借助EPC和Packet-Trace排除IOS-XE SD-WAN问题的示例

目录

简介

本文档介绍使用嵌入式数据包捕获(EPC)和数据包跟踪实用程序在运行Cisco IOS-XE SD-WAN的路由器上间歇性连接故障故障排除方法的示例。

问题

分支机构站点的用户报告说，如果用户空闲时间超过2-3分钟，使用直接互联网接入(DIA)的某些互联网应用（如SAP®、SSH、某些FTP客户端和其他应用集）将超时。如果它们在需要网络通信的应用程序内执行任何活动操作，则应用程序工作正常，不会发现任何问题。

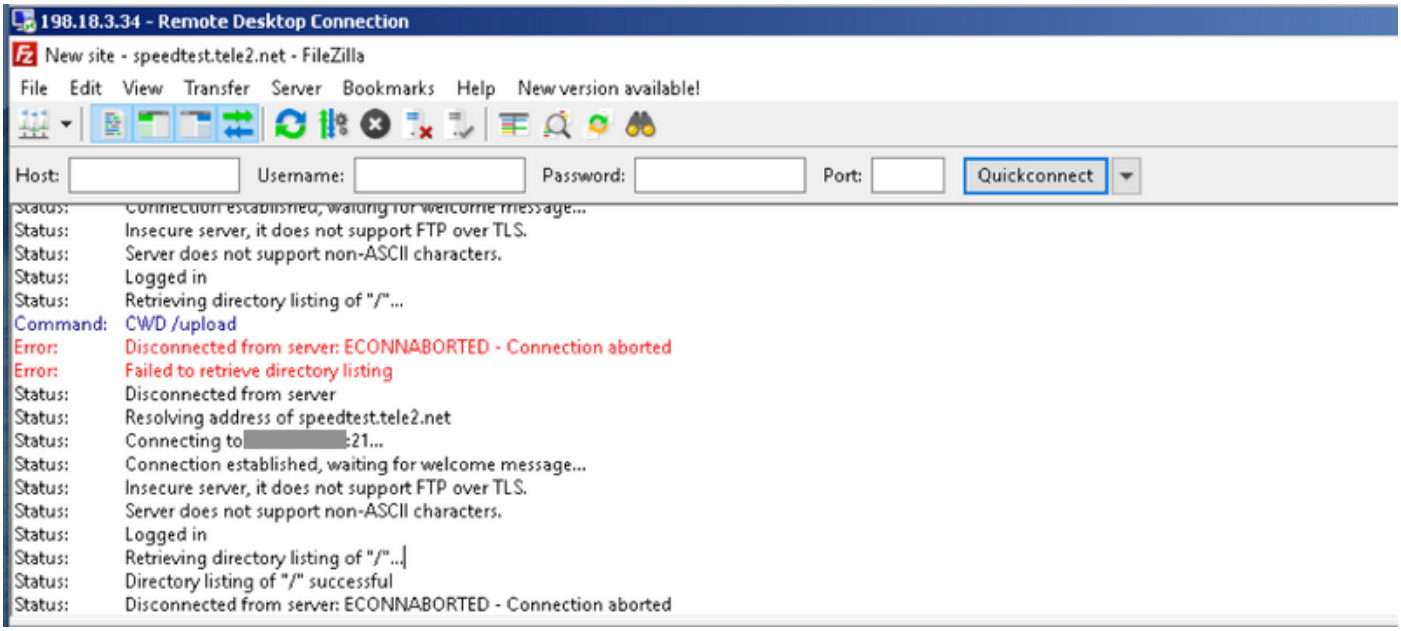
例如，如果执行**show version**并使会话空闲超过2分钟，而没有任何活动，然后按键盘上的任意键，如以下输出所示：

```
router#Connection reset by 100.64.2.9 port 22
```

检查了路由器终端线路上的IDLE超时，发现**exec-timeout**设置为10分钟，不负责描述的行为（请记住，其他应用也受到影响）：

```
router#show user
    Line       User       Host(s)              Idle       Location
*  1 vty 0     ekhabaro   idle                 00:00:00 10.149.4.41

  Interface    User               Mode         Idle     Peer Address
  unknown      (ONEP)             csrmgmt_infr 00:00:14

router#show line vty 0 | s Timeout
Timeouts:      Idle EXEC    Idle Session   Modem Answer  Session   Dispatch
               00:10:00        never                        none     not set
                            Idle Session Disconnect Warning
                              never
                            Login-sequence User Response
                             00:00:30
                            Autoselect Initial Wait
                              not set
```

另一种实时体验问题的方法是连接到某些公共FTP。然后，如果尝试刷新目录列表、更改文件夹或在2-3分钟不活动后下载内容，则会看到消息（以红色显示）：



解决方案

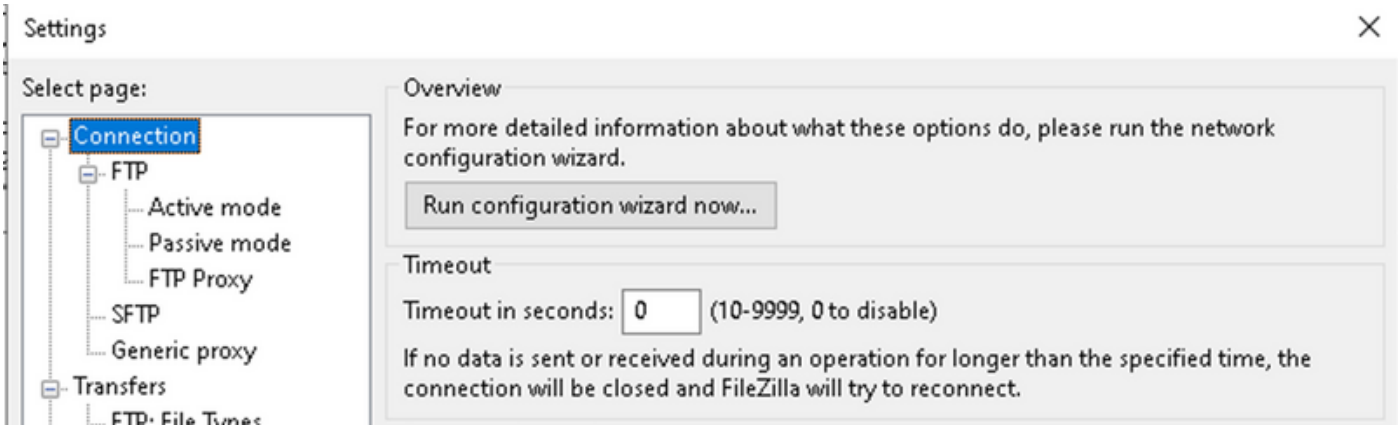
此类问题有时难以排除，但是提供IOS-XE数据路径数据包跟踪功能和嵌入式数据包捕获(EPC)IOS-XE实用程序的极大帮助。这里是使用和故障排除方法的示例。

使用EPC排除故障

在路由器上配置并启动嵌入式数据包捕获(EPC)。由于此站点使用DIA，因此您需要分别捕获外部和内部接口上的流量。此处198.51.100.7是FTP服务器的IP地址，10.5.40.14是客户端的IP地址：

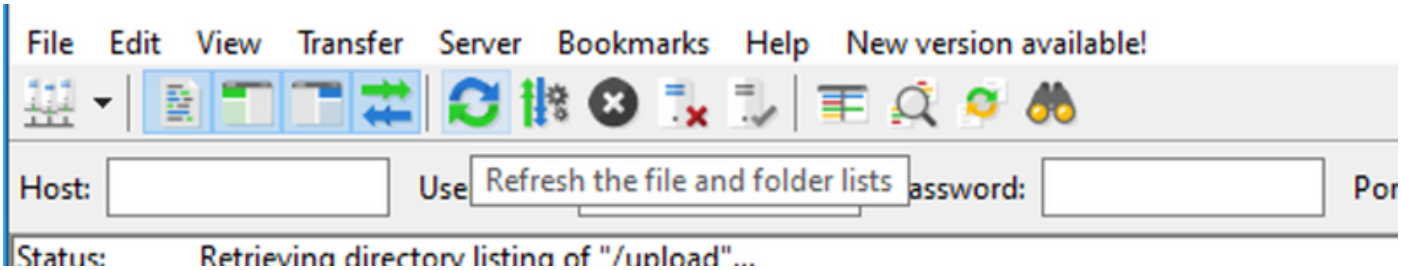
```
Branch#config-transaction

admin connected from 127.0.0.1 using console on Branch
Branch(config)# ip access-list extended CAP_ACL
Branch(config-ext-nacl)# 10 permit ip any host 10.5.40.14
Branch(config-ext-nacl)# 20 permit ip host 10.5.40.14 any
Branch(config-ext-nacl)# 30 permit ip any host 198.51.100.7
Branch(config-ext-nacl)# 40 permit ip host 198.51.100.7 any
Branch(config-ext-nacl)# commit
Commit complete.
Branch(config-ext-nacl)# end
Branch#
Branch#monitor capture CAP_EXT interface GigabitEthernet 2 both
Branch#monitor capture CAP_EXT interface GigabitEthernet 3 both
Branch#monitor capture CAP_INT interface GigabitEthernet 7 both
Branch#monitor capture CAP_EXT access-list CAP_ACL
Branch#monitor capture CAP_INT access-list CAP_ACL
Branch#monitor capture CAP_EXT start
Started capture point : CAP_EXT

Branch#monitor capture CAP_INT start
Started capture point : CAP_INT
```

接下来，从用户的主机使用FileZilla FTP客户端连接到FTP服务器。确保在FTP客户端选项的Edit > Settings**中禁用连**接的FTP客户端超时：

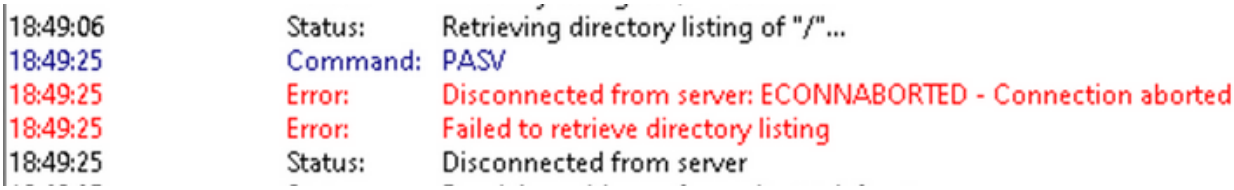


默认情况下，FileZilla FTP客户端在20秒后关闭会话本身，您无法通过其他应用程序重现用户发现的问题。

约2-3分钟处于非活动状态后，尝试刷新目录列表：



然后，在FTP客户端中，您会看到屏幕截图中类似的错误消息：



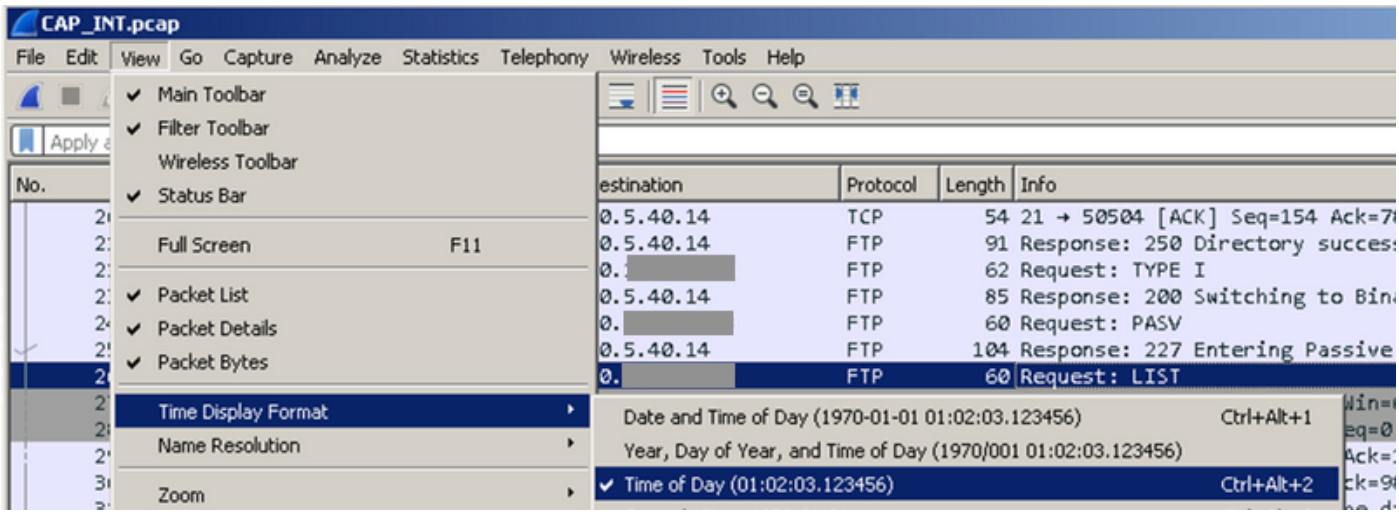
接下来，检查是否在内部和外部接口上捕获了某些数据包，停止EPC和导出缓冲区：

```
Branch#show monitor capture CAP_EXT buffer
 buffer size (KB) : 10240
 buffer used (KB) : 128
 packets in buf   : 37
 packets dropped  : 0
 packets per sec  : 24

Branch#show monitor capture CAP_INT buffer
 buffer size (KB) : 10240
 buffer used (KB) : 128
 packets in buf   : 39
 packets dropped  : 0
 packets per sec  : 1

Branch#monitor capture CAP_INT stop_export
Exported Successfully

Branch#monitor capture CAP_EXT stop_export
Exported Successfully
```

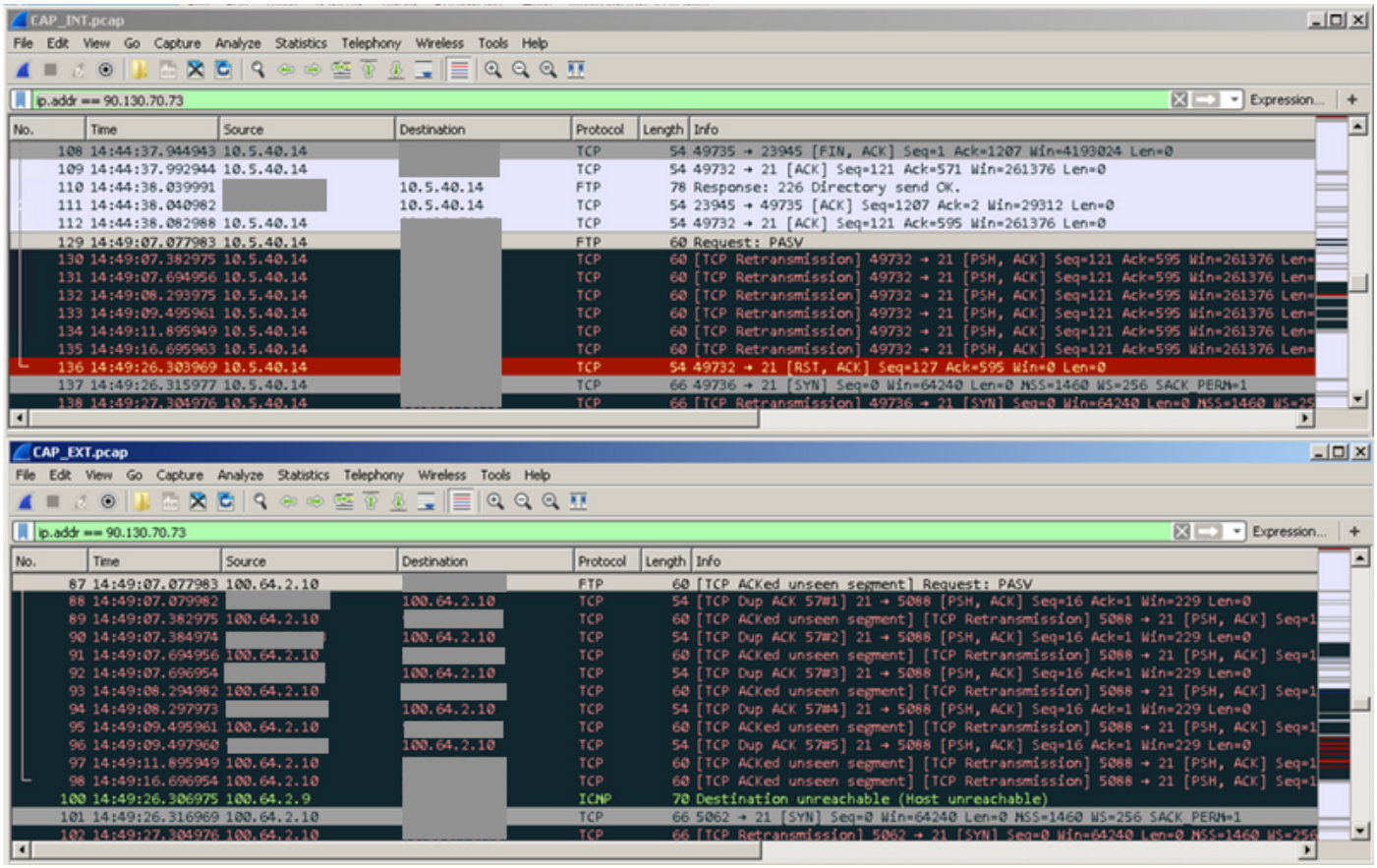
将捕获内容上传到您的PC，以便您能使用Wireshark分析它：

```
Branch#copy flash:CAP_INT.pcap sftp://admin:admin@203.0.113.36: vrf Mgmt-intf
Address or name of remote host [203.0.113.36]?
Destination username [admin]?
Destination filename [CAP_INT.pcap]?
SFTP send: Writing to /CAP_INT.pcap size 4362
!
4362 bytes copied in 0.296 secs (14736 bytes/sec)
Branch#copy flash:CAP_EXT.pcap sftp://admin:admin@203.0.113.36: vrf Mgmt-intf
Address or name of remote host [203.0.113.36]?
Destination username [admin]?
Destination filename [CAP_EXT.pcap]?
SFTP send: Writing to /CAP_EXT.pcap size 3839
!
3839 bytes copied in 0.299 secs (12839 bytes/sec)
```

在单独的Wireshark窗口中打开两个文件，并设置**Time Display Format**，以便更轻松地通过时间戳将外部接口上的数据包与内部接口上的数据包关联起来：



然后调整窗口，注意在外部接口和内部接口上执行的数据包捕获之间的差异(在捕获中**查找FTP** PASV请求):



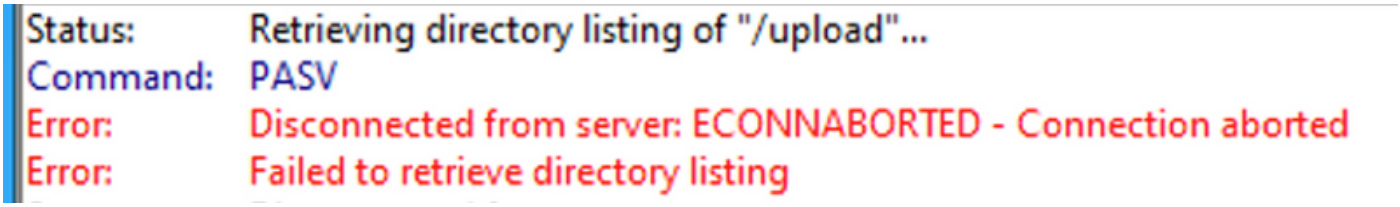
您可以看到该请求被发送到外部，并且发生了大量重新传输。此时，尚不清楚为什么来自外部主机的数据包（如88,90,92等数据包）未到达内部主机，但EPC为我们提供了宝贵信息，并确认某些数据包被cEdge路由器丢弃。

借助Cisco IOS-XE Packet Tracer实用程序排除故障

要进一步调查，必须使用数据包捕获和根据FTP服务器公有地址过滤数据：

```
debug platform condition ipv4 198.51.100.7/32 both
debug platform packet-trace packet 1024 fia-trace data-size 4096
debug platform condition start
!if you want to capture HEX data of the packet, use as well:
debug platform packet-trace copy packet both size 2048 L2
```

然后，再次连接到FTP，等待2-3分钟以上，然后单击刷新按钮或再次下载内容。在日志中，您可以注意到相同的错误消息，如图所示：



现在，从packet-trace中，您可以看到其中一个数据包被丢弃：

```
134   Gi3                    internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
135   Tu6000001              Gi7                       FWD
136   Gi7                    internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
```

```
137   Tu6000001               Gi3                       FWD
138   Gi3                     internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
139   Tu6000001               Gi7                       FWD
140   Gi7                     internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
141   Tu6000001               Gi3                       FWD
142   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
143   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
144   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
145   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
146   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
147   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
148   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
149   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
150   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
151   Gi3                     Gi3                       DROP   479 (SdwanImplicitAclDrop)
```

您还可以检查特定数据包的详细信息：

```
Branch#show platform packet-trace packet 151
Packet: 151         CBUG ID: 151
Summary
  Input     : GigabitEthernet3
  Output    : GigabitEthernet3
  State     : DROP 479 (SdwanImplicitAclDrop)
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
  Timestamp
    Start   : 179731083510 ns (11/07/2019 13:08:27.567722 UTC)
    Stop    : 179731145820 ns (11/07/2019 13:08:27.567785 UTC)
Path Trace
  Feature: IPV4(Input)
    Input       : GigabitEthernet3
    Output      : <unknown>
    Source      : 198.51.100.7
    Destination : 100.64.2.10
    Protocol    : 6 (TCP)
      SrcPort   : 21
      DstPort   : 5801
  Feature: DEBUG_COND_INPUT_PKT
    Entry       : Input - 0x817e8838
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 8280 ns
  Feature: IPV4_INPUT_DST_LOOKUP_CONSUME
    Entry       : Input - 0x817e885c
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 4160 ns
  Feature: SDWAN Implicit ACL
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Action : DISALLOW
    Reason : SDWAN_SERV_TCP
    Defer Action to Ingress ACL : No
  Feature: STILE_LEGACY_DROP_EXT
    Entry       : Input - 0x81835c68
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 12900 ns
  Feature: INGRESS_MMA_LOOKUP_DROP_EXT
    Entry       : Input - 0x8182be6c
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 14940 ns
```

```
  Feature: INPUT_DROP_FNF_AOR_EXT
    Entry       : Input - 0x81819480
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 22040 ns
  Feature: INPUT_FNF_DROP_EXT
    Entry       : Input - 0x818185bc
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 17580 ns
  Feature: INPUT_DROP_FNF_AOR_RELEASE_EXT
    Entry       : Input - 0x81818e08
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 4680 ns
  Feature: INPUT_DROP_EXT
    Entry       : Input - 0x817ed780
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 5540 ns
  Feature: IPV4_SDWAN_IMPLICIT_ACL     <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Entry       : Input - 0x8183c774
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 449760 ns
Packet Copy In
  00505608 6e500050 56add375 08004500 00363481 40002d06 122c5a82 46496440
  020a0015 16a9f873 89d3efaa e3785019 00e523cb 00003432 31205469 6d656f75
Packet Copy Out
  00505608 6e500050 56add375 08004500 00363481 40002c06 132c5a82 46496440
  020a0015 16a9f873 89d3efaa e3785019 00e523cb 00003432 31205469 6d656f75
```

这些数据包从目标FTP服务器重新传输。在数据包捕获中，您已经看到类似的一组重传。

根据packet-trace输出，SD-WAN隐式ACL（实际上是隧道接口配置下允许的服务列表）似乎出于某种原**因正在丢**弃数据包。您可以从突出显示**<<<<<**标记的行中得出结论。要进行测试，请排除SD-WAN隐式ACL并允许配置相应外部接口中的所有服务：

```
Branch#config-transaction

admin connected from 127.0.0.1 using console on Branch
Branch(config)# sdwan
Branch(config-sdwan)# interface GigabitEthernet3
Branch(config-interface-GigabitEthernet3)# tunnel-interface
Branch(config-tunnel-interface)# allow-service all
Branch(config-tunnel-interface)# commit
Commit complete.
```

> **提示：**另一个选项是配置显式IPv4访问列表，并使用access-group命令允许来自GigabitEthernet3接口上远程主机的数据包，它会覆盖SDWAN隐式ACL。

提交配置后，我们重复测试，但请确保停止数据包跟踪并在之前重新开始：

```
debug platform condition stop
debug platform packet-trace packet 1024 fia-trace data-size 4096
debug platform condition start
```

当问题再次重现（例如，当您尝试更改目录时），并且连接根据FTP客户端的日志丢失（FTP客户端尝试重新连接）时，让我们再次看到packet-trace统计信息：

```
Branch# show platform packet-trace statistics
Packets Summary
  Matched  292
  Traced   292
Packets Received
  Ingress  282
  Inject   10
    Count       Code  Cause
    10          6     QFP Fwall generated packet
Packets Processed
  Forward  134
  Punt     134
    Count       Code  Cause
    5           22    QFP Fwall generated packet
    129         64    Service Engine packet
  Drop     24
    Count       Code  Cause
    21          55    ForUs
  Consume  0
```

现在，您可以注意到另一个丢弃代码“DROP 55(ForUs)”，尽管您禁用了**allow-service all配置的**隐式ACL，但数据包仍在被丢弃。请仔细查看，并尝试了解丢弃的数据包和转发的数据包之间的差异：

```
Branch#show platform packet-trace summary
<skipped>
269   Gi3                   internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
270   Gi3                   internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
271   Tu6000001             Gi7                       FWD
272   Tu6000001             Gi7                       FWD
273   Gi7                   internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
274   Gi7                   internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
275   Tu6000001             Gi3                       FWD
276   Tu6000001             Gi3                       FWD
277   Gi7                   internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
278   Tu6000001             Gi3                       FWD
279   Gi3                   internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
280   Tu6000001             Gi7                       FWD
281   Gi7                   internal0/0/svc_eng:0     PUNT   64  (Service Engine packet)
282   Tu6000001             Gi3                       FWD
283   Gi3                   Gi3                       DROP   55  (ForUs)
284   Gi3                   Gi3                       DROP   55  (ForUs)
285   Gi3                   Gi3                       DROP   55  (ForUs)
286   Gi3                   Gi3                       DROP   55  (ForUs)
287   Gi3                   Gi3                       DROP   55  (ForUs)
288   Gi3                   Gi3                       DROP   55  (ForUs)
289   Gi3                   Gi3                       DROP   55  (ForUs)
290   Gi3                   Gi3                       DROP   55  (ForUs)
291   Gi3                   Gi3                       DROP   55  (ForUs)
292   Gi3                   Gi3                       DROP   55  (ForUs)
293   Gi3                   Gi3                       DROP   55  (ForUs)
```

在上一输出中，Gi7是服务端接口，Gi3是传输端接口。例如，比较数据包279和数据包283之间的差异（重要差异用**<<<<<**）标记：

```
Branch#show platform packet-trace packet 279
Packet: 279         CBUG ID: 794
Summary
  Input     : GigabitEthernet3
  Output    : internal0/0/svc_eng:0
  State     : PUNT 64  (Service Engine packet)
  Timestamp
    Start   : 142279273535701 ns (11/07/2019 12:46:47.57026 UTC)
    Stop    : 142279273732912 ns (11/07/2019 12:46:47.57223 UTC)
Path Trace
  Feature: IPV4(Input)
    Input       : GigabitEthernet3
    Output      : <unknown>
    Source      : 198.51.100.7
    Destination : 100.64.2.10
    Protocol    : 6 (TCP)
      SrcPort   : 28143
      DstPort   : 5668
  Feature: DEBUG_COND_INPUT_PKT
    Entry       : Input - 0x817e8838
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 5880 ns
  Feature: IPV4_INPUT_DST_LOOKUP_CONSUME
    Entry       : Input - 0x817e885c
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 7320 ns
  Feature: SDWAN Implicit ACL   <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Action : ALLOW
    Reason : SDWAN_NAT_DIA    <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Defer Action to Ingress ACL : No
  Feature: IPV4_SDWAN_IMPLICIT_ACL
    Entry       : Input - 0x8183c774
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 112800 ns
  Feature: IPV4_INPUT_FOR_US_MARTIAN
    Entry       : Input - 0x817e8860
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 78480 ns
  Feature: DEBUG_COND_APPLICATION_IN
    Entry       : Input - 0x817e8848
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 1460 ns
  Feature: DEBUG_COND_APPLICATION_IN_CLR_TXT
    Entry       : Input - 0x817e884c
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 120 ns
  Feature: IPV4_INPUT_VFR     <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Entry       : Input - 0x817e89b0
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 3880 ns
  Feature: NAT                <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Direction   : OUT to IN
    Action      : Translate Destination
    Steps       :
    Match id    : 1
```

```
  Old Address : 100.64.2.10 05668
  New Address : 10.5.40.14  49588
Feature: IPV4_NAT_INPUT_FIA <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
  Entry       : Input - 0x8182c8a8
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 117600 ns
Feature: IPV4_INPUT_DST_LOOKUP_ISSUE_EXT
  Entry       : Input - 0x817e8858
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 19620 ns
Feature: RELOOKUP_NOTIFY_EXT
  Entry       : Input - 0x817eed90
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 14040 ns
Feature: IPV4_INTERNAL_DST_LOOKUP_CONSUME_EXT
  Entry       : Input - 0x817e8870
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 4620 ns
Feature: IPV4_INPUT_FOR_US_EXT
  Entry       : Input - 0x817e89a4
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 280 ns
Feature: IPV4_VFR_REFRAG_EXT
  Entry       : Input - 0x817e89c0
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 2720 ns
Feature: CFT
  API                   : cft_handle_pkt
  packet capabilities   : 0x0000018c
  input vrf_idx         : 0
  calling feature       : STILE
  direction             : Input
  triplet.vrf_idx       : 3
  triplet.network_start : 0x01003f8e
  triplet.triplet_flags : 0x00000000
  triplet.counter       : 32
  cft_bucket_number     : 942419
  cft_l3_payload_size   : 20
  cft_pkt_ind_flags     : 0x00000100
  cft_pkt_ind_valid     : 0x00009bff
  tuple.src_ip          : 198.51.100.7
  tuple.dst_ip          : 10.5.40.14
  tuple.src_port        : 28143
  tuple.dst_port        : 49588
  tuple.vrfid           : 3
  tuple.l4_protocol     : TCP
  tuple.l3_protocol     : IPV4
  pkt_sb_state          : 0
  pkt_sb.num_flows      : 1
  pkt_sb.tuple_epoch    : 32
  returned cft_error    : 0
  returned fid          : 0xec4eeb70
Feature: NBAR
  Packet number in flow: N/A
  Classification state: Final
  Classification name: ftp-data
  Classification ID: [IANA-L4:20]
  Classification source: Unknown
```

```
  Number of matched sub-classifications: 0
  Number of extracted fields: 0
  Is PA (split) packet: False
  TPH-MQC bitmask value: 0x0
  Is optimized packet: False
Feature: IPV4_INPUT_STILE_LEGACY_EXT
  Entry       : Input - 0x81835ba8
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 315800 ns
Feature: IPV4_INPUT_FNF_FIRST_EXT
  Entry       : Input - 0x81818128
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 62200 ns
Feature: SDWAN_APP_ROUTE_POLICY_EXT
  Entry       : Input - 0x8183c758
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 12440 ns
Feature: SDWAN_DATA_POLICY_OUT_EXT
  Entry       : Input - 0x8183c754
  Input       : GigabitEthernet3
  Output      : <unknown>
  Lapsed time : 12520 ns
Feature: IPV4_INPUT_LOOKUP_PROCESS_EXT
  Entry       : Input - 0x817e8864
  Input       : GigabitEthernet3
  Output      : GigabitEthernet7
  Lapsed time : 8900 ns
Feature: IPV4_INPUT_IPOPTIONS_GOTO_OUTPUT_FEATURE_EXT
  Entry       : Output - 0x817e895c
  Input       : GigabitEthernet3
  Output      : GigabitEthernet7
  Lapsed time : 9840 ns
Feature: CBUG_OUTPUT_FIA
  Entry       : Output - 0x817e8840
  Input       : GigabitEthernet3
  Output      : GigabitEthernet7
  Lapsed time : 6520 ns
Feature: IPV4_OUTPUT_VFR
  Entry       : Output - 0x817e89b4
  Input       : GigabitEthernet3
  Output      : GigabitEthernet7
  Lapsed time : 3660 ns
Feature: ZBFW
  Action  : Fwd
  Zone-pair name         : ZP_GUEST-INSIDE_OUTSID_642078363
  Class-map name         : BRANCH-DIA-GUEST-seq-11-cm_
  Input interface        : GigabitEthernet3
  Egress interface       : GigabitEthernet7
  AVC Classification ID  : 0
  AVC Classification name: N/A
Feature: IPV4_OUTPUT_INSPECT
  Entry       : Output - 0x8181c97c
  Input       : GigabitEthernet3
  Output      : GigabitEthernet7
  Lapsed time : 296980 ns
Feature: CFT
  API                   : cft_handle_pkt
  packet capabilities   : 0x00000014
  input vrf_idx         : 0
  calling feature       : UTD
  direction             : Input
```

```
  triplet.vrf_idx       : 3
  triplet.network_start : 0x01003f8e
  triplet.triplet_flags : 0x00000004
  triplet.counter       : 32
  cft_bucket_number     : 942419
  cft_l3_payload_size   : 20
  cft_pkt_ind_flags     : 0x00000100
  cft_pkt_ind_valid     : 0x0000bbff
  tuple.src_ip          : 198.51.100.7
  tuple.dst_ip          : 10.5.40.14
  tuple.src_port        : 28143
  tuple.dst_port        : 49588
  tuple.vrfid           : 3
  tuple.l4_protocol     : TCP
  tuple.l3_protocol     : IPV4
  pkt_sb_state          : 0
  pkt_sb.num_flows      : 1
  pkt_sb.tuple_epoch    : 32
  returned cft_error    : 0
  returned fid          : 0xec4eeb70
Feature: UTD Policy (First FIA)
  Action         : Divert
  Input interface : GigabitEthernet3
  Egress interface: GigabitEthernet7
Feature: OUTPUT_UTD_FIRST_INSPECT
  Entry       : Output - 0x8183a0d8
  Input       : GigabitEthernet3
  Output      : GigabitEthernet7
  Lapsed time : 117420 ns
Feature: UTD Inspection
  Action         : Divert
  Input interface : GigabitEthernet3
  Egress interface: GigabitEthernet7
Feature: OUTPUT_UTD_FINAL_INSPECT
  Entry       : Output - 0x8183a108
  Input       : GigabitEthernet3
  Output      : GigabitEthernet7
  Lapsed time : 122900 ns
Feature: IPV4_OUTPUT_LOOKUP_PROCESS_EXT
  Entry       : Output - 0x817ee0e8
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 10980 ns
Feature: IPV4_OUTPUT_GOTO_OUTPUT_FEATURE_EXT
  Entry       : Output - 0x817edfd0
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 16200 ns
Feature: CBUG_OUTPUT_FIA
  Entry       : Output - 0x817e8840
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 4960 ns
Feature: IPV4_OUTPUT_VFR
  Entry       : Output - 0x817e89b4
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 520 ns
Feature: IPV4_OUTPUT_INSPECT
  Entry       : Output - 0x8181c97c
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 4420 ns
Feature: IPV4_OUTPUT_THREAT_DEFENSE
```

```
  Entry       : Output - 0x81838278
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 3300 ns
Feature: IPV4_VFR_REFRAG
  Entry       : Output - 0x817e89c0
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 320 ns
Feature: DEBUG_COND_APPLICATION_OUT_CLR_TXT
  Entry       : Output - 0x817e8854
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 4740 ns
Feature: UTD Encaps
  Action         : Encaps
  Input interface : GigabitEthernet3
  Egress interface: Tunnel6000001
Feature: IPV4_OUTPUT_L2_REWRITE
  Entry       : Output - 0x817e83b0
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 296420 ns
Feature: DEBUG_COND_MAC_EGRESS
  Entry       : Output - 0x817e8844
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 860 ns
Feature: DEBUG_COND_APPLICATION_OUT
  Entry       : Output - 0x817e8850
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 300 ns
Feature: IPV4_OUTPUT_FRAG
  Entry       : Output - 0x817e89a8
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 2560 ns
Feature: IPV4_OUTPUT_SDWAN_FNF_FINAL
  Entry       : Output - 0x818181b8
  Input       : GigabitEthernet3
  Output      : Tunnel6000001
  Lapsed time : 100980 ns
Feature: IPV4_TUNNEL_OUTPUT_FINAL
  Entry       : Output - 0x81838bac
  Input       : Tunnel6000001
  Output      : Tunnel6000001
  Lapsed time : 55460 ns
Feature: IPV4_TUNNEL_GOTO_OUTPUT
  Entry       : Output - 0x81838bb0
  Input       : Tunnel6000001
  Output      : Tunnel6000001
  Lapsed time : 3920 ns
Feature: IPV4_TUNNEL_FW_CHECK_EXT
  Entry       : Output - 0x81838de8
  Input       : Tunnel6000001
  Output      : Tunnel6000001
  Lapsed time : 9520 ns
Feature: IPV4_INPUT_DST_LOOKUP_ISSUE_EXT
  Entry       : Output - 0x817e8858
  Input       : Tunnel6000001
  Output      : Tunnel6000001
  Lapsed time : 14960 ns
Feature: IPV4_INPUT_ARL_EXT
```

```
  Entry       : Output - 0x817e89d0
  Input       : Tunnel6000001
  Output      : Tunnel6000001
  Lapsed time : 5680 ns
Feature: IPV4_INTERNAL_DST_LOOKUP_CONSUME_EXT
  Entry       : Output - 0x817e8870
  Input       : Tunnel6000001
  Output      : Tunnel6000001
  Lapsed time : 1260 ns
Feature: IPV4_TUNNEL_ENCAP_FOR_US_EXT
  Entry       : Output - 0x81838db8
  Input       : Tunnel6000001
  Output      : Tunnel6000001
  Lapsed time : 5460 ns
Feature: IPV4_INPUT_LOOKUP_PROCESS_EXT
  Entry       : Output - 0x817e8864
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 960 ns
Feature: IPV4_TUNNEL_ENCAP_GOTO_OUTPUT_FEATURE_EXT
  Entry       : Output - 0x817ee30c
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 13020 ns
Feature: CBUG_OUTPUT_FIA
  Entry       : Output - 0x817e8840
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 1980 ns
Feature: IPV4_OUTPUT_VFR
  Entry       : Output - 0x817e89b4
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 660 ns
Feature: IPV4_OUTPUT_INSPECT
  Entry       : Output - 0x8181c97c
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 15960 ns
Feature: IPV4_OUTPUT_THREAT_DEFENSE
  Entry       : Output - 0x81838278
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 1720 ns
Feature: IPV4_VFR_REFRAG
  Entry       : Output - 0x817e89c0
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 660 ns
Feature: DEBUG_COND_APPLICATION_OUT_CLR_TXT
  Entry       : Output - 0x817e8854
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 1560 ns
Feature: IPV4_OUTPUT_L2_REWRITE
  Entry       : Output - 0x817e83b0
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 10420 ns
Feature: DEBUG_COND_MAC_EGRESS
  Entry       : Output - 0x817e8844
  Input       : Tunnel6000001
  Output      : VirtualPortGroup1
  Lapsed time : 520 ns
```

```
  Feature: DEBUG_COND_APPLICATION_OUT
    Entry       : Output - 0x817e8850
    Input       : Tunnel6000001
    Output      : VirtualPortGroup1
    Lapsed time : 180 ns
  Feature: IPV4_OUTPUT_FRAG
    Entry       : Output - 0x817e89a8
    Input       : Tunnel6000001
    Output      : VirtualPortGroup1
    Lapsed time : 940 ns
  Feature: IPV4_OUTPUT_SDWAN_FNF_FINAL
    Entry       : Output - 0x818181b8
    Input       : Tunnel6000001
    Output      : VirtualPortGroup1
    Lapsed time : 2560 ns
  Feature: OUTPUT_SERVICE_ENGINE
    Entry       : Output - 0x81834550
    Input       : Tunnel6000001
    Output      : internal0/0/svc_eng:0
    Lapsed time : 65820 ns
  Feature: IPV4_INTERNAL_ARL_SANITY_EXT
    Entry       : Output - 0x817e89f4
    Input       : Tunnel6000001
    Output      : internal0/0/svc_eng:0
    Lapsed time : 12280 ns
  Feature: ZBFW
    Action  : Fwd
    Zone-pair name         : N/A
    Class-map name         : N/A
    Input interface        : Tunnel6000001
    Egress interface       : internal0/0/svc_eng:0
    AVC Classification ID  : 0
    AVC Classification name: N/A
  Feature: IPV4_OUTPUT_INSPECT_EXT
    Entry       : Output - 0x8181c97c
    Input       : Tunnel6000001
    Output      : internal0/0/svc_eng:0
    Lapsed time : 38200 ns
  Feature: IPV4_OUTPUT_THREAT_DEFENSE_EXT
    Entry       : Output - 0x81838278
    Input       : Tunnel6000001
    Output      : internal0/0/svc_eng:0
    Lapsed time : 1980 ns
  Feature: IPV4_VFR_REFRAG_EXT
    Entry       : Output - 0x817e89c0
    Input       : Tunnel6000001
    Output      : internal0/0/svc_eng:0
    Lapsed time : 400 ns
  Feature: IPV4_OUTPUT_DROP_POLICY_EXT
    Entry       : Output - 0x817e893c
    Input       : Tunnel6000001
    Output      : internal0/0/svc_eng:0
    Lapsed time : 26240 ns
  Feature: INTERNAL_TRANSMIT_PKT_EXT
    Entry       : Output - 0x817e88e4
    Input       : Tunnel6000001
    Output      : internal0/0/svc_eng:0
    Lapsed time : 156540 ns



Branch#show platform packet-trace packet 283
Packet: 283         CBUG ID: 798
```

```
Summary
  Input     : GigabitEthernet3
  Output    : GigabitEthernet3
  State     : DROP 55  (ForUs)
  Timestamp
    Start   : 142367023778233 ns (11/07/2019 12:48:14.807268 UTC)
    Stop    : 142367023853492 ns (11/07/2019 12:48:14.807343 UTC)
Path Trace
  Feature: IPV4(Input)
    Input       : GigabitEthernet3
    Output      : <unknown>
    Source      : 198.51.100.7
    Destination : 100.64.2.10
    Protocol    : 6 (TCP)
      SrcPort   : 21
      DstPort   : 5635
  Feature: DEBUG_COND_INPUT_PKT
    Entry       : Input - 0x817e8838
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 12340 ns
  Feature: IPV4_INPUT_DST_LOOKUP_CONSUME
    Entry       : Input - 0x817e885c
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 7140 ns
  Feature: SDWAN Implicit ACL    <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Action : ALLOW
    Reason : SDWAN_SERV_ALL      <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Defer Action to Ingress ACL : No
  Feature: IPV4_SDWAN_IMPLICIT_ACL
    Entry       : Input - 0x8183c774
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 139700 ns
  Feature: IPV4_INPUT_FOR_US_MARTIAN
    Entry       : Input - 0x817e8860
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 97840 ns
  Feature: DEBUG_COND_APPLICATION_IN
    Entry       : Input - 0x817e8848
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 2260 ns
  Feature: DEBUG_COND_APPLICATION_IN_CLR_TXT
    Entry       : Input - 0x817e884c
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 140 ns
  Feature: IPV4_INPUT_VFR      <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Entry       : Input - 0x817e89b0
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 5860 ns
  Feature: OCE_TRACE(Input)    <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Input       : GigabitEthernet3
    Output      : <unknown>
    Type        : OCE_ADJ_RECEIVE
  Feature: IPV4_NAT_INPUT_FIA  <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
    Entry       : Input - 0x8182c8a8
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 166780 ns
```

```
  Feature: STILE_LEGACY_DROP_EXT
    Entry       : Input - 0x81835c68
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 1920 ns
  Feature: INGRESS_MMA_LOOKUP_DROP_EXT
    Entry       : Input - 0x8182be6c
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 8340 ns
  Feature: INPUT_DROP_FNF_AOR_EXT
    Entry       : Input - 0x81819480
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 10920 ns
  Feature: INPUT_FNF_DROP_EXT
    Entry       : Input - 0x818185bc
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 6460 ns
  Feature: INPUT_DROP_FNF_AOR_RELEASE_EXT
    Entry       : Input - 0x81818e08
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 2240 ns
  Feature: INPUT_DROP_EXT
    Entry       : Input - 0x817ed780
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 1200 ns
  Feature: IPV4_INPUT_LOOKUP_PROCESS
    Entry       : Input - 0x817e8864
    Input       : GigabitEthernet3
    Output      : <unknown>
    Lapsed time : 176340 ns
```

如您所见，主要区别是，通常使用代码SDWAN_NAT_DIA和丢弃的数据包**SDWAN_SERV_ALL**来允许来自**外部的数据包**。此外，在**IPV4_INPUT_VFR**和**IPV4_NAT_INPUT_FIA**功能之间，对于允许的数据包，涉及不同的IOS-XE功能，即**NAT**和**OCE_TRACE**。所有差异都可能让您知道问题与NAT有关，因此，我们在建立FTP会话后检查NAT转换：

```
Branch#show ip nat translations tcp verbose | b 198.51.100.7
tcp  100.64.2.10:5801      10.5.40.14:49648      198.51.100.7:21       198.51.100.7:21
  create: 11/07/19 13:02:05, use: 11/07/19 13:02:06, timeout: 00:00:57
  Map-Id(In): 1
  Flags: unknown
  Appl type: none
  WLAN-Flags: unknown
  Mac-Address: 0000.0000.0000    Input-IDB:
  VRF: 40,  entry-id: 0xee541ec0, use_count:1
  In_pkts: 24 In_bytes: 698, Out_pkts: 13 Out_bytes: 605
  Output-IDB: GigabitEthernet3

tcp  100.64.2.10:5795      10.5.40.14:49644      52.179.129.229:443    52.179.129.229:443
  create: 11/07/19 13:01:18, use: 11/07/19 13:01:18, timeout: 00:00:09
  Map-Id(In): 1
  Flags: timing-out
  Appl type: none
  WLAN-Flags: unknown
  Mac-Address: 0000.0000.0000    Input-IDB:
```

```
  VRF: 40,  entry-id: 0xee542640, use_count:1
  In_pkts: 29 In_bytes: 5114, Out_pkts: 12 Out_bytes: 7113
  Output-IDB: GigabitEthernet3

tcp  100.64.2.10:5802      10.5.40.14:49649      198.51.100.7:21319    198.51.100.7:21319
  create: 11/07/19 13:02:06, use: 11/07/19 13:02:06, timeout: 00:00:57
  Map-Id(In): 1
  Flags: timing-out
  Appl type: none
  WLAN-Flags: unknown
  Mac-Address: 0000.0000.0000    Input-IDB:
  VRF: 40,  entry-id: 0xee541380, use_count:1
  In_pkts: 8 In_bytes: 184, Out_pkts: 4 Out_bytes: 837
  Output-IDB: GigabitEthernet3

tcp  100.64.2.10:5800      10.5.40.14:49636      198.51.100.7:21       198.51.100.7:21
  create: 11/07/19 13:02:05, use: 11/07/19 13:02:05, timeout: 00:00:56
  Map-Id(In): 1
  Flags: timing-out
  Appl type: none
  WLAN-Flags: unknown
  Mac-Address: 0000.0000.0000    Input-IDB:
  VRF: 40,  entry-id: 0xee5423c0, use_count:1
  In_pkts: 2 In_bytes: 66, Out_pkts: 1 Out_bytes: 20
  Output-IDB: GigabitEthernet3

tcp  100.64.2.10:5633      10.5.40.14:49432      52.242.211.89:443     52.242.211.89:443
  create: 11/07/19 12:44:18, use: 11/07/19 13:01:17, timeout: 00:00:08
  Map-Id(In): 1
  Flags: unknown
  Appl type: none
  WLAN-Flags: unknown
  Mac-Address: 0000.0000.0000    Input-IDB:
  VRF: 40,  entry-id: 0xee527840, use_count:1
  In_pkts: 53 In_bytes: 6257, Out_pkts: 29 Out_bytes: 7030
  Output-IDB: GigabitEthernet3

tcp  100.64.2.10:5792      10.5.40.14:49647      51.143.111.7:443      51.143.111.7:443
  create: 11/07/19 13:02:00, use: 11/07/19 13:02:09, timeout: 00:01:00
  Map-Id(In): 1
  Flags: syn_in
  Appl type: none
  WLAN-Flags: unknown
  Mac-Address: 0000.0000.0000    Input-IDB:
  VRF: 40,  entry-id: 0xee542500, use_count:1
  In_pkts: 6 In_bytes: 224, Out_pkts: 3 Out_bytes: 96
  Output-IDB: GigabitEthernet3

Total number of translations: 12
```

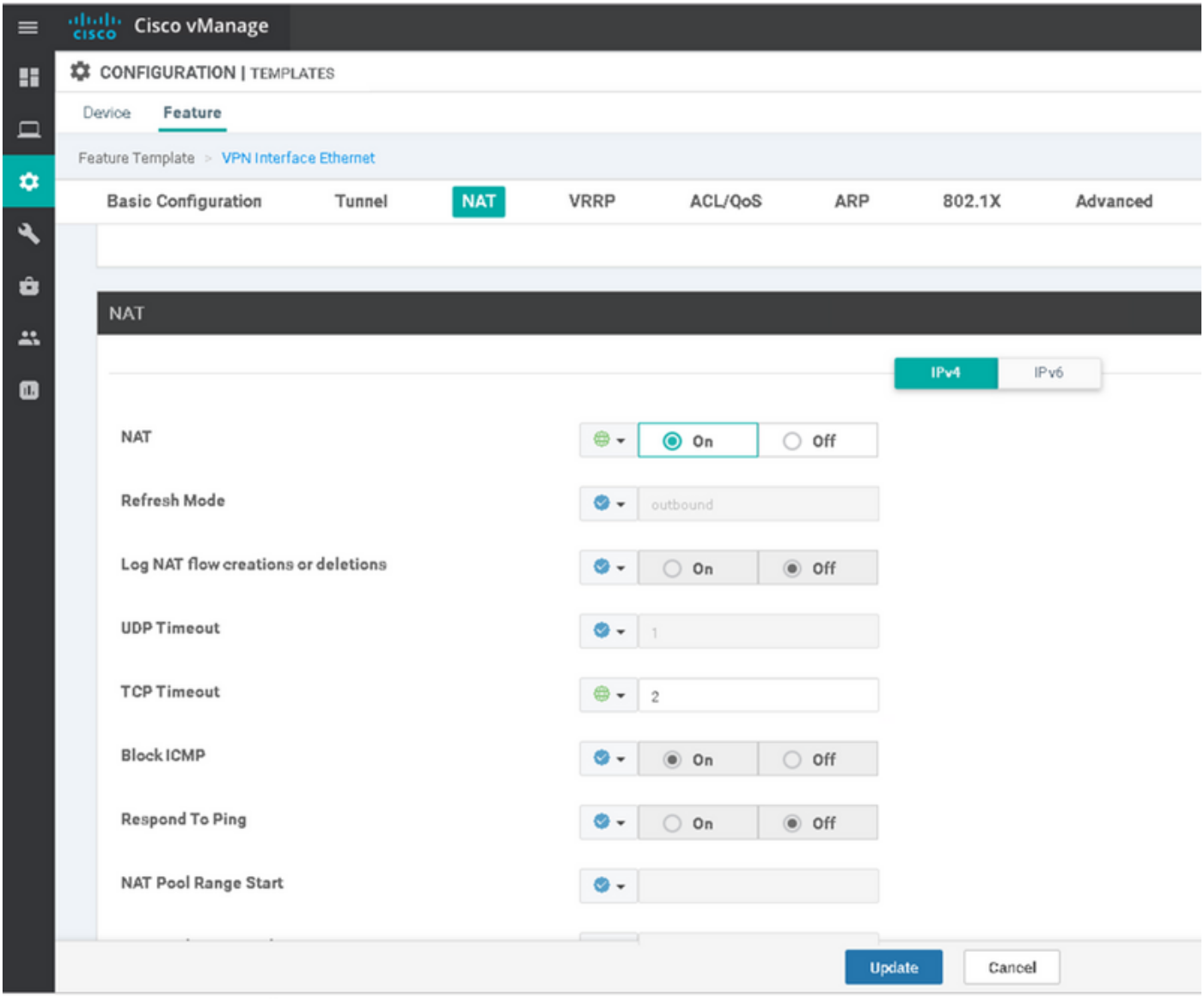
请注意超时。它看起来低得可疑吗？在FTP客户端处于非活动状态约2-3分钟后，再次检查，您会发现NAT表中没有转换：

```
Branch#    show ip nat translations  | i 198.51.100.7
Branch#
```

瞧！因此，问题的根本原因是：会话过快，尽管从FTP客户端会话的角度来看，cEdge路由器对该TCP会话一无所知，并丢弃返回的流量。如果检查配置，您会发现NAT会话超时配置为120秒，可能是错误的：

```
Branch#show run | i tcp-timeout
ip nat translation tcp-timeout 120
Branch#
```

此计时器必须在vManage上的相应设备模板中固定：



例如，将其更改为60分钟，然后问题解决。