

排除ACI L3Out — 子网0.0.0.0/0和系统PcTag 15故障

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简介

本文档介绍在L3Out EPG中定义0.0.0.0/0子网的PcTag派生。

背景信息

[ACI合同指南](#)的“L3Out EPG with 0.0.0.0/0 subnet”部分将0.0.0.0/0与“外部EPG的外部子网”范围流量分类总结为：

- 将来自与已配置的0.0.0.0/0子网匹配的最长前缀的L3Out的流量分配给VRF PcTag的源类ID (s类)。
- 发往与已配置的0.0.0.0/0子网匹配的最长前缀的L3Out EPG的流量将目标类ID(dclass)指定为15，即系统PcTag。

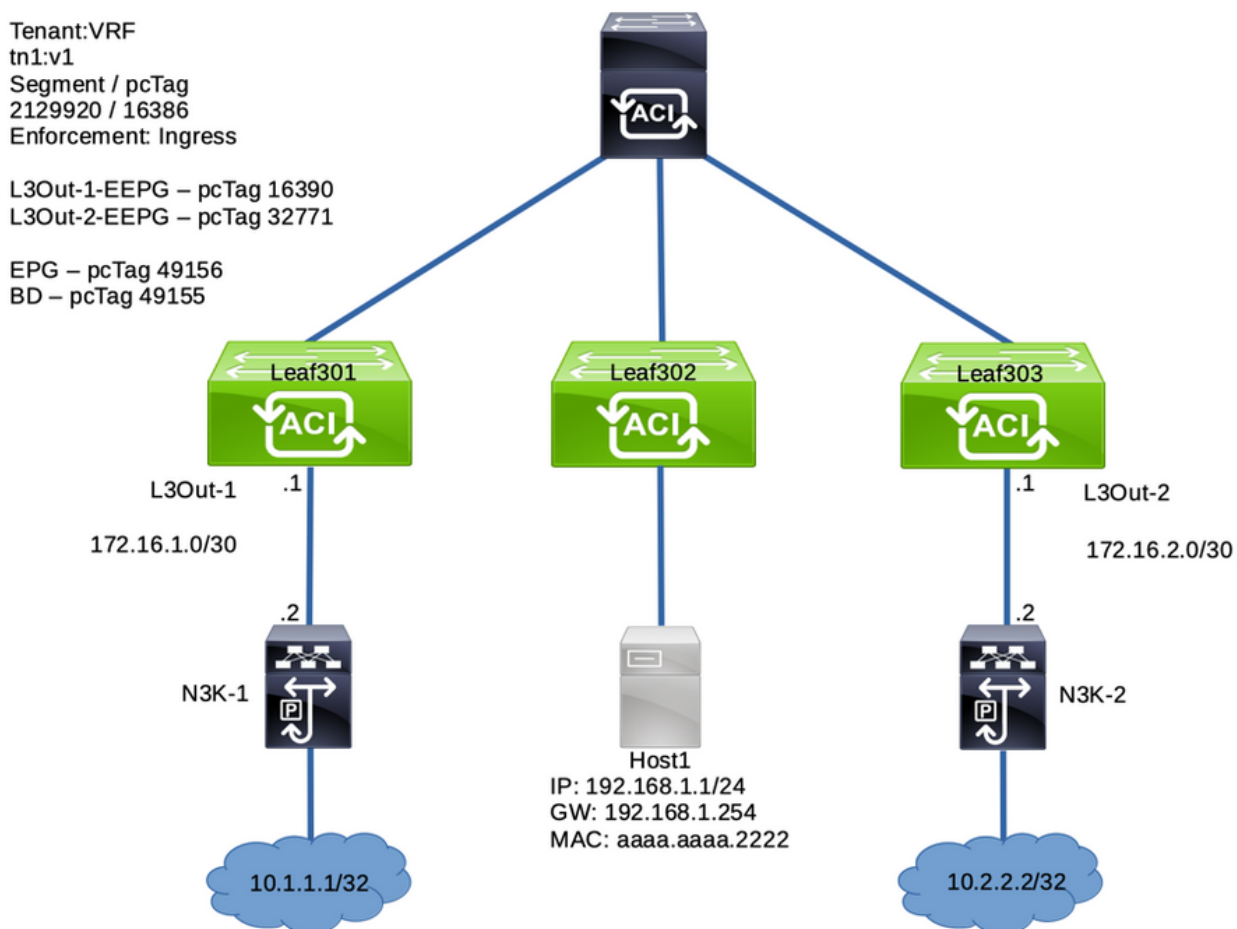
[ACI L3Out](#) 白皮书的“外部EPG的外部子网的例外情况”(An exception for 0.0.0.0/0 with External Subnets for the External EPG)部分包含警告：

“.....尽管不建议这样做，但您可以在同一VRF中的多个L3Out EPG中将0.0.0.0/0配置为“外部EPG的外部子网”..... 允许此配置时，会发生意外的合同部署.....”

本文深入介绍这种非预期的合同部署。

配置

拓扑图



配置要点

- 枝叶节点301和303是边界枝叶节点
- 枝叶节点302是非边界枝叶
- 边界枝叶301上的L3Out-1-EEPG有一个0.0.0.0/0子网，其中包含“外部EPG的外部子网”
- L3Out-1-EEPG提供合同
- 非边界枝叶302上的EPG使用相同的合同



Properties

Name: L3Out-1-EEPG

Alias:

Annotations: Click to add a new annotation

Global Alias: Description: optional

pcTag: 16390

Contract Exception Tag:

Configured VRF Name: v1

Resolved VRF: uni/tn-tn1/ctx-v1

QoS Class: Target DSCP:

Configuration Status: applied

Configuration Issues:

Preferred Group Member: Exclude IncludeIntra Ext-EPG Isolation: Enforced Unenforced

Subnets:

IP Address	Scope	Name	Aggregate	Route Control Profile	Route Summarization Policy
0.0.0.0/0	External Subnets for the External EPG				

验证

实施“入口”策略的VRF

非边界枝叶分区规则

如“背景信息”部分突出显示的那样，发往此L3Out后网络的流量，其中已配置0.0.0.0/0子网中最长前缀匹配项的目标类(pcTag)为15。

这是VRF "v1"(网段ID 2129920)的非边界枝叶302上的分区规则表：

```
Leaf-302# show zoning-rule scope 2129920
```

```

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Rule ID | SrcEPG | DstEPG | FilterID | Dir | operSt | Scope | Name |
Action | Priority | | | | | | |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 4107 | 0 | 0 | implarp | uni-dir | enabled | 2129920 |
permit | any_any_filter(17) | | | | | | |
| 4106 | 0 | 0 | implicit | uni-dir | enabled | 2129920 |
deny,log | any_any_any(21) | | | | | | |
| 4105 | 0 | 49155 | implicit | uni-dir | enabled | 2129920 |
permit | any_dest_any(16) | | | | | | |
| 4108 | 0 | 15 | implicit | uni-dir | enabled | 2129920 |
deny,log | any_vrf_any_deny(22) | | | | | | |
| 4112 | 16386 | 49156 | default | uni-dir | enabled | 2129920 | tn1:EPG_to_L3Out |
permit | src_dst_any(9) | | | | | | |
| 4111 | 49156 | 15 | default | uni-dir | enabled | 2129920 | tn1:EPG_to_L3Out |
permit | src_dst_any(9) | | | | | | |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

```

由于L3Out-1-EEPG和EPG(49156)之间的合同，安装了两个规则：

- 规则4112适用于从L3Out EPG发往EPG的外部流量，其中0.0.0.0/0 LPM发往EPG。流量按VRF PcTag(16386)和EPG(49156)的类别分类。
- 规则4111适用于从EPG发往0.0.0.0/0 LPM的L3Out EPG的流量。流量按EPG类别(49156)和System PcTag 15类别分类

边界枝叶分区 — 规则

由于VRF策略实施设置为“入口”（默认值），边界枝叶节点301没有与非边界枝叶节点302相同的分区规则。这些类型的流的策略预期将应用于非边界枝叶节点。

```
Leaf-301# show zoning-rule scope 2129920
```

Rule ID	SrcEPG	DstEPG	FilterID	Dir	operSt	Scope	Name	Action
4105	0	0	implarp	uni-dir	enabled	2129920		permit
4107	0	0	implicit	uni-dir	enabled	2129920		deny,log
4106	0	15	implicit	uni-dir	enabled	2129920		deny,log
4108	0	16387	implicit	uni-dir	enabled	2129920		permit

```
*No entry for 16386 to 49156 , or 49156 to 15*
```

EPG到L3Out ELAM

从EPG终端192.168.1.1 ping L3Out-1-EEPG后面的IP成功：

```
Host# ping 10.1.1.1 count 10000 int 1
PING 10.1.1.1 (10.1.1.1): 56 data bytes
64 bytes from 10.1.1.1: icmp_seq=0 ttl=252 time=1.063 ms
64 bytes from 10.1.1.1: icmp_seq=1 ttl=252 time=0.92 ms
64 bytes from 10.1.1.1: icmp_seq=2 ttl=252 time=0.963 ms
```

非边界枝叶302 (EPG网关) 上EPG到L3Out流量的ELAM确认：

1. 数据包具有预期的源IP和目标IP:源IP:192.168.1.1，目的IP:10.1.1.1
2. 源类(sclass)是EPG PcTag类**49156**
3. 目标类(dclass)为系统PcTag **15**，因为10.1.1.0/24最长前缀匹配L3Out-1-EEPG上的0.0.0.0/0子网
4. 在此节点302 (非边界枝叶节点) 上应用了策略。

Leaf-302# ereport

=====
=====

Captured Packet

=====
=====

...snip...

Outer L2 Header

Destination MAC : 0022.BDF8.19FF
Source MAC : **AAAA.AAAA.2222**
802.1Q tag is valid : yes(0x1)
CoS : 0(0x0)
Access Encap VLAN : 192(0xC0)

Outer L3 Header

L3 Type : IPv4
...
IP Protocol Number : ICMP
IP CheckSum : 63781(0xF925)
Destination IP : **10.1.1.1**
Source IP : **192.168.1.1**
...

=====
=====

Contract Lookup (FPC)

=====
=====

Contract Lookup Key

IP Protocol : ICMP(0x1)
L4 Src Port : 2048(0x800)
L4 Dst Port : 43014(0xA806)
sclass (src pcTag) : **49156(0xC004)**
dclass (dst pcTag) : **15(0xF)**
src pcTag is from local table : yes
...

Contract Result

Contract Drop : **no**
Contract Logging : no
Contract Applied : **yes**
Contract Hit : **yes**
Contract Aclqos Stats Index : **81875**
(show sys int aclqos zoning-rules | grep -B 9 "Idx: 81875")

可以输入ereport提供的命令，以便对命中的Zoning-Rule进行其他验证：

```

module-1(DBG-elam-insel6)# show sys int aclqos zoning-rules | grep -B 9 "Idx: 81875"
=====
Rule ID: 4111 Scope 6 Src EPG: 49156 Dst EPG: 15 Filter 65535
  unit_id: 0
  === Region priority: 2462 (rule prio: 9 entry: 158)===
    sw_index = 46 | hw_index = 45 | stats_idx = 81875

Curr TCAM resource:
=====
=== SDK Info ===
  Result/Stats Idx: 81875

```

L3Out到EPG ELAM

返回流获取在非边界枝叶节点302上应用的策略。当VRF策略实施设置为“入口”时，这是预期结果。

```

Leaf-302# ereport
...
-----
Inner L3 Header
-----
L3 Type           : IPv4
DSCP              : 0
Don't Fragment Bit : 0x0
TTL              : 254
IP Protocol Number : ICMP
Destination IP    : 192.168.1.1
Source IP         : 10.1.1.1
-----
Contract Lookup ( FPC )
-----
Contract Lookup Key
-----
IP Protocol           : ICMP( 0x1 )
L4 Src Port          : 0( 0x0 )
L4 Dst Port          : 60691( 0xED13 )
sclass (src pCtag)   : 16386( 0x4002 )
dclass (dst pCtag)   : 49156( 0xC004 )
src pCtag is from local table : no
derived from group-id in iVxLAN header of incoming packet
Unknown Unicast / Flood Packet : no
If yes, Contract is not applied here because it is flooded
-----
Contract Result
-----
Contract Drop        : no
Contract Logging     : no

```

```

Contract Applied          : yes
Contract Hit             : yes
Contract Aclqos Stats Index : 81874
(show sys int aclqos zoning-rules | grep -B 9 "Idx: 81874" )

```

进一步验证：

```

module-1(DBG-elam-insell14)# show sys int aclqos zoning-rules | grep -B 9 "Idx: 81874"
=====
Rule ID: 4112 Scope 6 Src EPG: 16386 Dst EPG: 49156 Filter 65535
  unit_id: 0
  === Region priority: 2462 (rule prio: 9 entry: 158)===
    sw_index = 47 | hw_index = 46 | stats_idx = 81874

  Curr TCAM resource:
  =====
  === SDK Info ===
    Result/Stats Idx: 81874
module-1(DBG-elam-insell14)#

```

实施“出口”策略的VRF

非边界枝叶分区规则

当VRF策略实施设置为“出口”时，L3Out的合同规则在边界枝叶节点和非边界枝叶节点上部署。因此，与“入口”实施相比，此配置会消耗额外的TCAM空间。此配置不是默认值，如果使用，必须认真考虑。

非边界枝叶节点302有两个分区规则，每个流方向性一个：

```

Leaf-302# show zoning-rule scope 2129920
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+
| Rule ID | SrcEPG | DstEPG | FilterID | Dir  | operSt | Scope | Name |
Action | Priority |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+
| 4107 | 0 | 0 | implarp | uni-dir | enabled | 2129920 |
permit | any_any_filter(17) |
| 4106 | 0 | 0 | implicit | uni-dir | enabled | 2129920 |
deny,log | any_any_any(21) |
| 4105 | 0 | 49155 | implicit | uni-dir | enabled | 2129920 |
permit | any_dest_any(16) |
| 4108 | 0 | 15 | implicit | uni-dir | enabled | 2129920 |
deny,log | any_vrf_any_deny(22) |
| 4112 | 16386 | 49156 | default | uni-dir | enabled | 2129920 | tn1:EPG_to_L3Out |
permit | src_dst_any(9) |
| 4111 | 49156 | 15 | default | uni-dir | enabled | 2129920 | tn1:EPG_to_L3Out |
permit | src_dst_any(9) |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+

```

边界枝叶分区 — 规则

通过“出口”策略实施，边界枝叶节点301还有另外两个分区规则：


```
-----
-----
Contract Lookup Key
-----
-----
IP Protocol                : ICMP( 0x1 )
L4 Src Port                : 2048( 0x800 )
L4 Dst Port                : 27360( 0x6AE0 )
sclass (src pcTag)      : 49156( 0xC004 )
dclass (dst pcTag)     : 1( 0x1 )
...
-----
-----
```

```
-----
-----
Contract Result
-----
-----
Contract Drop              : no
Contract Logging          : no
Contract Applied        : no
Contract Hit              : yes
Contract Aclqos Stats Index : 81903
( show sys int aclqos zoning-rules | grep -B 9 "Idx: 81903" )
-----
-----
```

边界枝叶节点301上的ELAM指示策略已应用于此节点。它还选择了System PcTag 15类。这意味着0.0.0.0/0 L3Out子网条目上匹配的最长前缀：

```
Leaf-301# ereport
=====
=====
                                           Captured Packet
=====
=====
-----
-----
```

```
-----
-----
Inner L3 Header
-----
-----
...
IP Protocol Number        : ICMP
Destination IP          : 10.1.1.1
Source IP              : 192.168.1.1
-----
-----
```

```
-----
-----
                                           Contract Lookup ( FPC )
=====
=====
-----
-----
```

```
-----
-----
Contract Lookup Key
-----
-----
IP Protocol                : ICMP( 0x1 )
L4 Src Port                : 2048( 0x800 )
L4 Dst Port                : 40498( 0x9E32 )
sclass (src pcTag)      : 49156( 0xC004 )
dclass (dst pcTag)     : 15( 0xF )
-----
-----
```

```

src pcTag is from local table          : no
derived from group-id in iVxLAN header of incoming packet
Unknown Unicast / Flood Packet       : no
If yes, Contract is not applied here because it is flooded

```

```

-----
Contract Result
-----

```

```

Contract Drop          : no
Contract Logging      : no
Contract Applied    : yes
Contract Hit       : yes
Contract Aclqos Stats Index : 81874
( show sys int aclqos zoning-rules | grep -B 9 "Idx: 81874" )
...

```

```

module-1(DBG-elam-insell14)# show sys int aclqos zoning-rules | grep -B 9 "Idx: 81874"

```

```

=====
Rule ID: 4110 Scope 6 Src EPG: 49156 Dst EPG: 15 Filter 65535
  unit_id: 0
  === Region priority: 2462 (rule prio: 9 entry: 158)===
    sw_index = 47 | hw_index = 46 | stats_idx = 81874

```

```

Curr TCAM resource:
=====
=== SDK Info ===
  Result/Stats Idx: 81874

```

L3Out到EPG ELAM

在此设置中，存在有关返回流的警告：

- 边界枝叶节点301没有针对192.168.1.1的终端学习。

```

Leaf-301# show endpoint ip 192.168.1.1
Legend:
S - static s - arp L - local O - peer-attached
V - vpc-attached a - local-aged p - peer-aged M - span
B - bounce H - vtep R - peer-attached-rl D - bounce-to-proxy
E - shared-service m - svc-mgr
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
---+
VLAN/ Encap MAC Address MAC Info/ Interface
Domain VLAN IP Address IP Info
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
---+
...empty...

```

因此，对于此流，策略未应用于边界枝叶节点301，必须隐式允许它到达下一个枝叶：

```

Leaf-301# ereport
=====
=====
Captured Packet
=====
=====
-----
-----

```

Outer L3 Header

```

-----
-----
...
IP Protocol Number           : ICMP
IP CheckSum                  : 25157( 0x6245 )
Destination IP             : 192.168.1.1
Source IP                  : 10.1.1.1

```

```

=====
=====
Contract Lookup ( FPC )
=====
=====

```

Contract Lookup Key

```

-----
-----
IP Protocol                   : ICMP( 0x1 )
L4 Src Port                   : 0( 0x0 )
L4 Dst Port                   : 33570( 0x8322 )
sclass (src pcTag)           : 16386( 0x4002 )
dclass (dst pcTag)           : 1( 0x1 )
src pcTag is from local table : yes
derived from a local table on this node by the lookup of src IP or MAC
Unknown Unicast / Flood Packet : no
If yes, Contract is not applied here because it is flooded

```

Contract Result

```

-----
-----
Contract Drop                 : no
Contract Logging              : no
Contract Applied           : no
Contract Hit                  : yes
Contract Aclqos Stats Index   : 81903
( show sys int aclqos zoning-rules | grep -B 9 "Idx: 81903" )

```

相反，策略应用于非边界枝叶节点302:

Leaf-302# ereport

```

=====
=====
Captured Packet
=====
=====

```

Inner L3 Header

```

-----
-----
...
IP Protocol Number           : ICMP
Destination IP             : 192.168.1.1
Source IP                  : 10.1.1.1

```

```

=====
Contract Lookup ( FPC )
=====
-----
Contract Lookup Key
-----
IP Protocol                : ICMP( 0x1 )
L4 Src Port                : 0( 0x0 )
L4 Dst Port                : 61057( 0xEE81 )
sclass (src pcTag)       : 16386( 0x4002 )
dclass (dst pcTag)       : 49156( 0xC004 )
src pcTag is from local table : no
derived from group-id in iVxLAN header of incoming packet
Unknown Unicast / Flood Packet : no
If yes, Contract is not applied here because it is flooded

-----
Contract Result
-----
Contract Drop              : no
Contract Logging           : no
Contract Applied         : yes
Contract Hit            : yes
Contract Aclqos Stats Index : 81874
( show sys int aclqos zoning-rules | grep -B 9 "Idx: 81874" )
...

module-1(DBG-elam-insell14)# show sys int aclqos zoning-rules | grep -B 9 "Idx: 81874"
=====
Rule ID: 4112 Scope 6 Src EPG: 16386 Dst EPG: 49156 Filter 65535
  unit_id: 0
  === Region priority: 2462 (rule prio: 9 entry: 158)===
    sw_index = 47 | hw_index = 46 | stats_idx = 81874

  Curr TCAM resource:
  =====
  === SDK Info ===
    Result/Stats Idx: 81874

```

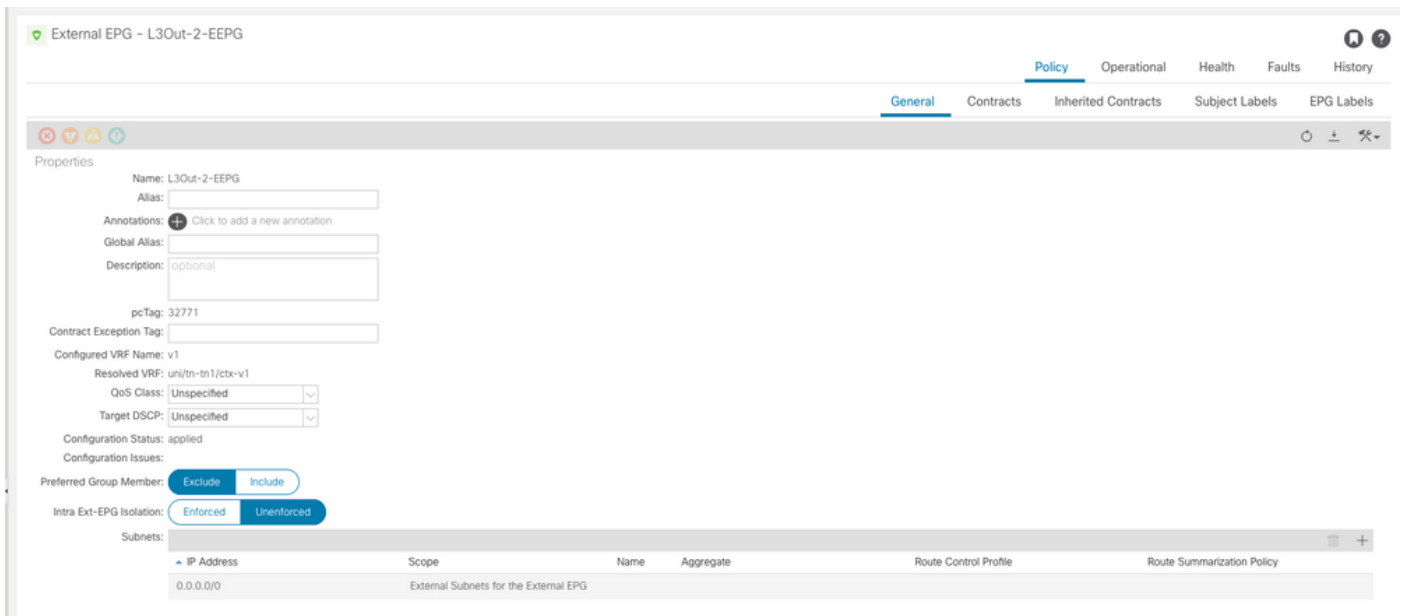
如果边界枝叶节点301有一个终端获知192.168.1.1，则应该已在该节点上应用策略。

故障排除

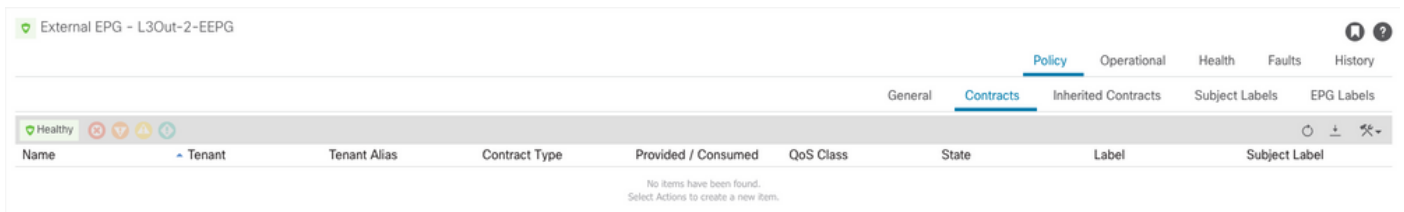
场景 — 非预期的允许

在同一VRF中部署多个L3Outs时，如果使用0.0.0.0/0子网和“外部EPG的外部子网”进行配置，则会允许流量意外传递到外部目标。

为此，请在L3Out-2-EEPG下添加0.0.0.0/0子网，该子网与L3Out-1-EEPG位于同一VRF中。



L3Out-2-EEPG上没有合同，因此我们预计默认情况下所有流量都会被丢弃：



但是，从EPG终端192.168.1.1到L3Out-2-EEPG后目标10.2.2.2的ping操作是成功的。这是意外的！

Host# ping 10.2.2.2

```

PING 10.2.2.2 (10.2.2.2): 56 data bytes
64 bytes from 10.2.2.2: icmp_seq=0 ttl=252 time=0.881 ms
64 bytes from 10.2.2.2: icmp_seq=1 ttl=252 time=0.801 ms
64 bytes from 10.2.2.2: icmp_seq=2 ttl=252 time=0.877 ms
64 bytes from 10.2.2.2: icmp_seq=3 ttl=252 time=0.827 ms

```

转发路由和policy-mgr前缀都显示此VRF中发往10.2.2.2的流量被分配系统PcTag 15

```
Leaf-302# vsh_lc -c "show forward route 10.2.2.2 platform vrf tn1:v1"
```

...

Policy Prefix 0.0.0.0/0

SDK Information:

```
vrf: 7(0x7), routed_if: 0x0 epc_class: 15(0xf)
```

...

```
Leaf-302# vsh -c "show system internal policy-mgr prefix"
```

Requested prefix data

```

Vrf-Vni VRF-Id Table-Id Table-State VRF-Name Addr
Class Shared Remote Complete Svc_ena
=====
=====
...
2129920 7 0x7 Up tn1:v1

```

```
0.0.0.0/0 15 False False False False
2129920 7 0x80000007 Up tnl:v1
::/0 15 False False False False
```

Leaf-302#

非边界枝叶节点302上的ELAM验证使用系统PcTag 15分类的数据流。

Leaf-302# **ereport**

```
=====  
=====  
=====  
=====  
----- Outer L3 Header -----  
----- ... IP  
Protocol Number : ICMP IP CheckSum : 14444( 0x386C ) Destination IP : 10.2.2.2  
Source IP : 192.168.1.1
```

```
=====  
=====  
Contract Lookup ( FPC )  
=====  
=====
```

```
-----  
Contract Lookup Key  
-----  
-----  
IP Protocol : ICMP( 0x1 )  
L4 Src Port : 2048( 0x800 )  
L4 Dst Port : 33134( 0x816E )  
sclass (src pcTag) : 49156( 0xC004 )  
dclass (dst pcTag) : 15( 0xF )  
src pcTag is from local table : yes  
derived from a local table on this node by the lookup of src IP or MAC  
Unknown Unicast / Flood Packet : no  
If yes, Contract is not applied here because it is flooded
```

```
-----  
Contract Result  
-----  
-----  
Contract Drop : no  
Contract Logging : no  
Contract Applied : yes  
Contract Hit : yes  
Contract Aclqos Stats Index : 81875  
( show sys int aclqos zoning-rules | grep -B 9 "Idx: 81875" )  
...
```

```
module-1(DBG-elam-insel6)# show sys int aclqos zoning-rules | grep -B 9 "Idx: 81875"  
=====  
Rule ID: 4111 Scope 6 Src EPG: 49156 Dst EPG: 15 Filter 65535  
unit_id: 0  
=== Region priority: 2462 (rule prio: 9 entry: 158)===  
sw_index = 46 | hw_index = 45 | stats_idx = 81875  
  
Curr TCAM resource:  
=====
```

```
=== SDK Info ===
Result/Stats Idx: 81875
```

VRF“v1”的Zoning-Rules未显示EPG和L3Out-2的任何新条目：

```
Leaf-302# show zoning-rule scope 2129920
+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+
| Rule ID | SrcEPG | DstEPG | FilterID | Dir  | operSt | Scope | Name          |
Action | Priority |         |          |      |         |       |               |
+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+
| 4107 | 0 | 0 | implarp | uni-dir | enabled | 2129920 |               |
permit | any_any_filter(17) |         |          |         |         |         |               |
| 4106 | 0 | 0 | implicit | uni-dir | enabled | 2129920 |               |
deny,log | any_any_any(21) |         |          |         |         |         |               |
| 4105 | 0 | 49155 | implicit | uni-dir | enabled | 2129920 |               |
permit | any_dest_any(16) |         |          |         |         |         |               |
| 4108 | 0 | 15 | implicit | uni-dir | enabled | 2129920 |               |
deny,log | any_vrf_any_deny(22) |         |          |         |         |         |               |
| 4112 | 16386 | 49156 | default | uni-dir | enabled | 2129920 | tn1:EPG_to_L3Out |
permit | src_dst_any(9) |         |          |         |         |         |               |
| 4111 | 49156 | 15 | default | uni-dir | enabled | 2129920 | tn1:EPG_to_L3Out |
permit | src_dst_any(9) |         |          |         |         |         |               |
+-----+-----+-----+-----+-----+-----+-----+
+-----+
Leaf-302#
```

由于L3Out-2-EEPG只配置了0.0.0.0/0子网，因此所有发往它的流量都使用System PcTag 15分类进行分类。

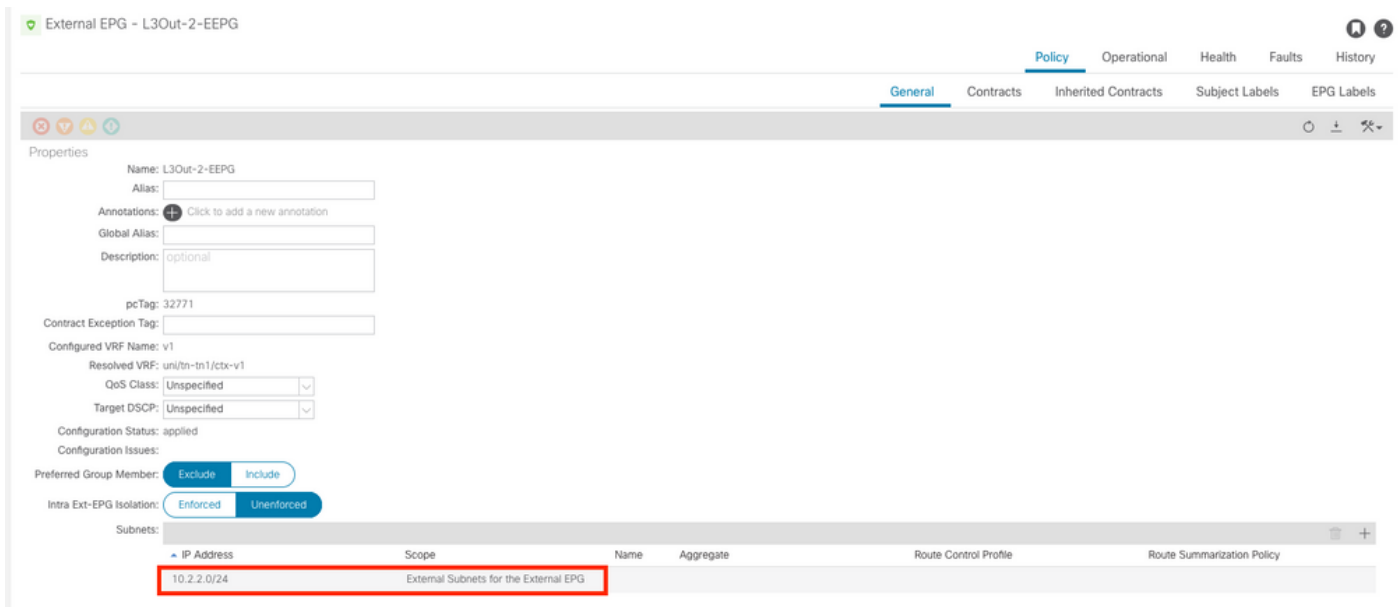
Zoning-Rules ID 4111和4112被编程为L3Out-1-EEPG同时具有0.0.0.0/0子网并提供EPG使用的合同。

由于此配置，意外地允许流向L3Out-2-EEPG!

解决方案 — 非预期的允许

要防止此行为，请执行以下操作：

1. 强烈建议每个VRF仅在一个L3Out EPG上使用0.0.0.0/0子网
2. 如果可能，在同一VRF中为其他L3Outs使用特定子网。这允许流量提取唯一的L3Out PcTag值作为其类。



应用这些更改以缓解意外允许：

1. 在L3Out-2-EEPG上，将0.0.0.0/0子网替换为10.2.2.0/24子网
2. 在L3Out-2-EEPG上，提供合同
3. 在EPG上，使用相同的合同

完成后，在非边界枝叶节点302上观察这些更改：

- 对于10.2.2.0/24，有一个更具体的policy-mgr前缀与L3Out-2-EEPG PcTag连接关32771
- 有一个Zoning-Rules ID 4109条目 此条目允许从EPG PcTag路由到49156L3Out-2-EEPG PcTag路由的流32771
- 有一个Zoning-Rules ID 4110条目 此条目允许从L3Out-2-EEPG PcTag到EPG 32771的流49156

更新的转发路由和policy-mgr前缀，其中显示10.2.2.2分配了32771的L3Out-2-EEPG PgTag:

```
Leaf-302# vsh_lc -c "show forward route 10.2.2.2 platform vrf tn1:v1"
```

```
...
Policy Prefix 10.2.2.0/24
...
SDK Information:
vrf: 7(0x7), routed_if: 0x0 epc_class: 32771(0x8003)
attributes: SUP_CP DST_POL_IC SRC_POL_IC
```

```
Leaf-302# vsh -c "show system internal policy-mgr prefix"
```

```
Requested prefix data
```

```
Vrf-Vni VRF-Id Table-Id Table-State VRF-Name Addr
Class Shared Remote Complete Svc_ena
=====
=====
...
2129920 7 0x7 Up tn1:v1
0.0.0.0/0 15 False False False False
2129920 7 0x80000007 Up tn1:v1
::/0 15 False False False False
2129920 7 0x7 Up tn1:v1
10.2.2.0/24 32771 False True False False
```


注意：无边界枝叶节点302上仍存在分区规则ID 4111和4112，因为L3Out-1-EEPG仍具有0.0.0.0/0子网，并且与EPG也存在合同关系。但是，L3Out-2-EEPG流量不再无意中使用了这些规则，因为其流量现在使用L3Out PcTag而不是系统PcTag 15进行分类：

```
Leaf-302# show zoning-rule scope 2129920
```

Rule ID	SrcEPG	DstEPG	FilterID	Dir	operSt	Scope	Name
4107	0	0	implarp	uni-dir	enabled	2129920	
4106	0	0	implicit	uni-dir	enabled	2129920	
4105	0	49155	implicit	uni-dir	enabled	2129920	
4108	0	15	implicit	uni-dir	enabled	2129920	
4112	16386	49156	default	uni-dir	enabled	2129920	tnl:EPG_to_L3Out
4111	49156	15	default	uni-dir	enabled	2129920	tnl:EPG_to_L3Out
4109	49156	32771	default	bi-dir	enabled	2129920	tnl:EPG_to_L3Out
4110	32771	49156	default	uni-dir-ignore	enabled	2129920	tnl:EPG_to_L3Out

从EPG主机ping L3Out-2-EEPG后的外部目标成功：

```
Host# ping 10.2.2.2
PING 10.2.2.2 (10.2.2.2): 56 data bytes
64 bytes from 10.2.2.2: icmp_seq=0 ttl=252 time=0.854 ms
64 bytes from 10.2.2.2: icmp_seq=1 ttl=252 time=0.669 ms
64 bytes from 10.2.2.2: icmp_seq=2 ttl=252 time=0.716 ms
64 bytes from 10.2.2.2: icmp_seq=3 ttl=252 time=0.669 ms
64 bytes from 10.2.2.2: icmp_seq=4 ttl=252 time=0.666 ms
```

非边界枝叶节点302上icmp请求的ELAM指示该类现在为32771 - L3Out-2-EEPG的PcTag。

```
Leaf-302# ereport
```

```
=====
=====
                                     Captured Packet
=====
=====
-----
Outer L3 Header
-----
...
IP Protocol Number : ICMP
IP CheckSum : 4095( 0xFFFF )
Destination IP : 10.2.2.2
Source IP : 192.168.1.1
```

```

=====
=====
Contract Lookup ( FPC )
=====
-----
Contract Lookup Key
-----
-----
IP Protocol                : ICMP( 0x1 )
L4 Src Port                : 2048( 0x800 )
L4 Dst Port                : 49837( 0xC2AD )
sclass (src pcTag)       : 49156( 0xC004 )
dclass (dst pcTag)       : 32771( 0x8003 )
src pcTag is from local table : yes
derived from a local table on this node by the lookup of src IP or MAC
Unknown Unicast / Flood Packet : no
If yes, Contract is not applied here because it is flooded

-----
-----
Contract Result
-----
-----
Contract Drop              : no
Contract Logging           : no
Contract Applied         : yes
Contract Hit            : yes
Contract Aclqos Stats Index : 81873
( show sys int aclqos zoning-rules | grep -B 9 "Idx: 81873" )
...

```

ereport提供的aclqos命令显示此流到达其中一个新的分区规则，特别是规则ID 4109:

```

module-1(DBG-elam-insel6)# show sys int aclqos zoning-rules | grep -B 9 "Idx: 81873"
=====
Rule ID: 4109 Scope 6 Src EPG: 49156 Dst EPG: 32771 Filter 65535
  unit_id: 0
  === Region priority: 2462 (rule prio: 9 entry: 158)===
    sw_index = 48 | hw_index = 47 | stats_idx = 81873

Curr TCAM resource:
=====
  === SDK Info ===
    Result/Stats Idx: 81873

```

关于此翻译

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