Review SGW Incorrectly Handling MBReq & CBReq Collision

Contents

Introduction

This document describes the collision observed between Modify Bearer Request (MBReq) and Create Bearer Request (CBReq) in the SGW during N26 handover.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- 5G SA
- LTE
- CUPS

Components Used

The information in this document is based on these software and hardware versions:

- Cisco StarOS® 21.28.m5
- Ultra Packet Core CUPS

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.

Problem

During an N26 inter-RAT 5G SA **->** 4G LTE handover for an EPS-Fallback VoLTE voice call, the QCI1 Dedicated Bearer creation and the Access Modify Bearer Request procedures occur independently of each other and can collide. When this collision occurs, the SGW fails to correctly set up the QCI5 ims bearer leading to voice calls and IMS traffic failing on LTE until the UE returns to 5G SA.

Analysis Performed

1. Handover from 5G to 4G completes successfully (TAU Request/Authentication/Encryption/Create Session Requests to move both bearers):

```
Frame 76      S1AP/NAS-EPS                                      InitialUEMessage, Tracking area up
Frame 98      GTPv2            EBI= 5,5  EUTRAN   QCI= 5        Create Session Request
Frame 99      GTPv2            EBI= 6,6  EUTRAN   QCI= 8        Create Session Request
Frame 109     S1AP/NAS-EPS                                      InitialContextSetupRequest, Tracki
```

2. Then, there is the Initial-Context-Setup Response Success and TAU Complete from the eNB with the eNB S1-U IPs. At this point, the MME has not provided these to the SGW and the SGW does not know where to send down-link UP packets:

```
Frame 111     S1AP             InitialContextSetupResponse
Frame 113     S1AP/NAS-EPS     UplinkNASTransport, Tracking area update complete
```

3. MME sends a Modify Bearer Request on all EBIs (5 & 6) to provide the eNB S1-U IP to the SGW (frames 114 and 115). However, at the same time, the SGW gets a Create Bearer Request on EBI= 5 (QCI-5) to create the QCI-1 bearer (frame 117). When this collision happens, the Modify Bearer Request on EBI= 5 does not get processed; therefore, the SGW never learns the eNB S1-U IP on the ims default bearer so down link packets cannot be delivered:

```
Frame 114     GTPv2            EBI= 6        EUTRAN                 Modify Bearer Request
Frame 115     GTPv2            EBI= 5        EUTRAN                 Modify Bearer Request
Frame 116     GTPv2            EBI= 6                               Modify Bearer Response
Frame 117     GTPv2            EBI= 5,0                  QCI= 1     Create Bearer Request
Frame 118     S1AP                                                 UECapabilityInfoIndicati
Frame 121     GTPv2            EBI= 5                               Downlink Data Notificati
Frame 122     GTPv2                                                Downlink Data Notificati
Frame 129     GTPv2            EBI= 5        EUTRAN                 Modify Bearer Request
Frame 130     GTPv2            EBI= 5                               Modify Bearer Response
Frame 131     S1AP/NAS-EPS                                         E-RABSetupRequest, Activa
Frame 132     S1AP                                                 E-RABSetupResponse
```

Based on 3GPP specification 29.274, SGW must be handling Bearer Context mismatch (for example, the collision between CBReq and MBReq):

14.3 Handling of Bearer Context Mismatch
14.3.2 Exceptional scenarios
During a dedicated bearer creation procedure, temporary Bearer Context mismatch may occur at the SGW, (
[...]
The SGW should handle such Bearer Context mismatch in an implementation specific way, but in such a way

Solution

This issue is caused by Cisco bug ID [CSCwf63318](#). To handle this collision at SGW as per standards, the Modify Bearer Request takes a higher precedence over the Create Bearer Request. SGW aborts the Create Bearer Request temporarily, then proceeds with the Modify Bearer Request and forwards it to PGW.