

# Debug Shell中的Linux TCP轉儲用於解決Diameter連線問題

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## 簡介

本文檔介紹如何使用StarOS調試shell中的TCP轉儲來解決Diameter連線問題。通常會出現請求協助排除Diameter連線未啟動或已關閉的案例，即使假設未發生配置或網路更改。直徑連線無法在初始TCP/IP協商級別或功能交換請求(CER)/功能交換應答(CEA)級別建立。

## 背景資訊

雖然不存在典型的「直徑對等」問題，但它們確實可以歸為幾類：

- 特定端點和/或通訊協定的所有對等點都已關閉。 <==== 下範例
- 特定連線埠編號的對等體已關閉。
- 連線到特定PSC、DPC或SF卡的對等裝置已關閉。

通常，TCP埠3868（預設值）用於Diameter伺服器端，不過也可以指定其他埠，如果對等配置線路的埠號線上路末尾指定，則該埠確認不同於配置中的3868。

## 對等問題

在此示例中，端點3gpp-aaa-s6b的對等體通過**show diameter peer full all**報告，在對等體行中未指定埠#，因此預設情況下使用埠3868，而用於Gy的對等體則對不同的對等體使用3868、3869和3870的組合。

**show diameter peers all**報告所有diameter端點的所有已配置對等體。此處我們看到為3gpp-aaa-s6b（已中斷）和Gy（正在工作）配置了6個對等體以及關聯的配置行，並注意到Gy具有一些自定義埠#s:

```
diameter endpoint 3gpp-aaa-s6b
```

```
origin realm epc.mnc260.mcc310.3gppnetwork.org
```

```
use-proxy
```

```
origin host s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org address 10.168.86.144
```

```
max-outstanding 64
```

```
route-failure threshold 100
```

```
route-failure deadtime 600
```

```
route-failure recovery-threshold percent 50
```

```
dscp af31
peer mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org realm epc.mnc260.mcc310.3gppnetwork.org
address 10.160.113.136
peer mp2.elgdra01.dra.epc.mnc260.mcc310.3gppnetwork.org realm epc.mnc260.mcc310.3gppnetwork.org
address 10.160.114.136
peer mp2.nvldra01.dra.epc.mnc260.mcc310.3gppnetwork.org realm epc.mnc260.mcc310.3gppnetwork.org
address 10.160.115.136
peer tsa06.draaro01.dra.epc.mnc260.mcc310.3gppnetwork.org realm
epc.mnc260.mcc310.3gppnetwork.org address 10.162.6.73
peer tsa06.drasyo01.dra.epc.mnc260.mcc310.3gppnetwork.org realm
epc.mnc260.mcc310.3gppnetwork.org address 10.164.57.41
peer tsa06.drawsc01.dra.epc.mnc260.mcc310.3gppnetwork.org realm
epc.mnc260.mcc310.3gppnetwork.org address 10.177.70.201
route-entry peer mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org
route-entry peer mp2.elgdra01.dra.epc.mnc260.mcc310.3gppnetwork.org
route-entry peer mp2.nvldra01.dra.epc.mnc260.mcc310.3gppnetwork.org
route-entry peer tsa06.draaro01.dra.epc.mnc260.mcc310.3gppnetwork.org
route-entry peer tsa06.drasyo01.dra.epc.mnc260.mcc310.3gppnetwork.org
route-entry peer tsa06.drawsc01.dra.epc.mnc260.mcc310.3gppnetwork.org

#exit
```

```
[local]IEPCF201# show diameter peers all
```

```
Friday December 11 20:27:43 UTC 2020
```

```
Diameter Peer details
```

```
=====
```

```
-----
Context: billing                Endpoint: 3gpp-aaa-s6b
-----
```

```
Peer: mp2.daladra01.dra.epc.mnc260.mc Addr:Port 10.160.113.136:3868
```

```
Peer: mp2.elgdra01.dra.epc.mnc260.mc Addr:Port 10.160.114.136:3868
```

```
Peer: mp2.nvldra01.dra.epc.mnc260.mc Addr:Port 10.160.115.136:3868
```

```
Peer: tsa06.draaro01.dra.epc.mnc260. Addr:Port 10.162.6.73:3868
```

```
Peer: tsa06.drasyo01.dra.epc.mnc260. Addr:Port 10.164.57.41:3868
```

```
Peer: tsa06.drawsc01.dra.epc.mnc260. Addr:Port 10.177.70.201:3868
-----
```

```
diameter endpoint credit-control
```

```
origin realm starent.gy.com
```

```
use-proxy
```

```
origin host iepcf201.gy address 10.168.86.151
```

```
destination-host-avp always
```

```

route-failure threshold 100
route-failure deadtime 600
route-failure recovery-threshold percent 50
peer ln24.daladra01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.160.113.136
port 3869
peer ln24.drawsc01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.177.70.201
port 3870
peer tsa05.drachr01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.164.144.88
peer tsa05.draphx01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.198.93.88
peer tsa05.drapol01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.182.16.88
peer tsa06.drachr01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.164.144.89
peer tsa06.draphx01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.198.93.89
peer tsa06.drapol01.dra.epc3.mnc260.mcc310.3gppnetwork.org realm nsn-gy address 10.182.16.89
route-entry peer ln24.drawsc01.dra.epc3.mnc260.mcc310.3gppnetwork.org weight 20
route-entry peer ln24.daladra01.dra.epc3.mnc260.mcc310.3gppnetwork.org
route-entry peer tsa05.drapol01.dra.epc3.mnc260.mcc310.3gppnetwork.org
route-entry peer tsa06.drapol01.dra.epc3.mnc260.mcc310.3gppnetwork.org
route-entry peer tsa05.drachr01.dra.epc3.mnc260.mcc310.3gppnetwork.org weight 5
route-entry peer tsa05.draphx01.dra.epc3.mnc260.mcc310.3gppnetwork.org weight 5
route-entry peer tsa06.drachr01.dra.epc3.mnc260.mcc310.3gppnetwork.org weight 5
route-entry peer tsa06.draphx01.dra.epc3.mnc260.mcc310.3gppnetwork.org weight 5

#exit

```

另外值得注意的是，對於大多數設定，使用Proxy可配置被指定為ASR端設定對等，以使用所有活動卡上運行的Diamproxy進程，例如，這是一個vPC-DI，其中這些卡稱為服務功能卡。

```

[local]IEPCF201# show task resources facility diamproxy all
Friday December 11 20:34:37 UTC 2020

```

cpu facility	inst	task cputime		memory		files		sessions			S status
		used	allc	used	alloc	used	allc	used	allc		
3/0 diamproxy	5	0.12%	90%	41.62M	250.0M	38	2500	--	--	-	good
5/0 diamproxy	2	0.11%	90%	41.63M	250.0M	51	2500	--	--	-	good
6/0 diamproxy	6	0.13%	90%	41.62M	250.0M	35	2500	--	--	-	good
7/0 diamproxy	3	0.12%	90%	41.64M	250.0M	34	2500	--	--	-	good
8/0 diamproxy	4	0.13%	90%	41.65M	250.0M	34	2500	--	--	-	good
10/0 diamproxy	1	0.10%	90%	41.64M	250.0M	49	2500	--	--	-	good
Total	6	0.71%		249.8M		241				0	

```
[local]IEPCF201#
```

此處show diameter peers full all is taken from show support details捕獲了3gpp-aaa-s6b終結點的Diameter peers all down這一事實。請注意，這是從show support details(SSD)獲取的show diameter peers full命令的特殊debug版本，因此它還顯示與aaamgr進程的所有對等體連線（此處不顯示輸出），因此連線的最終計數遠高於正常運行時的計數，但底部顯示的是摘要輸出，如同使用較少連線數正常運行一樣(144)。FULL輸出附在本文中，因此只顯示一個對等體的連線（但所有6個鑽石代數）以簡潔方式顯示。

還顯示一個用於Gy端點的開放工作連線的示例，在該示例中，您可以看到一個名為Local Address的額外欄位，該欄位捕獲ASR端正在運行的連線，而在斷開的3gpp-aaa-s6b對等體上，該欄位不存在。（稍後顯示的輸出是客戶為包含本地地址的3gpp-aaa-s6b對等點修復問題後的輸出。）

```

***** show diameter peers full *****
Sunday December 13 15:19:00 UTC 2020

```

```
-----
Context: billing Endpoint: 3gpp-aaa-s6b
-----
```

```

Peer Hostname: mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org
Local Hostname: 0001-diamproxy.s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org

```

Peer Realm: epc.mnc260.mcc310.3gppnetwork.org  
Local Realm: epc.mnc260.mcc310.3gppnetwork.org  
Peer Address: 10.160.113.136:3868  
State: IDLE [TCP]  
CPU: 10/0 Task: diamproxy-1  
Messages Out/Queued: 0/0  
Supported Vendor IDs: None  
Admin Status: Enable  
DPR Disconnect: N/A  
Peer Backoff Timer running:N/A

Peer Hostname: mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org  
Local Hostname: 0002-diamproxy.s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org  
Peer Realm: epc.mnc260.mcc310.3gppnetwork.org  
Local Realm: epc.mnc260.mcc310.3gppnetwork.org  
Peer Address: 10.160.113.136:3868  
State: IDLE [TCP]  
CPU: 5/0 Task: diamproxy-2  
Messages Out/Queued: 0/0  
Supported Vendor IDs: None  
Admin Status: Enable  
DPR Disconnect: N/A  
Peer Backoff Timer running:N/A

Peer Hostname: mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org  
Local Hostname: 0003-diamproxy.s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org  
Peer Realm: epc.mnc260.mcc310.3gppnetwork.org  
Local Realm: epc.mnc260.mcc310.3gppnetwork.org  
Peer Address: 10.160.113.136:3868  
State: IDLE [TCP]  
CPU: 7/0 Task: diamproxy-3  
Messages Out/Queued: 0/0  
Supported Vendor IDs: None  
Admin Status: Enable  
DPR Disconnect: N/A  
Peer Backoff Timer running:N/A

Peer Hostname: mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org  
Local Hostname: 0004-diamproxy.s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org  
Peer Realm: epc.mnc260.mcc310.3gppnetwork.org  
Local Realm: epc.mnc260.mcc310.3gppnetwork.org  
Peer Address: 10.160.113.136:3868  
State: IDLE [TCP]  
CPU: 8/0 Task: diamproxy-4  
Messages Out/Queued: 0/0  
Supported Vendor IDs: None  
Admin Status: Enable  
DPR Disconnect: N/A  
Peer Backoff Timer running:N/A

Peer Hostname: mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org  
Local Hostname: 0005-diamproxy.s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org  
Peer Realm: epc.mnc260.mcc310.3gppnetwork.org  
Local Realm: epc.mnc260.mcc310.3gppnetwork.org  
Peer Address: 10.160.113.136:3868  
State: IDLE [TCP]

```
CPU: 3/0 Task: diamproxy-5
Messages Out/Queued: 0/0
Supported Vendor IDs: None
Admin Status: Enable
DPR Disconnect: N/A
Peer Backoff Timer running:N/A
```

```
Peer Hostname: mp2.daladra01.dra.epc.mnc260.mcc310.3gppnetwork.org
Local Hostname: 0006-diamproxy.s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org
Peer Realm: epc.mnc260.mcc310.3gppnetwork.org
Local Realm: epc.mnc260.mcc310.3gppnetwork.org
Peer Address: 10.160.113.136:3868
State: IDLE [TCP]
```

```
CPU: 6/0 Task: diamproxy-6
Messages Out/Queued: 0/0
Supported Vendor IDs: None
Admin Status: Enable
DPR Disconnect: N/A
Peer Backoff Timer running:N/A
```

...

```
-----
Context: billing Endpoint: credit-control
-----
```

...

```
Peer Hostname: ln24.daladra01.dra.epc3.mnc260.mcc310.3gppnetwork.org
Local Hostname: 0001-diamproxy.iepcf201.gy
Peer Realm: nsn-gy
Local Realm: starent.gy.com
Peer Address: 10.160.113.136:3869
Local Address: 10.168.86.151:55584
State: OPEN [TCP]
```

```
CPU: 10/0 Task: diamproxy-1
Messages Out/Queued: 0/0
Supported Vendor IDs: 10415
Admin Status: Enable
DPR Disconnect: N/A
Peer Backoff Timer running:N/A
```

```
Peers Summary:
Peers in OPEN state: 1404
Peers in CLOSED state: 468
Peers in intermediate state: 0
Total peers matching specified criteria: 1872
```

供參考，以下是此命令的正常輸出，其中顯示了沒有aamgrs的連線計數：

```
Peers Summary:
Peers in OPEN state: 107
Peers in CLOSED state: 36
Peers in intermediate state: 1
Total peers matching specified criteria: 144
```

## 資料包捕獲收集

正如所討論的，此場景顯示s6b端點的所有直徑對等點都已關閉，問題不是針對特定的diamproxy/卡，這表示任何卡的PCAP收集應適當地代表問題進行故障排除。如果僅在特定鑽石上發現問題，則更重要的是為該流程捕獲PCAP。這一點非常重要，因為收集過程需要指定特定的卡 — 它不能通過單個捕獲在所有卡上運行 — 儘管在這種情況下，問題確實在所有卡上可見，但下面顯示了兩張卡上的捕獲，以幫助對如何分析結果資料做出一些說明。

首先檢視卡表並從中挑選幾張活動卡（3和5）來運行捕獲，同時注意哪些是Demux卡不應指定。

```
[local]IEPCF201# show card table
Friday December 11 17:15:28 UTC 2020
Slot          Card Type                                Oper State   SPOF  Attach
-----
1: CFC        Control Function Virtual Card             Active       No
2: CFC        Control Function Virtual Card             Standby      -
3: FC         4-Port Service Function Virtual Card     Active       No     <=====
4: FC         4-Port Service Function Virtual Card     Standby      -
5: FC         4-Port Service Function Virtual Card     Active       No     <=====
6: FC         4-Port Service Function Virtual Card     Active       No
7: FC         4-Port Service Function Virtual Card     Active       No
8: FC         4-Port Service Function Virtual Card     Active       No
9: FC         4-Port Service Function Virtual Card     Active       No
10: FC        4-Port Service Function Virtual Card     Active       No
[local]IEPCF201#
```

```
[local]IEPCF201# show session recovery status verbose
Saturday December 12 21:43:11 UTC 2020
Session Recovery Status:
  Overall Status      : Ready For Recovery
  Last Status Update  : 4 seconds ago

-----sessmgr-----aaamgr----- demux
cpu state  active standby active standby active status
-----
3/0 Active  12      1      12      1      0      Good
4/0 Standby  0       12     0       12     0      Good
5/0 Active  12      1      12      1      0      Good
6/0 Active  12      1      12      1      0      Good
7/0 Active  12      1      12      1      0      Good
8/0 Active  12      1      12      1      0      Good
9/0 Active  0       0      0       0      8      Good (Demux)
10/0 Active 12      1      12      1      0      Good
[local]IEPCF201#
```

此外，需要檢索定義diameter對等體的上下文#，在這種情況下，將啟用計費上下#2。

```
***** show context *****
Sunday December 13 15:14:24 UTC 2020
Context Name   ContextID   State      Description
-----
local          1           Active
billing        2           Active     <=====
calea          3           Active
gi             4           Active
sgw            5           Active
```

接下來是登入Linux debug shell中要在其自己的CLI作業階段中收集PCAP的卡（本例中為卡3和卡5）：

**附註：**大多數操作員除非被告知特定於機箱/客戶的密碼（具體取決於其設定方式），否則他們可能無權訪問調試外殼。當登入到卡（ASR 5000或ASR 5500的PSC或DPC）或虛擬機器（vPC-DI的服務功能(SF))的基礎作業系統時，請務必小心。

```
[local]IEPCF201# cli test password <password>
Saturday December 12 21:43:54 UTC 2020
Warning: Test commands enables internal testing and debugging commands
        USE OF THIS MODE MAY CAUSE SIGNIFICANT SERVICE INTERRUPTION
[local]IEPCF201#
[local]IEPCF201# debug shell card 3 cpu 0
Saturday December 12 21:44:02 UTC 2020
Last login: Fri Dec 11 19:26:34 +0000 2020 on pts/1 from card1-cpu0.
qvpc-di:card3-cpu0#
```

現在，運行一個特殊的Linux命令**setvr**（設定虛擬路由器），該命令僅在自定義StarOS版本的Linux中可用，並指定以前檢索到的上下文#。請注意，提示符會更改：

```
qvpc-di:card3-cpu0# setvr 2 bash
bash-2.05b#
```

此時，可以使用以下引數運行TCP轉儲。請注意，如果埠號與前面所示的gy示例不同，則應使用該埠號。此外，如果存在要捕獲資料包的特定對等地址，則可以使用**host <host ip address>**指定主機IP地址。運行該命令幾分鐘，然後使用Control-C停止捕獲。如果捕獲了PACKETS，則顯示資料包數。

```
bash-2.05b# tcpdump -i any -s 0 -w /tmp/diameter_SF3.pcap "port 3868"
tcpdump: listening on any
^C
1458 packets received by filter
0 packets dropped by kernel
bash-2.05b#
```

接下來，使用**exit**命令退出虛擬路由器空間，然後將檔案複製到活動管理卡的快閃記憶體中，對於ASR 5500為MIO 5或6，或者在此情況下為vPC-DI 1或2。

```
bash-2.05b# exit
exit
qvpc-di:card3-cpu0# scp /tmp/diameter_SF3.pcap card1:/flash/sftp/diameter_SF3.pcap
diameter_SF3.pcap          100% 110KB 110.4KB/s   00:00
qvpc-di:card3-cpu0# exit
[local]IEPCF201#
```

此時，可以使用**sftp**使用網路中存在的任何方式檢索檔案，以訪問/flash目錄。

以下是適用於SF 5的命令，重複剛才針對SF 3顯示的命令。理想情況下，同時運行兩個作業階段，以便同時擷取進行分析（不過這可能不是必要的）。

```
[local]IEPCF201# cli test password <password>
Saturday December 12 21:43:28 UTC 2020
Warning: Test commands enables internal testing and debugging commands
        USE OF THIS MODE MAY CAUSE SIGNIFICANT SERVICE INTERRUPTION
[local]IEPCF201# debug shell card 5 cpu 0
Saturday December 12 21:44:13 UTC 2020
qvpc-di:card5-cpu0#
qvpc-di:card5-cpu0# setvr 2 bash
bash-2.05b# tcpdump -i any -s 0 -w /tmp/diameter_SF5.pcap "port 3868"
tcpdump: listening on any
```

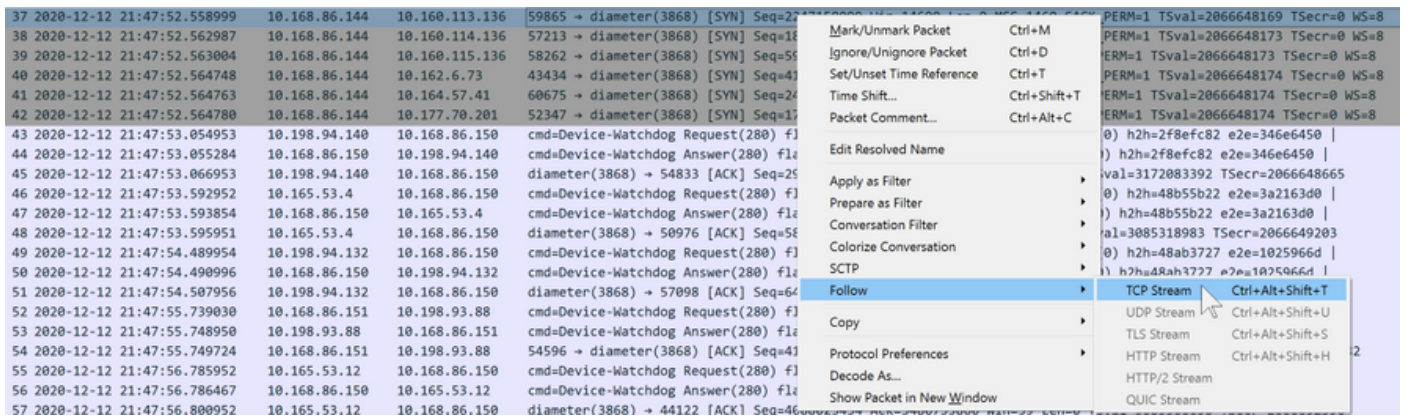
```

^C
1488 packets received by filter
0 packets dropped by kernel
bash-2.05b# exit
exit
qvpc-di:card5-cpu0# scp /tmp/diameter_SF5.pcap card1:/flash/sftp/diameter_SF5.pcap
diameter_SF5.pcap          100% 113KB 112.7KB/s   00:00
qvpc-di:card5-cpu0# exit
[local]IEPCF201#

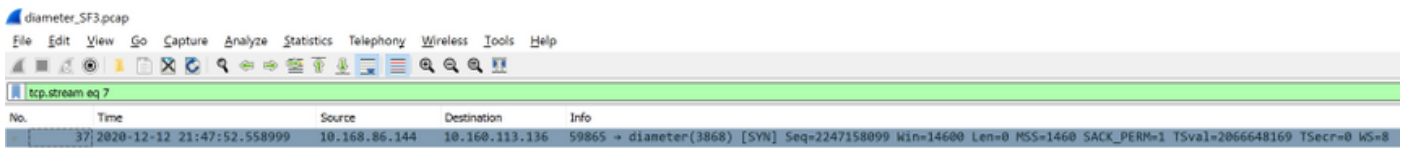
```

## PCAP分析

這裡的目標是確定故障在直徑連線建立過程中的位置。如前所述，它可能在TCP/IP連線中，也可能在隨後的CER/CEA步驟中。對於TCP/IP，請檢視是否正在傳送TCP SYN，是否正在接收TCP SYN ACK，然後是從ASR傳送的ACK。可以使用任意數量的過濾器過濾資料包，以幫助進行分析。在這種情況下，filter tcp.flags.syn == 1顯示針對此特定卡的所有6個對等體都傳送了SYN。在檢視未過濾的檢視時，右擊SYN資料包並利用Wireshark中的TCP資料流功能，該功能通過選擇跟隨來聚合使用同一TCP埠號的所有TCP資料包.....TCP流，檢視是否存在建立連線的TCP資料包的對應交換。



在此案例中，請注意SYN以外沒有其他封包，這確認ASR可能正在傳送SYN但並未收到任何回應，如此一來ASR便不會成為連線設定失敗的原因（雖然不能保證確實如此，但可能並未傳送封包，或是回應遭捨棄，在這種情況下，外部PCAP將有助於進一步縮小問題範圍）。



另外值得注意的是，模式每30秒重複一次，這與diameter端點30秒的預設配置相匹配，以重試連線—ASR不會放棄，而是將永遠重試，直到成功為止。SF 5的PCAP顯示完全相同的行為。

```

context billing
diameter endpoint 3gpp-aaa-s6b
connection timeout 30
connection retry-timeout 30

```



No.	Time	Source	Destination	Info
37	2020-12-12 21:47:52.558999	10.168.86.144	10.160.113.136	59865 → diameter(3868) [SYN] Seq=2247158099 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066648169 TSecr=0 WS=8
38	2020-12-12 21:47:52.562987	10.168.86.144	10.160.114.136	57213 → diameter(3868) [SYN] Seq=1806187659 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066648173 TSecr=0 WS=8
39	2020-12-12 21:47:52.563004	10.168.86.144	10.160.115.136	58262 → diameter(3868) [SYN] Seq=593422692 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066648173 TSecr=0 WS=8
40	2020-12-12 21:47:52.564748	10.168.86.144	10.162.6.73	43434 → diameter(3868) [SYN] Seq=4111917603 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066648174 TSecr=0 WS=8
41	2020-12-12 21:47:52.564763	10.168.86.144	10.164.57.41	60675 → diameter(3868) [SYN] Seq=249946840 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066648174 TSecr=0 WS=8
42	2020-12-12 21:47:52.564780	10.168.86.144	10.177.70.201	52347 → diameter(3868) [SYN] Seq=171243962 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066648174 TSecr=0 WS=8
133	2020-12-12 21:48:22.592084	10.168.86.144	10.160.113.136	46954 → diameter(3868) [SYN] Seq=1599801985 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066678202 TSecr=0 WS=8
134	2020-12-12 21:48:22.592112	10.168.86.144	10.160.114.136	35751 → diameter(3868) [SYN] Seq=3337865783 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066678202 TSecr=0 WS=8
135	2020-12-12 21:48:22.592129	10.168.86.144	10.160.115.136	43169 → diameter(3868) [SYN] Seq=3026367013 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066678202 TSecr=0 WS=8
136	2020-12-12 21:48:22.592143	10.168.86.144	10.162.6.73	59796 → diameter(3868) [SYN] Seq=1603160447 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066678202 TSecr=0 WS=8
137	2020-12-12 21:48:22.599364	10.168.86.144	10.164.57.41	60677 → diameter(3868) [SYN] Seq=3877471182 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066678209 TSecr=0 WS=8
138	2020-12-12 21:48:22.599396	10.168.86.144	10.177.70.201	50877 → diameter(3868) [SYN] Seq=375168575 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066678209 TSecr=0 WS=8
217	2020-12-12 21:48:52.595089	10.168.86.144	10.160.113.136	47032 → diameter(3868) [SYN] Seq=3396628935 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066708205 TSecr=0 WS=8
218	2020-12-12 21:48:52.595110	10.168.86.144	10.160.114.136	33418 → diameter(3868) [SYN] Seq=1405313703 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066708205 TSecr=0 WS=8
219	2020-12-12 21:48:52.596989	10.168.86.144	10.160.115.136	37717 → diameter(3868) [SYN] Seq=4108332795 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066708207 TSecr=0 WS=8
220	2020-12-12 21:48:52.597006	10.168.86.144	10.162.6.73	43508 → diameter(3868) [SYN] Seq=1142592045 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066708207 TSecr=0 WS=8
221	2020-12-12 21:48:52.597024	10.168.86.144	10.164.57.41	32922 → diameter(3868) [SYN] Seq=1673081762 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066708207 TSecr=0 WS=8
222	2020-12-12 21:48:52.597038	10.168.86.144	10.177.70.201	38623 → diameter(3868) [SYN] Seq=2074222018 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066708207 TSecr=0 WS=8
313	2020-12-12 21:49:22.614018	10.168.86.144	10.160.113.136	37338 → diameter(3868) [SYN] Seq=1371056611 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066738224 TSecr=0 WS=8
314	2020-12-12 21:49:22.614045	10.168.86.144	10.160.114.136	43483 → diameter(3868) [SYN] Seq=4212342380 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066738224 TSecr=0 WS=8
315	2020-12-12 21:49:22.616176	10.168.86.144	10.160.115.136	60092 → diameter(3868) [SYN] Seq=2954594158 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066738226 TSecr=0 WS=8
316	2020-12-12 21:49:22.616196	10.168.86.144	10.162.6.73	34616 → diameter(3868) [SYN] Seq=332280458 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066738226 TSecr=0 WS=8
317	2020-12-12 21:49:22.616211	10.168.86.144	10.164.57.41	52412 → diameter(3868) [SYN] Seq=1830555143 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066738226 TSecr=0 WS=8
318	2020-12-12 21:49:22.616228	10.168.86.144	10.177.70.201	44325 → diameter(3868) [SYN] Seq=2745428018 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066738226 TSecr=0 WS=8
406	2020-12-12 21:49:52.620143	10.168.86.144	10.160.113.136	57729 → diameter(3868) [SYN] Seq=52777398 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066768230 TSecr=0 WS=8
407	2020-12-12 21:49:52.621217	10.168.86.144	10.160.114.136	53024 → diameter(3868) [SYN] Seq=3814405758 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066768231 TSecr=0 WS=8
408	2020-12-12 21:49:52.621235	10.168.86.144	10.160.115.136	53651 → diameter(3868) [SYN] Seq=593445658 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066768231 TSecr=0 WS=8
409	2020-12-12 21:49:52.621248	10.168.86.144	10.162.6.73	57360 → diameter(3868) [SYN] Seq=3087447500 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066768231 TSecr=0 WS=8
410	2020-12-12 21:49:52.625336	10.168.86.144	10.164.57.41	34845 → diameter(3868) [SYN] Seq=560819250 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066768235 TSecr=0 WS=8
411	2020-12-12 21:49:52.625353	10.168.86.144	10.177.70.201	44899 → diameter(3868) [SYN] Seq=2172486101 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066768235 TSecr=0 WS=8
505	2020-12-12 21:50:22.637579	10.168.86.144	10.160.113.136	55966 → diameter(3868) [SYN] Seq=3186446422 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066798247 TSecr=0 WS=8
506	2020-12-12 21:50:22.639702	10.168.86.144	10.160.114.136	39076 → diameter(3868) [SYN] Seq=3286959003 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=2066798249 TSecr=0 WS=8

將各種因素結合在一起，直徑基數統計資訊顯示，失敗連線的數量正在以與SF/diamproxies數量和重試超時相當的速度增加。數學如下：6個對等點\* 6個鑽石代理=每30秒嘗試次數36次。因此，在一分鐘內將嘗試72次，這可以通過運行show diameter statistics proxy並檢視Connection Timeouts在一分鐘內從60984遞增到61056 = 72來看到，如CLI時間戳所示。

```
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:10 UTC 2020
Connection Timeouts: 60984
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:12 UTC 2020
Connection Timeouts: 60984
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:14 UTC 2020
Connection Timeouts: 60984
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:17 UTC 2020
Connection Timeouts: 60990
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:19 UTC 2020
Connection Timeouts: 60990
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:21 UTC 2020
Connection Timeouts: 60996
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:25 UTC 2020
Connection Timeouts: 61002
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:27 UTC 2020
Connection Timeouts: 61002
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:29 UTC 2020
Connection Timeouts: 61008
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:32 UTC 2020
Connection Timeouts: 61014
[local]IEPCF201# show diameter statistics proxy | grep "Connection Timeouts"
Friday December 11 20:39:35 UTC 2020
Connection Timeouts: 61014
```



另請注意，CER/CEA的數量（跨所有直徑對等體）微不足道，這證明它從未達到嘗試交換這些資料包的程度，這意味著這是TCP/IP設定問題。

```
[local]IEPCF201# show diameter statistics proxy
Friday December 11 20:57:09 UTC 2020
...
Capabilities Exchange Requests and Answers statistics:
  Connection CER sent: 109
  Connection CER send errors: 0
  CERs received: 0
  Connection CER create failures: 0
  CEAs received: 108
  CEA AVPs unknown: 0
  CEA Application ID mismatch: 0
  Read CEA Messages: 108
  Read CEA Messages Unexpected: 0
  Read CEA Missing: 0
  Read CEA Negotiation Failure: 0
  Read CER Messages: 0
  Read CER Messages Unexpected: 0
  Read CER Missing: 0
  Tw Expire Waiting for CEA: 0
```

最後請注意，在客戶解決問題後，處於CLOSED狀態的對等體會返回到0，並且**show diameter peers full all output**中會顯示Local Address欄位。

```
Peer Hostname: mp1.daldra01.dra.epc.mnc260.mcc310.3gppnetwork.org
Local Hostname: 0001-diamproxy.s6b.IEPCF201.epc.mnc260.mcc310.3gppnetwork.org
Peer Realm: epc.mnc260.mcc310.3gppnetwork.org
Local Realm: epc.mnc260.mcc310.3gppnetwork.org
Peer Address: 10.160.113.133:3868
Local Address: 10.168.86.144:32852
State: OPEN [TCP]
CPU: 10/0 Task: diamproxy-1
Messages Out/Queued: 0/0
Supported Vendor IDs: None
Admin Status: Enable
DPR Disconnect: N/A
Peer Backoff Timer running:N/A
```

```
Peers Summary:
  Peers in OPEN state: 144
  Peers in CLOSED state: 0
  Peers in intermediate state: 0
  Total peers matching specified criteria: 144
```

```
[local]IEPCF101#
```