

Solución de problemas de transferencia de llamada de audio en el momento de la transferencia de SRVCC en VoLTE

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Introducción

Este documento describe cómo resolver el problema que ocurre cuando una llamada de audio en VoLTE no se transfiere sin problemas en el momento de la entrega de SRVCC.

Prerequisites

Requirements

Cisco recomienda que tenga conocimiento sobre estos temas:

- Conocimiento de hardware de 5000/5500
- StarOS

Componentes Utilizados

Este documento no tiene restricciones específicas en cuanto a versiones de software y de hardware.

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. Si tiene una red en vivo, asegúrese de entender el posible impacto de cualquier comando.

Abreviaturas

VoLTE
SRVCC
CCR
CCA

Evolución de voz sobre largo plazo
Continuidad de llamadas de voz de radio única
Solicitud de control de crédito
Respuesta de control de crédito

| | |
|------|--|
| AVP | Par de valores de atributo |
| PCRF | Función de regla de cobro y política |
| PCEF | Función de aplicación de cobro y políticas |
| SGW | Gateway de servicio |
| PGW | Gateway de red de datos de paquetes |
| MME | Entidad de gestión de movilidad |

Problema

El proveedor de servicios informó de que, aunque la entrega SRVCC se realizó correctamente en MME, la llamada VoLTE no se transfirió sin problemas a la red 2G/3G heredada. Después de completar la entrega SRVCC, MME envió el mensaje **DELETE_BEARER_COMMAND** a SGW con el indicador del portador de voz como true y el lanzamiento del portador en PGW fue exitoso. Sin embargo, en una comunicación posterior de PGW a PCRF, se observó que PGW no notifica a PCRF como PS_to_CS_Handover a pesar de que SRVCC tuvo éxito al final de MME.

Troubleshoot

Esta sección proporciona información para resolver el problema de la gestión de llamadas de audio cuando se transfiere de VoLTE a una red 2G/3G heredada a través de la transferencia SRVCC.

Los seguimientos "mon sub" recopilados con la entrega SRVCC. Esta es la secuencia de mensajes intercambiados entre MME, SGW, PGW y PCRF.

DELETE_BEARER_COMMAND mensaje de MME a SGW como indicador del portador de voz 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

Además, SGW envía el mensaje **EGTP_DELETE_BEARER_COMMAND** a 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

Además, **DELETE_BEARER** es aceptado por PGW e inicia la eliminación del portador:

<<<

[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

Además, PGW inicia el mensaje de actualización de CCR hacia PCRF. Aquí, en el AVP de informe de reglas de carga, PGW informa al PCRF sobre el nombre de regla de carga, el estado de regla PCC y el código de error de regla. Aquí se encuentra que PGW envía el Rule-Failure-Code incorrecto a PCRF. Como MME indicó la liberación del portador de voz (ya que la bandera era cierta), PGW debe informar a PCRF como entrega PS_to_CS. En lugar de esto, hay un error Resource_Allocation_ que se informa a PCRF. Como resultado, PCRF estaba considerando un fallo en la red 4G e informando lo mismo al IMS. Por lo tanto, el IMS estaba iniciando la terminación de llamadas VoLTE. Por lo tanto, aunque SRVCC tuvo éxito, la llamada no se transfirió sin problemas a la red 2G/3G heredada.

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_HANOVER.

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_HANOVER.

Mensaje de actualización de CCR de PGW a PCRF con respecto a AVP de informe de regla de carga:

<<<

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
```

Solución En la red del cliente se utilizó el diccionario de diámetro del rel-8. Se encuentra que PS_CS_Handover no fue soportado en el rel-8. Por lo tanto, necesita actualizar el diccionario a 3gpp-r10. Después de actualizar el diccionario a 3gpp-r10, la causa se envía correctamente como PS_CS_Handover.

Después de esto, es posible que las llamadas de audio de los usuarios finales puedan pasar sin problemas a la red 2G/3G antigua desde VoLTE.

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

DELETE_BEARER_COMMAND mensaje de SGW a PGW como indicador de voz verdadero:

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

Además, es aceptado por PGW e inicia la liberación del portador.

<<<

[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

CCR de PGW a PCRF con respecto al AVP de informe de regla de carga con código de falla visto como PS_CS_Handover.

<<<

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

Se debe utilizar un diccionario de diámetro adecuado para la transferencia sin problemas de una llamada de audio de VoLTE en 4G a una red 2G/3G heredada a través de la transferencia SRVCC. Esto fue soportado después de que el diccionario de diámetro fue actualizado a 3gpp-rel10 bajo ims-auth-service.