Configuring Cisco TrustSec

This chapter describes how to configure Cisco TrustSec on Cisco NX-OS devices.

This chapter includes the following sections:

Information About Cisco TrustSec

This section provides information about Cisco TrustSec.

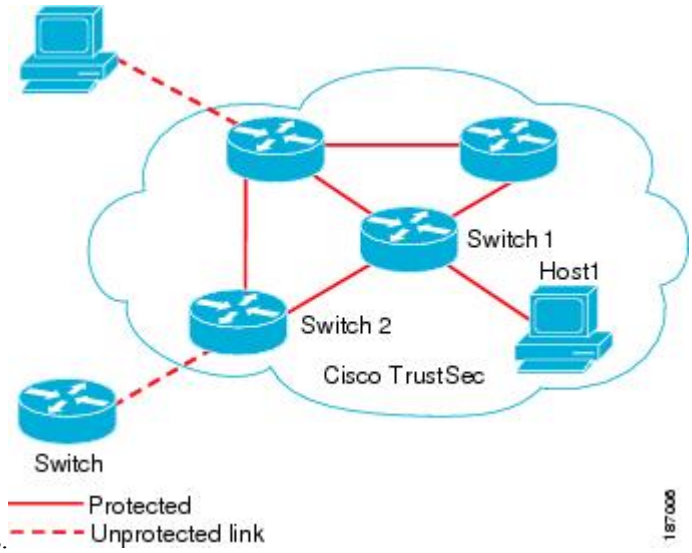
Cisco TrustSec Architecture

The Cisco TrustSec security architecture builds secure networks by establishing clouds of trusted network devices. Cisco TrustSec also uses the device information acquired during authentication for classifying, or coloring, the packets as they enter the network. This packet classification is maintained by tagging packets on ingress to the Cisco TrustSec network so that they can be properly identified for the purpose of applying security and other policy criteria along the data path. The tag, also called the security group tag (SGT), allows the network to enforce the access control policy by enabling the endpoint device to act upon the SGT to filter traffic.

Note Ingress refers to entering the first Cisco TrustSec-capable device encountered by a packet on its path to the destination and egress refers to leaving the last Cisco TrustSec-capable device on the path.

Figure 1: Cisco TrustSec Network Cloud Example

This figure shows an example of a Cisco TrustSec cloud. In this example, several networking devices and an endpoint device are inside the Cisco TrustSec cloud. One endpoint device and one networking device are outside the cloud because they are not Cisco TrustSec-capable devices.



The Cisco TrustSec architecture consists of the following major components:

Authentication
Verifies the identity of each device before allowing them to join the Cisco TrustSec network.

Authorization
Decides the level of access to the Cisco TrustSec network resources for a device based on the authenticated identity of the device.

Access control
Applies access policies on a per-packet basis using the source tags on each packet.

A Cisco TrustSec network has the following entities:

Authenticators (AT)
Devices that are already part of a Cisco TrustSec network.

Authorization server (AS)
Servers that may provide authentication information, authorization information, or both.

When the link first comes up, authorization occurs in which each side of the link obtains policies, such as SGT and ACLs, that apply to the link.

Authentication

Cisco TrustSec authenticates a device before allowing it to join the network.

Device Identities

Cisco TrustSec does not use IP addresses or MAC addresses as device identities. Instead, assign a name (device ID) to each Cisco TrustSec-capable Cisco NX-OS device to identify it uniquely in the Cisco TrustSec network. This device ID is used for the following:

- Looking up authorization policy

- Looking up passwords in the databases during authentication

Device Credentials

Cisco TrustSec supports password-based credentials. The authentication servers may use self-signed certificates instead. Cisco TrustSec authenticates the supplicants through passwords and uses MSCHAPv2 to provide mutual authentication even if the authentication server certificate is not verifiable.

The authentication server uses a temporarily configured password to authenticate the supplicant when the supplicant first joins the Cisco TrustSec network. When the supplicant first joins the Cisco TrustSec network, the authentication server authenticates the supplicant using a manufacturing certificate and then generates a strong password and pushes it to the supplicant with the PAC. The authentication server also keeps the new password in its database.

User Credentials

Cisco TrustSec does not require a specific type of user credentials for endpoint devices. You can choose any type of authentication method for the user (for example, MSCHAPv2, LEAP, generic token card (GTC), or OTP) and use the corresponding credentials.

SGACLs and SGTs

In security group access lists (SGACLs), you can control the operations that users can perform based on assigned security groups. The grouping of permissions into a role simplifies the management of the security policy. As you add users to a Cisco NX-OS device, you simply assign one or more security groups and they immediately receive the appropriate permissions. You can modify security groups to introduce new privileges or restrict current permissions.

Cisco TrustSec assigns a unique 16-bit tag, called the security group tag (SGT), to a security group. The number of SGTs in a Cisco NX-OS device is limited to the number of authenticated network entities. The SGT is a single label that indicates the privileges of the source within the entire enterprise. Its scope is global within a Cisco TrustSec network.

The management server derives the SGTs based on the security policy configuration. You do not have to configure them manually.

Once authenticated, Cisco TrustSec tags any packet that originates from a device with the SGT that represents the security group to which the device is assigned. The packet carries this SGT throughout the network within the Cisco TrustSec header. Because this tag represents the group of the source, the tag is referred to as the source SGT. At the egress edge of the network, Cisco TrustSec determines the group that is assigned to the packet destination device and applies the access control policy.

Cisco TrustSec defines access control policies between the security groups. By assigning devices within the network to security groups and applying access control between and within the security groups, Cisco TrustSec essentially achieves access control within the network.

Figure 2: SGACL Policy Example

This figure shows an example of an SGACL policy.

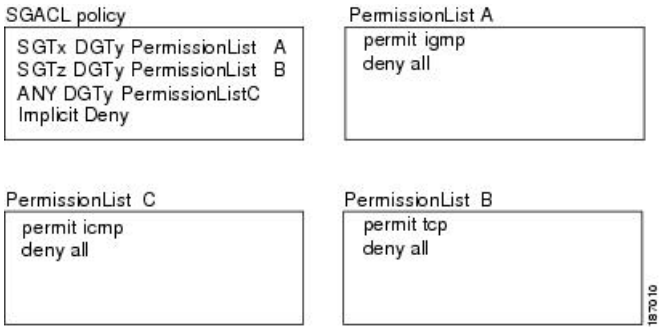
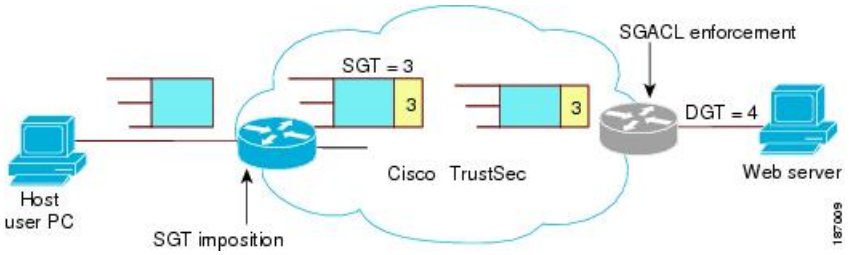


Figure 3: SGT and SGACL in Cisco TrustSec Network

This figure shows how the SGT assignment and the SGACL enforcement operate in a Cisco TrustSec network.



The Cisco NX-OS device defines the Cisco TrustSec access control policy for a group of devices as opposed to IP addresses in traditional ACLs. With such a decoupling, the network devices are free to move throughout the network and change IP addresses. Entire network topologies can change. As long as the roles and the permissions remain the same, changes to the network do not change the security policy. This feature greatly reduces the size of ACLs and simplifies their maintenance.

In traditional IP networks, the number of access control entries (ACEs) configured is determined as follows:

Number of ACEs = (number of sources specified) X (number of destinations specified) X (number of permissions specified)

Cisco TrustSec uses the following formula:

Number of ACEs = number of permissions specified

For information about SGACL policy enforcement with SGT caching, see SGACL Policy Enforcement With Cisco TrustSec SGT Caching.

Determining the Source Security Group

A network device at the ingress of the Cisco TrustSec network cloud needs to determine the SGT of the packet entering the Cisco TrustSec network cloud so that it can tag the packet with that SGT when it forwards it into the Cisco TrustSec network cloud. The egress network device needs to determine the SGT of the packet so that it can apply the SGACLs.

The network device can determine the SGT for a packet using one of the following methods:

- Obtain the source SGT during policy acquisition—After the Cisco TrustSec authentication phase, a network device acquires a policy from an authentication server. The authentication server indicates

whether the peer device is trusted or not. If a peer device is not trusted, the authentication server can also provide an SGT to apply to all packets coming from the peer device.

- Obtain the source SGT field from the Cisco TrustSec header—If a packet comes from a trusted peer device, the Cisco TrustSec header carries the correct SGT field if the network device is not the first network device in the Cisco TrustSec network cloud for the packet.

Determining the Destination Security Group

The egress network device in a Cisco TrustSec network cloud determines the destination group for applying the SGACL. In some cases, ingress devices or other nonegress devices might have destination group information available. In those cases, SGACLs might be applied in these devices rather than in egress devices.

Cisco TrustSec determines the destination group for the packet based on the destination IP address.

Do not configure the destination SGT to enforce Cisco TrustSec on egress broadcast, multicast, and unknown unicast traffic on Fabric Extender (FEX) or vEthernet ports. Instead, set the DST to zero (unknown). The following is an example of the correct configuration:

```
cts role-based access-list acl-on-fex-egress
     deny udp
     deny ip
cts role-based sgt 9 dst 0 access-list acl-on-fex-egress
```

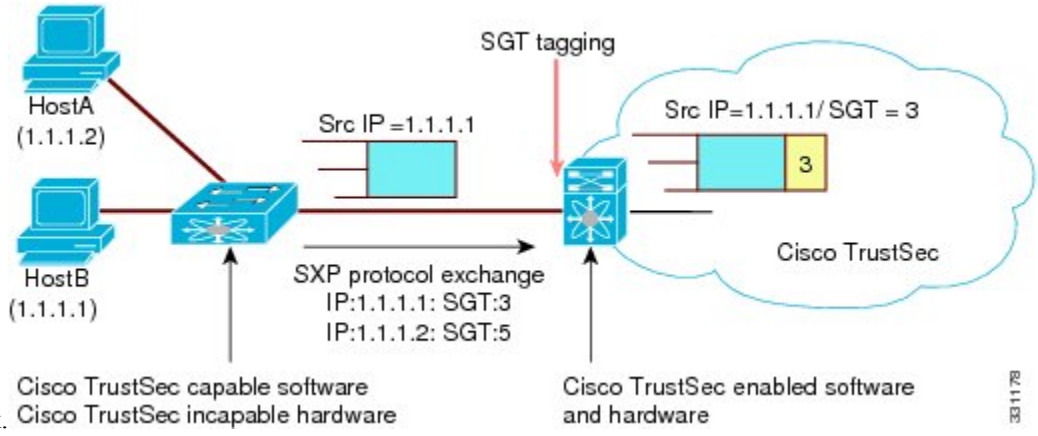
SXP for SGT Propagation Across Legacy Access Networks

The Cisco NX-OS device hardware in the access layer supports Cisco TrustSec. Without the Cisco TrustSec hardware, the Cisco TrustSec software cannot tag the packets with SGTs. You can use SXP to propagate the SGTs across network devices that do not have hardware support for Cisco TrustSec.

SXP operates between access layer devices and distribution layer devices. The access layer devices use SXP to pass the IP addresses of the Cisco TrustSec-authenticated devices with their SGTs to the distribution switches. Distribution devices with both Cisco TrustSec-enabled software and hardware can use this information to tag packets appropriately and enforce SGACL policies.

Figure 4: Using SXP to Propagate SGT Information

This figure shows how to use SXP to propagate SGT information in a legacy network.



Tagging packets with SGTs requires hardware support. You might have devices in your network that cannot tag packets with SGTs. To allow these devices to send IP address-to-SGT mappings to a device that has Cisco

TrustSec-capable hardware, you must manually set up the SXP connections. Manually setting up an SXP connection requires the following:

- If you require SXP data integrity and authentication, you must configure the same SXP password on both of the peer devices. You can configure the SXP password either explicitly for each peer connection or globally for the device. The SXP password is not required.
- You must configure each peer on the SXP connection as either an SXP speaker or an SXP listener. The speaker device distributes the SXP information to the listener device.

Note This Cisco Nexus device does not have the functionality to be an SXP listener. It can only be an SXP speaker.

- You can specify a source IP address to use for each peer relationship or you can configure a default source IP address for peer connections where you have not configured a specific source IP address.

Environment Data Download

The Cisco TrustSec environment data is a collection of information or policies that assists a device to function as a Cisco TrustSec node. The device acquires the environment data from the authentication server when the device first joins a Cisco TrustSec network cloud, although you might also manually configure some of the data on a device. For example, you must configure the seed Cisco TrustSec device with the authentication server information, which can later be augmented by the server list that the device acquires from the authentication server.

Note If you have manually configured the Cisco TrustSec device ID, but not using the AAA server for a Cisco TrustSec deployment, you should remove the Cisco TrustSec device ID by using the **no cts device-id** command. Otherwise, the following false syslog error is generated:

```
ENVIRONMENT_DATA_DOWNLOAD_FAILURE:  Environment data download failed from AAA
```

The **no cts device-id** command is supported from Cisco NX-OS Release 7.2. If you are using Cisco NX-OS Release 6.2.6 or a later release, you can disable only by disabling Cisco TrustSec and reapplying Cisco TrustSec configurations without the **cts device-id** configuration.

The device must refresh the Cisco TrustSec environment data before it expires. The device can also cache the data and reuse it after a reboot if the data has not expired.

The device uses RADIUS to acquire the following environment data from the authentication server:

Server lists
: List of servers that the client can use for future RADIUS requests (for both authentication and authorization)

Device SGT
: Security group to which the device itself belongs

Expiry timeout
: Interval that controls how often the Cisco TrustSec device should refresh its environment data

Licensing Requirements for Cisco TrustSec

The following table shows the licensing requirements for this feature:

Table 1: Licensing Requirements for Cisco TrustSec

Product	License Requirement
Cisco NX-OS	Cisco TrustSec requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the *License and Copyright Information for Cisco NX-OS Software*.

Prerequisites for Cisco TrustSec

Cisco TrustSec has the following prerequisites:

- You must enable the 802.1X feature before you enable the Cisco TrustSec feature. Although none of the 802.1X interface level features are available, 802.1X is required for the device to authenticate with RADIUS.

Guidelines and Limitations for Cisco TrustSec

Please see the Cisco Nexus 7000 I/O Module Comparison Matrix for hardware support for Cisco TrustSec's MACSec (802.1ae).

Cisco TrustSec has the following guidelines and limitations:

- Cisco TrustSec SGT supports IPv4 addressing only.
- Cisco TrustSec SGT in-line tagging is not supported over OTV, VXLAN, FCoE, or Programmable Fabric.
- SXP cannot use the management (mgmt 0) interface.
- You cannot enable Cisco TrustSec on interfaces in half-duplex mode.
- AAA authentication and authorization for Cisco TrustSec is only supported by the Cisco Secure Access Control Server (ACS) and Cisco Identity Services Engine (ISE).
- Cisco TrustSec is supported on the Cisco Nexus 5500 Series switch. It is not supported on the Cisco Nexus 5000 Series switch.
- Cisco TrustSec uses RADIUS for authentication.
- Clearing policies does not take affect immediately; it requires a flap to occur. In addition, the way policies are cleared depends on whether the SGT is static or dynamic. For a static SGT, the SGT is reset to 0 after

the flap occurs. For dynamic SGT, the SGT is downloaded again from the RADIUS server after the flap occurs.

- Cisco TrustSec supports management switch virtual interfaces (SVIs), not routed SVIs.
- The 802.1X feature must be enabled before you enable the Cisco TrustSec feature. However, none of the 802.1X interface level features are available. The 802.1X feature is only used for the device to authenticate with RADIUS.
- RBACL is only implemented on bridged Ethernet traffic and cannot be enabled on a routing VLAN or routing interface.
- The determination of whether a peer is trusted or not and its capability to propagate SGTs on egress are made at the physical interface level.
- Cisco TrustedSec interface configurations on port channel members must be exactly the same. If a port channel member is inconsistent with the other port channel members, it will be error disabled.
- In a vPC domain, use the configuration synchronization mode (config-sync) to create switch profiles to ensure that the Cisco TrustSec configuration is synchronized between peers. If you configure the same vPC differently on two peer switches, traffic is treated differently.
- In the Nexus 5500 switch, the maximum number of RBACL TCAM entries is 128, with 4 entries used by default, and the remaining 124 entries user-configurable.
- Cisco TrustSec is not supported on Layer 3 interfaces or Virtual Routing and Forwarding (VRF) interfaces.
- The **cts-manual**, **cts trusted mode**, and **no-propagate sgt** configurations must be consistent among all FEX ports or vEthernet ports on the same fabric port. If these configurations are inconsistent, the interfaces are err-disabled.
- The **cts-manual**, **sgt value**, **cts trusted mode**, and **no-propagate sgt** configurations must be consistent among all port channel members on the same port channel. If these configurations are inconsistent, the interfaces are err-disabled.
- In Nexus 5500 series switch, only one TCAM entry is displayed for multiple SGT and DGT entries that share the same RBACL. So, the counter stats for the SGT and DGT pairs are the aggregate count of all the pairs.

Default Settings for Cisco TrustSec Parameters

This table lists the default settings for Cisco TrustSec parameters.

Table 2: Default Cisco TrustSec Parameters Settings

Parameter	Default
Cisco TrustSec	Disabled
SXP	Disabled
SXP default password	None
SXP reconcile period	120 seconds (2 minutes)

Parameter	Default
SXP retry period	60 seconds (1 minute)
RBACL logging	Disabled
RBACL statistics	Disabled

Configuring Cisco TrustSec

This section provides information about the configuration tasks for Cisco TrustSec.

Enabling the Cisco TrustSec SGT Feature

You must enable both the 802.1X feature and the Cisco TrustSec feature on the Cisco NX-OS device before you can configure Cisco TrustSec. However, none of the 802.1X interface level features are available. The 802.1X feature is only used for the device to authenticate with RADIUS.

SUMMARY STEPS

1. **configure terminal**
2. **feature dot1x**
3. **feature cts**
4. **exit**
5. (Optional) **show cts**
6. (Optional) **show feature**
7. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**feature dot1x** **Example:** `switch(config)# feature dot1x`	Enables the 802.1X feature.
Step 3	**feature cts** **Example:** `switch(config)# feature cts`	Enables the Cisco TrustSec feature.
Step 4	**exit** **Example:**	Exits global configuration mode.

	Command or Action	Purpose
	`switch(config)# exit` `switch#`	
Step 5	(Optional) **show cts** **Example:** `switch# show cts`	Displays the Cisco TrustSec configuration.
Step 6	(Optional) **show feature** **Example:** `switch# show feature`	Displays the enabled status for features.
Step 7	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Configuring Cisco TrustSec Device Credentials

You must configure unique Cisco TrustSec credentials on each Cisco TrustSec-enabled Cisco NX-OS device in your network. Cisco TrustSec uses the password in the credentials for device authentication.

Note You must also configure the Cisco TrustSec credentials for the Cisco NX-OS device on the Cisco Secure ACS. See the documentation at:

http://www.cisco.com/c/en/us/support/security/secure-access-control-system/products-installation-and-configuration-guides-list.html

Before you begin

Ensure that you have enabled Cisco TrustSec.

SUMMARY STEPS

1. **configure terminal**
2. **cts device-id** *name* **password** *password*
3. **exit**
4. (Optional) **show cts**
5. (Optional) **show cts environment**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:**	Enters global configuration mode.

	Command or Action	Purpose
	`switch# configure terminal` `switch(config)#`	
Step 2	**cts device-id** *name* **password** *password* **Example:** `switch(config)# cts device-id MyDevice1 password CiscO321`	Configures a unique device ID and password. The *name* argument has a maximum length of 32 characters and is case sensitive. **Note** To remove the configuration of device ID and the password, use the **no** form of the command.

Step 3	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 4	(Optional) **show cts** **Example:** `switch# show cts`	Displays the Cisco TrustSec configuration.
Step 5	(Optional) **show cts environment** **Example:** `switch# show cts environment`	Displays the Cisco TrustSec environment data.
Step 6	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Configuring AAA for Cisco TrustSec

You can use Cisco Secure ACS for Cisco TrustSec authentication. You must configure RADIUS server groups and specify the default AAA authentication and authorization methods on one of the Cisco TrustSec-enabled Cisco NX-OS devices in your network cloud.

Note Only the Cisco Secure ACS supports Cisco TrustSec.

Configuring AAA on a Cisco NX-OS Device in a Cisco TrustSec Network

This section describes how to configure AAA on the Cisco NX-OS device in your Cisco TrustSec network cloud.

Before you begin

- Obtain the IPv4 address or hostname for the Cisco Secure ACS.

- Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

1. **configure terminal**
2. **radius-server host** {*ipv4-address* | *ipv6-address* | *hostname*} **key** [**0** | **7**] *key* **pac**
3. (Optional) **show radius-server**
4. **aaa group server radius** *group-name*
5. **server** {*ipv4-address* | *ipv6-address* | *hostname*}
6. **use-vrf** *vrf-name*
7. **exit**
8. **aaa authentication cts default group** *group-name*
9. **aaa authorization cts default group** *group-name*
10. **exit**
11. (Optional) **show radius-server groups** [*group-name*]
12. (Optional) **show aaa authentication**
13. (Optional) **show aaa authorization**
14. (Optional) **show cts pacs**
15. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**radius-server host** {*ipv4-address* | *ipv6-address* | *hostname*} **key** [**0** | **7**] *key* **pac** **Example:** `switch(config)# radius-server host 10.10.1.1 key L1a0K2s9 pac`	Configures a RADIUS server host with a key and PAC. The *hostname* argument is alphanumeric, case sensitive, and has a maximum of 256 characters. The *key* argument is alphanumeric, case sensitive, and has a maximum length of 63 characters. The **0** option indicates that the key is in clear text. The **7** option indicates that the key is encrypted. The default is clear text.
Step 3	(Optional) **show radius-server** **Example:** `switch# show radius-server`	Displays the RADIUS server configuration.

Step 4	**aaa group server radius** *group-name*
	Example:
	`switch(config)# aaa group server radius Rad1`
	`switch(config-radius)#`
		Specifies the RADIUS server group and enters RADIUS server group configuration mode.

Step 5	**server** {*ipv4-address* | *ipv6-address* | *hostname*} **Example:**	Specifies the RADIUS server host address.

	Command or Action	Purpose
	`switch(config-radius)# server 10.10.1.1`	
Step 6	**use-vrf** *vrf-name* **Example:** `switch(config-radius)# use-vrf management`	Specifies the management VRF instance for the AAA server group. **Note** If you use the management VRF instance, no further configuration is necessary for the devices in the network cloud. If you use a different VRF instance, you must configure the devices with that VRF instance.

Step 7	**exit**
	Example:
	`switch(config-radius)# exit`
	`switch(config)#`
		Exits RADIUS server group configuration mode.

Step 8	**aaa authentication cts default group** *group-name* **Example:** `switch(config)# aaa authentication cts default group Rad1`	Specifies the RADIUS server groups to use for Cisco TrustSec authentication.
Step 9	**aaa authorization cts default group** *group-name* **Example:** `switch(config)# aaa authentication cts default group Rad1`	Specifies the RADIUS server groups to use for Cisco TrustSec authorization.

Step 10	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 11	(Optional) **show radius-server groups** [*group-name*] **Example:** `switch# show radius-server group rad1`	Displays the RADIUS server group configuration.
Step 12	(Optional) **show aaa authentication** **Example:** `switch# show aaa authentication`	Displays the AAA authentication configuration.
Step 13	(Optional) **show aaa authorization** **Example:** `switch# show aaa authorization`	Displays the AAA authorization configuration.
Step 14	(Optional) **show cts pacs** **Example:** `switch# show cts pacs`	Displays the Cisco TrustSec PAC information.

	Command or Action	Purpose
Step 15	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Configuring Cisco TrustSec Authentication in Manual Mode

You can manually configure Cisco TrustSec on an interface if your Cisco NX-OS device does not have access to a Cisco Secure ACS. You must manually configure the interfaces on both ends of the connection.

Caution For the Cisco TrustSec manual mode configuration to take effect, you must enable and disable the interface, which disrupts traffic on the interface.

Before you begin

Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

1. **configure terminal**
2. **interface** *interface slot/port*
3. **cts manual**
4. (Optional) **policy dynamic identity** *peer-name*
5. (Optional) **policy static sgt** *tag* [**trusted**]
6. **exit**
7. **shutdown**
8. **no shutdown**
9. **exit**
10. (Optional) **show cts interface** {**all** | **ethernet** *slot/port*}
11. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**interface** *interface slot/port* **Example:**	Specifies an interface and enters interface configuration mode.

	Command or Action	Purpose
	`switch(config)# interface ethernet 2/2` `switch(config-if)#`	

Step 3	**cts manual**
	Example:
	`switch(config-if)# cts manual`
	`switch(config-if-cts-manual)#`
		Enters Cisco TrustSec manual configuration mode.
		Note You cannot enable Cisco TrustSec on interfaces in half-duplex mode.

Step 4	(Optional) **policy dynamic identity** *peer-name* **Example:** `switch(config-if-cts-manual)# policy dynamic identity MyDevice2`	Configures a dynamic authorization policy download. The *peer-name* argument is the Cisco TrustSec device ID for the peer device. The peer name is case sensitive. **Note** Ensure that you have configured the Cisco TrustSec credentials and AAA for Cisco TrustSec. **Note** The **policy dynamic** and **policy static** commands are mutually exclusive. Only one can be applied at a time. To change from one to the other, you must use the **no** form of the command to remove the configuration before configuring the other command.
Step 5	(Optional) **policy static sgt** *tag* [**trusted**] **Example:** `switch(config-if-cts-manual)# policy static sgt 0x2`	Configures a static authorization policy. The *tag* argument is a hexadecimal value in the format **0x***hhhh*. The range is from 0x2 to 0xffef. The **trusted** keyword indicates that traffic coming on the interface with this SGT should not have its tag overridden. **Note** The **policy dynamic** and **policy static** commands are mutually exclusive. Only one can be applied at a time. To change from one to the other, you must use the **no** form of the command to remove the configuration before configuring the other command.

Step 6	**exit**
	Example:
	`switch(config-if-cts-manual)# exit`
	`switch(config-if)#`
		Exits Cisco TrustSec manual configuration mode.

Step 7	**shutdown** **Example:** `switch(config-if)# shutdown`	Disables the interface.
Step 8	**no shutdown** **Example:** `switch(config-if)# no shutdown`	Enables the interface and enables Cisco TrustSec authentication on the interface.

	Command or Action	Purpose

Step 9	**exit**
	Example:
	`switch(config-if)# exit`
	`switch(config)#`
		Exits interface configuration mode.

Step 10	(Optional) **show cts interface** {**all** | **ethernet** *slot*/*port*} **Example:** `switch# show cts interface all`	Displays the Cisco TrustSec configuration for the interfaces.
Step 11	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Configuring SGACL Policies

This section provides information about the configuration tasks for SGACL policies.

SGACL Policy Configuration Process

Follow these steps to configure Cisco TrustSec SGACL policies:

Step 1 For Layer 2 interfaces, enable SGACL policy enforcement for the VLANs with Cisco TrustSec-enabled interfaces.

Step 2 If you are not using AAA on a Cisco Secure ACS to download the SGACL policy configuration, manually configure the SGACL mapping and policies.

Enabling SGACL Policy Enforcement on VLANs

If you use SGACLs, you must enable SGACL policy enforcement in the VLANs that have Cisco TrustSec-enabled Layer 2 interfaces.

Note This operation cannot be performed on FCoE VLANs.

Before you begin

- Ensure that you enabled Cisco TrustSec.
- Ensure that you enabled SGACL batch programming.

SUMMARY STEPS

1. **configure terminal**
2. **vlan** *vlan-id*
3. **cts role-based enforcement**
4. **exit**
5. (Optional) **show cts role-based enable**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**vlan** *vlan-id*
	Example:
	`switch(config)# vlan 10`
	`switch(config-vlan)#`
		Specifies a VLAN and enters VLAN configuration mode.

Step 3	**cts role-based enforcement** **Example:** `switch(config-vlan)# cts role-based enforcement`	Enables Cisco TrustSec SGACL policy enforcement on the VLAN. **Note** If you enable the cts role-based enforcement on a VLAN and no other configuration on ports, the traffic traversing through these ports are subject to (0,0) SGACL. You can either configure this SGACL statically or download it from Cisco ISE.

Step 4	**exit**
	Example:
	`switch(config-vlan)# exit`
	`switch(config)#`
		Saves the VLAN configuration and exits VLAN configuration mode.

Step 5	(Optional) **show cts role-based enable** **Example:** `switch(config)# show cts role-based enable`	Displays the Cisco TrustSec SGACL enforcement configuration.
Step 6	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Manually Configuring Cisco TrustSec SGTs

You can manually configure unique Cisco TrustSec security group tags (SGTs) for the packets originating from this device.

Before you begin

Ensure that you have enabled Cisco TrustSec.

SUMMARY STEPS

1. **configure terminal**
2. **cts sgt** *tag*
3. **exit**
4. (Optional) **show cts environment-data**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**cts sgt** *tag* **Example:** `switch(config)# cts sgt 0x00a2`	Configures the SGT for packets sent from the device. The *tag* argument is a hexadecimal value in the format **0x***hhhh*. The range is from 0x2 to 0xffef.

Step 3	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 4	(Optional) **show cts environment-data** **Example:** `switch# show cts environment-data`	Displays the Cisco TrustSec environment data information.
Step 5	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Manually Configuring IPv4-Address-to-SGACL SGT Mapping for a VLAN

You can manually configure an IPv4 address to SGACL SGT mapping on a VLAN so that the policies for that SGT are downloaded from the Secure ACS server, or if you are using SXP mode, the SGT mapping is relayed to the listener.

Before you begin

- Ensure that you enabled Cisco TrustSec.
- Ensure that you enabled SGACL policy enforcement on the VLAN.

SUMMARY STEPS

1. **configure terminal**
2. **vlan** *vlan-id*
3. **cts role-based sgt-map** *ipv4-address tag*
4. **exit**
5. (Optional) **show cts role-based sgt-map**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**vlan** *vlan-id*
	Example:
	`switch(config)# vlan 10`
	`switch(config-vlan)#`
		Specifies a VLAN and enters VLAN configuration mode.

Step 3	**cts role-based sgt-map** *ipv4-address tag* **Example:** `switch(config-vlan)# cts role-based sgt-map 10.10.1.1 100`	Configures SGT mapping for the SGACL policies for the VLAN.

Step 4	**exit**
	Example:
	`switch(config-vlan)# exit`
	`switch(config)#`
		Saves the VLAN configuration and exits VLAN configuration mode.

Step 5	(Optional) **show cts role-based sgt-map** **Example:** `switch(config)# show cts role-based sgt-map`	Displays the Cisco TrustSec SGACL SGT mapping configuration.

	Command or Action	Purpose
Step 6	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9
Enabling SGACL Policy Enforcement on VLANs , on page 16

Manually Configuring IPv4-Address-to-SGACL SGT Mapping for a VRF Instance

You can manually configure IPv4-address-to-SGACL SGT mapping on a VRF instance if a Cisco Secure ACS is not available to download the SGACL policy configuration. You can use this feature if you do not have Cisco Secure ACS available on your Cisco NX-OS device. The IPv4-SGT mapping for VRF is useful for the SXP speaker.

Note The **cts role based enforcement** command is not supported on VRF.

Before you begin

- Ensure that you enabled Cisco TrustSec.
-
- Ensure that the Layer-3 module is enabled.

SUMMARY STEPS

1. **configure terminal**
2. **vrf context** *vrf-name*
3. **cts role-based sgt-map** *ipv4-address tag*
4. **exit**
5. (Optional) **show cts role-based sgt-map**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**vrf context** *vrf-name* **Example:**	Specifies a VRF instance and enters VRF configuration mode.

	Command or Action	Purpose
	`switch(config)# vrf context accounting` `switch(config-vrf)#`	
Step 3	**cts role-based sgt-map** *ipv4-address tag* **Example:** `switch(config-vrf)# cts role-based sgt-map 10.10.1.1 100`	Configures SGT mapping for the SGACL policies for the VLAN.

Step 4	**exit**
	Example:
	`switch(config-vrf)# exit`
	`switch(config)#`
		Exits VRF configuration mode.

Step 5	(Optional) **show cts role-based sgt-map** **Example:** `switch(config)# show cts role-based sgt-map`	Displays the Cisco TrustSec SGACL SGT mapping configuration.
Step 6	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Manually Configuring SGACL Policies

You can manually configure SGACL policies on your Cisco NX-OS device if a Cisco Secure ACS is not available to download the SGACL policy configuration. You can also enable role-based access control list (RBACL) logging, which allows users to monitor specific types of packets exiting the Cisco NX-OS device.

Before you begin

Ensure that you have enabled Cisco TrustSec.

For Cisco TrustSec logging to function, you must enable Cisco TrustSec counters or statistics.

Ensure that you have enabled SGACL policy enforcement on the VLAN.

If you plan to enable RBACL logging, ensure that you have enabled RBACL policy enforcement on the VLAN.

If you plan to enable RBACL logging, ensure that you have set the logging level of CTS manager syslogs to 6 or less.

SUMMARY STEPS

1. **configure terminal**
2. **cts role-based access-list** *list-name*
3. (Optional) {**deny** | **permit**} **all** [**log**]
4. (Optional) {**deny** | **permit**} **icmp** [**log**]
5. (Optional) {**deny** | **permit**} **igmp** [**log**]
6. (Optional) {**deny** | **permit**} **ip** [**log**]

7. (Optional) {**deny** | **permit**} **tcp** [{**dst** | **src**} {{**eq** | **gt** | **lt** | **neq**} *port-number* | **range** *port-number1 port-number2*}] [**log**]
8. {**deny** | **permit**} **udp** [{**dst** | **src**} {{**eq** | **gt** | **lt** | **neq**} *port-number* | **range** *port-number1 port-number2*}] [**log**]
9. **exit**
10. **cts role-based sgt** {*sgt-value* | **any** | **unknown**} **dgt** {*dgt-value* | **any** | **unknown**} **access-list** *list-name*
11. (Optional) **show cts role-based access-list**
12. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**cts role-based access-list** *list-name*
	Example:
	`switch(config)# cts role-based access-list MySGACL`
	`switch(config-rbacl)#`
		Specifies an SGACL and enters role-based access list configuration mode. The *list-name* argument value is alphanumeric, case sensitive, and has a maximum length of 32 characters.

Step 3	(Optional) {**deny**	**permit**} **all** [**log**] **Example:** `switch(config-rbacl)# deny all log`	Denies or permits all traffic. Optionally, you can use the **log** keyword to specify that packets matching this configuration be logged.
Step 4	(Optional) {**deny**	**permit**} **icmp** [**log**] **Example:** `switch(config-rbacl)# permit icmp`	Denies or permits Internet Control Message Protocol (ICMP) traffic. Optionally, you can use the **log** keyword to specify that packets matching this configuration be logged.
Step 5	(Optional) {**deny**	**permit**} **igmp** [**log**] **Example:** `switch(config-rbacl)# deny igmp`	Denies or permits Internet Group Management Protocol (IGMP) traffic. Optionally, you can use the **log** keyword to specify that packets matching this configuration be logged.
Step 6	(Optional) {**deny**	**permit**} **ip** [**log**] **Example:** `switch(config-rbacl)# permit ip`	Denies or permits IP traffic. Optionally, you can use the **log** keyword to specify that packets matching this configuration be logged.
Step 7	(Optional) {**deny**	**permit**} **tcp** [{**dst**	**src**} {{**eq**	**gt**	**lt**	**neq**} *port-number*	**range** *port-number1 port-number2*}] [**log**] **Example:** `switch(config-rbacl)# deny tcp dst eq 100`	Denies or permits TCP traffic. The default permits all TCP traffic. The range for the *port-number*, *port-number1*, and *port-number2* arguments is from 0 to 65535. Optionally, you can use the **log** keyword to specify that packets matching this configuration be logged.
Step 8	{**deny**	**permit**} **udp** [{**dst**	**src**} {{**eq**	**gt**	**lt**	**neq**} *port-number*	**range** *port-number1 port-number2*}] [**log**]	Denies or permits UDP traffic. The default permits all UDP traffic. The range for the *port-number*, *port-number1*, and *port-number2* arguments is from 0 to 65535.

	Command or Action	Purpose
	Example: `switch(config-rbacl)# permit udp src eq 1312`	Optionally, you can use the **log** keyword to specify that packets matching this configuration be logged.

Step 9	**exit**
	Example:
	`switch(config-rbacl)# exit`
	`switch(config)#`
		Exits role-based access-list configuration mode.

Step 10	**cts role-based sgt** {*sgt-value* | **any** | **unknown**} **dgt** {*dgt-value* | **any** | **unknown**} **access-list** *list-name* **Example:** `switch(config)# cts role-based sgt 3 dgt 10 access-list MySGACL`	Maps the SGT values to the SGACL. The *sgt-value* and *dgt-value* argument values range from 0 to 65519. **Note** You must create the SGACL before you can map SGTs to it.
Step 11	(Optional) **show cts role-based access-list** **Example:** `switch(config)# show cts role-based access-list`	Displays the Cisco TrustSec SGACL configuration.
Step 12	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9
Enabling SGACL Policy Enforcement on VLANs , on page 16

Displaying the Downloaded SGACL Policies

After you configure the Cisco TrustSec device credentials and AAA, you can verify the Cisco TrustSec SGACL policies downloaded from the Cisco Secure ACS. The Cisco NX-OS software downloads the SGACL policies when it learns of a new SGT through authentication and authorization on an interface or from manual IPv4 address to SGACL SGT mapping.

Before you begin

Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

1. **show cts role-based access-list**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**show cts role-based access-list** **Example:** `switch# show cts role-based access-list`	Displays Cisco TrustSec SGACLs, both downloaded from the Cisco Secure ACS and manually configured on the Cisco NX-OS device.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Refreshing the Downloaded SGACL Policies

You can refresh the SGACL policies downloaded to the Cisco NX-OS device by the Cisco Secure ACS.

Before you begin

Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

1. **cts refresh role-based-policy**
2. (Optional) **show cts role-based policy**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**cts refresh role-based-policy** **Example:** `switch# cts refresh role-based-policy`	Refreshes the Cisco TrustSec SGACL policies from the Cisco Secure ACS.
Step 2	(Optional) **show cts role-based policy** **Example:** `switch# show cts role-based policy`	Displays the Cisco TrustSec SGACL policies.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Enabling Statistics for RBACL

You can request a count of the number of packets that match role-based access control list (RBACL) policies. These statistics are collected per ACE.

Note RBACL statistics are lost only when the Cisco NX-OS device reloads or you deliberately clear the statistics.

Before you begin

Ensure that you have enabled Cisco TrustSec.

If you plan to enable RBACL statistics, ensure that you have enabled RBACL policy enforcement on the VLAN.

When you enable RBACL statistics, each policy requires one entry in the hardware. If you do not have enough space remaining in the hardware, an error message appears, and you are unable to enable the statistics.

SUMMARY STEPS

1. **configure terminal**
2. [**no**] **cts role-based counters enable**
3. (Optional) **copy running-config startup-config**
4. **exit**
5. (Optional) **show cts role-based counters**
6. (Optional) **clear cts role-based counters**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	[**no**] **cts role-based counters enable** **Example:** `switch(config)# cts role-based counters enable`	Enables or disables RBACL statistics. The default is disabled.
Step 3	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Step 4	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 5	(Optional) **show cts role-based counters** **Example:** `switch# show cts role-based counters`	Displays the configuration status of RBACL statistics and lists statistics for all RBACL policies.
Step 6	(Optional) **clear cts role-based counters** **Example:** `switch# clear cts role-based counters`	Clears the RBACL statistics so that all counters are reset to 0.

Clearing Cisco TrustSec SGACL Policies

You can clear the Cisco TrustSec SGACL policies.

Note Clearing policies does not take affect immediately; it requires a flap to occur. In addition, the way policies are cleared depends on whether the SGT is static or dynamic. For a static SGT, the SGT is reset to 0 after the flap occurs. For dynamic SGT, the SGT is downloaded again from the RADIUS server after the flap occurs.

Before you begin

Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

1. (Optional) **show cts role-based policy**
2. **clear cts policy** {**all** | **peer** *device-name* | **sgt** *sgt-value*}

DETAILED STEPS

	Command or Action	Purpose
Step 1	(Optional) **show cts role-based policy** **Example:** `switch# clear cts policy all`	Displays the Cisco TrustSec RBACL policy configuration.
Step 2	**clear cts policy** {**all**	**peer** *device-name*	**sgt** *sgt-value*} **Example:** `switch# clear cts policy all`	Clears the policies for Cisco TrustSec connection information.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Manually Configuring SXP

You can use the SGT Exchange Protocol (SXP) to propagate the SGTs across network devices that do not have hardware support for Cisco TrustSec. This section describes how to configure Cisco TrustSec SXP on Cisco NX-OS devices in your network.

Cisco TrustSec SXP Configuration Process

Follow these steps to manually configure Cisco TrustSec SXP:

SUMMARY STEPS

1. Enable the Cisco TrustSec feature.
2. Enable Cisco TrustSec SXP.
3. Configure SXP peer connections.

DETAILED STEPS

Step 1 Enable the Cisco TrustSec feature.

Step 2 Enable Cisco TrustSec SXP.

Step 3 Configure SXP peer connections.

Note You cannot use the management (mgmt 0) connection for SXP.

Related Topics

Enabling SGACL Policy Enforcement on VLANs , on page 16
Manually Configuring IPv4-Address-to-SGACL SGT Mapping for a VLAN, on page 19
Manually Configuring SGACL Policies, on page 21
Enabling the Cisco TrustSec SGT Feature , on page 9
Enabling Cisco TrustSec SXP , on page 27
Configuring Cisco TrustSec SXP Peer Connections, on page 28

Enabling Cisco TrustSec SXP

You must enable Cisco TrustSec SXP before you can configure peer connections.

Before you begin

Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

1. **configure terminal**
2. **cts sxp enable**
3. **exit**
4. (Optional) **show cts sxp**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**cts sxp enable** **Example:** `switch(config)# cts sxp enable`	Enables SXP for Cisco TrustSec.

Step 3	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 4	(Optional) **show cts sxp** **Example:** `switch# show cts sxp`	Displays the SXP configuration.

	Command or Action	Purpose
Step 5	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9

Configuring Cisco TrustSec SXP Peer Connections

You must configure the SXP peer connection on both the speaker and listener devices. When using password protection, make sure to use the same password on both ends.

Note If the default SXP source IP address is not configured and you do not specify the SXP source address in the connection, the Cisco NX-OS software derives the SXP source IP address from existing local IP addresses. The SXP source address could be different for each TCP connection initiated from the Cisco NX-OS device.

Note This Cisco Nexus switch supports SXP speaker mode only. Therefore, any SXP peer must be configured as a listener.

Before you begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled SXP.

Ensure that you enabled RBACL policy enforcement in the VRF instance.

SUMMARY STEPS

1. **configure terminal**
2. **cts sxp connection peer** *peer-ipv4-addr* [**source** *src-ipv4-addr*] **password** {**default** | **none** | **required** *password*} **mode listener** [**vrf** *vrf-name*]
3. **exit**
4. (Optional) **show cts sxp connections**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

	Command or Action	Purpose
Step 2	**cts sxp connection peer** *peer-ipv4-addr* [**source** *src-ipv4-addr*] **password** {**default** | **none** | **required** *password*} **mode listener** [**vrf** *vrf-name*] **Example:** `switch(config)# cts sxp connection peer 10.10.1.1 source 20.20.1.1 password default mode listener`	Configures the SXP address connection. The **source** keyword specifies the IPv4 address of the source device. The default source is IPv4 address you configured using the **cts sxp default source-ip** command. The **password** keyword specifies the password that SXP should use for the connection using the following options: • Use the **default** option to use the default SXP password that you configured using the **cts sxp default password** command. • Use the **none** option to not use a password. • Use the **required** option to use the password specified in the command. The **speaker** and **listener** keywords specify the role of the remote peer device. Because this Cisco Nexus Series switch can only act as the speaker in the connection, the peer must be configured as the listener. The **vrf** keyword specifies the VRF instance to the peer. The default is the default VRF instance. **Note** You cannot use the management (mgmt 0) interface for SXP.

Step 3	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 4	(Optional) **show cts sxp connections** **Example:** `switch# show cts sxp connections`	Displays the SXP connections and their status.
Step 5	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9
Enabling Cisco TrustSec SXP , on page 27

Configuring the Default SXP Password

By default, SXP uses no password when setting up connections. You can configure a default SXP password for the Cisco NX-OS device.

Before you begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled SXP.

SUMMARY STEPS

1. **configure terminal**
2. **cts sxp default password** *password*
3. **exit**
4. (Optional) **show cts sxp**
5. (Optional) **show running-config cts**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**cts sxp default password** *password* **Example:** `switch(config)# cts sxp default password A2Q3d4F5`	Configures the SXP default password.

Step 3	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 4	(Optional) **show cts sxp** **Example:** `switch# show cts sxp`	Displays the SXP configuration.
Step 5	(Optional) **show running-config cts** **Example:** `switch# show running-config cts`	Displays the SXP configuration in the running configuration.
Step 6	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9
Enabling Cisco TrustSec SXP , on page 27

Configuring the Default SXP Source IPv4 Address

The Cisco NX-OS software uses the default source IPv4 address in all new TCP connections where a source IPv4 address is not specified. When you change the default source IP address, the existing SXP connections are reset and the IP-SGT bindings learned over SXP are cleared. The SXP connections, for which a source IP address has been configured, will continue to use the same IP address, while coming back up.

The SXP connections, for which a source IP address has not been configured, uses the default IP address as the source IP address. Note that for such connections, correct destination IP address configuration on the peer and the reachability to the default source IP address are the required conditions before such connections can become operational. It is recommended to ensure that these conditions are met for existing operational connections, before configuring default source IP address on a device.

Before you begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled SXP.

SUMMARY STEPS

1. **configure terminal**
2. **cts sxp default source-ip** *src-ip-addr*
3. **exit**
4. (Optional) **show cts sxp**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**cts sxp default source-ip** *src-ip-addr* **Example:** `switch(config)# cts sxp default source-ip 10.10.3.3`	Configures the SXP default source IPv4 address.

Step 3	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 4	(Optional) **show cts sxp** **Example:** `switch# show cts sxp`	Displays the SXP configuration.
Step 5	(Optional) **copy running-config startup-config** **Example:**	Copies the running configuration to the startup configuration.

	Command or Action	Purpose
	`switch# copy running-config startup-config`	

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9
Enabling Cisco TrustSec SXP , on page 27

Changing the SXP Retry Period

The SXP retry period determines how often the Cisco NX-OS software retries an SXP connection. When an SXP connection is not successfully set up, the Cisco NX-OS software makes a new attempt to set up the connection after the SXP retry period timer expires. The default value is 60 seconds (1 minute). Setting the SXP retry period to 0 seconds disables the timer and retries are not attempted.

Before you begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled SXP.

SUMMARY STEPS

1. **configure terminal**
2. **cts sxp retry-period** *seconds*
3. **exit**
4. (Optional) **show cts sxp**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**cts sxp retry-period** *seconds* **Example:** `switch(config)# cts sxp retry-period 120`	Changes the SXP retry timer period. The default value is 60 seconds (1 minute). The range is from 0 to 64000.

Step 3	**exit**
	Example:
	`switch(config)# exit`
	`switch#`
		Exits global configuration mode.

Step 4	(Optional) **show cts sxp** **Example:** `switch# show cts sxp`	Displays the SXP configuration.

	Command or Action	Purpose
Step 5	(Optional) **copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Related Topics

Enabling the Cisco TrustSec SGT Feature , on page 9
Enabling Cisco TrustSec SXP , on page 27

Verifying the Cisco TrustSec Configuration

To display Cisco TrustSec configuration information, perform one of the following tasks:

Command	Purpose
show cts	Displays Cisco TrustSec information.
show cts credentials	Displays Cisco TrustSec credentials for EAP-FAST.
show cts environment-data	Displays Cisco TrustSec environmental data.
show cts interface {**all** | **ethernet** *slot*/*port*}	Displays the Cisco TrustSec configuration for the interfaces.
show cts role-based access-list	Displays Cisco TrustSec SGACL information.
show cts pacs	Displays Cisco TrustSec authorization information and PACs in the device key store.
show cts role-based counters	Displays the configuration status of RBACL statistics and lists statistics for all RBACL policies.
show cts role-based enable	Displays Cisco TrustSec SGACL enforcement status.
show cts role-based policy	Displays Cisco TrustSec SGACL policy information.
show cts role-based sgt-map	Displays the Cisco TrustSec SGACL SGT map configuration.
show cts sxp	Displays Cisco TrustSec SXP information.
show running-config cts	Displays the Cisco TrustSec information in the running configuration.

Configuration Examples for Cisco TrustSec

This section provides configuration examples for Cisco TrustSec.

Example: Enabling Cisco TrustSec

The following example shows how to enable Cisco TrustSec:

```
feature dot1x
feature cts
cts device-id device1 password Cisco321
```

Example: Configuring AAA for Cisco TrustSec on a Cisco NX-OS Device

The following example shows how to configure AAA for Cisco TrustSec on the Cisco NX-OS device:

```
radius-server host 10.10.1.1 key Cisco123 pac
aaa group server radius Rad1
  server 10.10.1.1
  use-vrf management
aaa authentication cts default group Rad1
aaa authorization cts default group Rad1
```

Example: Configuring Cisco TrustSec Authentication in Manual Mode

The following example shows how to configure Cisco TrustSec authentication in manual mode static policy on an interface:

```
interface ethernet 2/1
  cts manual
    policy static sgt 0x20
    no propagate-sgt
```

The following example shows how to configure Cisco TrustSec authentication in manual mode dynamic policy on an interface:

```
interface ethernet 2/2
  cts manual
    policy dynamic identity device2
```

Example: Configuring Cisco TrustSec Role-Based Policy Enforcement for a VLAN

The following example shows how to enable Cisco TrustSec role-based policy enforcement for a VLAN:

```
vlan 10
  cts role-based enforcement
```

Example: Configuring IPv4 Address to SGACL SGT Mapping for the Default VRF Instance

The following example shows how to manually configure IPv4 address to SGACL SGT mapping for Cisco TrustSec role-based policies for the default VRF instance:

```
cts role-based sgt-map 10.1.1.1 20
```

Example: Configuring IPv4 Address to SGACL SGT Mapping for a VLAN

The following example shows how to manually configure IPv4 address to SGACL SGT mapping for Cisco TrustSec role-based policies for a VLAN:

```
vlan 10
  cts role-based sgt-map 20.1.1.1 20
```

Example: Manually Configuring Cisco TrustSec SGACLs

The following example shows how to manually configure Cisco TrustSec SGACLs:

```
cts role-based access-list abcd
  permit icmp
cts role-based sgt 10 dgt 20 access-list abcd
```

The following example shows how to enable RBACL logging:

```
cts role-based access-list RBACL1
  deny tcp src eq 1111 dest eq 2222 log
cts role-based sgt 10 dgt 20 access-list RBACL1
```

The above configuration generates the following ACLLOG syslog:

```
%$ VDC-1 %$ %CTS-6-CTS_RBACL_STAT_LOG: CTS ACE permit all log, Threshold exceeded: Hit count
 in 10s period = 4
```

Note The ACLLOG syslog does not contain the destination group tag (DGT) information of the matched RBACL policy.

The following example shows how to enable and display RBACL statistics:

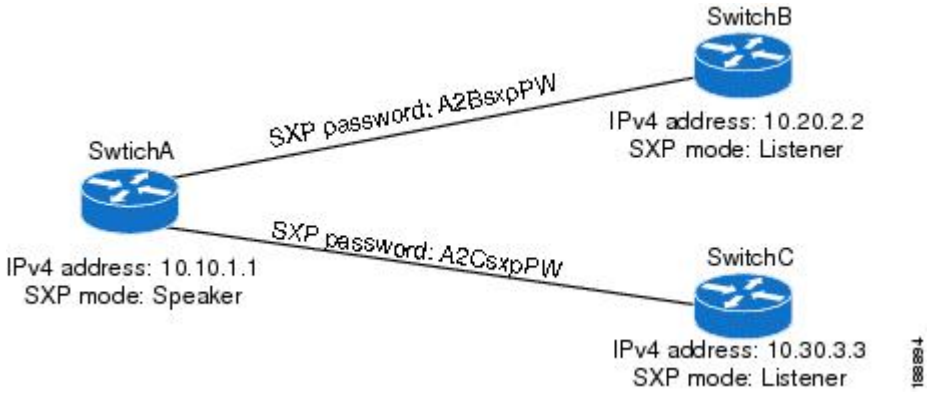
```
cts role-based counters enable
show cts role-based counters

RBACL policy counters enabled
Counters last cleared: 06/08/2009 at 01:32:59 PM
rbacl:abc
```

```
        deny tcp dest neq 80                              [0]
        deny tcp dest range 78 79                         [0]
rbacl:def
        deny udp                                          [0]
        deny ip                                           [0]
        deny igmp                                         [0]
```

Example: Manually Configuring SXP Peer Connections

This figure shows an example of SXP peer connections over the default VRF instance.

Figure 5: Example SXP Peer Connections



Note Because this Cisco Nexus switch supports only SXP speaker mode, it can only be configured as SwitchA in this example.

The following example shows how to configure the SXP peer connections on SwitchA:

```
feature cts
cts sxp enable
cts sxp connection peer 10.20.2.2 password required A2BsxpPW mode listener
cts sxp connection peer 10.30.3.3 password required A2CsxpPW mode listener
```

The following example shows how to configure the SXP peer connection on SwitchB:

```
feature cts
cts sxp enable
cts sxp connection peer 10.10.1.1 password required A2BsxpPW mode speaker
```

The following example shows how to configure the SXP peer connection on SwitchC:

```
feature cts
cts sxp enable
cts sxp connection peer 10.10.1.1 password required A2CsxpPW mode speaker
```

Additional References for Cisco TrustSec

This sections provides additional information related to implementing Cisco TrustSec.

Related Documentation

Related Topic	Document Title
Cisco NX-OS licensing	*Cisco NX-OS Licensing Guide*
Command Reference	

Feature History for Cisco TrustSec

This table lists the release history for this feature.

Table 3: Feature History for Cisco TrustSec

Feature Name	Releases	Feature Information
Cisco TrustSec	5.1(3)N1(1)	This feature was introduced.