

排除VoLTE中SRVCC切换时的音频呼叫转移问题

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简介

本文档介绍如何排除在SRVCC切换时VoLTE中的音频呼叫无法无缝传输时发生的问题。

先决条件

要求

Cisco 建议您了解以下主题：

- 5000/5500的硬件知识
- StarOS

使用的组件

本文档不限于特定的软件和硬件版本。

本文档中的信息都是基于特定实验室环境中的设备编写的。

本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

缩写

VoLTE
SRVCC
CCR
CCA
AVP
PCRF
PCEF
SGW
PGW
MME

长期发展之声
单射频语音呼叫连续性
信用控制请求
信用控制答案
属性值对
策略和计费规则功能
策略和计费实施功能
服务网关
数据包数据网络网关
移动管理实体

问题

服务提供商报告称，即使SRVCC在MME中成功切换，VoLTE呼叫也未无缝转接到传统2G/3G网络。SRVCC切换完成后，MME向SGW发送DELETE_BEARER_COMMAND消息，语音承载标志为true，并且PGW上的承载释放成功。

但是，在从PGW到PCRF的进一步通信中，观察到PGW不将PCRF作为PS_to_CS_Havson通知，即使SRVCC在MME端成功。

故障排除

本部分提供信息，以排除音频呼叫处理问题，当音频呼叫通过SRVCC切换从VoLTE传输到传统2G/3G网络时。

收集的“监控子”跟踪与SRVCC切换。以下是MME、SGW、PGW和PCRF之间交换的消息序列。

DELETE_BEARER_COMMAND消息从MME到SGW作为语音承载标志true:

```
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
```

此外，SGW将EGTP_DELETE_BEARER_COMMAND消息发送到PGW:

```
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
```

此外，PGW接受DELETE_BEARER并启动对承载的删除：

```
<<<
[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

PGWPCRFCCRAVPPGWPCRFPCCPGWPCRFRule-Failure-CodeMMEPGWPCRFPSP_to_CSPCRF
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 this IP-CAN bearer by including the Rule-Failure-Code AVP set to the value PS_TO_CS_HANDOVER.

PGWPCRFAVPCCR

<<<

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)
incorrect. It should be PS_CS_Handover

>> failure code is

[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-8 diameter8PS_CS_Havsing
3gpp-r103gpp-r10PS_CS_Havson
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

PGWPCRFCCRAVPPS_CS_Havson

<<<

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

SRVCC4GVoLTE2G/3Gims-auth-service3gpp-rel10