ASR5x00: MME Attach Failure Because of Silent Drops

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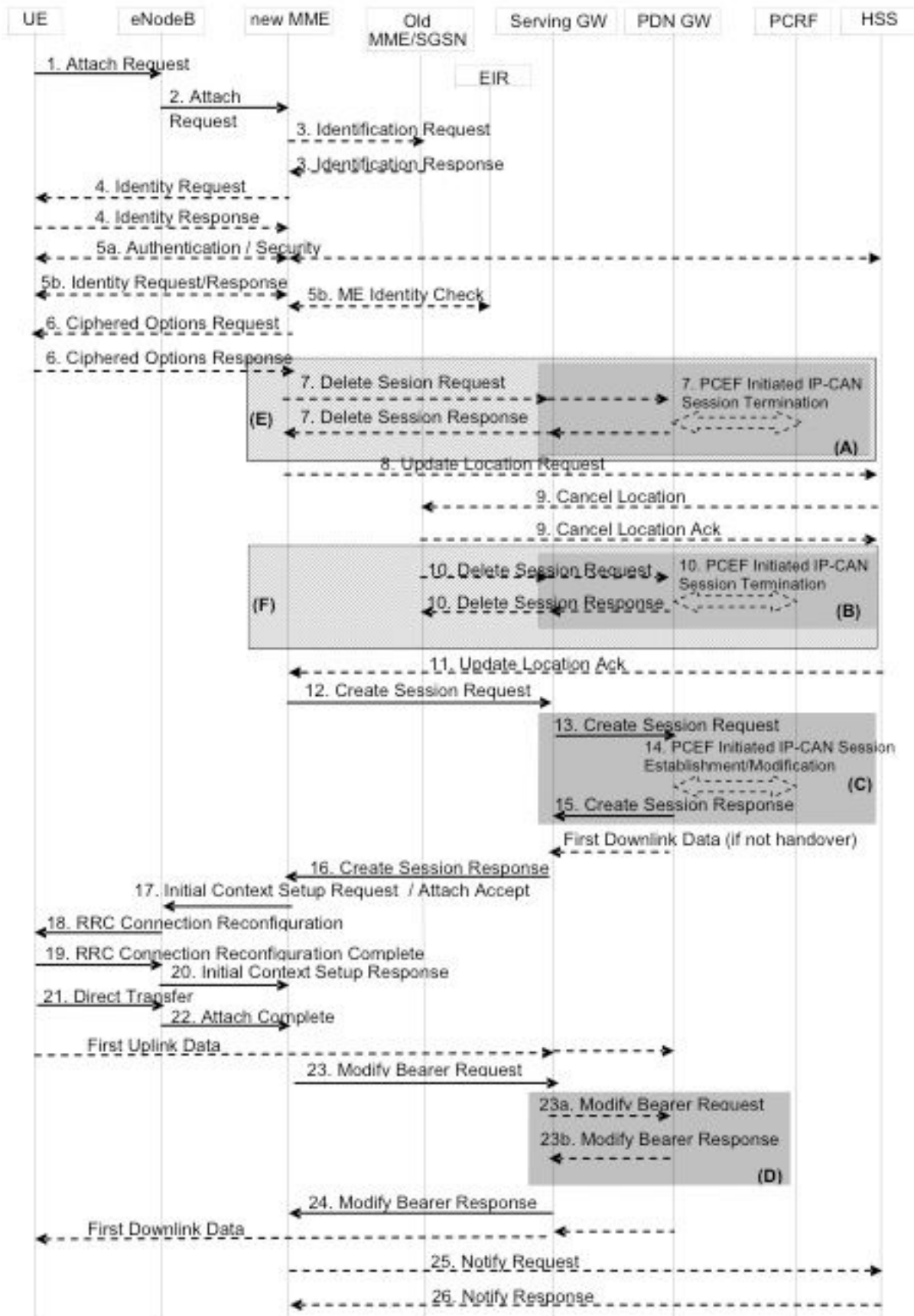
Introduction

This document describes the counters used to check the number of attach failures, which happens due to the silent drops of attach procedures in the Mobility Management Entity (MME).

Problem: MME Attach Failure because of Silent Drops

The basic call flow for the Attach Procedure in Evolved Packet System (EPS).

Main steps during the attach procedure.

1. User Equipment (UE) sends **Attach Request** towards MME. This **Attach Request** also contains **PDN Connectivity Request**.

2. MME perform all Authentication and ciphering related procedure with UE.

3. MME sends the **Create Session Request** to Serving Gateway (SGW) and SGW creates a session with Packet Data Network (PDN) Gateway (PGW) and SGW respond with **Create Session Response** to MME.

4. MME sends **Attach Accept** to UE and **Initial Context Setup Request** to eNodeB.

5. eNodeB performs the E-RAB (Evolved – Radio Access Bearer) setup procedure with UE.

6. eNodeB sends Initial Context Setup Response to MME after E-RAB with UE was set up.

7. UE sends **Attach Complete** to MME and here attach procedure is considered as successful.

8. MME sends **Modify Bearer Request** to SGW to send eNodeB S1-U (S1-User Plane) information to SGW.

Attach procedure gets failed due to various reasons but here are the 2 ways to handle those failures:

1. MME sends an **Attach Reject** message to UE.
2. MME does not send an **Attach Reject** message to UE and silently discard the Attach Procedure.

When MME sends an **Attach Reject** then you either have EPS Mobility Management (EMM) or EPS Session Management (ESM) cause associated with that **Attach Reject** and MME have various counters to track these values.

MME can discard **Attach Procedure** silently without sending any **Attach Reject** to UE. Here are a few possible reasons:

- Authentication Failed: If an **Attach Request** fails because of **Authentication Failure** and no **Attach Reject** is sent or when there is a maximum re-transmissions of **Authentication Requests** or **Security Mode Command** reached then also MME doesn't send **Attach Reject**.

- UE Initiated Detach: When UE sends a **Detach Request** while Attach Procedure is still going on.

- Different **Attach Procedure** Received: More than one **Attach Request** is received and no **Attach Accept** or **Attach Accept** is sent.

- Detach In Progress: When Detach and Attach procedure collision happens.

- Radio Setup Failure: Whenever there is some issue at the radio network. This can happen because of various issues like radio link issue between UE and eNodeB, network issue between MME and eNodeB, etc.

Before software release 17.0, MME does not have statistics to count the silent attach procedure discards.

Solution

From release 17.0 onwards, counters are added which count the silent drops of **Attach Procedure**.

Same can be checked with commands **show mme-service statistics** and **show mme-service statistics verbose**.

```
[local]asr5000# show mme-service statistics
.........

    No Attach Reject/Accept:            0
      Authentication Fail:              0   UE initiated detach:              0
      Detach in progress:               0   Different Attach Recvd:           0

[local]asr5000# show mme-service statistics verbose
.............
Procedure Failure Reasons:
  Attach failure:                       0
    Max retx auth req:                  0   Max retx sec mode cmd:            0
    Max retx attach accept:             0   Setup timeout expiry:             0
    SCTP/S1-failure:                    0   Internal guard timeout:           0
    UE context release:                 0   Max retx ESM info req:            0
    Other reasons:                      0

  Intra MME TAU failure:                0
    Max retx auth req:                  0   Max retx sec mode cmd:            0
    Max retx TAU accept:                0   SCTP/S1-failure:                  0
    Internal guard timeout:             0   UE context release:               0
    Other reasons:                      0

  Inter node TAU failure:               0
    Max retx auth req:                  0   Max retx sec mode cmd:            0
    Max retx TAU accept:                0   Setup timeout expiry:             0
    SCTP/S1-failure:                    0   Internal guard timeout:           0
    UE context release:                 0   Relocation failure:               0
    Other reasons:                      0

  IM exit failure:                      0
    Max retx TAU accept:                0   SCTP/S1-failure:                  0
    Internal guard timeout:             0   UE context release:               0
    Other reasons:                      0
```

These are the description of counters mentioned in **show mme-service statistics verbose**.

- Attach Failure: Total numbers of Attach procedures failed at MME. It also includes attach failures for which attach rejects were sent.

- Max retx auth req: Total numbers of attached triggered authentication procedure failed due to maximum re-transmissions of Authentication requests.

- Max retx sec mode cmd: Total numbers of attached triggered authentication procedure failed due to maximum re-transmissions of Security Mode Commands.

- Max retx attach accept: Total numbers of attach procedures failed due to maximum retransmissions of attach accept.

- Setup timeout expiry: Total numbers of attach procedures failed due to the expiry of setup timeout.

- SCTP/S1-Failure: Total numbers of attach procedures failed due to the Stream Control Transmission Protocol (SCTP) down.

- Internal guard timeout: Total numbers of attach procedures failed due to the expiry of the internal guide timeout. This also includes an internal guard timeout for auth procedures. If auth procedure is called and auth procedure is aborted due to its guard timer then also this timer will be increased.

- UE context release: Total numbers of attach procedures failed due to UE context release from the eNodeB.

- Max retx ESM info req: Total numbers of attach procedures failed due to maximum re-transmissions of ESM info requests.

- Other reasons: Total numbers of attach procedures failed due to unknown reasons.

These are the bulkstats counters corresponding to the above mentioned CLI (command line interface) output:

show mme-service statistics

Bulkstats Counter	CLI Counter
emm-msgtx-attach-no-rej-send-total	No Attach Reject/Accept
emm-msgtx-attach-auth-failed	Authentication Fail
emm-msgtx-attach-ue-initiated-detach	UE initiated detach
emm-msgtx-attach-detach-in-progress	Detach in progress
emm-msgtx-attach-diff-attach-recv	Different Attach Recvd

show mme-service statistics verbose

Bulkstats Counter	CLI Counter
attach-proc-fail-total	Attach failure
attach-proc-fail-max-retx-auth-req	Max retx auth req
attach-proc-fail-max-retx-sec-mode-cmd	Max retx sec mode cmd
attach-proc-fail-max-retx-attach-accept	Max retx attach accept
attach-proc-fail-setup-timeout-exp	Setup timeout expiry
attach-proc-fail-sctp-fail	SCTP/S1-failure
attach-proc-fail-guard-timeout-exp	Internal guard timeout
attach-proc-fail-ue-ctxt-release	UE context release
attach-proc-fail-max-retx-esm-info-req	Max retx ESM info req
attach-proc-fail-other-reason	Other reasons

These counters are taken into account while calculating Key Performance Indicators (KPIs) so that the attach procedure failure due to silent failures are accounted for properly.

Related Information

- **Rel 17.0 Stats-Count-Reference**
- **3GPP Specifications 23.401**
- **3GPP specifications 24.301**

- [Rel 17.0 MME Admin Guide](#)