VoLTEでのSRVCCハンドオーバー時のオーディオコール転送問題のトラブルシューティング

内容

[概要](#)
[前提条件](#)
[要件](#)
[使用するコンポーネント](#)
[省略形](#)
[問題](#)
[トラブルシュート](#)
[解決方法](#)

概要

このドキュメントでは、SRVCCハンドオーバー時にVoLTEの音声コールがシームレスに転送されない場合に発生する問題をトラブルシューティングする方法について説明します。

前提条件

要件

次の項目に関する知識があることが推奨されます。

- 5000/5500のハードウェア知識
- StarOS

使用するコンポーネント

このドキュメントの内容は、特定のソフトウェアやハードウェアのバージョンに限定されるものではありません。

このドキュメントの情報は、特定のラボ環境にあるデバイスに基づいて作成されました。このドキュメントで使用するすべてのデバイスは、初期（デフォルト）設定の状態から起動しています。本稼働中のネットワークでは、各コマンドによって起こる可能性がある影響を十分確認してください。

省略形

VoLTE	Voice over Long Term Evolution
SRVCC	単一の無線音声コールの継続性
CCR	与信管理要求
CCA	与信管理解答
AVP	属性値ペア

PCRF	ポリシーおよび課金ルール機能
PCEF	ポリシーおよび課金適用機能
SGW	サービングゲートウェイ
PGW	パケットデータネットワークゲートウェイ
MME	モビリティ管理エンティティ

問題

サービスプロバイダーは、MMEでSRVCCのハンドオーバーが成功しても、VoLTEコールがレガシー2G/3Gネットワークにシームレスに転送されなかったことを報告しました。SRVCCハンドオーバーが完了した後、MMEは**DELETE_BEARER_COMMANDメッセージをSGWに送信**し、音声ベアラフラグがtrueで、PGWでのベアラーリリースが成功しました。
しかし、PGWからPCRFへのさらなる通信では、MME側でSRVCCが成功しても、PGWがPCRFをPS_to_CS_Handoverとして通知しないことが確認されました。

トラブルシュート

このセクションでは、SRVCCハンドオーバーを介してVoLTEからレガシー2G/3Gネットワークに転送される際のオーディオコール処理の問題をトラブルシューティングするための情報を提供します。

SRVCCハンドオーバーで収集された「mon sub」トレース。MME、SGW、PGW、およびPCRF間で交換されるメッセージのシーケンスを次に示します。

DELETE_BEARER_COMMANDメッセージをMMEからSGWにボイスベアラフラグとしてtrueに設定します。

```
INBOUND>>>>>  12:17:24:406 Eventid:141004(3)
[SGW-S11/S4]GTPv2C Rx PDU, from 10.206.33.X:30464 to 10.206.31.Y:2123 (57)
TEID: 0x81E0418E, Message type: EGTP_DELETE_BEARER_COMMAND (0x42)
Sequence Number: 0xD2101D (13766685)
GTP HEADER
       Version number: 2
       TEID flag: Present
       Piggybacking flag: Not present
       Message Priority flag: Not present
       Message Priority: NA
       Message Length: 0x0035 (53)

INFORMATION ELEMENTS
       BEARER CONTEXT:
           Type: 93  Length: 10  Inst: 0
           Value:
               EPS BEARER ID:
                   Type: 73  Length: 1  Inst: 0
                   Value: 7
               BEARER FLAGS:
                   Type: 97  Length: 1  Inst: 0
                   Value:
                        VB : 1                                    >> voice bearer as true
       ULI TIMESTAMP:
           Type: 170  Length: 4  Inst: 0
           Value:
               Seconds: 3766718840
```

```
       USER LOCATION INFO:
           Type: 86  Length: 13  Inst: 0
           Value:
               Location type: TAI
               MCC: XYZ
               MNC: AB
               TAC: 0x7D5
               Location type: ECGI
               MCC: XYZ
               MNC: AB
               ECI: 0xE02F902

       UE TIME ZONE:
           Type: 114  Length: 2  Inst: 0
           Value:
               TZ: +5:30
               DST: +0 hour
```

さらに、SGWはEGTP_**DELETE_BEARER_COMMANDメッセージを**PGWに送信します。

```
INBOUND>>>>>  12:17:24:407 Eventid:141004(3)
[PGW-S5/S2a/S2b]GTPv2C Rx PDU, from 223.224.X.Y:36368 to 223.224.A.B:2123 (57)
TEID: 0x80F0E1DB, Message type: EGTP_DELETE_BEARER_COMMAND (0x42)
Sequence Number: 0xAD818E (11370894)
GTP HEADER
        Version number: 2
        TEID flag: Present
        Piggybacking flag: Not present
        Message Priority flag: Not present
        Message Priority: NA
        Message Length: 0x0035 (53)

INFORMATION ELEMENTS
        BEARER CONTEXT:
            Type: 93  Length: 10  Inst: 0
            Value:
                EPS BEARER ID:
                    Type: 73  Length: 1  Inst: 0
                    Value: 7
                BEARER FLAGS:
                    Type: 97  Length: 1  Inst: 0
                    Value:
                        VB : 1                                  >> voice bearer as true
        ULI TIMESTAMP:
            Type: 170  Length: 4  Inst: 0
            Value:
                Seconds: 3766718840
        USER LOCATION INFO:
            Type: 86  Length: 13  Inst: 0
            Value:
                Location type: TAI
                MCC: XYZ
                MNC: AB
                TAC: 0x7D5
                Location type: ECGI
                MCC: XYZ
                MNC: AB
                ECI: 0xE02F902
        UE TIME ZONE:
            Type: 114  Length: 2  Inst: 0
            Value:
                TZ: +5:30
```

```
                DST: +0 hour
```

さらに、**DELETE_BEARER**がPGWによって受け入れられ、ベアラの削除を開始します。

```
<<<
[PGW-S5/S2a/S2b]GTPv2C Tx PDU, from 223.224.A.B:2123 to 223.224.X.Y:36368 (17)
TEID: 0x80F3C18E, Message type: EGTP_DELETE_BEARER_REQUEST (0x63)
Sequence Number: 0xAD818E (11370894)
GTP HEADER
        Version number: 2
        TEID flag: Present
        Piggybacking flag: Not present
        Message Priority flag: Not present
        Message Priority: NA
        Message Length: 0x000D (13)

INFORMATION ELEMENTS
        EPS BEARER ID:
            Type: 73  Length: 1  Inst: 1
            Value: 7
```

PGWPCRFCCRCharging-Rule-Report AVPPGWCharging-Rule-NamePCC-Rule-Status Rule-Failure-CodePCRFPGWRule-Failure-CodePCRFMMEPGWPS_to_CSPCRFPCRF Resource_Allocation_failurePCRF4GIMSIMSVoLTESRVCC2G/3G

In 3GPP TS 29.212 V13.5.0 (2016-03)
As mentioned in section 3.6, Request of IP-CAN Bearer Termination
If the IP-CAN bearer termination is caused by the PS to CS handover, the PCEF shall report related PCC rules for this IP-CAN bearer by including the Rule-Failure-Code AVP set to the value PS_TO_CS_HANDOVER.

In 3GPP TS 29.212 V14.3.0 (2017-03)
As mentioned in section 4.5.6 Indication of IP-CAN Bearer Termination Implications
When the PCEF detects that a dedicated IP-CAN bearer could not be activated or has been terminated it shall remove the affected PCC rules and send a CCR command to the PCRF with CC-Request-Type AVP set to the value "UPDATE_REQUEST", including the Charging-Rule-Report AVP specifying the affected PCC rules with the PCC-Rule-Status set to inactive and including the Rule-Failure-Code AVP assigned to the value RESOURCE_ALLOCATION_FAILURE.

SRVCC PS-to-CS Handover Indication Support in starOS
This feature helps in notifying the PCRF about the exact reason for PCC rule deactivation on Voice bearer deletion.
This exact cause will help PCRF to then take further action appropriately.
This feature ensures complete compliance for SRVCC, including support for PS-to-CS handover indication when voicebearers are released.
If the IP-CAN bearer termination is caused by the PS to CS handover, the PCEF may report related PCC rules for thisIP-CAN bearer by including the Rule-Failure-Code AVP set to the value PS_TO_CS_HANDOVER.

Charging-Rule-Report AVPPGWPCRFCCR

```
<<<
Diameter message from 10.0.232.X:32933 to 10.5.40.Y:3869
  Base Header Information:
   Version:            0x01        (1)
   Message Length:     0x000260    (608)
   Command Flags:      0xc0        (192) REQ PXY
   Command Code:       0x000110    (272) Credit-Control-Request
   Application ID:     0x01000016  (16777238)   3GPP-Gx
   Hop2Hop-ID:         0xb7cf10ce  (3083800782)
   End2End-ID:         0x3b6b4886  (996886662)
  AVP Information:
     [M]  Session-Id
        Code:      0x00000107 (263) Session-Id
        Flags:     0x40       (64)  [M]
        Length:    0x00004f   (79)
```

```
   Data: 0003-diamproxy.asr55k.gx;1385806608;584234203;5cd9037d-1db02

 [M]  Auth-Application-Id
    Code:      0x00000102 (258) Auth-Application-Id
    Flags:     0x40       (64)  [M]
    Length:    0x00000c   (12)
    Data: 16777238

 [M]  Origin-Host
    Code:      0x00000108 (264) Origin-Host
    Flags:     0x40       (64)  [M]
    Length:    0x00002b   (43)
    Data: 0003-diamproxy.asr55k.gx

 [M]  Origin-Realm
    Code:      0x00000128 (296) Origin-Realm
    Flags:     0x40       (64)  [M]
    Length:    0x00001a   (26)
    Data: cisco.com

[M]  Destination-Realm
    Code:      0x0000011b (283) Destination-Realm
    Flags:     0x40       (64)  [M]
    Length:    0x00002a   (42)
    Data: PCRF.MNC0AB.MCCXYZ.3GPPNETWORK.ORG

 [M]  CC-Request-Type
    Code:      0x000001a0 (416) CC-Request-Type
    Flags:     0x40       (64)  [M]
    Length:    0x00000c   (12)
    Data: UPDATE_REQUEST (2)

 [M]  CC-Request-Number
    Code:      0x0000019f (415) CC-Request-Number
    Flags:     0x40       (64)  [M]
    Length:    0x00000c   (12)
    Data: 2

 [M]  Destination-Host
    Code:      0x00000125 (293) Destination-Host
    Flags:     0x40       (64)  [M]
    Length:    0x000037   (55)
    Data: PCRF01.PCRF.MNC0AB.MCCXYZ.3GPPNETWORK.ORG

 [M]  Origin-State-Id
    Code:      0x00000116 (278) Origin-State-Id
    Flags:     0x40       (64)  [M]
    Length:    0x00000c   (12)
    Data: 1552081338

 [M]  Subscription-Id
    Code:      0x000001bb (443) Subscription-Id
    Flags:     0x40       (64)  [M]
    Length:    0x000028   (40)
     [M]  Subscription-Id-Type
        Code:      0x000001c2 (450) Subscription-Id-Type
        Flags:     0x40       (64)  [M]
        Length:    0x00000c   (12)
        Data: END_USER_E164 (0)

     [M]  Subscription-Id-Data
        Code:      0x000001bc (444) Subscription-Id-Data
        Flags:     0x40       (64)  [M]
        Length:    0x000014   (20)
```

```
       Data: 121234567891

[M]  Subscription-Id
   Code:      0x000001bb (443) Subscription-Id
   Flags:     0x40       (64)  [M]
   Length:    0x00002c   (44)
    [M]  Subscription-Id-Type
       Code:      0x000001c2 (450) Subscription-Id-Type
       Flags:     0x40       (64)  [M]
       Length:    0x00000c   (12)
       Data: END_USER_IMSI (1)

    [M]  Subscription-Id-Data
       Code:      0x000001bc (444) Subscription-Id-Data
       Flags:     0x40       (64)  [M]
       Length:    0x000017   (23)
       Data: XYZAB1234567891

[M]  Framed-IPv6-Prefix
   Code:      0x00000061 (97) Framed-IPv6-Prefix
   Flags:     0x40       (64)  [M]
   Length:    0x000012   (18)
   Data: Reserved: 00 Prefixlen: 64 IPv6 prefix: 2401:4900:4097:f050::

[M]  User-Equipment-Info
   Code:      0x000001ca (458) User-Equipment-Info
   Flags:     0x40       (64)  [M]
   Length:    0x00002c   (44)
    [M]  User-Equipment-Info-Type
       Code:      0x000001cb (459) User-Equipment-Info-Type
       Flags:     0x40       (64)  [M]
       Length:    0x00000c   (12)
       Data: IMEISV (0)

    [M]  User-Equipment-Info-Value
       Code:      0x000001cc (460) User-Equipment-Info-Value
       Flags:     0x40       (64)  [M]
       Length:    0x000018   (24)
       Data: 9876543211234

[M]  Called-Station-Id
   Code:      0x0000001e (30) Called-Station-Id
   Flags:     0x40       (64)  [M]
   Length:    0x00000b   (11)
   Data: ims

[V] [M]  Charging-Rule-Report
   Code:      0x000003fa (1018) Charging-Rule-Report
   Flags:     0xc0       (192) [V]  [M]
   Length:    0x00006c   (108)
   Vendor-Id: 0x000028af (10415) 3GPP
    [V] [M]  Charging-Rule-Name
       Code:      0x000003ed (1005) Charging-Rule-Name
       Flags:     0xc0       (192) [V]  [M]
       Length:    0x00001e   (30)
       Vendor-Id: 0x000028af (10415) 3GPP
       Data: I_AD_VOLTE00F72513

    [V] [M]  Charging-Rule-Name
       Code:      0x000003ed (1005) Charging-Rule-Name
       Flags:     0xc0       (192) [V]  [M]
       Length:    0x00001e   (30)
       Vendor-Id: 0x000028af (10415) 3GPP
       Data: I_AD_VOLTE00F72512
```

```
         [V] [M]  PCC-Rule-Status
            Code:      0x000003fb (1019) PCC-Rule-Status
            Flags:     0xc0       (192) [V]  [M]
            Length:    0x000010   (16)
            Vendor-Id: 0x000028af (10415) 3GPP
            Data: INACTIVE (1)

         [V] [M]  Rule-Failure-Code
            Code:      0x00000407 (1031) Rule-Failure-Code
            Flags:     0xc0       (192) [V]  [M]
            Length:    0x000010   (16)
            Vendor-Id: 0x000028af (10415) 3GPP
            Data: RESOURCE_ALLOCATION_FAILURE (10)                          >> failure code is
incorrect. It should be PS_CS_Handover

     [V] [M]  Access-Network-Charging-Address
        Code:      0x000001f5 (501) Access-Network-Charging-Address
        Flags:     0xc0       (192) [V]  [M]
        Length:    0x000012   (18)
        Vendor-Id: 0x000028af (10415) 3GPP
        Data: IPv4 223.224.X.Y
```

rel-8PS_CS_Handoverrel-8
3gpp-r103gpp-r10PS_CS_Handover
VoLTE2G/3G

```
ims-auth-service DRA_Gx_SPG
   policy-control
     diameter dictionary r8-gx-standard
     diameter update-dictionary-avps 3gpp-r10    << diameter dictionary updated to 3gpp-r10
```

SGWPGWDELETE_BEARER_COMMANDtrue:

```
INBOUND>>>>>  From sessmgr:205 tpc_interface.c:1338 (Callid 3cda3ef4) 13:28:21:659
Eventid:141004(3)
[PGW-S5/S2a/S2b]GTPv2C Rx PDU, from 223.224.M.N:39632 to 223.224.P.Q:2123 (57)
TEID: 0x845800CD, Message type: EGTP_DELETE_BEARER_COMMAND (0x42)
Sequence Number: 0xE9625A (15295066)
GTP HEADER
        Version number: 2
        TEID flag: Present
        Piggybacking flag: Not present
        Message Priority flag: Not present
        Message Priority: NA
        Message Length: 0x0035 (53)

INFORMATION ELEMENTS
        BEARER CONTEXT:
            Type: 93  Length: 10  Inst: 0
            Value:
                EPS BEARER ID:
                    Type: 73  Length: 1  Inst: 0
                    Value: 7

                BEARER FLAGS:
                    Type: 97  Length: 1  Inst: 0
                    Value:
                        VB : 1                                  >> voice bearer as true

        ULI TIMESTAMP:
            Type: 170  Length: 4  Inst: 0
            Value:
                Seconds: 3769747091
        USER LOCATION INFO:
            Type: 86  Length: 13  Inst: 0
```

```
            Value:
                Location type: TAI
                MCC: XYZ
                MNC: AB
                TAC: 0x844
                Location type: ECGI
                MCC: XYZ
                MNC: AB
                ECI: 0xDCF8C02

        UE TIME ZONE:
            Type: 114  Length: 2  Inst: 0
            Value:
                TZ: +5:30
                DST: +0 hour
```

PGW

```
<<<
[PGW-S5/S2a/S2b]GTPv2C Tx PDU, from 223.224.M.N:2123 to 223.224.P.Q:39632 (17)
TEID: 0x8064A25A, Message type: EGTP_DELETE_BEARER_REQUEST (0x63)
Sequence Number: 0xE9625A (15295066)
GTP HEADER
        Version number: 2
        TEID flag: Present
        Piggybacking flag: Not present
        Message Priority flag: Not present
        Message Priority: NA
        Message Length: 0x000D (13)

INFORMATION ELEMENTS
        EPS BEARER ID:
            Type: 73  Length: 1  Inst: 1
            Value: 7
```

PS_CS_HandoverCharging-Rule-Report AVPPGWPCRFCCR

```
<<<
Diameter message from 10.206.17.X:51119 to 10.5.40.Y:3007
  Base Header Information:
   Version:            0x01        (1)
   Message Length:     0x000260    (608)
   Command Flags:      0xc0        (192) REQ PXY
   Command Code:       0x000110    (272) Credit-Control-Request
   Application ID:     0x01000016  (16777238)   3GPP-Gx
   Hop2Hop-ID:         0xaebac4d3  (2931475667)
   End2End-ID:         0x19b8ec95  (431549589)
  AVP Information:
     [M]  Session-Id
        Code:      0x00000107 (263) Session-Id
        Flags:     0x40       (64)  [M]
        Length:    0x00004e   (78)
        Data: 0007-diamproxy.asr55k.dra.gx;1020935924;202167245;5d0747d1-cd02

     [M]  Auth-Application-Id
        Code:      0x00000102 (258) Auth-Application-Id
        Flags:     0x40       (64)  [M]
        Length:    0x00000c   (12)
        Data: 16777238

     [M]  Origin-Host
        Code:      0x00000108 (264) Origin-Host
        Flags:     0x40       (64)  [M]
        Length:    0x00002b   (43)
        Data: 0007-diamproxy.asr55k.dra.gx

     [M]  Origin-Realm
```

```
   Code:      0x00000128 (296) Origin-Realm
   Flags:     0x40       (64)  [M]
   Length:    0x00001a   (26)
   Data: cisco.com

[M]  Destination-Realm
   Code:      0x0000011b (283) Destination-Realm
   Flags:     0x40       (64)  [M]
   Length:    0x00002a   (42)
   Data: PCRF.MNC0AB.MCCXYZ.3GPPNETWORK.ORG

[M]  CC-Request-Type
   Code:      0x000001a0 (416) CC-Request-Type
   Flags:     0x40       (64)  [M]
   Length:    0x00000c   (12)
   Data: UPDATE_REQUEST (2)

[M]  CC-Request-Number
   Code:      0x0000019f (415) CC-Request-Number
   Flags:     0x40       (64)  [M]
   Length:    0x00000c   (12)
   Data: 2

[M]  Destination-Host
   Code:      0x00000125 (293) Destination-Host
   Flags:     0x40       (64)  [M]
   Length:    0x000037   (55)
   Data: PCRF01.NO.DC.PCRF.MNC0AB.MCCXYZ.3GPPNETWORK.ORG

[M]  Origin-State-Id
   Code:      0x00000116 (278) Origin-State-Id
   Flags:     0x40       (64)  [M]
   Length:    0x00000c   (12)
   Data: 1559087623

[M]  Subscription-Id
   Code:      0x000001bb (443) Subscription-Id
   Flags:     0x40       (64)  [M]
   Length:    0x000028   (40)
    [M]  Subscription-Id-Type
       Code:      0x000001c2 (450) Subscription-Id-Type
       Flags:     0x40       (64)  [M]
       Length:    0x00000c   (12)
       Data: END_USER_E164 (0)

   [M]  Subscription-Id-Data
       Code:      0x000001bc (444) Subscription-Id-Data
       Flags:     0x40       (64)  [M]
       Length:    0x000014   (20)
       Data: 121234567891

[M]  Subscription-Id
   Code:      0x000001bb (443) Subscription-Id
   Flags:     0x40       (64)  [M]
   Length:    0x00002c   (44)
    [M]  Subscription-Id-Type
       Code:      0x000001c2 (450) Subscription-Id-Type
       Flags:     0x40       (64)  [M]
       Length:    0x00000c   (12)
       Data: END_USER_IMSI (1)

    [M]  Subscription-Id-Data
       Code:      0x000001bc (444) Subscription-Id-Data
       Flags:     0x40       (64)  [M]
```

```
          Length:    0x000017   (23)
          Data: XYZAB1234567891

     [M]  Framed-IPv6-Prefix
        Code:      0x00000061 (97) Framed-IPv6-Prefix
        Flags:     0x40       (64)  [M]
        Length:    0x000012   (18)
        Data: Reserved: 00 Prefixlen: 64 IPv6 prefix: 2401:4900:4071:32ec::

     [M]  User-Equipment-Info
        Code:      0x000001ca (458) User-Equipment-Info
        Flags:     0x40       (64)  [M]
        Length:    0x00002c   (44)
         [M]  User-Equipment-Info-Type
          Code:      0x000001cb (459) User-Equipment-Info-Type
          Flags:     0x40       (64)  [M]
          Length:    0x00000c   (12)
          Data: IMEISV (0)

         [M]  User-Equipment-Info-Value
          Code:      0x000001cc (460) User-Equipment-Info-Value
          Flags:     0x40       (64)  [M]
          Length:    0x000018   (24)
          Data: 9876543211234

     [M]  Called-Station-Id
        Code:      0x0000001e (30) Called-Station-Id
        Flags:     0x40       (64)  [M]
        Length:    0x00000b   (11)
        Data: ims

     [V] [M]  Charging-Rule-Report
        Code:      0x000003fa (1018) Charging-Rule-Report
        Flags:     0xc0       (192) [V]  [M]
        Length:    0x00006c   (108)
        Vendor-Id: 0x000028af (10415) 3GPP
         [V] [M]  Charging-Rule-Name
          Code:      0x000003ed (1005) Charging-Rule-Name
          Flags:     0xc0       (192) [V]  [M]
          Length:    0x00001e   (30)
          Vendor-Id: 0x000028af (10415) 3GPP
          Data: I_AD_VOLTE03D4E98A

         [V] [M]  Charging-Rule-Name
          Code:      0x000003ed (1005) Charging-Rule-Name
          Flags:     0xc0       (192) [V]  [M]
          Length:    0x00001e   (30)
          Vendor-Id: 0x000028af (10415) 3GPP
          Data: I_AD_VOLTE03D4E989

         [V] [M]  PCC-Rule-Status
          Code:      0x000003fb (1019) PCC-Rule-Status
          Flags:     0xc0       (192) [V]  [M]
          Length:    0x000010   (16)
          Vendor-Id: 0x000028af (10415) 3GPP
          Data: INACTIVE (1)

         [V] [M]  Rule-Failure-Code
          Code:      0x00000407 (1031) Rule-Failure-Code
          Flags:     0xc0       (192) [V]  [M]
          Length:    0x000010   (16)
          Vendor-Id: 0x000028af (10415) 3GPP
          Data: PS_TO_CS_HANDOVER (13)                          >> failure code seen as
PS_to_CS_Handover
```

```
     [V] [M]  Access-Network-Charging-Address
        Code:      0x000001f5 (501) Access-Network-Charging-Address
        Flags:     0xc0       (192) [V]  [M]
        Length:    0x000012   (18)
        Vendor-Id: 0x000028af (10415) 3GPP
        Data: IPv4 223.224.X.Y
```

diameter4GVoLTESRVCC2G/3Gdiameterims-auth-service3gpp-rel10