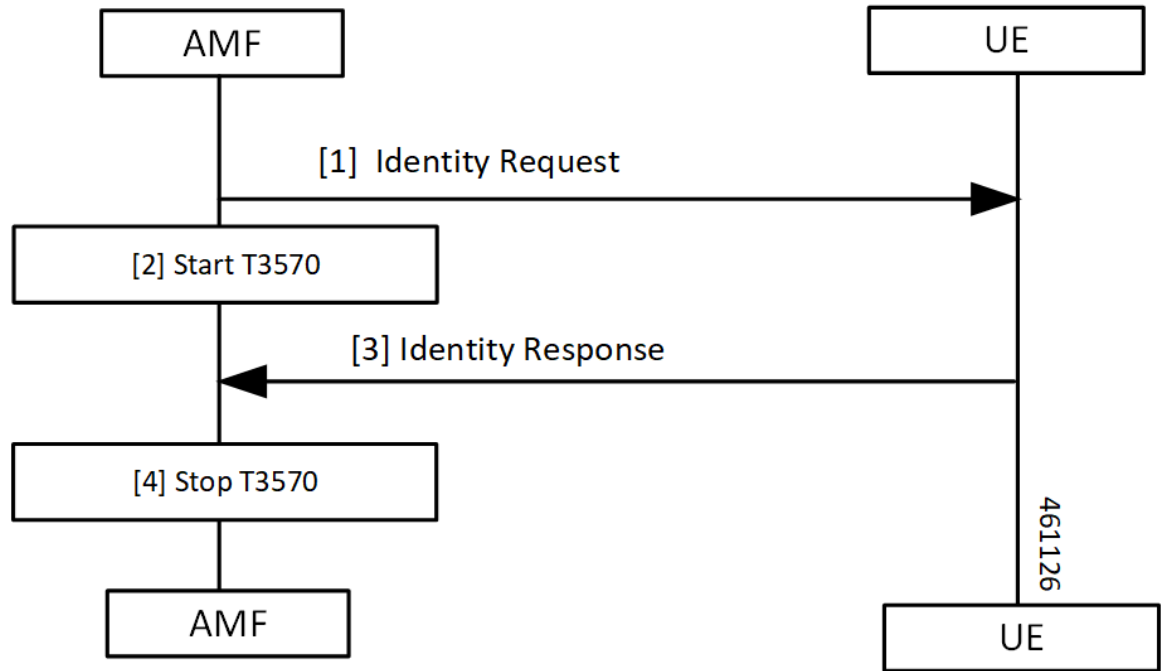


Table 10: T3570 Timer Call Flow Description

Step	Description
1, 2	The AMF sends the Identity Request to the UE and starts the T3570 timer.
3, 4	The AMF receives the Identity Response from the UE and stops the T3570 timer.

### Tidle Timer Call Flow

This section describes the Tidle timer call flow.

Tidle timer call flow is a sample call flow. Tidle timer expiry can happen post various signalling procedures, not just registration procedure.

Figure 9: Tidle Timer Call Flow

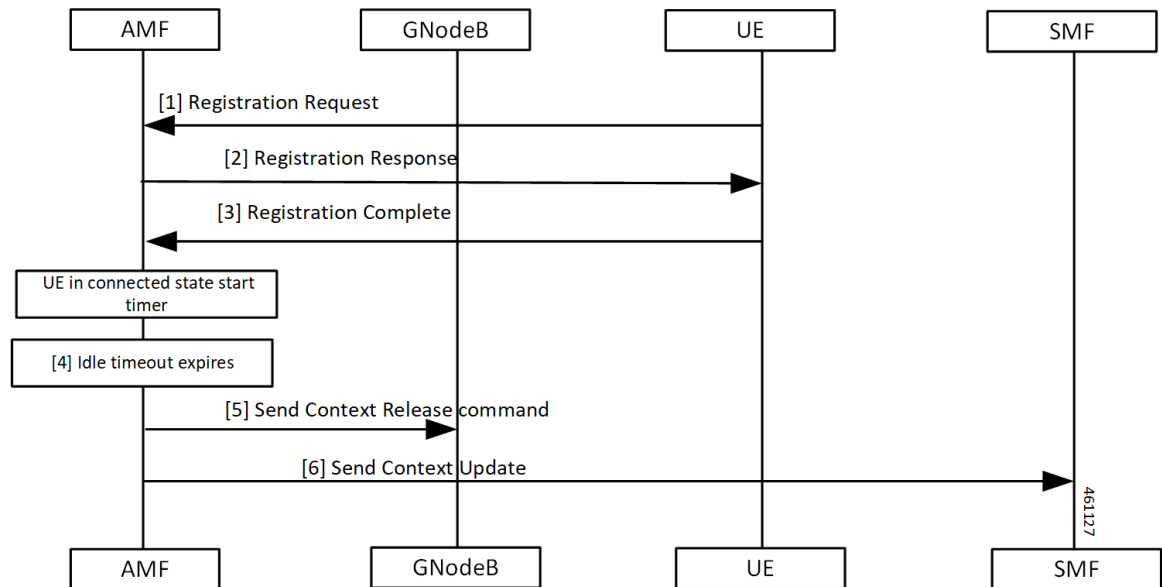


Table 11: Tidle Timer Call Flow Description

Step	Description
1	The UE sends the Registration Request to the AMF
2	The UE receives Registration Response from the AMF.
3	The UE sends the Registration Complete to the AMF. When UE moves to CONNECTED state, the AMF starts the configured timer. The value ranges between 30 seconds to seven hours.
4	The AMF waits for the Tidle timer expiry.
5	The AMF sends the Context Release Command to the gNodeB.
6	The AMF sends the Context Update to the SMF.

## Procedural Timer Call Flow

This section describes the procedural timer call flow.

Figure 10: Procedural Timer Call Flow

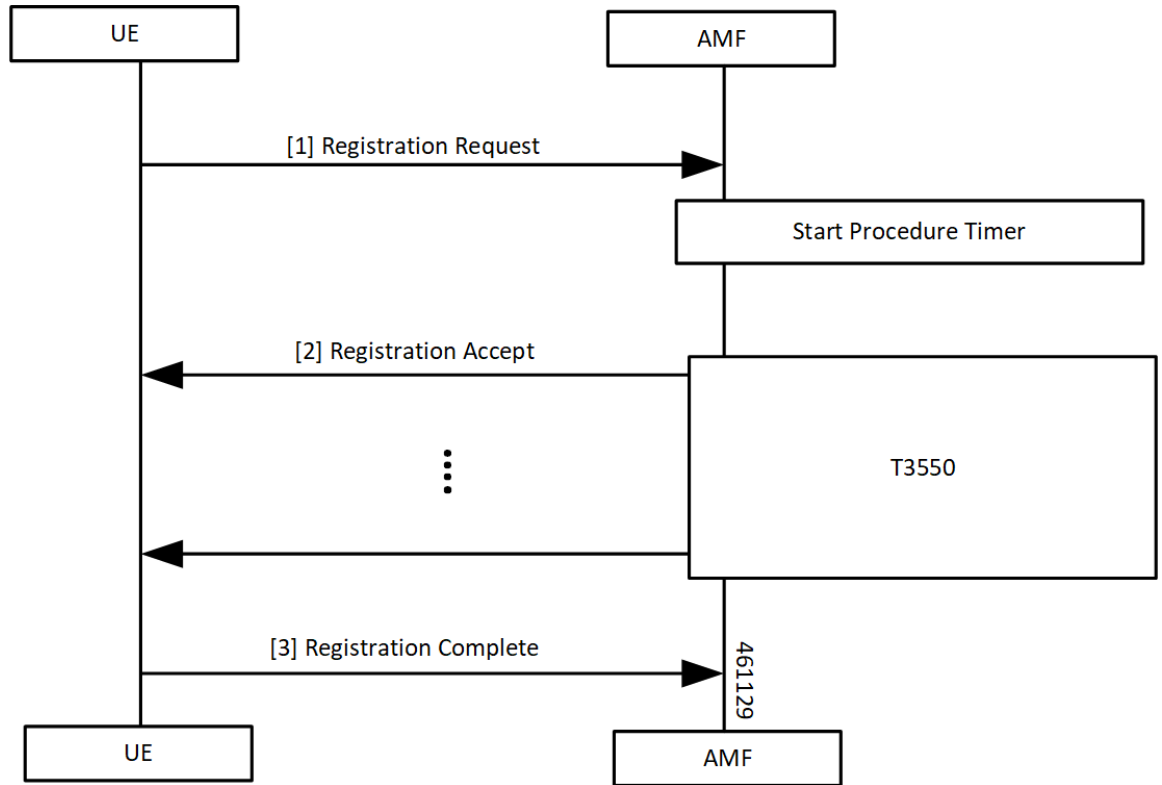


Table 12: Procedural Timer Call Flow Description

Step	Description
1	The AMF starts the Procedure timer upon receiving Registration Request per UE basis.
2	AMF starts the T3550 timer when it sends the Registration Accept to UE and stops after receiving the Registration Complete.  When the timer expires before sending Registration Accept towards the UE, the following actions takes place: <ul style="list-style-type: none"> <li>• Clear context locally, on UDM and PCF.</li> <li>• Registration Reject procedure.</li> </ul> When Registration Accept to the UE is successful, AMF updates t3550 (retry and timeout) based on remaining time and retry count.
3	The UE sends Registration Complete to the AMF.

## Standards Compliance

This feature complies with the following standards specification:

- 3GPP TS 24.501 "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3"

## Feature Configuration

Configuring this feature involves the following steps:

- 3GPP timer configurations—These commands support in configuring 3GPP timers. For more information, refer to [Configuring the 3GPP Timers, on page 14](#).
- Non-3GPP timer configurations—These commands support in configuring non-3GPP timers. For more information, refer to [Configuring the Non-3GPP Timers, on page 16](#).

## Configuring the 3GPP Timers

To configure the GPP timers, use the following configuration:

```

config
  amf-global
    call-control-policy policy_name
      timers timer_type { retry retry_count | value timeout_value }
    end

```

### NOTES:

- **timers** *timer\_type* **retry** *retry\_count*—Specify the retry count.
- **timers** *timer\_type* **value** *timeout\_value*—Specify the timeout value.

For the *timer\_type*, refer to the following table.

**Table 13: 3GPP Timers and Values**

Timer	Retry Count or Attempt Count	Timeout Value
tidt	Not Applicable	Must be an integer in the range of 0–35712000 seconds. The default value is 3480 seconds.
ho-supervisory	Not Applicable	Must be an integer in the range of 100–10000 mill seconds. The default value is 500 milliseconds.
tpurge	Not Applicable	Must be an integer in the range of 0–35712000 seconds. The default value is 86400.

Timer	Retry Count or Attempt Count	Timeout Value
t3346	Not Applicable	<p>Must be an integer in the range of 1–11160 seconds.</p> <p>The default value is 900 seconds.</p> <p>While processing the t3346 timer towards UE, AMF adds a random offset to the configured timer value. This random offset is based on the configured timer value.</p> <p>If timer value is:</p> <ul style="list-style-type: none"> <li>• Greater than or equal to 0 seconds, random offset is in the range of 0–30 seconds.</li> <li>• Greater than 62 seconds, random offset is in the range of 0–300 seconds.</li> <li>• Greater than 1860 seconds, random offset is in the range of 0–1000 seconds.</li> </ul> <p>Maximum value of the recomputed timer value is 11160 seconds.</p>
t3502	Not Applicable	<p>Must be an integer in the range of 0–35712000 seconds.</p> <p>The default value is 720 seconds.</p>
t3512	Not Applicable	<p>Must be an integer in the range of 0–35712000 seconds.</p> <p>The default value is 3240 seconds.</p>
t3513	<p>This parameter defines the number of paging attempts.</p> <p>Must be an integer in the range of 1–5.</p> <p>The default value is 2.</p>	<p>Must be an integer in the range of 1–10 seconds.</p> <p>The default value is 5 seconds.</p>
t3522	<p>This parameter defines the number of paging retries.</p> <p>Must be an integer in the range of 0–5.</p> <p>The default value is 4.</p>	<p>Must be an integer in the range of 0–30 seconds.</p> <p>The default value is 6 seconds.</p>
t3550	<p>This parameter defines the number of paging retries.</p> <p>Must be an integer in the range of 0–5.</p> <p>The default value is 4.</p>	<p>Must be an integer in the range of 0–30 seconds.</p> <p>The default value is 6 seconds.</p>

Timer	Retry Count or Attempt Count	Timeout Value
t3555	This parameter defines the number of paging retries. Must be an integer in the range of 0–5. The default value is 4.	Must be an integer in the range of 0–30 seconds. The default value is 6 seconds.
t3560	This parameter defines the number of paging retries. Must be an integer in the range of 0–5. The default value is 4.	Must be an integer in the range of 0–30 seconds. The default value is 6 seconds.
t3570	This parameter defines the number of paging retries. Must be an integer in the range of 0–5. The default value is 4.	Must be an integer in the range of 0–30 seconds. The default value is 6 seconds.

To configure the t3513 timer, use the following configuration:

```

config
  amf-global
    call-control-policy policy_name
      timers t3513 { attempts paging_attemps_count | value timeout_value }
    end

```

#### NOTES:

- **timers t3513 attempts** *paging\_attemps\_count*—Specify the number of paging attempts.
- **timers t3513 value** *timeout\_value*—Specify the t3513 timeout value.

For the t3513 timer configuration values, refer to the *3GPP Timers and Values* table.

## Configuring the Non-3GPP Timers

To configure the Non-3GPP timers, use the following configuration:

```

config
  amf-global
    call-control-policy policy_name
      timers timer_type value timer_value
    end

```

#### NOTES:

- **timers** *timer\_type* **value** *timer\_value*—Specify the timeout value.

For the *timer\_type*, refer to the following table.



Table 14: Non-3GPP Timers and Values

Timer	Timeout Value
context-transfer-guard	Must be an integer in the range of 0–35712000 seconds. The default value is zero seconds.
proc-timeout ue-registration	Must be an integer in the range of 10–120 seconds.
tidle	Must be an integer in the range of 30–25200 seconds.
tn2	Must be an integer in the range of 0–35712000 seconds. The default value is six seconds.

## Configuring the IDLE Timer

To configure the IDLE timer, use the following configuration:

```
config
  amf-global
    call-control-policy policy_name
      timers tidle value timeout_value
    end
```

### NOTES:

- **timers tidle value *timeout\_value***—Specify the IDLE timeout value in seconds.

## Configuration Example

The following is an example configuration.

```
config
  amf-global
    call-control-policy local
      timers tidle 2
    end
```

## Configuring the Procedural Timer

To configure the Procedural timer for AMF, use the following configuration:

```
config
  amf-global
    timers proc-timeout ue-registration value timeout_value
  end
```

### NOTES:

- **timers procedure-timeout ue-registration value *timeout\_value***—Specify the UE Registration procedure timeout value in seconds. Must be an integer in the range of 10-120 seconds.

## Configuration Example

The following is an example configuration.

```
config
  amf-global
    call-control-policy local
    timers proc-timeout pdu-create value 20
  end
```