Troubleshoot Missing EPS-Location-Information AVP under Insert-Subscriber-Data-Answer Message

Contents

Introduction

This document describes how to troubleshoot the missing EPS-Location-Information AVP under Insert-Subscriber-Data-Answer message.

Prerequisites

3GPP Technical Specifications - 29.272

Requirements

Cisco recommends that you have knowledge of the StarOS-Mobility Management Entity (MME) admin guide.

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Overview

Insert-Subscriber-Data Request (ISDR) and Insert-Subscriber-Data Answer (ISDA) are messages defined over the S6a/S6d interface in 3GPP networks. These messages enable the Home Subscriber Server (HSS) to

push updated subscriber data to the MME (S6a) or SGSN (S6d) without requiring a request from the access network.

The Insert-Subscriber-Data procedure is used when the HSS needs to update subscriber information stored in the MME or SGSN (Serving GPRS Support Node). Unlike other Diameter procedures, this one is initiated by the HSS, not the MME/SGSN.

Typical Scenarios for ISDR Usage:

1. Administrative Updates: Triggered by changes in user subscription data stored in HSS (for example, new or modified subscriptions).
2. Operator Determined Barring: Used when barring rules are applied, changed, or removed by the operator.
3. Subscriber Tracing: Enables or updates subscriber tracing in the MME/SGSN.
4. UE Reachability: Informs MME/SGSN that HSS wants to be notified when the UE becomes reachable.
5. T-ADS (Terminating Access Domain Support) Support: Requests data needed for Traffic Steering at Application Layer (T-ADS).
6. Location/State Retrieval: Fetches UE location or state information from MME/SGSN.
7. Local Time Zone Info: Retrieves time zone details of the UE (User Equipment) current location.
8. STN-SR (Session Transfer Number for SRVCC) Update: Updates the SRVCC (Single Radio Voice Call Continuity) routing number due to interactions with SCC-AS (Service Centralization and Continuity Application Server).
9. PDN (Packet Data Network) GW (Gateway) Info (Non-3GPP): Updates MME/SGSN with PDN Gateway identities for non-3GPP access, including emergency services.
10. SMS (Short Message Service) Deregistration: Notifies MME that it has been deregistered for SMS services.
11. P-CSCF (Proxy Call Session Control Function) Restoration: Triggers restoration as per HSS instructions (per 3GPP TS 23.380).
12. Monitoring Event Configuration: Requests configuration/reporting or deletion of monitoring events.
13. Active Time Update: Sends desired PSM (Power Saving Mode) Active Time to MME.

Message Format of ISDR-ISDA

```
< Insert-Subscriber-Data-Request> ::= < Diameter Header: 319, REQ, PXY, 16777251 >
                                      < Session-Id >
                                      [ DRMP ]
                                      [ Vendor-Specific-Application-Id ]
                                      { Auth-Session-State }
                                      { Origin-Host }
                                      { Origin-Realm }
                                      { Destination-Host }
                                      { Destination-Realm }
                                      { User-Name }
                                      *[ Supported-Features]
                                      { Subscription-Data}
                                      [ IDR- Flags ]
                                      *[ Reset-ID ]
                                      *[ AVP ]
                                      *[ Proxy-Info ]
                                      *[ Route-Record ]

< Insert-Subscriber-Data-Answer> ::= < Diameter Header: 319, PXY, 16777251 >
                                      < Session-Id >
                                      [ DRMP ]
```

```
                                    [ Vendor-Specific-Application-Id ]
                                    *[ Supported-Features ]
                                    [ Result-Code ]
                                    [ Experimental-Result ]
                                    { Auth-Session-State }
                                    { Origin-Host }
                                    { Origin-Realm }
                                    [ IMS-Voice-Over-PS-Sessions-Supported ]
                                    ETSI
                                    3GPP TS 29.272 version 15.4.0 Release 15 70 ETSI TS 129 272 V15.4.0
                                    [ Last-UE-Activity-Time ]
                                    [ RAT-Type ]
                                    [ IDA-Flags ]
                                    [ EPS-User-State ]
                                    [ EPS-Location-Information ]
                                    [Local-Time-Zone ]
                                    [ Supported-Services ]
                                    *[ Monitoring-Event-Report ]
                                    *[ Monitoring-Event-Config-Status ]
                                    *[ AVP ]
                                    [ Failed-AVP ]
                                    *[ Proxy-Info ]
                                    *[ Route-Record ]
```

What is the Role of EPS-Location-Information AVP?

The EPS-Location-Information AVP under the Insert Subscriber Data procedure in 3GPP is used to provide information about the user location relevant for Evolved Packet System (EPS) operations. Specifically, it allows the HSS to request the MME for the subscriber current location details. This can include the TAC (Tracking Area Code) and eNB (evolved NodeB) ID of the cell serving the subscriber. The primary purpose of this AVP is for the HSS to retrieve location information about a subscriber.

Call Flow
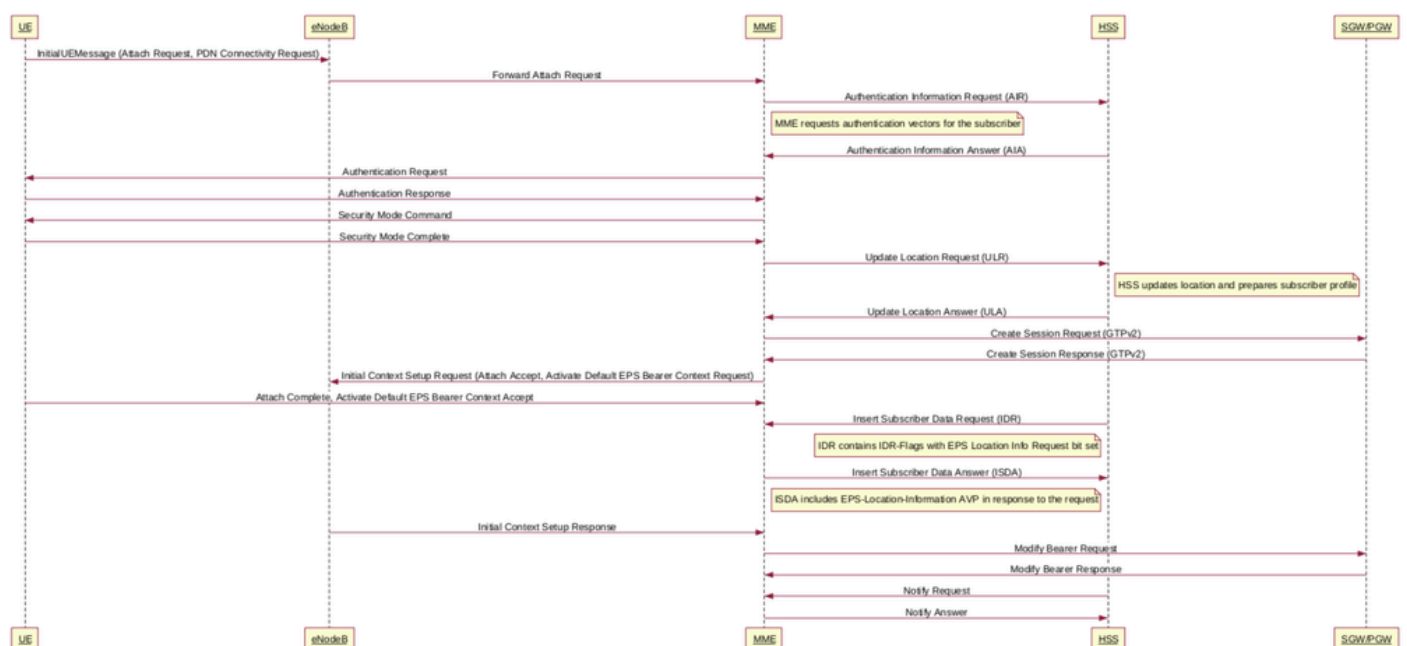
1. HSS initiates ISDR:

The HSS, responsible for storing and managing subscriber data, initiates an ISDR message (with EPS Location Info Request set to 1 under the IDR-Flags AVP) to the MME or SGSN. This is triggered by events like a subscriber subscription profile being modified or a location update.

2. MME/SGSN receives ISDR:

The MME or SGSN receives the ISDR message and extracts the subscriber data.

3. MME/SGSN performs actions:

The MME or SGSN uses the received subscriber location data to update its local database and potentially trigger other procedures, like location updates or service activations.

4. MME/SGSN sends ISDA:

Once the MME or SGSN has processed the ISDR and updated its data, it sends an ISDA message which contains EPS Location Information AVP (under which there are the required 3 AVPs- Cell Id, TAC, Age-of-Location-Info) back to the HSS to acknowledge the completion of the process.

5. HSS receives ISDA:

The HSS receives the ISDA message and verifies that the data was successfully inserted in the MME or SGSN.

Troubleshoot

- The primary aspect is to check if the 'Update-Dictionary-Avps' is present across all the 'HSS services'. In this case it is 'NA'. You can check the same by executing this CLI:

```
******** show hss-peer-service service all *******

Service name                  : hss<>
Notify Request Message        : Enable
Service name                  : hss<>
Notify Request Message        : Enable

Update-Dictionary-Avps        : N/A
```

- Once, this is checked, you can ask for these logs in order to troubleshoot the issue further:

```
1. Request "show config verbose"

2. Monitor Subscriber with all the required options:
      monitor subscriber <imsi>, along with 19,33,34,35,A,S,X,Y,+++

3. Debug logs:

      logging filter active facility diameter level debug
      logging filter active facility sessmgr level debug
      logging filter active facility mme-app level debug
      logging active
```

```
     no logging active // to deactivate


4. Logging monitor:

     configure
      logging monitor msid <imsi>
     exit

5. Request syslogs which captures the issue.
```

Problematic Scenario

In the problematic pcap shown (packet 1), you can see that 'EPS location information AVP' is requested/set to '1' in the Insert-subscriber-Data Request (ISDR) and there is no 'EPS information' present in the Insert-susbcriber-data Answer (ISDA) (Packet 2) though it was requested.

```
No.         | Time                       | Info
         1  2024-11-12 06:20:30.195754  cmd=3GPP-Insert-Subscriber-Data Request(319) flags=RP-- appl=3GPP S6a/S6d(1...
         2  2024-11-12 06:20:30.197956  SACK (Ack=0, Arwnd=262144) cmd=3GPP-Insert-Subscriber-Data Answer(319) flag...
```

```
> Frame 2: 360 bytes on wire (2880 bits), 376 bytes captured (3008 bits)
> Linux cooked capture v1
> Internet Protocol Version 4, Src: j
> Stream Control Transmission Protoco
∨ Diameter Protocol
     Version: 0x01
     Length: 280
   > Flags: 0x40, Proxyable
     Command Code: 3GPP-Insert-Subscriber-Data (319)
     ApplicationId: 3GPP S6a/S6d (16777251)
     Hop-by-Hop Identifier: 0xe6e09fca
     End-to-End Identifier: 0x0062ee81
     [Request In: 1]
     [Response Time: 0.002202000 seconds]
   > AVP: Session-Id(263) l=71
   > AVP: Supported-Features(6
   > AVP: Result-Code(268) l=1
   > AVP: Auth-Session-State(2
   > AVP: Origin-Host(264) l=6
   > AVP: Origin-Realm(296) l=
```

In order to further troubleshoot the issue, you must ensure that you proceed through all the requested logs.

As mentioned earlier, first you must check the **hss-peer-service** configuration of the problematic node.

Reference configuration:

```
hss-peer-service <>
     diameter hss-endpoint <>
     no diameter update-dictionary-avps
     --- more lines ---
   exit
```

In this configuration, you can see there was 'no diameter update-dictionary-avps'.

Hence, it was updated to the latest release as per the StarOS admin guide in order to rectify the issue, which is release 11.

Here is the reference configuration:

<#root>

Mode

```
Exec > Global Configuration > Context Configuration > HSS Peer Service Configuration
```

configure > context

```
context_name
```

> hss-peer-service

```
service_name
```

Entering the above command sequence results in the following prompt:

```
[context_name]host_name(config-hss-peer-service)#
```

Syntax

diameter update-dictionary-avps { 3gpp-r10 | 3gpp-r11 | 3gpp-r9 }

no diameter update-dictionary-avps

no

Sets the command to the default value where Release 8 ('standard') dictionary is used for backward comp

3gpp-r10

Configures the MME /SGSN to signal additional AVPs to HSS in support of Release 10 of 3GPP 29.272.

3gpp-r11

Configures the MME /SGSN to signal additional AVPs to HSS in support of Release 11 of 3GPP 29.272.

Using this keyword is necessary to enable the MME to fully support inclusion of the Additional Mobile S

a-msisdn

 command in the Call-Control Profile configuration mode.

3gpp-r9

Configures the MME/SGSN to signal Release 9 AVPs to HSS.

Usage Guidelines

Use this command to configure the 3GPP release that should be supported for this HSS peer service.

This command is only applicable for the 'standard' diameter dictionary as defined in the

diameter hss-dictionary

command.

Solution

Once the suggested CLI is implemented, here is the successful trace, that is, 'EPS location information' present in the ISDA.