ASA 和 Catalyst 3750X 系列交换机 TrustSec 配置示例和故障排除指南

目录

简介

本文描述如何在思科安全自适应安全设备(ASA)和Cisco Catalyst 3750X系列交换机(3750X)上配置Cisco TrustSec(CTS)。

为了了解安全组标记(SGT)和IP地址之间的映射，ASA使用SGT交换协议(SXP)。然后，使用基于SGT的访问控制列表(ACL)来过滤流量。3750X从思科身份服务引擎(ISE)下载基于角色的访问控制列表(RBACL)策略，并根据这些策略过滤流量。本文详细介绍数据包级别，以便描述通信运行方式和预期调试。

先决条件

要求

Cisco 建议您具有以下主题的基础知识：

- CTS组件
- ASA和Cisco IOS®的CLI配置

使用的组件

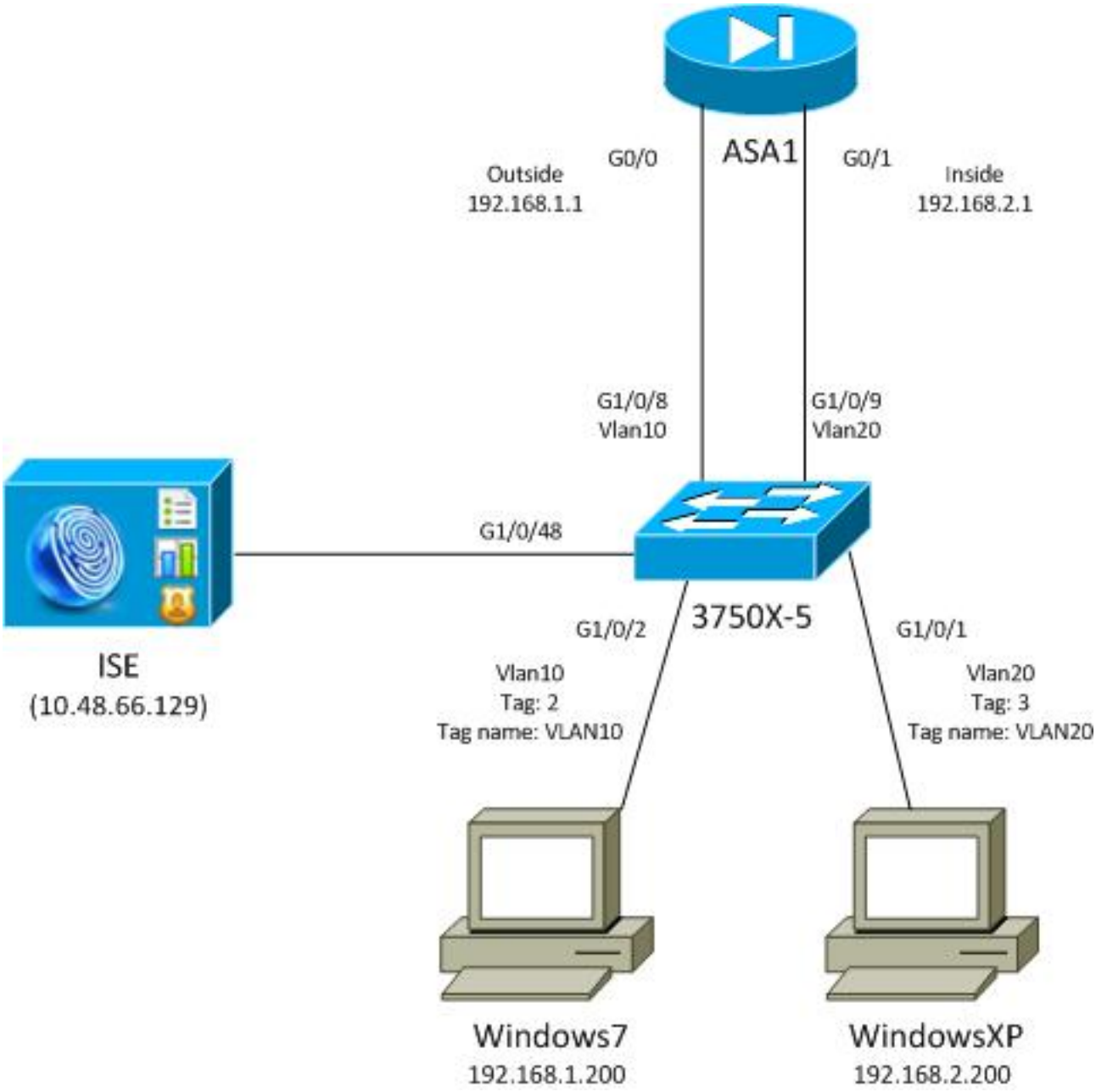
本文档中的信息基于以下软件和硬件版本：

- Cisco ASA软件9.1版及更高版本
- Microsoft(MS)Windows 7和MS Windows XP
- Cisco 3750X软件，版本15.0及更高版本
- Cisco ISE软件1.1.4版及更高版本

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

配置

网络图



流量传输

以下是流量：

- 3750X配置在**G1/0/1**和**G1/0/2**上，用于端口身份验证。
- ISE用作身份验证、授权和记帐(AAA)服务器。
- MAC地址绕行(MAB)用于MS Windows 7的身份验证。
- IEEE 802.1x用于MS Windows XP，以证明使用哪种身份验证方法无关紧要。

身份验证成功后，ISE返回SGT，3750X将该标记绑定到身份验证会话。交换机还使用**ip device tracking**命令获取两个站点的IP地址。然后，交换机使用SXP将SGT和IP地址之间的映射表发送到ASA。两台MS Windows PC都有指向ASA的默认路由。

ASA收到来自映射到SGT的IP地址的流量后，能够根据SGT使用ACL。此外，当您使用3750X作为路由器（两个MS Windows工作站的默认网关）时，它能够根据从ISE下载的策略过滤流量。

以下是配置和验证步骤，在本文档后面的部分中会详细介绍其中的每个步骤：

- 在3750X上使用ip device tracking命令进行端口身份验证
- 身份验证、SGT和安全组访问控制列表(SGACL)策略的ISE配置
- ASA和3750X上的CTS配置
- 3750X（自动）和ASA（手动）上的保护访问凭证(PAC)调配
- ASA和3750X上的环境更新
- 3750X上的端口身份验证验证和实施
- 3750X上的策略更新
- SXP交换（ASA作为侦听器，3750X作为扬声器）
- 使用SGT ACL在ASA上过滤流量
- 使用从ISE下载的策略在3750X上过滤流量

配置

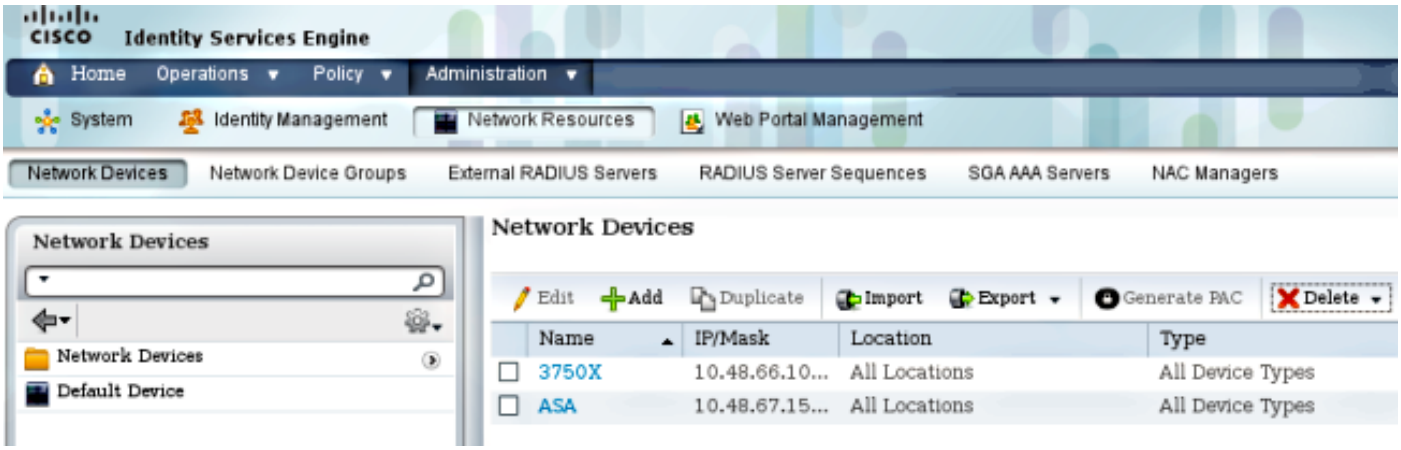
在3750X上使用*ip device tracking*命令进行端口身份验证

这是802.1x或MAB的典型配置。只有当您使用来自ISE的活动通知时，才需要RADIUS授权更改(CoA)。

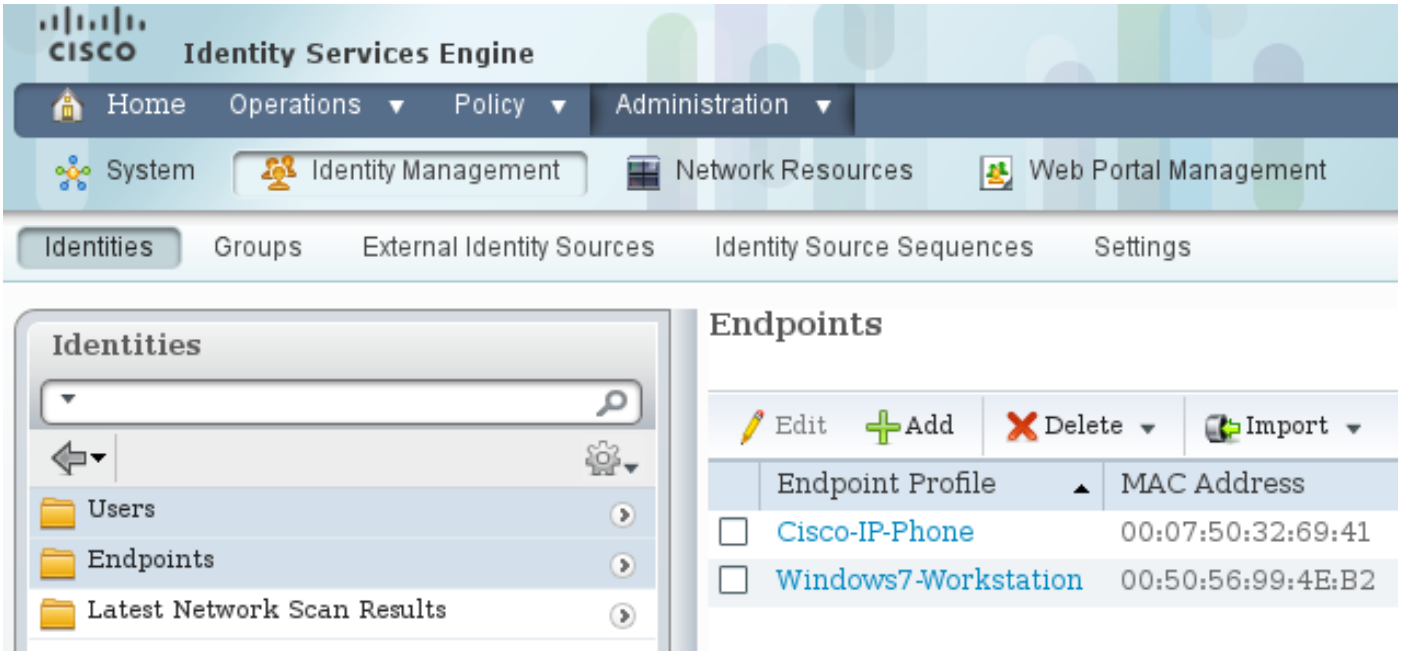
```
aaa new-model
aaa authentication dot1x default group radius
aaa authorization network default group radius
aaa authorization network ise group radius
aaa accounting dot1x default start-stop group radius

!Radius COA
aaa server radius dynamic-author
 client 10.48.66.129 server-key cisco
 server-key cisco

ip device tracking

interface GigabitEthernet1/0/1
 description windowsxp
 switchport mode access
 authentication order mab dot1x
 authentication port-control auto
 mab
 dot1x pae authenticator
 spanning-tree portfast
!
interface GigabitEthernet1/0/2
 description windows7
 switchport mode access
 authentication order mab dot1x
 authentication port-control auto
 mab
 dot1x pae authenticator
spanning-tree portfast

radius-server host 10.48.66.129 pac key cisco
radius-server host 10.48.66.129 auth-port 1812
radius-server vsa send accounting
radius-server vsa send authentication
```

身份验证、SGT和SGACL策略的ISE配置

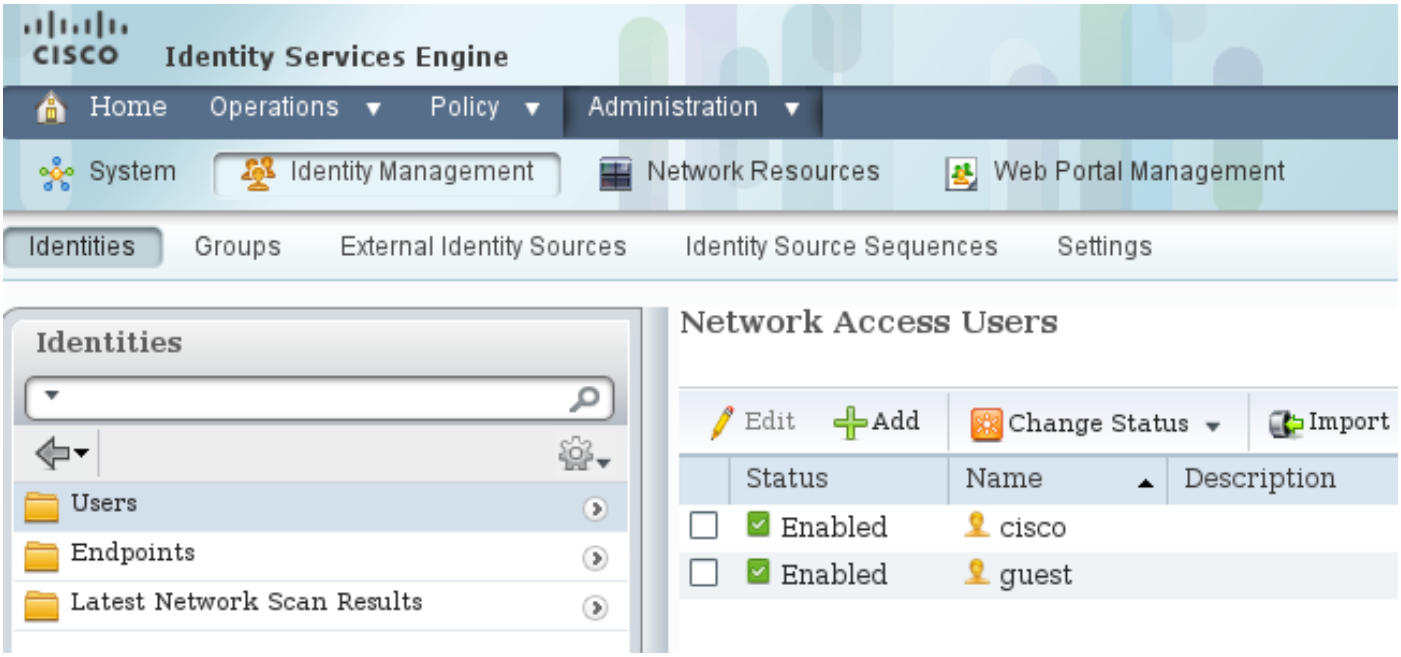
ISE必须在**Administration > Network Devices**下配置两个网络设备：



对于使用MAB身份验证的MS Windows 7，必须在**管理>身份管理>身份>终端**下创建终端身份（MAC地址）：

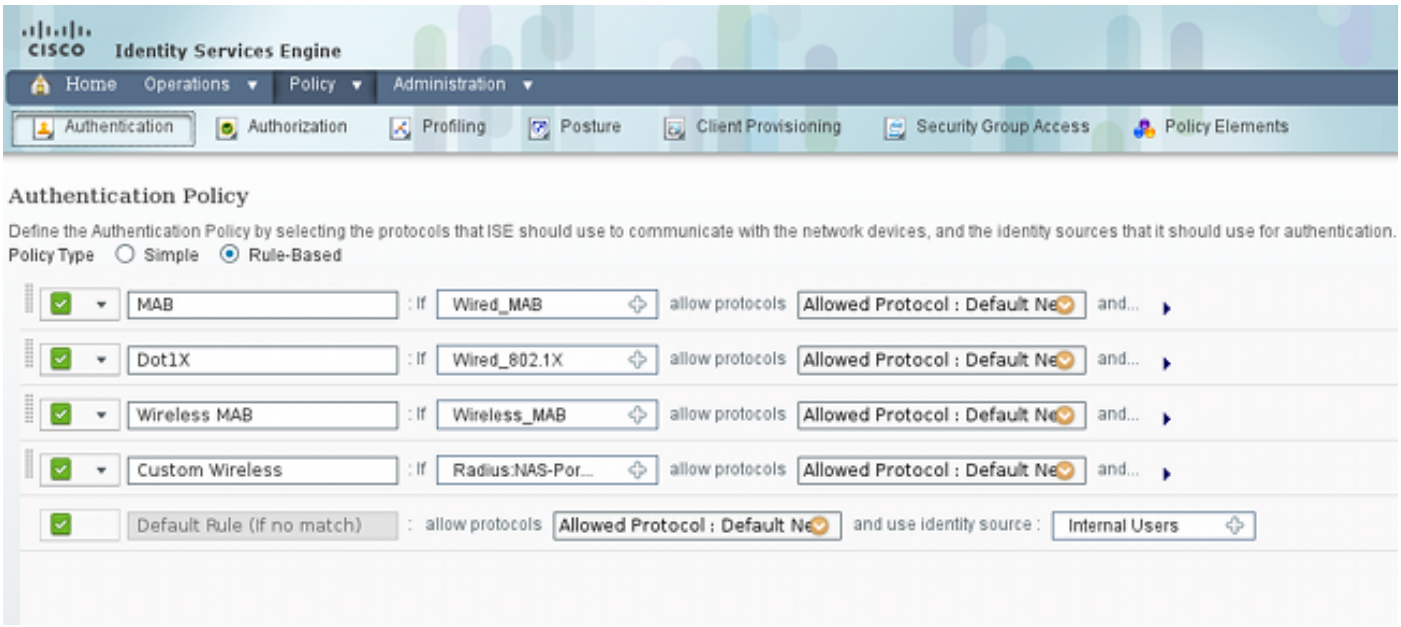


对于使用802.1x身份验证的MS Windows XP，您必须在**Administration > Identity Management > Identities > Users**下创建用户身份（用户名）：

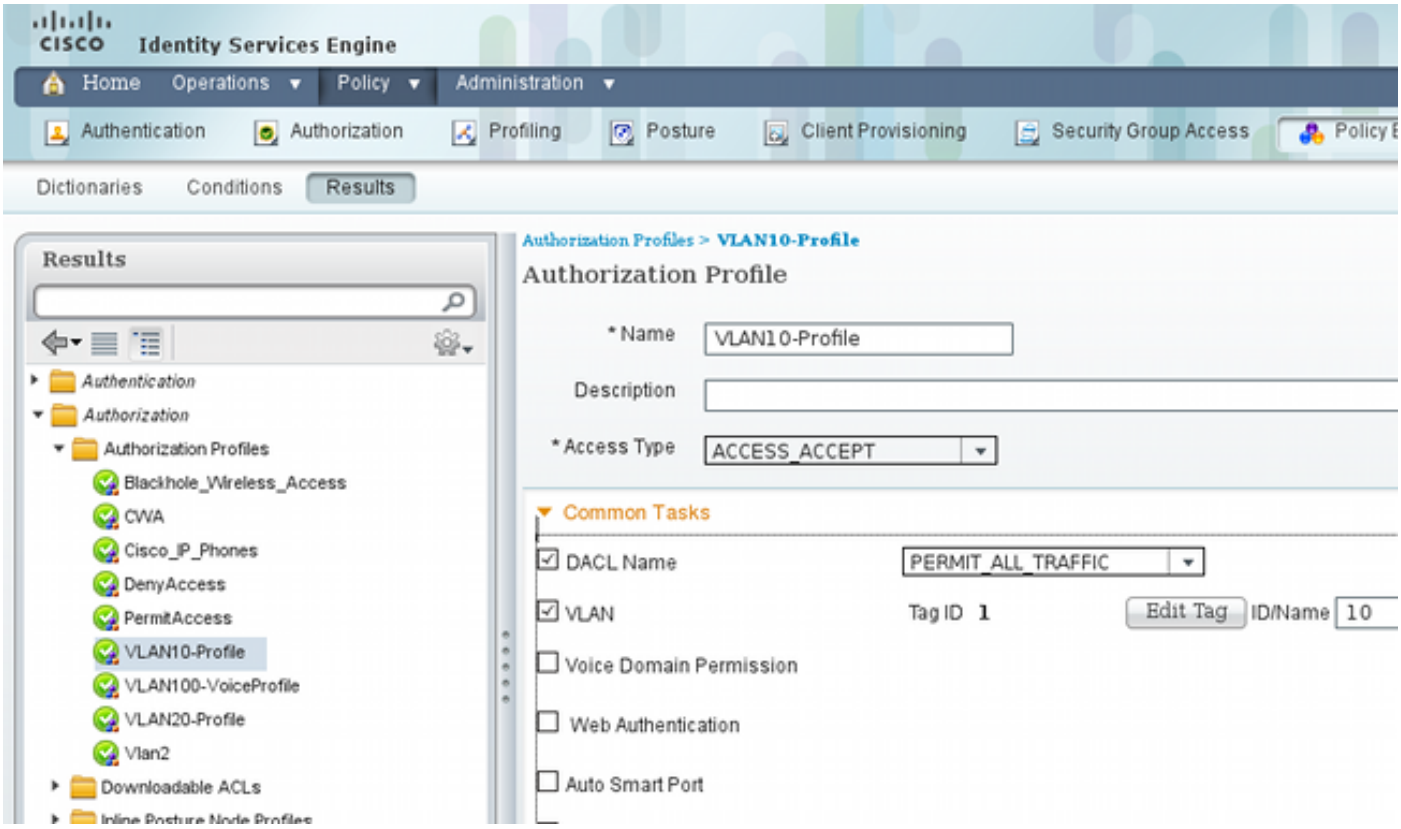


使用用户名**cisco**。使用这些凭证为MS Windows XP配置受可扩展身份验证协议保护的EAP(EAP-PEAP)。

在ISE上，使用默认身份验证策略（请勿更改）。第一个是MAB身份验证策略，第二个是802.1x:



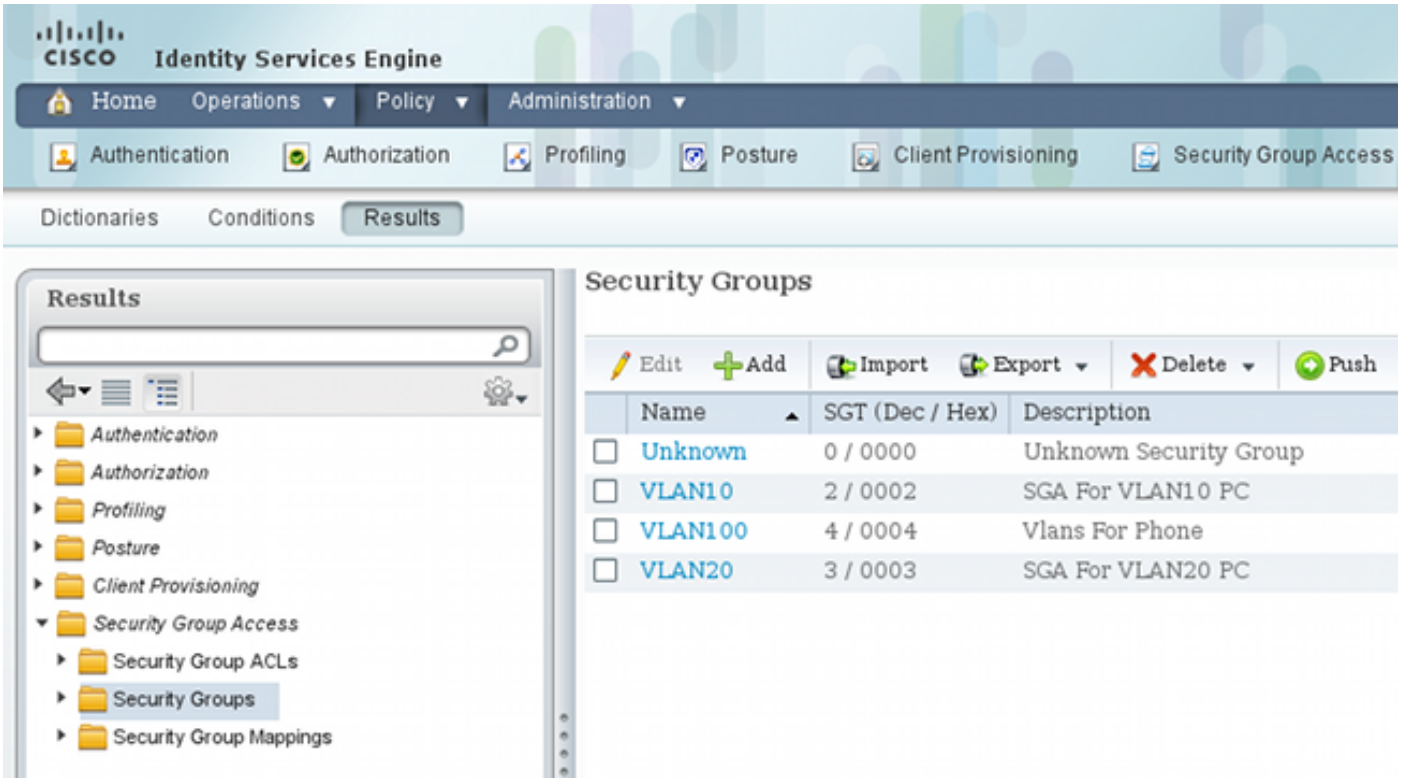
要配置授权策略，必须在**Policy > Results > Authorization > Authorization Profiles**下定义授权配置文件。包含可下载ACL(DACL)的VLAN10-Profile允许所有流量，用于MS Windows 7配置文件：



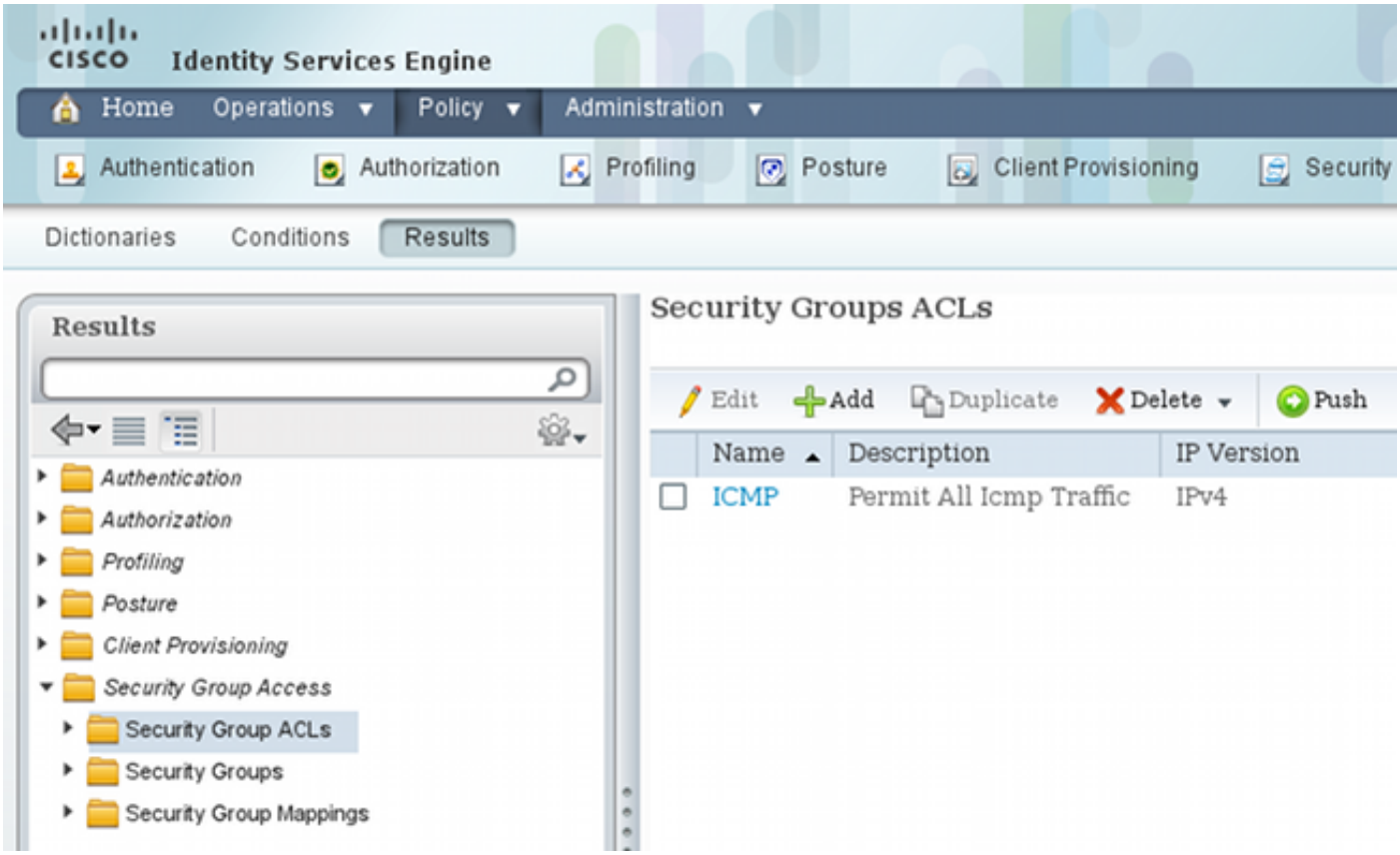
MS Windows XP使用类似的配置VLAN20-Profile，但VLAN编号(20)除外。

要在ISE上配置SGT组（标记），请导航至**策略>结果>安全组访问>安全组**。

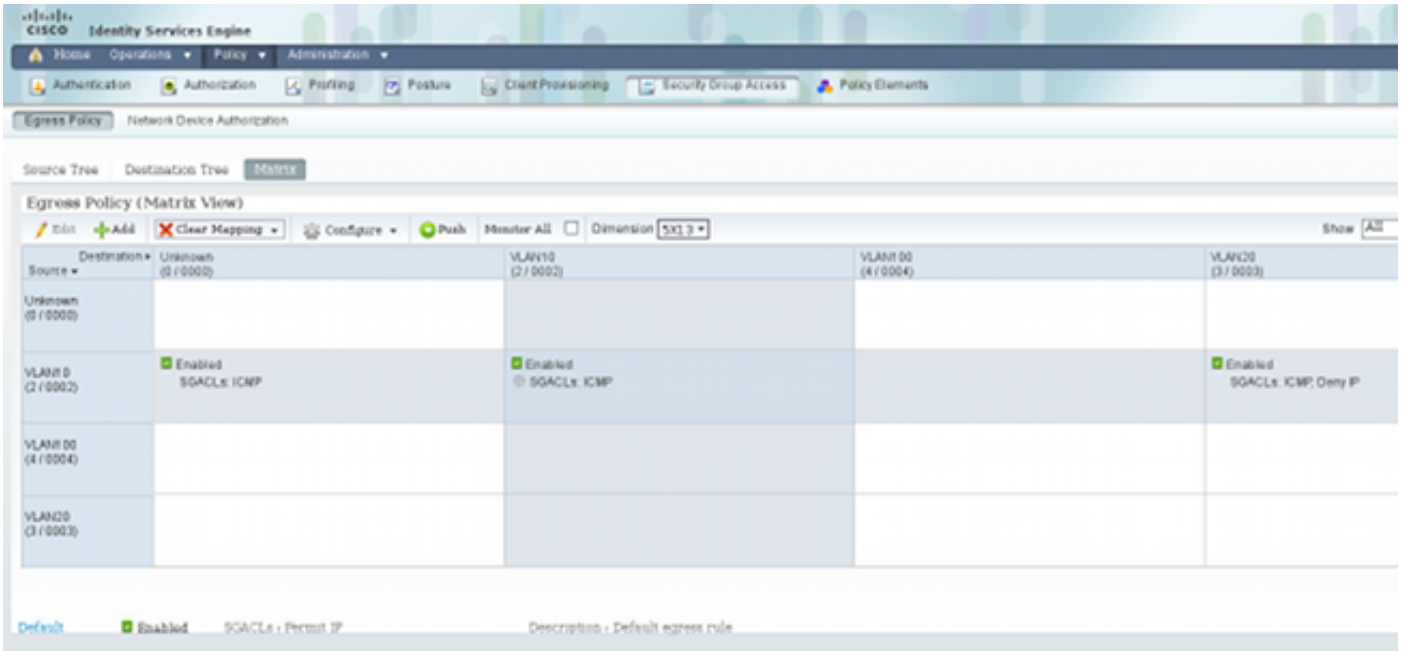
注意：不能选择标签号；它由第一个空闲号码自动选择，但1除外。您只能配置SGT名称。



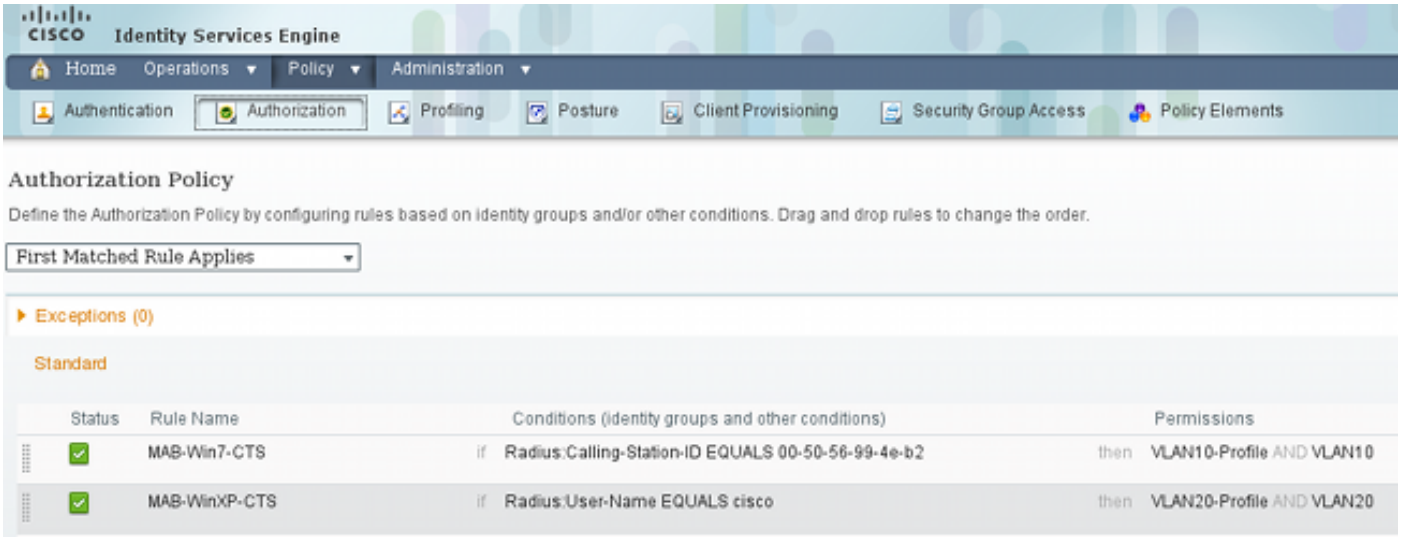
要创建SGACL以允许Internet控制消息协议(ICMP)流量，请导航到**Policy > Results > Security Group Access > Security Group ACLs**:



要创建策略，请导航到**Policy > Security Group Access > Egress Policy**。对于VLAN10与未知VLAN或VLAN10或VLAN20之间的流量，使用ICMP ACL(**permit icmp**):



要设置授权规则，请导航到**Policy > Authorization**。对于MS Windows 7（特定MAC地址），使用**VLAN10-Profile**，返回VLAN10和DACL，以及名为**VLAN10**的SGT的安全配置文件VLAN10。对于MS Windows XP（特定用户名），使用**VLAN20-Profile**，返回VLAN 20和DACL，使用名为**VLAN20**的SGT返回安全配置文件VLAN20。



完成交换机和ASA配置，以便它们接受SGT RADIUS属性。

ASA和3750X上的CTS配置

您必须配置基本CTS设置。在3750X上，必须指示应下载哪些服务器策略：

```
aaa authorization network ise group radius
cts authorization list ise
```

在ASA上，仅需要AAA服务器以及指向该服务器的CTS:

```
aaa-server ISE protocol radius
aaa-server ISE (mgmt) host 10.48.66.129
 key *****
cts server-group ISE
```

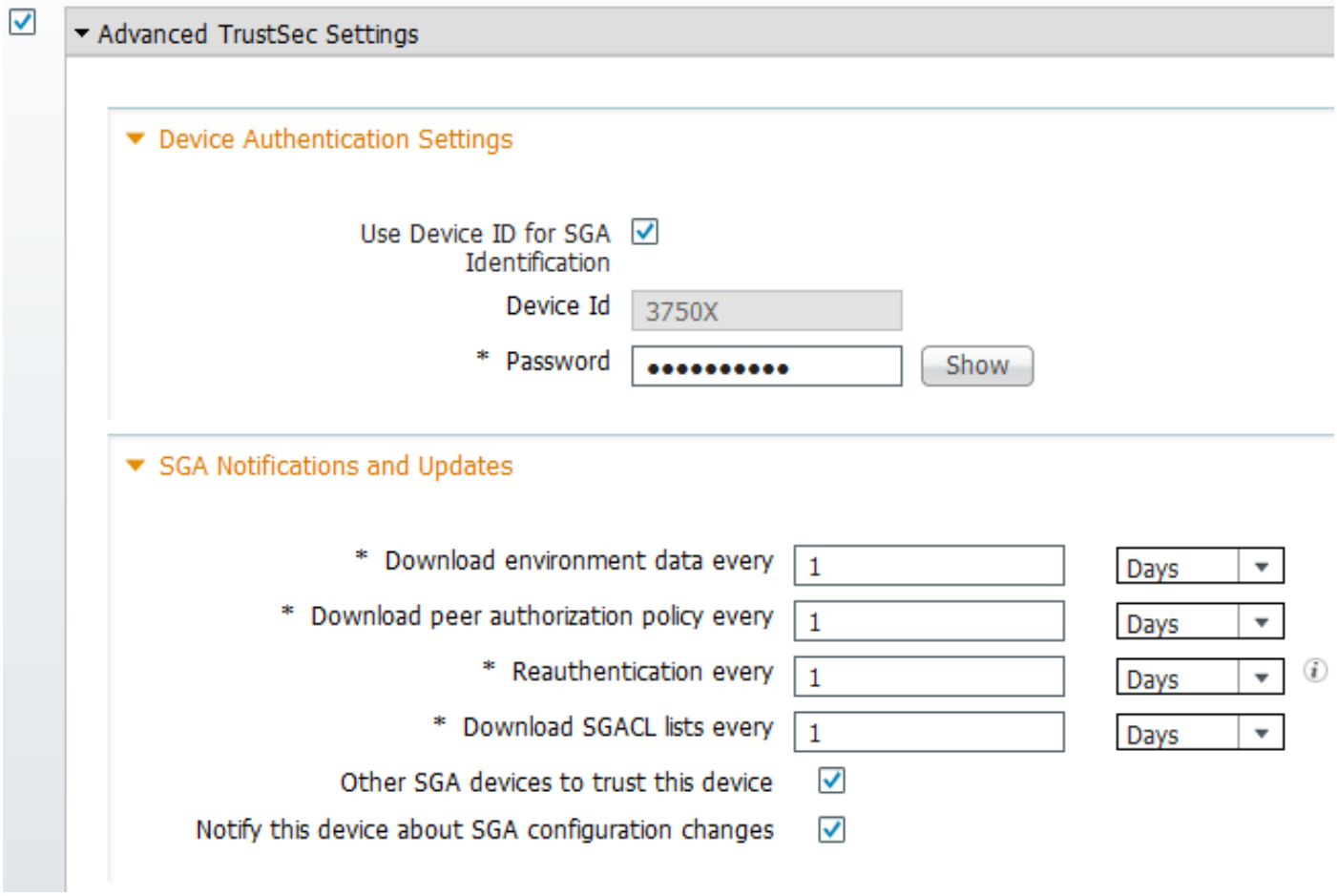
> **注**：在3750X上，必须使用**group radius**命令明确指向**ISE服**务器。这是因为3750X使用自动PAC调配。

3750X（自动）和ASA上的PAC调配（手动）

CTS云中的每台设备都必须通过身份验证服务器(ISE)进行身份验证，才能被其他设备信任。为此，它使用可扩展身份验证协议 — 通过安全协议的灵活身份验证(EAP-FAST)方法(RFC 4851)。此方法要求您在带外提供PAC。此过程也称为**phase0**，它未在任何RFC中定义。EAP-FAST的PAC具有类似于可扩展身份验证协议 — 传输层安全(EAP-TLS)的证书的角色。使用PAC建立安全隧道（第1阶段），在第2阶段进行身份验证时需要该安全隧道。

3750X上的PAC调配

3750X支持自动PAC调配。在交换机和ISE上使用共享密码来下载PAC。必须在ISE上的**Administration > Network Resources > Network Devices**下配置该密码和ID。选择交换机，然后展开**Advanced TrustSec Settings**部分以配置：



要让PAC使用这些凭证，请输入以下命令：

```
bsns-3750-5#cts credentials id 3750X password ciscocisco
bsns-3750-5#show cts pacs
 AID: C40A15A339286CEAC28A50DBBAC59784
 PAC-Info:
   PAC-type = Cisco Trustsec
   AID: C40A15A339286CEAC28A50DBBAC59784
   I-ID: 3750X
   A-ID-Info: Identity Services Engine
   Credential Lifetime: 08:04:40 UTC Sep 25 2013
 PAC-Opaque: 000200B000030001000400010C40A15A339286CEAC28A50DBBAC59784000600940003
010094F559DAE0C837D7847F2454CAD7E80B0000001351C8235900093A803D7D427BFB5C6F0FBBDF
7EDF0818C58FECF97F8BDECF1B115FB0240260ADA8C96A46AA2A64C9EA2DB51E0E886768CA2D133D
2468D9D33339204BAA7E4CA2DE8E37FF1EB5BCB343408E9847998E301C26DDC6F91711F631A5B4C7
C2CB09EAB028630A3B22901FE3EF44F66FD019D09D2C46D92283
 Refresh timer is set for 2y24w
```

ASA上的PAC调配

ASA仅支持手动PAC调配。这意味着您必须在ISE上手动生成它（在网络设备/ASA中）：

然后必须安装文件（例如，使用FTP）：

```
bsns-asa5510-17(config)# cts import-pac ftp://ftp:ftp@10.147.25.80/ASA.pac
password ciscocisco
!PAC Imported Successfully

bsns-asa5510-17(config)# show cts pac

 PAC-Info:
   Valid until: Jul 04 2014 13:33:02
   AID:         c40a15a339286ceac28a50dbbac59784
   I-ID:        ASA
   A-ID-Info:   Identity Services Engine
   PAC-type:    Cisco Trustsec
 PAC-Opaque:
   000200a800030001000400010c40a15a339286ceac28a50dbbac597840006008c000301
   0003d64668f2badc76e251683394b3d5690000001351d15dd900093a8044df74b2b71f
   e667d7b908db7aeea3229e61462bdb70f46580bef9425011126bbf6c2f4212ccdacf08
   c01ddbc7608c3a1ddeb996ba9bfbd1b207281e3edc9ff61b9e800f225dc3f82bd5f794
   7e0a86bee8a3d437af93f54e61858bac877c58d3fe0ec6be54b4c75fad23e1fd
```

ASA和3750X上的环境更新

在此阶段，两台设备都已正确安装PAC，并自动开始下载ISE环境数据。这些数据基本上是标记编号和它们的名称。要触发ASA上的环境刷新，请输入以下命令：

```
bsns-asa5510-17# cts refresh environment-data
```

要在ASA上验证它（很遗憾，您看不到特定SGT标记/名称，但稍后会进行验证），请输入以下命令：

```
bsns-asa5510-17(config)# show cts environment-data
CTS Environment Data
====================
Status:                    Active
Last download attempt:     Successful
Environment Data Lifetime: 86400 secs
Last update time:          05:05:16 UTC Apr 14 2007
Env-data expires in:       0:23:56:15 (dd:hr:mm:sec)
Env-data refreshes in:     0:23:46:15 (dd:hr:mm:sec)
```

要在3750X上验证它，请使用以下命令触发环境刷新：

```
bsns-3750-5#cts refresh environment-data
```

要验证结果，请输入以下命令：

```
bsns-3750-5#show cts environment-data
CTS Environment Data
====================
Current state = COMPLETE
Last status = Successful
Local Device SGT:
 SGT tag = 0-01:Unknown
Server List Info:
Installed list: CTSServerList1-0001, 1 server(s):
 *Server: 10.48.66.129, port 1812, A-ID C40A15A339286CEAC28A50DBBAC59784
         Status = ALIVE    flag(0x11)
         auto-test = TRUE, keywrap-enable = FALSE, idle-time = 60 mins,
deadtime = 20 secs
Security Group Name Table:
 0001-60 :
    0-47:Unknown
    2-47:VLAN10
    3-47:VLAN20
    4-47:VLAN100
Transport type = CTS_TRANSPORT_IP_UDP
Environment Data Lifetime = 86400 secs
Last update time = 05:33:49 UTC Thu Apr 7 2011
Env-data expires in   0:16:46:50 (dd:hr:mm:sec)
Env-data refreshes in 0:16:46:50 (dd:hr:mm:sec)
Cache data applied           = NONE
State Machine is running
```

这表示所有标记和相应的名称都已正确下载。

3750X上的端口身份验证验证和实施

在3750X具有环境数据后，必须验证SGT是否应用于经过身份验证的会话。

要验证MS Windows 7是否正确通过身份验证，请输入以下命令：

```
bsns-3750-5#show authentication sessions interface g1/0/2
           Interface:  GigabitEthernet1/0/2
         MAC Address:  0050.5699.4eb2
          IP Address:  192.168.1.200
           User-Name:  00-50-56-99-4E-B2
              Status:  Authz Success
              Domain:  DATA
     Security Policy:  Should Secure
     Security Status:  Unsecure
      Oper host mode:  single-host
    Oper control dir:  both
       Authorized By:  Authentication Server
         Vlan Policy:  10
             ACS ACL:  xACSACLx-IP-PERMIT_ALL_TRAFFIC-51134bb2
                 SGT:  0002-0
     Session timeout:  N/A
        Idle timeout:  N/A
   Common Session ID:  C0A800010000001002B67334C
     Acct Session ID:  0x00000179
              Handle:  0x94000101
```

```
Runnable methods list:
      Method   State
       mab      Authc Success
      dot1x    Not run
```

输出显示VLAN10与SGT 0002和DACL一起用于所有流量。

要验证MS Windows XP是否正确通过身份验证，请输入以下命令：

```
bsns-3750-5#sh authentication sessions interface g1/0/1
           Interface:  GigabitEthernet1/0/1
         MAC Address:  0050.5699.4ea1
          IP Address:  192.168.2.200
           User-Name:  cisco
              Status:  Authz Success
              Domain:  DATA
     Security Policy:  Should Secure
     Security Status:  Unsecure
      Oper host mode:  multi-auth
    Oper control dir:  both
       Authorized By:  Authentication Server
         Vlan Policy:  20
             ACS ACL:  xACSACLx-IP-PERMIT_ALL_TRAFFIC-51134bb2
                 SGT:  0003-0
     Session timeout:  N/A
        Idle timeout:  N/A
   Common Session ID:  C0A80001000000FE2B67334C
     Acct Session ID:  0x00000177
              Handle:  0x540000FF

Runnable methods list:
      Method   State
      dot1x    Authc Success
      mab      Not run
```

输出显示，VLAN 20与SGT 0003和DACL一起用于所有流量

使用ip device tracking功能检测IP地址。DHCP交换机应配置为dhcp snooping。然后，在监听DHCP响应后，它会获取客户端的IP地址。对于静态配置的IP地址（如本例所示），使用arp snooping功能，并且PC必须发送任何数据包才能检测交换机的IP地址。

对于**设备跟踪**，可能需要隐藏命令才能在端口上激活它：

```
bsns-3750-5#ip device tracking interface g1/0/1
bsns-3750-5#ip device tracking interface g1/0/2
bsns-3750-5#show ip device tracking all
IP Device Tracking = Enabled
IP Device Tracking Probe Count = 3
IP Device Tracking Probe Interval = 30
IP Device Tracking Probe Delay Interval = 0
---------------------------------------------------------------------
 IP Address     MAC Address   Vlan  Interface                STATE
---------------------------------------------------------------------
192.168.1.200   0050.5699.4eb2  10   GigabitEthernet1/0/2     ACTIVE
192.168.2.200   0050.5699.4ea1  20   GigabitEthernet1/0/1     ACTIVE

Total number interfaces enabled: 2
Enabled interfaces:
 Gi1/0/1, Gi1/0/2
```

3750X上的策略更新

3750X（与ASA不同）可以从ISE下载策略。在下载和实施策略之前，您必须使用以下命令启用策略：

```
bsns-3750-5(config)#cts role-based enforcement
bsns-3750-5(config)#cts role-based enforcement vlan-list 1-1005,1007-4094
```

如果未启用该策略，则下载该策略，但不会安装该策略，也不会将其用于实施。

要触发策略刷新，请输入以下命令：

```
bsns-3750-5#cts refresh policy
Policy refresh in progress
```

要验证是否已从ISE下载策略，请输入以下命令：

```
bsns-3750-5#show cts role-based permissions
IPv4 Role-based permissions default:
       Permit IP-00
IPv4 Role-based permissions from group 2:VLAN10 to group Unknown:
       ICMP-20
IPv4 Role-based permissions from group 2:VLAN10 to group 2:VLAN10:
       ICMP-20
IPv4 Role-based permissions from group 2:VLAN10 to group 3:VLAN20:
       ICMP-20
       Deny IP-00
```

输出显示仅下载策略的必要部分。

在CTS云中，数据包包含源主机的SGT，并在目**标设备上进行实施**。这意味着数据包将从源设备转发到最后一台设备，该设备直接连接到目的主机。该设备是实施点，因为它知道其直连主机的SGT，并知道对于特定目标SGT是否应该允许或拒绝具有源SGT的传入数据包。

此决定基于从ISE下载的策略。

在此场景中，所有策略都将被下载。但是，如果清除MS Windows XP身份验证会话(SGT=VLAN20)，则交换机无需下载任何与VLAN20对应的策略（行），因为该SGT中没有更多设备连接到交换机。

高级（故障排除）部分说明3750X如何通过检查数据包级别来决定应下载哪些策略。

SXP Exchange（将ASA用作侦听器，将3750X用作扬声器）

ASA不支持SGT。ASA会丢弃所有带有SGT的帧。因此，3750X无法向ASA发送SGT标记的帧。而是使用SXP。该协议允许ASA从交换机接收有关IP地址与SGT之间映射的信息。借助该信息，ASA能够将IP地址映射到SGT并根据SGACL做出决策。

要将3750X配置为扬声器，请输入以下命令：

```
cts sxp enable
cts sxp default source-ip 192.168.1.10
cts sxp default password cisco
```

```
cts sxp connection peer 192.168.1.1 password default mode local
```

要将ASA配置为侦听程序，请输入以下命令：

```
cts sxp enable
cts sxp default password *****
cts sxp default source-ip 192.168.1.1
cts sxp connection peer 192.168.1.10 password default mode local listener
```

要验证ASA是否已收到映射，请输入以下命令：

```
bsns-asa5510-17# show cts sxp sgt-map ipv4 detail
Total number of IP-SGT mappings : 2
Total number of IP-SGT mappings shown: 2

SGT        : 2:VLAN10
IPv4       : 192.168.1.200
Peer IP    : 192.168.1.10
Ins Num    : 1
Status     : Active
Seq Num    : 49

SGT        : 3:VLAN20
IPv4       : 192.168.2.200
Peer IP    : 192.168.1.10
Ins Num    : 1
Status     : Active
Seq Num    : 39
```

现在，当ASA收到源IP地址为192.168.1.200的传入数据包时，它能够将其视为来自SGT=2的传入数据包。对于源IP地址192.168.200.2，它能够将其视为来自SGT=3。目的IP地址也是如此。

> **注**:3750X必须知道关联主机的IP地址。这是通过IP设备跟踪完成的。对于终端主机上静态配置的IP地址，交换机必须在身份验证后接收任何数据包。这会触发IP设备跟踪以查找其IP地址，从而触发SXP更新。当只有SGT已知时，它不会通过SXP发送。

使用SGT ACL在ASA上过滤流量

以下是对ASA配置的检查：

```
interface Ethernet0/0
 nameif outside
 security-level 0
 ip address 192.168.1.1 255.255.255.0
!
interface Ethernet0/1
 nameif inside
 security-level 100
 ip address 192.168.2.1 255.255.255.0
```

创建一个ACL并将其应用于内部接口。它允许从SGT=3到SGT=2(称为VLAN10)的所有ICMP流量：

```
access-list inside extended permit icmp security-group tag 3 any security-group
name VLAN10 any
access-group inside in interface inside
```

注：您可以使用标记编号或标记名称。

如果从源IP地址为**192.168.2.200(SGT=3)的**MS Windows XP ping IP地址为**192.168.1.200(SGT=2)**的MS Windows 7，则ASA会建立连接：

```
%ASA-6-302020: Built outbound ICMP connection for faddr 192.168.1.200/0
(2:VLAN10) gaddr 192.168.2.200/512 laddr 192.168.2.200/512(3:VLAN20)
```

当您尝试使用Telnet时，流量会被阻止：

```
Deny tcp src inside:192.168.2.200/2478(3:VLAN20) dst outside:192.168.1.200/23
(2:VLAN10) by access-group "inside"
```

ASA上有更多配置选项。源和目标都可以使用安全标记和IP地址。此规则允许从**SGT标记= 3**和IP地址**192.168.2.200**到名为**VLAN10**的SGT标记和目标主机地址**192.168.1.200**的ICMP回应流量：

```
access-list inside extended permit icmp security-group tag 3 host 192.168.2.200
security-group name VLAN10 host 192.168.1.200 echo
```

对象组也可以实现此目的：

```
object-group security SGT-VLAN-10
 security-group name VLAN10
object-group security SGT-VLAN-20
 security-group tag 3
object-group network host1
 network-object host 192.168.1.200
object-group network host2
 network-object host 192.168.2.200
object-group service my-icmp-echo
 service-object icmp echo

access-list inside extended permit object-group my-icmp-echo
object-group-security SGT-VLAN-20 object-group host2 object-group-security
SGT-VLAN-10 object-group host1
```

使用从ISE下载的策略在3750X上进行流量过滤(RBACL)

也可以在交换机上定义本地策略。但是，此示例展示从ISE下载的策略。允许在ASA上定义的策略在一个规则中使用IP地址和SGT（以及来自Active Directory的用户名）。在交换机上定义的策略（本地和来自ISE）仅允许SGT。如果您需要在规则中使用IP地址，则建议在ASA上进行过滤。

测试MS Windows XP和MS Windows 7之间的ICMP流量。为此，您必须在MS Windows上将默认网关从ASA更改为3750X。3750X具有路由接口，能够路由数据包：

```
interface Vlan10
 ip address 192.168.1.10 255.255.255.0
!
interface Vlan20
 ip address 192.168.2.10 255.255.255.0
```

已从ISE下载策略。要验证它们，请输入以下命令：

```
 bsns-3750-5#show cts role-based permissions
IPv4 Role-based permissions default:
       Permit IP-00
IPv4 Role-based permissions from group 2:VLAN10 to group Unknown:
       ICMP-20
IPv4 Role-based permissions from group 2:VLAN10 to group 2:VLAN10:
       ICMP-20
IPv4 Role-based permissions from group 2:VLAN10 to group 3:VLAN20:
       ICMP-20
       Deny IP-00
```

从VLAN10(MS Windows 7)到VLAN20(MS WindowsXP)的流量受ICMP-20 ACL的制约，ICMP-20 ACL从ISE下载：

```
bsns-3750-5#show ip access-lists ICMP-20
Role-based IP access list ICMP-20 (downloaded)
   10 permit icmp
```

要验证ACL，请输入以下命令：

```
bsns-3750-5#show cts rbacl
CTS RBACL Policy
================
RBACL IP Version Supported: IPv4
 name   = Deny IP-00
 IP protocol version = IPV4
 refcnt = 2
 flag   = 0x41000000
 stale  = FALSE
 RBACL ACEs:
   deny ip

  name   = ICMP-20
 IP protocol version = IPV4
 refcnt = 6
 flag   = 0x41000000
 stale  = FALSE
 RBACL ACEs:
    permit icmp

 name   = Permit IP-00
 IP protocol version = IPV4
 refcnt = 2
 flag   = 0x41000000
 stale  = FALSE
 RBACL ACEs:
   permit ip
```

要验证SGT映射以确保来自两台主机的流量被正确标记，请输入以下命令：

```
bsns-3750-5#show cts role-based sgt-map all
Active IP-SGT Bindings Information

IP Address              SGT     Source
============================================
192.168.1.200           2       LOCAL
192.168.2.200           3       LOCAL

IP-SGT Active Bindings Summary
============================================
```

```
Total number of LOCAL    bindings = 2
Total number of active   bindings = 2
```

从MS Windows 7(**SGT=2**)到MS Windows XP(**SGT=3**)的ICMP与ACL ICMP-20配合使用效果良好。通过检查从**2**到**3**（15个允许的数据包）的流量计数器可以验证这一点：

```
bsns-3750-5#show cts role-based counters
Role-based IPv4 counters
# '-' in hardware counters field indicates sharing among cells with identical
policies
From    To      SW-Denied       HW-Denied       SW-Permitted    HW-Permitted

2       0       0               0               1695            224
2       2       0               -               0               -

*       *       0               0               133258          132921

2       3       0               0               0               15
```

在您尝试使用Telnet计数器后，被拒绝的数据包会增加（ICMP-20 ACL上不允许出现这种情况）：

```
bsns-3750-5#show cts role-based counters
Role-based IPv4 counters
# '-' in hardware counters field indicates sharing among cells with identical
policies
From    To      SW-Denied       HW-Denied       SW-Permitted    HW-Permitted

2       0       0               0               1695            224
2       2       0               -               0               -

*       *       0               0               133281          132969

2       3       0               2               0               15
```

> **注意**：输出中显示的星号(*)字符与所有未标记的流量相关(该列和行在ISE上的矩阵中称为unknown，并使用标记号**为0**)。

当您拥有带有log关键字的ACL条目（在ISE上定义）时，相应的数据包详细信息和采取的操作会与带有log关键字的任何ACL中记录相同。

验证

有关验证过程，请参阅各个配置部分。

故障排除

PAC调配

使用自动PAC调配时可能出现问题。请记住对RADIUS服务器使用**pac**关键字。3750X上的自动

PAC调配使用可扩展身份验证协议的EAP-FAST方法，内部方法使用Microsoft质询握手身份验证协议(EAP-MSCHAPv2)身份验证。在调试时，您会看到多个RADIUS消息，它们是EAP-FAST协商的一部分，用于构建安全隧道，该隧道使用具有已配置ID和密码的EAP-MSCHAPv2进行身份验证。

第一个RADIUS请求使用AAA **service-type=cts-pac-provisioning**以通知ISE这是一个PAC请求。

```
bsns-3750-5#debug cts provisioning events
bsns-3750-5#debug cts provisioning packets

*Mar  1 09:55:11.997: CTS-provisioning: New session socket: src=
10.48.66.109:57516 dst=10.48.66.129:1645
*Mar  1 09:55:11.997: CTS-provisioning: Sending EAP Response/Identity to
10.48.66.129
*Mar  1 09:55:11.997: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:11.997: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:11.997: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
*Mar  1 09:55:12.006: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.006: CTS-provisioning: Sending EAPFAST response to
10.48.66.129
*Mar  1 09:55:12.006: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.106: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.115: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
*Mar  1 09:55:12.744: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.744: CTS-provisioning: Sending EAPFAST response to
10.48.66.129
*Mar  1 09:55:12.744: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.844: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.844: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
*Mar  1 09:55:12.853: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.853: CTS-provisioning: Sending EAPFAST response to 10.48.66.129
*Mar  1 09:55:12.853: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.853: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.861: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
*Mar  1 09:55:12.861: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.861: CTS-provisioning: Sending EAPFAST response to 10.48.66.129
*Mar  1 09:55:12.861: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.878: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.878: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
*Mar  1 09:55:12.886: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.886: CTS-provisioning: Sending EAPFAST response to 10.48.66.129
*Mar  1 09:55:12.886: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.895: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.895: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
*Mar  1 09:55:12.895: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.895: CTS-provisioning: Sending EAPFAST response to 10.48.66.129
*Mar  1 09:55:12.903: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.912: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.912: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
*Mar  1 09:55:12.920: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.920: CTS-provisioning: Sending EAPFAST response to 10.48.66.129
*Mar  1 09:55:12.920: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.928: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.928: CTS-provisioning: Received RADIUS challenge from
10.48.66.129.
```

```
*Mar  1 09:55:12.970: CTS-pac-refresh: PAC C40A15A339286CEAC28A50DBBAC59784
refresh timer has been set for 20y30w
*Mar  1 09:55:12.970: CTS-provisioning: Ignoring key data.
*Mar  1 09:55:12.979: CTS-provisioning: Received TX_PKT from EAP method
*Mar  1 09:55:12.979: CTS-provisioning: Sending EAPFAST response to 10.48.66.129
*Mar  1 09:55:12.979: CTS-provisioning: OUTGOING RADIUS msg to 10.48.66.129:
*Mar  1 09:55:12.995: CTS-provisioning: INCOMING RADIUS msg from 10.48.66.129:
*Mar  1 09:55:12.995: CTS-provisioning: Received RADIUS reject from 10.48.66.129.
*Mar  1 09:55:12.995: CTS-provisioning: Successfully obtained PAC for A-ID
c40a15a339286ceac28a50dbbac59784
*Mar  1 09:55:12.995: CTS-provisioning: cts_provi_server_cleanup: 10.48.66.129
*Mar  1 09:55:12.995: CTS-provisioning: work complete, process terminating.
```

输出末尾的**RADIUS reject**是预期值，因为您已经收到PAC，并且没有执行进一步的身份验证过程。

请记住，与ISE的所有其他通信均需要PAC。但是，如果没有配置，交换机在配置时仍会尝试环境或策略刷新。然后，它不会在RADIUS请求中附加**cts-opaqueue**(PAC)，从而导致失败。

如果您的PAC密钥错误，此错误消息会显示在ISE上：

```
The Message-Authenticator RADIUS attribute is invalid
```

如果PAC密钥错误，您还会看到交换机上的调试(**debug cts provisioning + debug radius**)的以下输出：

```
Apr 20 10:07:11.768: CTS-provisioning: Sending EAP Response/Identity t
Apr 20 10:07:15.325: RADIUS(0000024B): Request timed out!
Apr 20 10:07:15.325: RADIUS: No response from (10.62.84.224:1645,1646) for
id 1645/37
```

如果使用现代**radius server**约定，则会显示：

```
radius server KRK-ISE
 address ipv4 10.62.84.224 auth-port 1645 acct-port 1646
 pac key CISCO
```

注意：您必须在ISE上使用您在设备身份验证设置**中使用的密码**。

PAC调配成功后，ISE上会显示以下内容：

Authentication Summary	
Logged At:	June 26,2013 1:36:32.676 PM
RADIUS Status:	PAC provisioned
NAS Failure:	
Username:	3750
MAC/IP Address:	BC:16:65:25:A5:00
Network Device:	3750X : 10.48.66.109 :
Allowed Protocol:	NDAC_SGT_Service
Identity Store:	Internal CTS Devices
Authorization Profiles:	
SGA Security Group:	
Authentication Protocol :	EAP-FAST(EAP-MSCHAPv2)

环境更新

环境刷新用于从ISE获取基本数据，包括SGT编号和名称。数据包级别显示它只有三个RADIUS请求和具有属性的响应。

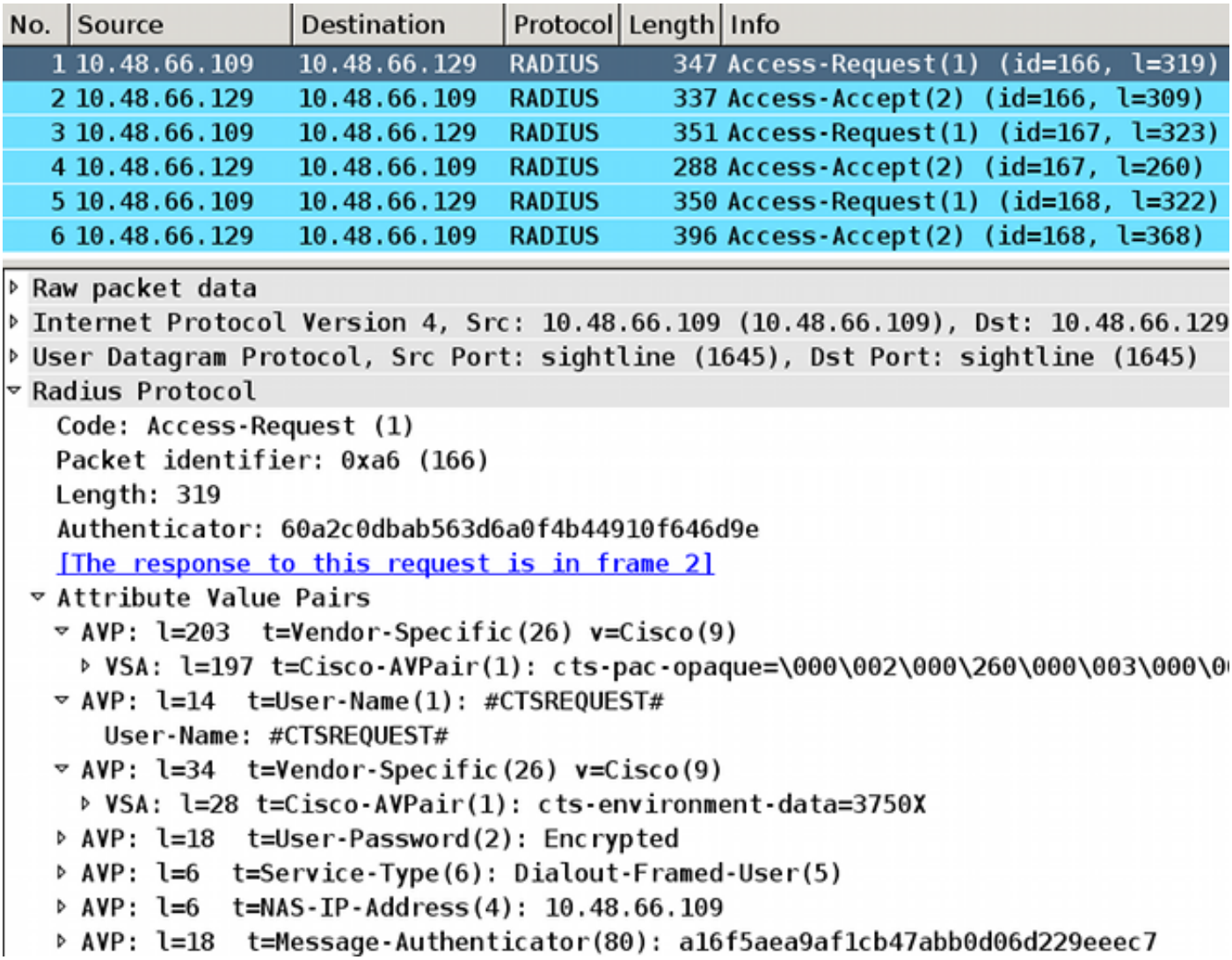
对于第一个请求，交换机收到**CTSServerlist**名称。对于第二个SGT，它会收到该列表的详细信息，对于最后一个SGT，它会收到带有标记和名称的所有SGT:

No.	Source	Destination	Protocol	Length	Info
1	10.48.66.109	10.48.66.129	RADIUS	347	Access-Request(1) (id=166, l=319)
2	10.48.66.129	10.48.66.109	RADIUS	337	Access-Accept(2) (id=166, l=309)
3	10.48.66.109	10.48.66.129	RADIUS	351	Access-Request(1) (id=167, l=323)
4	10.48.66.129	10.48.66.109	RADIUS	288	Access-Accept(2) (id=167, l=260)
5	10.48.66.109	10.48.66.129	RADIUS	350	Access-Request(1) (id=168, l=322)
6	10.48.66.129	10.48.66.109	RADIUS	396	Access-Accept(2) (id=168, l=368)

```
Authenticator: b1672c429de0593417de4315ee0bd40c
[This is a response to a request in frame 5]
[Time from request: 0.008000000 seconds]
▾ Attribute Value Pairs
  ▾ AVP: l=14  t=User-Name(1): #CTSREQUEST#
      User-Name: #CTSREQUEST#
  ▸ AVP: l=40  t=State(24): 52656175746853657373696f6e3a306133303432383130...
  ▸ AVP: l=50  t=Class(25): 434143533a3061333034323831303030303134303353143...
  ▸ AVP: l=6  t=Termination-Action(29): RADIUS-Request(1)
  ▸ AVP: l=18  t=Message-Authenticator(80): ac8e7b6f0d59da776f0dbf1ffa04baf1
  ▾ AVP: l=39  t=Vendor-Specific(26) v=Cisco(9)
    ▸ VSA: l=33 t=Cisco-AVPair(1): cts:security-group-table=0001-5
  ▾ AVP: l=46  t=Vendor-Specific(26) v=Cisco(9)
    ▸ VSA: l=40 t=Cisco-AVPair(1): cts:security-group-info=0-0-00-Unknown
  ▾ AVP: l=45  t=Vendor-Specific(26) v=Cisco(9)
    ▸ VSA: l=39 t=Cisco-AVPair(1): cts:security-group-info=ffff-0-00-ANY
  ▾ AVP: l=45  t=Vendor-Specific(26) v=Cisco(9)
    ▸ VSA: l=39 t=Cisco-AVPair(1): cts:security-group-info=2-0-00-VLAN10
  ▾ AVP: l=45  t=Vendor-Specific(26) v=Cisco(9)
    ▸ VSA: l=39 t=Cisco-AVPair(1): cts:security-group-info=3-0-00-VLAN20
```

此处可以看到默认**SGT 0**和 **ffff**，以及两个自定义：SGT标记2命名为**VLAN10**,SGT标记3命名为**VLAN20**。

注意：由于PAC调配，所有RADIUS请求都包括**cts-pac-opaque**。



No.	Source	Destination	Protocol	Length	Info
1	10.48.66.109	10.48.66.129	RADIUS	347	Access-Request(1) (id=166, l=319)
2	10.48.66.129	10.48.66.109	RADIUS	337	Access-Accept(2) (id=166, l=309)
3	10.48.66.109	10.48.66.129	RADIUS	351	Access-Request(1) (id=167, l=323)
4	10.48.66.129	10.48.66.109	RADIUS	288	Access-Accept(2) (id=167, l=260)
5	10.48.66.109	10.48.66.129	RADIUS	350	Access-Request(1) (id=168, l=322)
6	10.48.66.129	10.48.66.109	RADIUS	396	Access-Accept(2) (id=168, l=368)

在3750X上，您应该看到所有三种RADIUS响应的调试，以及相应的列表、列表详细信息和特定SGT内部列表：

```
bsns-3750-5#debug cts environment-data all

*Mar  1 10:05:07.454: CTS env-data&colon; cleanup mcast SGT table
*Mar  1 10:05:18.057: CTS env-data&colon; Force environment-data refresh
*Mar  1 10:05:18.057: CTS env-data&colon; download transport-type =
CTS_TRANSPORT_IP_UDP
*Mar  1 10:05:18.057:     cts_env_data START: during state env_data_complete,
got event 0(env_data_request)
*Mar  1 10:05:18.057: @@@ cts_env_data START: env_data_complete ->
env_data_waiting_rsp
*Mar  1 10:05:18.057: env_data_waiting_rsp_enter: state = WAITING_RESPONSE
*Mar  1 10:05:18.057: env_data_request_action: state = WAITING_RESPONSE
*Mar  1 10:05:18.057: cts_env_data_is_complete: FALSE, req(x0), rec(x0),
expect(x81), complete1(x85), complete2(xB5), complete3(x28B5)
*Mar  1 10:05:18.057: cts_aaa_req_setup: (CTS env-data)Private group appears DEAD,
attempt public group
*Mar  1 10:05:18.057: cts_aaa_req_setup: (CTS env-data)CTS_TRANSPORT_IP_UDP
*Mar  1 10:05:18.057: cts_aaa_req_setup: (CTS env-data)AAA req(x7C3DF10)
*Mar  1 10:05:18.057: cts_aaa_attr_add: AAA req(0x7C3DF10)
*Mar  1 10:05:18.057:   username = #CTSREQUEST#
*Mar  1 10:05:18.057:   cts-environment-data = 3750X
*Mar  1 10:05:18.057: cts_aaa_req_send: AAA req(0x7C3DF10) successfully sent to AAA.
*Mar  1 10:05:18.083: cts_aaa_callback: (CTS env-data)AAA req(0x7C3DF10)
response success
```

```
*Mar  1 10:05:18.083:   AAA attr: Unknown type (447).
*Mar  1 10:05:18.083:   AAA attr: Unknown type (220).
*Mar  1 10:05:18.083:   AAA attr: Unknown type (275).
*Mar  1 10:05:18.083:   AAA attr: server-list = CTSServerList1-0001.
*Mar  1 10:05:18.083:   AAA attr: security-group-tag = 0000-00.
*Mar  1 10:05:18.083:   AAA attr: environment-data-expiry = 86400.
*Mar  1 10:05:18.083:   AAA attr: security-group-table = 0001-5.
*Mar  1 10:05:18.083: CTS env-data&colon; Receiving AAA attributes
 CTS_AAA_SLIST
    slist name(CTSServerList1) received in 1st Access-Accept
   slist name(CTSServerList1) created
 CTS_AAA_SECURITY_GROUP_TAG - SGT = unicast-unknown-00
 CTS_AAA_ENVIRONMENT_DATA_EXPIRY = 86400.
 CTS_AAA_SGT_NAME_LIST
   table(0001) received in 1st Access-Accept
   old name(), gen()
   new name(0001), gen(50)
 CTS_AAA_DATA_END
*Mar  1 10:05:18.083:     cts_env_data WAITING_RESPONSE: during state
env_data_waiting_rsp, got event 1(env_data_received)
*Mar  1 10:05:18.083: @@@ cts_env_data WAITING_RESPONSE: env_data_waiting_rsp ->
env_data_assessing
*Mar  1 10:05:18.083: env_data_assessing_enter: state = ASSESSING
*Mar  1 10:05:18.083: env_data_assessing_action: state = ASSESSING
*Mar  1 10:05:18.083: cts_env_data_is_complete: FALSE, req(x1089), rec(xC83),
expect(x28B5), complete1(x85), complete2(xB5), complete3(x28B5)
*Mar  1 10:05:18.083:     cts_env_data ASSESSING: during state env_data_assessing,
got event 3(env_data_incomplete)
*Mar  1 10:05:18.083: @@@ cts_env_data ASSESSING: env_data_assessing ->
env_data_waiting_rsp
*Mar  1 10:05:18.083: env_data_waiting_rsp_enter: state = WAITING_RESPONSE
*Mar  1 10:05:18.083: env_data_request_action: state = WAITING_RESPONSE
*Mar  1 10:05:18.083: cts_env_data_is_complete: FALSE, req(x1089), rec(xC83),
expect(x28B5), complete1(x85), complete2(xB5), complete3(x28B5)
*Mar  1 10:05:18.083: cts_aaa_req_setup: (CTS env-data)Private group appears DEAD,
attempt public group
*Mar  1 10:05:18.083: cts_aaa_req_setup: (CTS env-data)CTS_TRANSPORT_IP_UDP
*Mar  1 10:05:18.083: cts_aaa_req_setup: (CTS env-data)AAA req(x792FFD0)
*Mar  1 10:05:18.083: cts_aaa_attr_add: AAA req(0x792FFD0)
*Mar  1 10:05:18.091:   username = #CTSREQUEST#
*Mar  1 10:05:18.091:   cts-server-list = CTSServerList1
*Mar  1 10:05:18.091: cts_aaa_req_send: AAA req(0x792FFD0) successfully sent to AAA.
*Mar  1 10:05:18.099: cts_aaa_callback: (CTS env-data)AAA req(0x792FFD0)
response success
*Mar  1 10:05:18.099:   AAA attr: Unknown type (447).
*Mar  1 10:05:18.099:   AAA attr: Unknown type (220).
*Mar  1 10:05:18.099:   AAA attr: Unknown type (275).
*Mar  1 10:05:18.099:   AAA attr: server-list = CTSServerList1-0001.
*Mar  1 10:05:18.099:   AAA attr: server = c40a15a339286ceac28a50dbbac59784:
10.48.66.129:1812.
*Mar  1 10:05:18.099: CTS env-data&colon; Receiving AAA attributes
 CTS_AAA_SLIST
    2nd Access-Accept slist name(CTSServerList1), gen(0001)
 CTS_AAA_SERVERS
   server (c40a15a339286ceac28a50dbbac59784:10.48.66.129:1812) added
 CTS_AAA_DATA_END
*Mar  1 10:05:18.099:     cts_env_data WAITING_RESPONSE: during state
env_data_waiting_rsp, got event 1(env_data_received)
*Mar  1 10:05:18.099: @@@ cts_env_data WAITING_RESPONSE: env_data_waiting_rsp ->
env_data_assessing
*Mar  1 10:05:18.099: env_data_assessing_enter: state = ASSESSING
*Mar  1 10:05:18.099: env_data_assessing_action: state = ASSESSING
*Mar  1 10:05:18.099: cts_env_data_is_complete: FALSE, req(x108D), rec(xC87),
expect(x28B5), complete1(x85), complete2(xB5), complete3(x28B5)
```

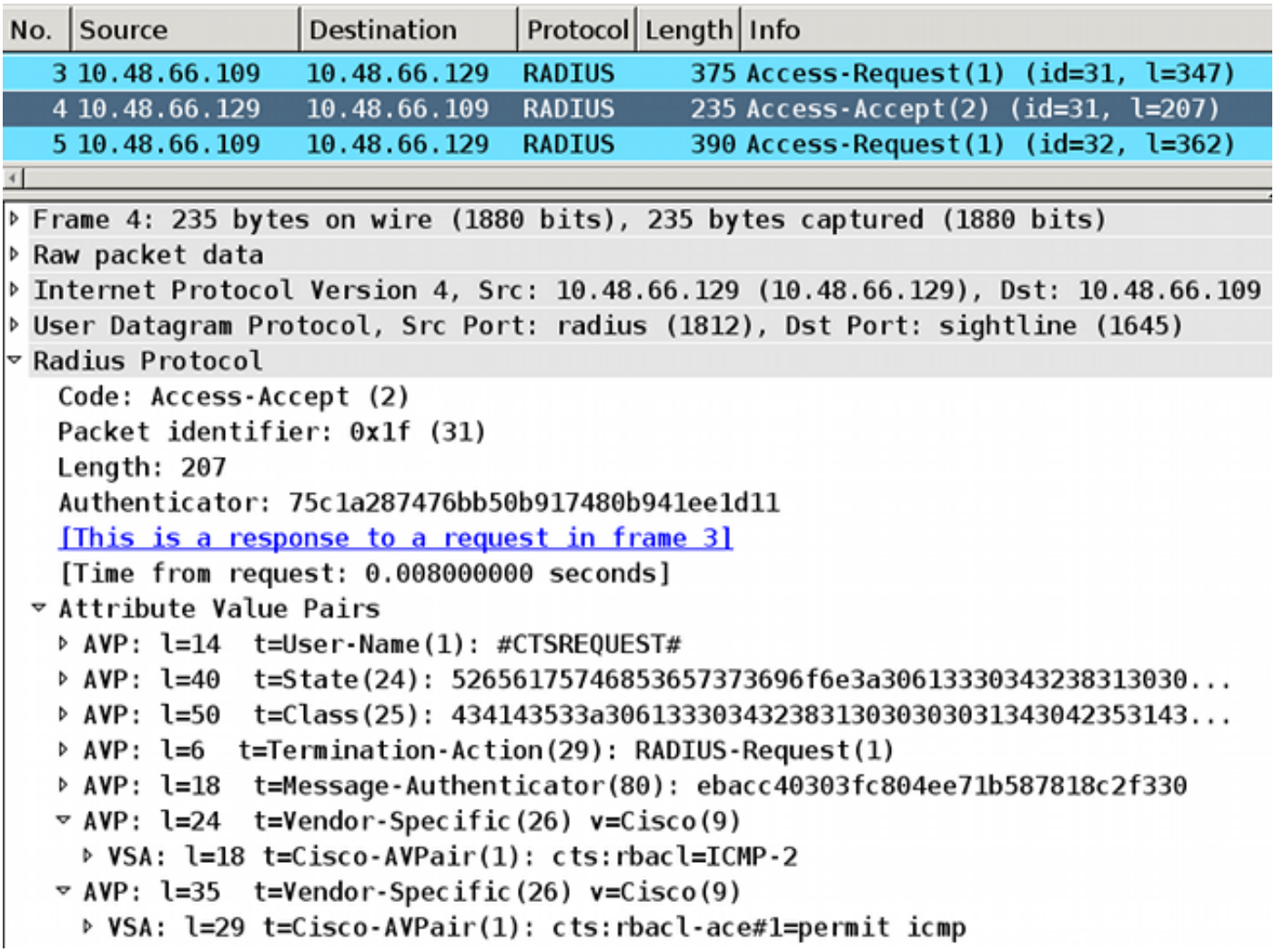
```
*Mar  1 10:05:18.099:     cts_env_data ASSESSING: during state env_data_assessing,
got event 3(env_data_incomplete)
*Mar  1 10:05:18.099: @@@ cts_env_data ASSESSING: env_data_assessing ->
env_data_waiting_rsp
*Mar  1 10:05:18.099: env_data_waiting_rsp_enter: state = WAITING_RESPONSE
*Mar  1 10:05:18.099: env_data_request_action: state = WAITING_RESPONSE
*Mar  1 10:05:18.099: cts_env_data_is_complete: FALSE, req(x108D), rec(xC87),
expect(x28B5), complete1(x85), complete2(xB5), complete3(x28B5)
*Mar  1 10:05:18.099: cts_aaa_req_setup: (CTS env-data)Using private server group
*Mar  1 10:05:18.099: cts_aaa_req_setup: (CTS env-data)CTS_TRANSPORT_IP_UDP
*Mar  1 10:05:18.099: cts_aaa_req_setup: (CTS env-data)AAA req(x7A6C4AC)
*Mar  1 10:05:18.099: cts_aaa_attr_add: AAA req(0x7A6C4AC)
*Mar  1 10:05:18.099:   username = #CTSREQUEST#
*Mar  1 10:05:18.099:   cts-security-group-table = 0001
*Mar  1 10:05:18.099: cts_aaa_req_send: AAA req(0x7A6C4AC) successfully sent to AAA.
*Mar  1 10:05:18.108: cts_aaa_callback: (CTS env-data)AAA req(0x7A6C4AC)
response success
*Mar  1 10:05:18.108:   AAA attr: Unknown type (447).
*Mar  1 10:05:18.108:   AAA attr: Unknown type (220).
*Mar  1 10:05:18.108:   AAA attr: Unknown type (275).
*Mar  1 10:05:18.108:   AAA attr: security-group-table = 0001-5.
*Mar  1 10:05:18.108:   AAA attr: security-group-info = 0-0-00-Unknown.
*Mar  1 10:05:18.108:   AAA attr: security-group-info = ffff-0-00-ANY.
*Mar  1 10:05:18.108:   AAA attr: security-group-info = 2-0-00-VLAN10.
*Mar  1 10:05:18.108:   AAA attr: security-group-info = 3-0-00-VLAN20.
*Mar  1 10:05:18.108:  CTS env-data&colon; Receiving AAA attributes
 CTS_AAA_SGT_NAME_LIST
   table(0001) received in 2nd Access-Accept
   old name(0001), gen(50)
   new name(0001), gen(50)
 CTS_AAA_SGT_NAME_INBOUND - SGT = unicast-unknown-00
   flag (128) server name (Unknown) added
  name (0001), request (1), receive (1)
  Setting SG Name receving bit CTS_ENV_DATA_SGT_NAME_ENTRY on
 CTS_AAA_SGT_NAME_INBOUND - SGT = unicast-default-00
   flag (128) server name (ANY) added
  name (0001), request (1), receive (1)
  Setting SG Name receving bit CTS_ENV_DATA_SGT_NAME_ENTRY on
 CTS_AAA_SGT_NAME_INBOUND - SGT = 2-00
   flag (128) server name (VLAN10) added
  name (0001), request (1), receive (1)
  Setting SG Name receving bit CTS_ENV_DATA_SGT_NAME_ENTRY on
 CTS_AAA_SGT_NAME_INBOUND - SGT = 3-00
   flag (128) server name (VLAN20) added
  name (0001), request (1), receive (1)
  Setting SG Name receving bit CTS_ENV_DATA_SGT_NAME_ENTRY on
 CTS_AAA_DATA_END
*Mar  1 10:05:18.108:     cts_env_data WAITING_RESPONSE: during state
env_data_waiting_rsp, got event 1(env_data_received)
*Mar  1 10:05:18.108: @@@ cts_env_data WAITING_RESPONSE: env_data_waiting_rsp ->
env_data_assessing
*Mar  1 10:05:18.108: env_data_assessing_enter: state = ASSESSING
*Mar  1 10:05:18.108: env_data_assessing_action: state = ASSESSING
*Mar  1 10:05:18.116: cts_env_data_is_complete: TRUE, req(x2085), rec(x2C87),
expect(x81), complete1(x85), complete2(xB5), complete3(x28B5)
*Mar  1 10:05:18.116:     cts_env_data ASSESSING: during state env_data_assessing,
got event 4(env_data_complete)
*Mar  1 10:05:18.116: @@@ cts_env_data ASSESSING: env_data_assessing ->
env_data_complete
*Mar  1 10:05:18.116: env_data_complete_enter: state = COMPLETE
*Mar  1 10:05:18.116: env_data_install_action: state = COMPLETE
```

策略刷新

只有交换机支持策略刷新。它类似于环境更新。这些只是RADIUS请求和接受。

交换机要求输入默认列表中的所有ACL。然后，对于每个不是最新（或不存在）的ACL，它会发送另一个请求以获取详细信息。

以下是请求ICMP-20 ACL时的响应示例：



请记住，您必须配置**cts role-based enforcement**才能实施该ACL。

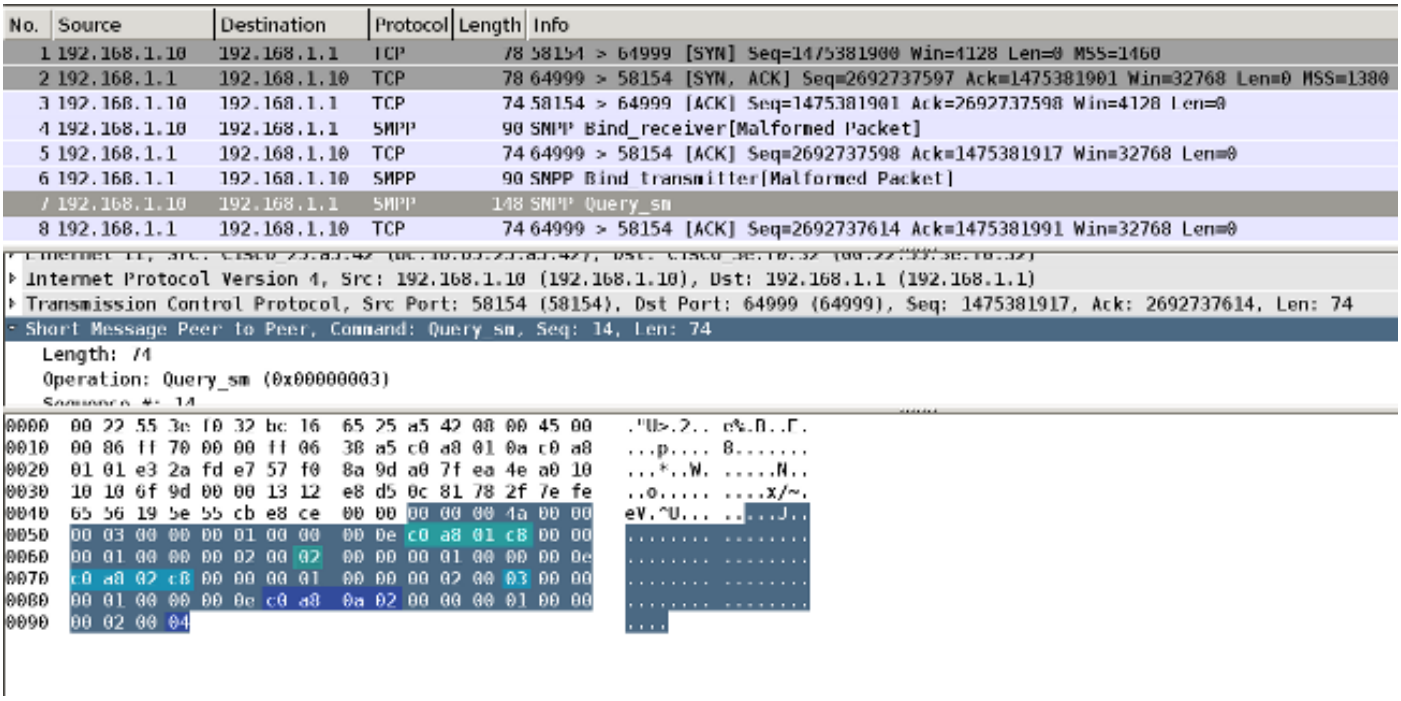
调试指示是否发生更改（基于gen ID）。如果需要，您可以卸载旧策略，并安装新策略。这包括ASIC编程（硬件支持）。

```
bsns-3750-5#debug cts all

Mar 30 02:39:37.151:  CTS authz entry: peer(Unknown-2) Receiving AAA attributes
   rcv rbacl list: flags: req(81)rcv(0)wait(80)prev(0)install(880)
    - SGT = 2-01:VLAN10
    - SGT = 2-01:VLAN10
   current arg_cnt=8, expected_num_args=11
   3rd Access-Accept rbacl received name(ICMP), gen(20)
   received_policyp->sgt(2-01:VLAN10)
   existing sgt_policy(73FFDB4) sgt(2-01:VLAN10)
   RBACL name(ICMP-20)flag(40000000) already exists
  acl_listp(740266C) old_acl_infop(0),exist_rbacl_type(0)
 CTS_AAA_AUTHORIZATION_EXPIRY = 86400.
 CTS_AAA_DATA_END
```

```
Mar 30 02:39:37.176: cts_authz_entry_complete_action: Policy download complete -
peer(Unknown-2) SGT(2-01:VLAN10) status(RBACL-POLICY SUCCEEDED)
Mar 30 02:39:37.176: cts_authz_rbacl_uninstall_cb:
Mar 30 02:39:37.176: uninstall cb_ctx:
Mar 30 02:39:37.176:   session_hdl = F1000003
Mar 30 02:39:37.176:   sgt_policyp = 73FFDB4, sgt=(2-01:VLAN10), magic(BABECABB)
Mar 30 02:39:37.176:   ip_version  = IPV6
Mar 30 02:39:37.176:   src-or-dst  = BOTH
Mar 30 02:39:37.176:   wait_rbm_install_ip_ver(0)
Mar 30 02:39:37.176:   wait_rbm_uninstall_ip_ver(C0000000)
Mar 30 02:39:37.176: cts_authz_rbacl_uninstall_cb:
Mar 30 02:39:37.176: uninstall cb_ctx:
Mar 30 02:39:37.176:   session_hdl = F1000003
Mar 30 02:39:37.176:   sgt_policyp = 73FFDB4, sgt=(2-01:VLAN10), magic(BABECABB)
Mar 30 02:39:37.176:   ip_version  = IPV4
Mar 30 02:39:37.176:   src-or-dst  = BOTH
Mar 30 02:39:37.176:   wait_rbm_install_ip_ver(0)
Mar 30 02:39:37.176:   wait_rbm_uninstall_ip_ver(40000000)

Mar 30 02:39:37.210: install cb_ctx:
Mar 30 02:39:37.210:   session_hdl = F1000003
Mar 30 02:39:37.210:   sgt_policyp = 73FFDB4, sgt=(2-01:VLAN10), magic(BABECABB)
Mar 30 02:39:37.210:   ip_version  = IPV6
Mar 30 02:39:37.210:   src-or-dst  = SRC
Mar 30 02:39:37.210:   wait_rbm_install_ip_ver(C0000000)
Mar 30 02:39:37.210:   wait_rbm_uninstall_ip_ver(0)
Mar 30 02:39:37.210: cts_authz_rbacl_install_cb: Waiting for more RBM callback
for remaining IP version(40000000) RBACL policy(73FFDB4) for SGT(2-01:VLAN10)
flag(41400001)
Mar 30 02:39:37.210: cts_authz_rbacl_install_cb:
Mar 30 02:39:37.210: install cb_ctx:
Mar 30 02:39:37.210:   session_hdl = F1000003
Mar 30 02:39:37.210:   sgt_policyp = 73FFDB4, sgt=(2-01:VLAN10), magic(BABECABB)
Mar 30 02:39:37.210:   ip_version  = IPV4
Mar 30 02:39:37.210:   src-or-dst  = SRC
Mar 30 02:39:37.210:   wait_rbm_install_ip_ver(40000000)
Mar 30 02:39:37.210:   wait_rbm_uninstall_ip_ver(0)
Mar 30 02:39:37.210: cts_authz_rbacl_install_cb: Program RBACL policy(73FFDB4)
for SGT(2-01:VLAN10) flag(41400001) success
```

SXP交换

SXP更新由查找设备IP地址的IP设备跟踪代码触发。然后，使用短消息对等设备(SMPP)协议发送更新。它使用**TCP选项19**进行身份验证，该选项与边界网关协议(BGP)相同。SMPP负载未加密。Wireshark没有适用于SMPP负载的正确解码器，但很容易找到其中的数据：



- 第一个c0 a8 01 c8是192.168.1.200，并且带有标记2。
- 第二个c0 a8 02 c8是192.168.2.200,带有标记3。
- 第三个c0 a8 0a 02是192.168.10.2，具有tag 4(此标记用于测试电话SGT=4)

在IP设备跟踪找到MS Windows 7的IP地址后，在3750X上进行了以下调试：

```
bsns-3750-5#debug cts sxp message
bsns-3750-5#debug cts sxp internal
bsns-3750-5#debug cts sxp conn
bsns-3750-5#debug cts sxp mdb
bsns-3750-5#debug cts sxp error

Apr  7 00:39:06.874: CTS-SXP-CONN:sxp_process_message_event = CTS_SXPMSG_REQUEST
Apr  7 00:39:06.874: CTS-SXP-CONN:sxp_process_request  CTS_SXPMSG_REQ_CONN_NVGEN
Apr  7 00:39:06.874: CTS-SXP-CONN:cts_get_next_sxpconn_cli
Apr  7 00:39:06.874: CTS-SXP-CONN:cts_get_next_sxpconn_cli
Apr  7 00:39:06.874: CTS-SXP-INTNL:sxp_process_request boolean set
Apr  7 00:39:06.874: CTS-SXP-INTNL:sxp_send_request set boolean after
Apr  7 00:40:05.418: CTS-SXP-CONN:is_cts_sxp_rf_active
Apr  7 00:40:05.418: CTS-SXP-MDB:sxp_export_ipsgt_change 192.168.1.200/32 add 1
```

以下是ASA上的相应调试：

```
bsns-asa5510-17# debug cts sxp all

%ASA-7-776018: CTS SXP: Binding 192.168.1.200->2:VLAN10 from peer 192.168.1.10
(instance 1) added in SXP database.
%ASA-7-776019: CTS SXP: Binding 192.168.1.200->2:VLAN10 added. Update binding
manager.
%ASA-6-776251: CTS SGT-MAP: Binding 192.168.1.200->2:VLAN10 from SXP added to
binding manager.
%ASA-7-776014: CTS SXP: SXP received binding forwarding request (add) binding
192.168.1.200->2:VLAN10.
```

为了查看ASA上的更多调试，您可以启用调试详细级别：

```
bsns-asa5510-17# debug cts condition level detail
debug cts condition level detail is enable
```

ASA上的SGACL

在ASA正确安装SXP收到的SGT映射后，安全组ACL应该可以正常工作。当映射遇到问题时，请输入：

```
bsns-asa5510-17# debug cts sgt-map
```

带有security-group的ACL与IP地址或用户身份的ACL的工作方式完全相同。日志可揭示问题，以及所命中的ACL的确切条目。

以下是从MS Windows XP到MS Windows 7的ping，表明Packet Tracer工作正常：

```
bsns-asa5510-17# packet-tracer input inside icmp 192.168.2.200 8 0 192.168.1.200
detailed
<output ommitted>

Phase: 2
Type: ACCESS-LIST
Subtype: log
Result: ALLOW
Config:
access-group inside in interface inside
access-list inside extended permit icmp security-group tag 3 any security-group
name VLAN10 any
Additional Information:
 Forward Flow based lookup yields rule:
 in  id=0xaaf2ae80, priority=13, domain=permit, deny=false
       hits=185, user_data=0xaa2f5040, cs_id=0x0, use_real_addr, flags=0x0,
protocol=1
       src ip/id=0.0.0.0, mask=0.0.0.0, icmp-type=0, tag=3:VLAN20
       dst ip/id=0.0.0.0, mask=0.0.0.0, icmp-code=0, tag=2:VLAN10, dscp=0x0
       input_ifc=inside, output_ifc=any

<output ommitted>
```

相关信息

- 适用于3750的Cisco TrustSec配置指南
- 适用于ASA 9.1的思科TrustSec配置指南
- Cisco TrustSec部署和路线图
- 技术支持和文档 - Cisco Systems

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