

Risoluzione dei problemi relativi al trasferimento di chiamate audio al momento del passaggio di consegne SRVCC in VoLTE

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Introduzione

In questo documento viene descritto come risolvere il problema che si verifica quando una chiamata audio in VoLTE non viene trasferita senza problemi al momento del passaggio a SRVCC.

Prerequisiti

Requisiti

Cisco raccomanda la conoscenza dei seguenti argomenti:

- Conoscenze hardware di 5000/5500
- StarOS

Componenti usati

Il documento può essere consultato per tutte le versioni software o hardware.

Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione.

Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

Abbreviazioni

VoLTE
SRVCC

Evoluzione Voice over Long Term
Continuità singola chiamata vocale radio

CCR	Richiesta di controllo del credito
CCA	Risposta di controllo del credito
AVP	Coppia valori attributo
PCRF	Funzione criterio e regola di addebito
PCEF	Funzione di applicazione delle policy e dei costi
SGW	Serving Gateway
PGW	Packet Data Network Gateway
MME	Entità Mobility Management

Problema

Il provider di servizi ha riferito che, anche se il passaggio di risorse a SRVCC è riuscito in MME, la chiamata VoLTE non è stata trasferita in modo trasparente alla rete 2G/3G legacy. Una volta completato il trasferimento SRVCC, MME ha inviato il messaggio **DELETE_BEARER_COMMAND** a SGW con il flag di connessione vocale true e la versione di connessione a PGW riuscita. Tuttavia, in occasione di ulteriori comunicazioni da PGW a PCRF, è stato osservato che PGW non notifica PCRF come PS_to_CS_Handover anche se SRVCC ha avuto successo al termine della procedura MME.

Risoluzione dei problemi

In questa sezione vengono fornite informazioni per risolvere il problema della gestione delle chiamate audio quando viene trasferita da VoLTE alla rete 2G/3G legacy tramite il passaggio di consegne SRVCC.

Tracce "mon sub" raccolte con il passaggio di consegne SRVCC. Di seguito è riportata la sequenza dei messaggi scambiati tra MME, SGW, PGW e PCRF.

DELETE_BEARER_COMMAND messaggio da MME a SGW come flag di portatore voce 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

Inoltre, SGW invia il messaggio **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

Inoltre, **DELETE_BEARER** viene accettato da PGW e avvia l'eliminazione del supporto:

<<<

[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

Inoltre, PGW avvia un messaggio di aggiornamento CCR verso PCRF. In questo caso, in Charging-Rule-Report AVP, PGW informa PCRF in merito a Charging-Rule-Name, PCC-Rule-Status e Rule-Failure-Code. In questo caso PGW invia il codice di errore della regola errato a PCRF. Come MME ha indicato la release di Voice bearer (come il flag era true), PGW deve informare a PCRF come PS_to_CS handover. Al contrario, è presente un errore Resource_Allocation_failure segnalato a PCRF. Di conseguenza, PCRF stava prendendo in considerazione un guasto nella rete 4G e informando allo stesso modo IMS. Per questo motivo, IMS ha avviato la terminazione delle chiamate VoLTE. Quindi, anche se SRVCC ha avuto successo, la chiamata non è stata trasferita alla rete 2G/3G legacy.

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.

Messaggio di aggiornamento CCR da PGW a PCRF per quanto riguarda la regola di carica e il rapporto AVP:

<<<

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

Soluzione Nella rete del cliente è stato utilizzato il dizionario rel-8 diametro. PS_CS_Handover non è supportato in rel-8.

È quindi necessario aggiornare il dizionario a 3gpp-r10. Dopo aver aggiornato il dizionario a 3gpp-r10, la causa viene correttamente inviata come PS_CS_Handover.

Dopo questo, le chiamate audio degli utenti finali potrebbero essere in grado di passare senza problemi alla rete 2G/3G legacy da 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 messaggio da SGW a PGW come flag di portatore voce true:

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

Inoltre, è accettato da PGW e avvia la liberazione del portatore.

<<<

[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 da PGW a PCRF per quanto riguarda l'AVP Charging-Rule-Report con codice di errore visualizzato come 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

È necessario utilizzare un apposito dizionario di diametro per trasferire senza problemi una chiamata audio da VoLTE in 4G alla rete 2G/3G legacy attraverso il passaggio di consegne SRVCC. Questo è stato supportato dopo che il dizionario dei diametri è stato aggiornato a 3gpp-rel10 sotto ims-auth-service.