



Configuring Cisco TrustSec

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

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Information About Cisco TrustSec

This section provides information about Cisco TrustSec.

Cisco TrustSec Architecture

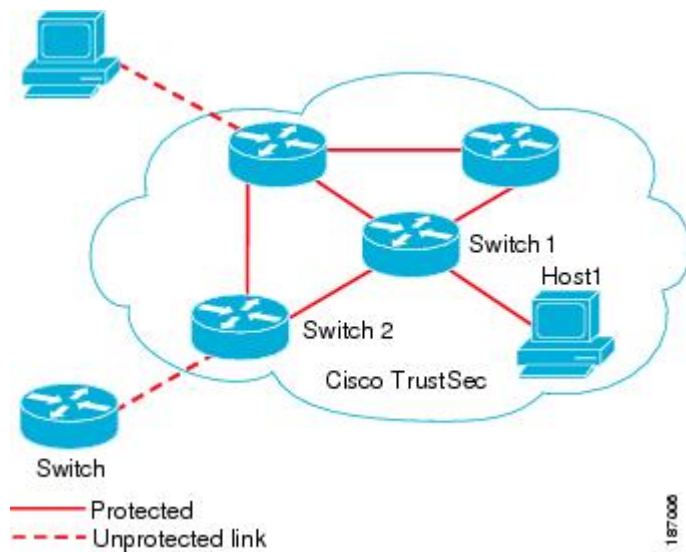
The Cisco TrustSec security architecture builds secure networks by establishing clouds of trusted network devices. Each device in the cloud is authenticated by its neighbors. Communication on the links between devices in the cloud is secured with a combination of encryption, message integrity checks, and data-path replay protection mechanisms. Cisco TrustSec also uses the device and user identification 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.

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 or they have been refused access.

Figure 1: Cisco TrustSec Network Cloud Example



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.
Secure communication	Provides encryption, integrity, and data-path replay protection for the packets that flow over each link in the Cisco TrustSec network.

A Cisco TrustSec network has the following three entities:

Supplicants	Devices that attempt to join a Cisco TrustSec network.
Authenticators (AT)	Devices that are already part of a Cisco TrustSec network.
Authorization server	Servers that may provide authentication information, authorization information, or both.

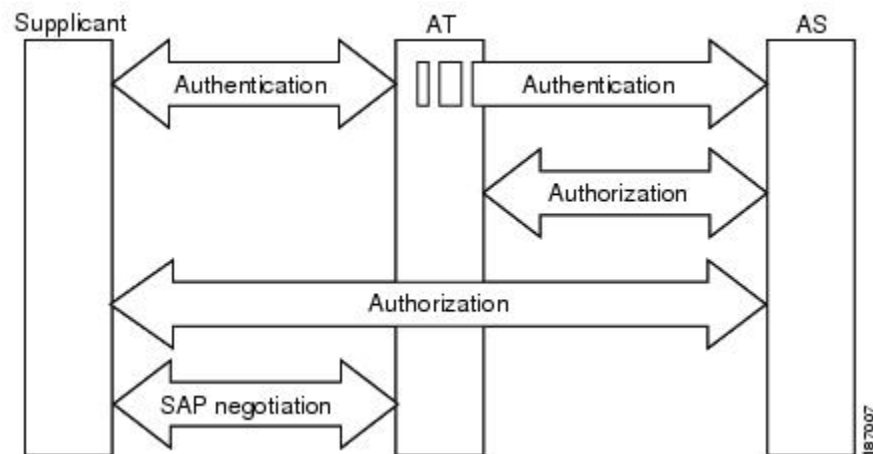
When the link between the supplicant and the AT first comes up, the following sequence of events may occur:

Authentication (802.1X)	The authentication server performs the authentication of the supplicant or the authentication completes trivially if you configure the devices to unconditionally authenticate each other.
Authorization	Each side of the link obtains policies, such as SGT and ACLs, that apply to the link. A supplicant may need to use the AT as a relay if it has no other Layer 3 route to the authentication server.
Security Association Protocol (SAP) negotiation	The EAPOL-Key exchange occurs between the supplicant and the AT to negotiate a cipher suite, exchange security parameter indexes (SPIs), and manage keys. Successful completion of all three tasks results in the establishment of a security association (SA).

Ports stay in the unauthorized state (blocking state) until the SAP negotiation completes.

This figure shows the SAP negotiation, including how ports stay in unauthorized state until the SAP negotiation completes.

Figure 2: SAP Negotiation



SAP negotiation can use any of the following modes of operation:

- Galois/Counter Mode (GCM) encryption
- GCM authentication (GMAC)
- No encapsulation (clear text)
- Encapsulation with no encryption or authentication

Based on the IEEE 802.1AE standard, Cisco TrustSec uses ESP-128 GCM and GMAC.

Authentication

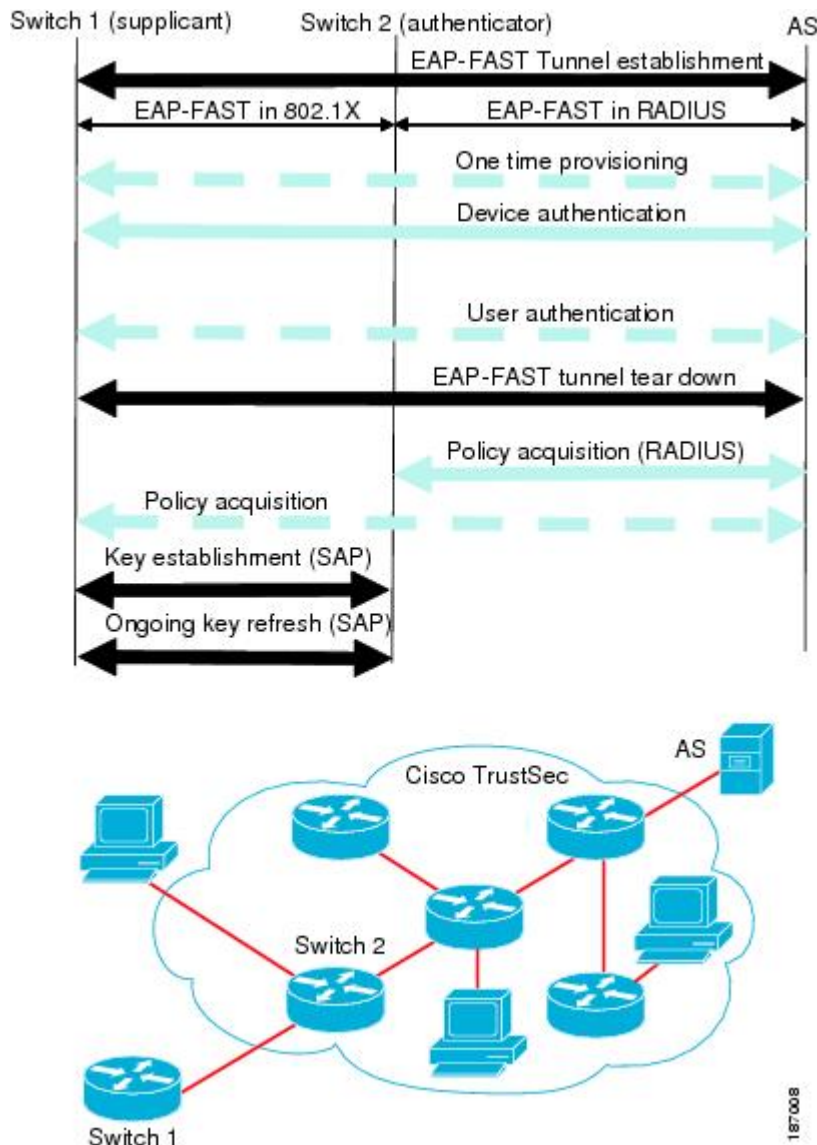
Cisco TrustSec authenticates a device before allowing it to join the network. Cisco TrustSec uses 802.1X authentication with Extensible Authentication Protocol Flexible Authentication via Secure Tunnel (EAP-FAST) as the Extensible Authentication Protocol (EAP) method to perform the authentication.

Cisco TrustSec and Authentication

Cisco TrustSec uses EAP-FAST for authentication. EAP-FAST conversations allow for other EAP method exchanges inside the EAP-FAST tunnel using chains, which allows administrators to use traditional user authentication methods, such as Microsoft Challenge Handshake Authentication Protocol Version 2 (MSCHAPv2), while still having security provided by the EAP-FAST tunnel.

This figure shows the EAP-FAST tunnel and inner methods as used in Cisco TrustSec.

Figure 3: Cisco TrustSec Authentication



Cisco TrustSec Enhancements to EAP-FAST

The implementation of EAP-FAST for Cisco TrustSec has the following enhancements:

Authenticate the authenticator	Securely determines the identity of the AT by requiring the AT to use its protected access credential (PAC) to derive the shared secret between itself and the authentication server. This feature also prevents you from configuring RADIUS shared secrets on the authentication server for every possible IP address that can be used by the AT.
Notify each peer of the identity of its neighbor	By the end of the authentication exchange, the authentication server has identified both the supplicant and the AT. The authentication server conveys the identity of the AT, and whether the AT is Cisco TrustSec-capable, to the supplicant by using additional type-length-value parameters (TLVs) in the protected EAP-FAST termination. The authentication server also conveys the identity of the supplicant and whether the supplicant is Cisco TrustSec-capable, to the AT by using RADIUS attributes in the Access-Accept message. Because each peer knows the identity of its neighbor, it can send additional RADIUS Access-Requests to the authentication server to acquire the policy to be applied on the link.
AT posture evaluation	The AT provides its posture information to the authentication server whenever it starts the authentication exchange with the authentication server on behalf of the supplicant.

802.1X Role Selection

In 802.1X, the AT must have IP connectivity with the authentication server because it has to relay the authentication exchange between the supplicant and the AT using RADIUS over UDP/IP. When an endpoint device, such as a PC, connects to a network, it is obvious that it should act as a supplicant. However, in the case of a Cisco TrustSec connection between two network devices, the 802.1X role of each network device might not be immediately apparent to the other network device.

Instead of requiring manual configuration of the AT and supplicant roles for the Cisco NX-OS devices, Cisco TrustSec runs a role-selection algorithm to automatically determine which Cisco NX-OS device acts as the AT and which device acts as the supplicant. The role-selection algorithm assigns the AT role to the device that has IP reachability to a RADIUS server. Both devices start both the AT and supplicant state machines. When a Cisco NX-OS device detects that its peer has access to a RADIUS server, it terminates its own AT state machine and assumes the role of the supplicant. If both Cisco NX-OS devices have access to a RADIUS server, the algorithm compares the MAC addresses used as the source for sending the EAP over LAN (EAPOL) packets. The Cisco NX-OS device that has the MAC address with the higher value becomes the AT and the other Cisco NX-OS device becomes the supplicant.

Cisco TrustSec Authentication Summary

By the end of the Cisco TrustSec authentication process, the authentication server has performed the following actions:

- Verified the identities of the supplicant and the AT.
- Authenticated the user if the supplicant is an endpoint device.

At the end of the Cisco TrustSec authentication process, both the AT and the supplicant know following:

- Device ID of the peer
- Cisco TrustSec capability information of the peer
- Key used for the SAP

Device Identities

Cisco TrustSec does not use IP addresses or MAC addresses as device identities. Instead, you 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 these credentials to mutually authenticate the supplicant during the EAP-FAST phase 0 (provisioning) exchange where a PAC is provisioned in the supplicant. Cisco TrustSec does not perform the EAP-FAST phase 0 exchange again until the PAC expires and only performs EAP-FAST phase 1 and phase 2 exchanges for future link bringups. The EAP-FAST phase 1 exchange uses the PAC to mutually authenticate the authentication server and the supplicant. Cisco TrustSec uses the device credentials only during the PAC provisioning (or reprovisioning) steps.

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. The authentication server and the supplicant use this password for mutual authentication in all future EAP-FAST phase 0 exchanges.

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. Cisco TrustSec performs user authentication inside the EAP-FAST tunnel as part of the EAP-FAST phase 2 exchange.

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 the 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 the 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.

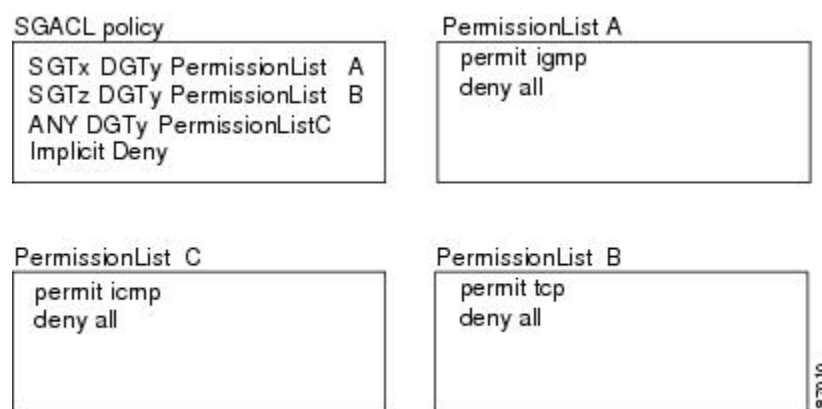
The management server derives the SGTs based on the security policy configuration. You do not have to configure them manually.

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.

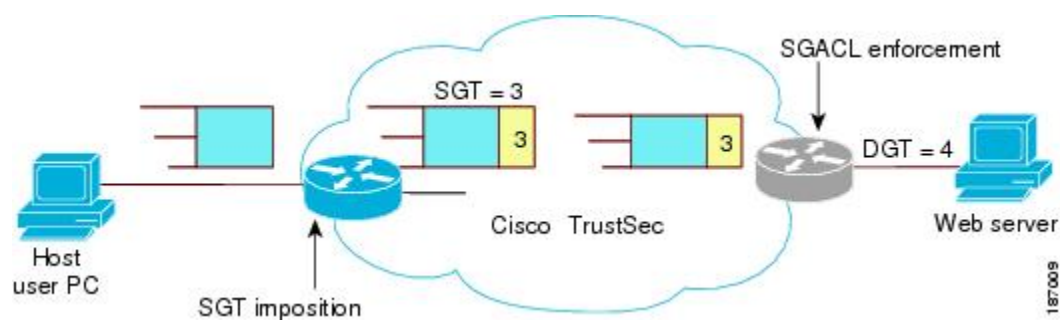
This figure shows an example of an SGACL policy.

Figure 4: SGACL Policy Example



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

Figure 5: SGT and SGACL in Cisco TrustSec Network



The Cisco NX-OS device defines 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 size of ACLs and simplifies their maintenance.

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

of ACEs = (# of sources specified) X (# of destinations specified) X (# of permissions specified)

Cisco TrustSec uses the following formula:

of ACEs = # of permissions specified

Determining the Source Security Group

A network device at the ingress of the Cisco TrustSec cloud needs to determine the SGT of the packet entering the Cisco TrustSec cloud so that it can tag the packet with that SGT when it forwards it into the Cisco TrustSec 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 in 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. Authentication server indicates whether the peer device is trusted or not. If a peer device is not trusted then 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 cloud for the packet.
- Look up the source SGT based on the source IP address—In some cases, you can manually configure the policy to decide the SGT of a packet based on the source IP address. The SGT Exchange Protocol (SXP) can also populate the IP-address-to-SGT mapping table.

Determining the Destination Security Group

The egress network device in a Cisco TrustSec 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 in following ways:

- Destination SGT of the egress port obtained during the policy acquisition
- Destination SGT lookup based on the destination IP address

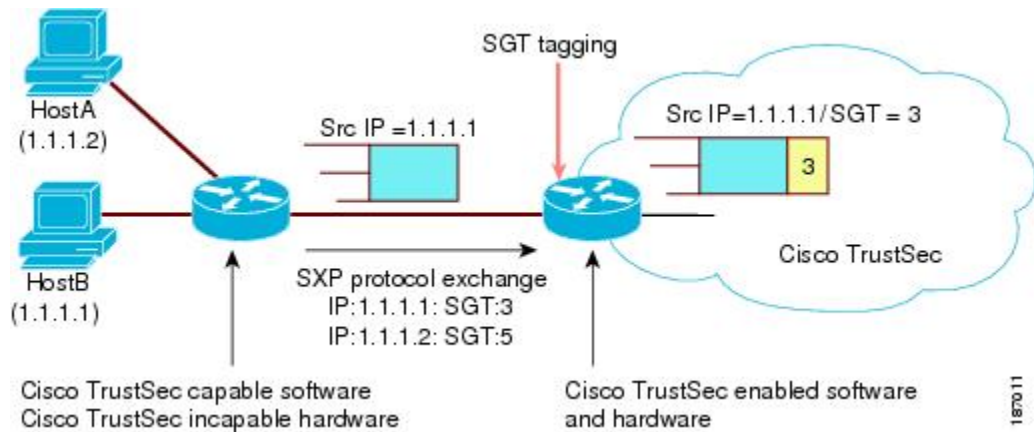
SXP for SGT Propagation Across Legacy Access Networks

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.

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

Figure 6: Using SXP to Propagate SGT Information



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 both 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.
- 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.

Authorization and Policy Acquisition

After authentication ends, both the supplicant and AT obtain the security policy from the authentication server. The supplicant and AT enforce the policy against each other. Both the supplicant and AT provide the peer device ID that each receives after authentication. If the peer device ID is not available, Cisco TrustSec can use a manually configured peer device ID.

The authentication server returns the following policy attributes:

Cisco TrustSec trust	Indicates whether the neighbor device is to be trusted for the purpose of putting the SGT in the packets.
Peer SGT	Indicates the security group that the peer belongs to. If the peer is not trusted, all packets received from the peer are tagged with this SGT. If the device does not know if the SGACLs are associated with the peer's SGT, the device may send a follow-up request to fetch the SGACLs.
Authorization expiry time	Indicates the number of seconds before the policy expires. The Cisco-proprietary attribute-value (AV) pairs indicates the expiration time of an authorization or policy

response to a Cisco TrustSec device. A Cisco TrustSec device should refresh its policy and authorization before it times out.



Tip

Each Cisco TrustSec device should support some minimal default access policy in case it is not able to contact the authentication server to get an appropriate policy for the peer.

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 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.

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.

RADIUS Relay Functionality

The Cisco NX-OS device that plays the role of the Cisco TrustSec AT in the 802.1X authentication process has IP connectivity to the authentication server, which allows it to acquire the policy and authorization from the authentication server by exchanging RADIUS messages over UDP/IP. The supplicant device may not have IP connectivity with the authentication server. In such cases, Cisco TrustSec allows the AT to act as a RADIUS relay for the supplicant.

The supplicant sends a special EAP over LAN (EAPOL) message to the Cisco TrustSec AT that contains the RADIUS server IP address and UDP port and the complete RADIUS request. The Cisco TrustSec AT extracts the RADIUS request from the received EAPOL message and sends it over UDP/IP to the authentication server. When the RADIUS response returns from the authentication server, the Cisco TrustSec AT forwards the message back to the supplicant, encapsulated in an EAPOL frame.

Virtualization Support for Cisco TrustSec

Cisco TrustSec configuration and operation are local to the virtual device context (VDC). For more information on VDCs, see the [Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 4.2](#).

Licensing Requirements for Cisco TrustSec

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	<p>Configuring Cisco TrustSec requires an Advanced Services license. For an explanation of the Cisco NX-OS licensing scheme and how to obtain and apply licenses, see the Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 4.2.</p> <p>Note Cisco TrustSec licensing does not have a grace period. You must obtain and install an Advanced Services license before you can use Cisco TrustSec.</p>

Prerequisites for Cisco TrustSec

Cisco TrustSec has the following prerequisites:

- You must install the Advance Service license.
- You must enable the 802.1X feature.

Guidelines and Limitations for Cisco TrustSec

Cisco TrustSec has the following guidelines and limitations:

- Cisco TrustSec uses RADIUS for authentication.
- You cannot configure both Cisco TrustSec and 802.1X on an interface; you can configure only one or the other. However, you must enable the 802.1X feature for Cisco TrustSec to use EAP-FAST authentication.
- AAA authentication and authorization for Cisco TrustSec is only supported by the Cisco Secure Access Control Server (ACS).
- Cisco TrustSec supports IPv4 addressing only.
- SXP cannot use the management (mgmt 0) interface.
- You cannot enable Cisco TrustSec on interfaces in half-duplex mode.
- You cannot clear the Cisco TrustSec policies.
- If SGACL is applied to the packets being routed through SVI, SGACL has to be enabled on all the VLANs and the VRF involved.

Default Settings For Cisco TrustSec

This table lists the default settings for Cisco TrustSec parameters.

Table 1: Default Cisco TrustSec Parameters Settings

Parameters	Default
Cisco TrustSec	Disabled
SXP	Disabled
SXP default password	None
SXP reconcile period	120 seconds (2 minutes)
SXP retry period	60 seconds (1 minute)
Caching	Disabled

Configuring Cisco TrustSec

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

Enabling the Cisco TrustSec Feature

You must enable both the 802.1X and Cisco TrustSec features on the Cisco NX-OS device before you can configure Cisco TrustSec.

**Note**

You cannot disable the 802.1X feature after you enable the Cisco TrustSec feature.

Before You Begin

Ensure that you have installed the Advanced Services license.

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 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: switch(config)# exit switch#	Exits configuration mode.
Step 5	show cts Example: switch# show cts	(Optional) Displays the Cisco TrustSec configuration.
Step 6	show feature Example: switch# show feature	(Optional) Displays the enabled status for features.
Step 7	copy running-config startup-config Example: switch# copy running-config startup-config	(Optional) 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 the following URL:

http://www.cisco.com/en/US/products/sw/secursw/ps5338/products_installation_and_configuration_guides_list.html).

Before You Begin

Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

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

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	cts device-id <i>name</i> password <i>password</i> Example: <pre>switch(config)# cts device-id MyDevice1 password Cisco321</pre>	Configures a unique device ID and password. The <i>name</i> argument has a maximum length of 32 characters and is case sensitive.
Step 3	exit Example: <pre>switch(config)# exit switch#</pre>	Exits configuration mode.
Step 4	show cts Example: <pre>switch# show cts</pre>	(Optional) Displays the Cisco TrustSec configuration.
Step 5	copy running-config startup-config Example: <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature](#) , page 12

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. Because Cisco TrustSec supports RADIUS relay, you need to

configure AAA only on a seed Cisco NX-OS device that is directly connected to a Cisco Secure ACS. For all the other Cisco TrustSec-enabled Cisco NX-OS devices, Cisco TrustSec automatically provides a private AAA server group, `aaa-private-sg`. The seed Cisco NX-OS devices uses the management VRF to communicate with the Cisco Secure ACS.

**Note**

Only the Cisco Secure ACS supports Cisco TrustSec.

Configuring AAA on the Cisco TrustSec Seed Cisco NX-OS Devices

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

**Note**

When you configure the AAA RADIUS server group for the seed Cisco NX-OS device, you must specify a VRF. If you use the management VRF, no further configuration is necessary for the nonseed devices in the network cloud. If you use a different VRF, you must configure the nonseed devices with that VRF.

Before You Begin

Obtain the IPv4 or IPv6 address or hostname for the Cisco 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 dot1x 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: <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
Step 2	radius-server host {ipv4-address ipv6-address hostname} key [0 7] key pac Example: <pre>switch(config)# radius-server host 10.10.1.1 key L1a0K2s9 pac</pre>	Configures a RADIUS server host with a key and PAC. The <i>hostname</i> argument is The <i>key</i> 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	show radius-server Example: <pre>switch# show radius-server</pre>	(Optional) Displays the RADIUS server configuration.
Step 4	aaa group server radius group-name Example: <pre>switch(config)# aaa group server radius Rad1 switch(config-radius)#</pre>	Specifies the RADIUS server group and enters RADIUS server group configuration mode.
Step 5	server {ipv4-address ipv6-address hostname} Example: <pre>switch(config-radius)# server 10.10.1.1</pre>	Specifies the RADIUS server host address.
Step 6	use-vrf vrf-name Example: <pre>switch(config-radius)# use-vrf management</pre>	Specifies the management VRF for the AAA server group. Note If you use the management VRF, no further configuration is necessary for the nonseed devices in the network cloud. If you use a different VRF, you must configure the nonseed devices with that VRF.
Step 7	exit Example: <pre>switch(config-radius)# exit switch(config)#</pre>	Exits RADIUS server group configuration mode.
Step 8	aaa authentication dot1x default group group-name Example: <pre>switch(config)# aaa authentication dot1x default group Rad1</pre>	Specifies the RADIUS server groups to use for 802.1X authentication.

	Command or Action	Purpose
Step 9	aaa authorization cts default group <i>group-name</i> 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 configuration mode.
Step 11	show radius-server groups [<i>group-name</i>] Example: switch# show radius-server group rad2	(Optional) Displays the RADIUS server group configuration.
Step 12	show aaa authentication Example: switch# show aaa authentication	(Optional) Displays the AAA authentication configuration.
Step 13	show aaa authorization Example: switch# show aaa authorization	(Optional) Displays the AAA authorization configuration.
Step 14	show cts pacs Example: switch# show cts pacs	(Optional) Displays the Cisco TrustSec PAC information.
Step 15	copy running-config startup-config Example: switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Configuring AAA on Cisco TrustSec Nonseed Cisco NX-OS Devices , page 17](#)

Configuring AAA on Cisco TrustSec Nonseed Cisco NX-OS Devices

Cisco TrustSec configures an AAA server group named `aaa-private-sg` on the nonseed Cisco NX-OS devices in the network cloud. By default, the `aaa-private-sg` server group uses the management VRF to communicate with the Cisco Secure ACS and no further configuration is required on the nonseed Cisco NX-OS devices. However, if you choose to use a different VRF, you must change the `aaa-private-sg` on the nonseed Cisco NX-OS device to use the correct VRF.

Before You Begin

Ensure that you enabled Cisco TrustSec.

Ensure that you have configured a seed Cisco NX-OS device in your network.

SUMMARY STEPS

1. **configure terminal**
2. **aaa group server radius aaa-private-sg**
3. **use-vrf *vrf-name***
4. **exit**
5. (Optional) **show radius-server groups aaa-private-sg**
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	aaa group server radius aaa-private-sg Example: switch(config)# aaa group server radius aaa-private-sg switch(config-radius)#	Specifies the RADIUS server group aaa-private-sg and enters RADIUS server group configuration mode.
Step 3	use-vrf <i>vrf-name</i> Example: switch(config-radius)# use-vrf MyVRF	Specifies the management VRF for the AAA server group.
Step 4	exit Example: switch(config-radius)# exit switch(config)#	Exits configuration mode.
Step 5	show radius-server groups aaa-private-sg Example: switch(config)# show radius-server groups aaa-private-sg	(Optional) Displays the RADIUS server group configuration for the default server group.
Step 6	copy running-config startup-config Example: switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Configuring AAA on the Cisco TrustSec Seed Cisco NX-OS Devices , page 15](#)

Configuring Cisco TrustSec Authentication, Authorization, SAP, and Data Path Security

This section provides information about the configuration tasks for Cisco TrustSec authentication, authorization, SAP, and data path security.

Cisco TrustSec Configuration Process for Cisco TrustSec Authentication and Authorization

Follow these steps to configure Cisco TrustSec authentication and authorization:

SUMMARY STEPS

1. Enable the Cisco TrustSec feature.
2. Enable Cisco TrustSec authentication.
3. Enable 802.1X authentication for Cisco TrustSec on the interfaces.

DETAILED STEPS

- | | |
|---------------|--|
| Step 1 | Enable the Cisco TrustSec feature. |
| Step 2 | Enable Cisco TrustSec authentication. |
| Step 3 | Enable 802.1X authentication for Cisco TrustSec on the interfaces. |

Related Topics

- [Enabling the Cisco TrustSec Feature](#) , page 12
- [Enabling Cisco TrustSec Authentication](#) , page 19

Enabling Cisco TrustSec Authentication

You must enable Cisco TrustSec authentication on the interfaces. By default, the data path replay protection feature is enabled and the SAP operating mode is GCM-encrypt.



Caution

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



Note

Enabling 802.1X mode for Cisco TrustSec automatically enables authorization and SAP on the interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet *slot/port* [- *port2*]**
3. **cts dot1x**
4. (Optional) **no replay-protection**
5. (Optional) **sap modelist {gcm-encrypt | gmac | no-encap | null}**
6. **exit**
7. **shutdown**
8. **no shutdown**
9. **exit**
10. (Optional) **show cts interface all**
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 ethernet <i>slot/port</i> [- <i>port2</i>] Example: switch(config)# interface ethernet 2/2 switch(config-if)#	Specifies a single port or a range of ports and enters interface configuration mode.						
Step 3	cts dot1x Example: switch(config-if)# cts dot1x switch(config-if-cts-dot1x)#	Enables 802.1X authentication for Cisco TrustSec and enters Cisco TrustSec 802.1X configuration mode.						
Step 4	no replay-protection Example: switch(config-if-cts-dot1x)# no replay-protection	(Optional) Disables replay protection. The default is enabled.						
Step 5	sap modelist {gcm-encrypt gmac no-encap null} Example: switch(config-if-cts-dot1x)# sap modelist gcm-encrypt	(Optional) Configures the SAP operation mode on the interface. <table><tr><td>gcm-encrypt</td><td>GCM encryption</td></tr><tr><td>gmac</td><td>GCM authentication only</td></tr><tr><td>no-encap</td><td>No encapsulation for SAP and no SGT insertion</td></tr></table>	gcm-encrypt	GCM encryption	gmac	GCM authentication only	no-encap	No encapsulation for SAP and no SGT insertion
gcm-encrypt	GCM encryption							
gmac	GCM authentication only							
no-encap	No encapsulation for SAP and no SGT insertion							

	Command or Action	Purpose
		null Encapsulation without authentication or encryption The default is gcm-encrypt.
Step 6	exit Example: switch(config-if-cts-dot1x) # exit switch(config-if) #	Exits Cisco TrustSec 802.1X 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.
Step 9	exit Example: switch(config-if) # exit switch(config) #	Exits interface configuration mode.
Step 10	show cts interface all Example: switch(config) # show cts interface all	(Optional) Displays the Cisco TrustSec configuration on the interfaces.
Step 11	copy running-config startup-config Example: switch(config) # copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)

Configuring Data-Path Replay Protection for Cisco TrustSec on Interfaces

By default, the Cisco NX-OS software enables the data-path replay protection feature. You can disable the data-path replay protection feature on the interfaces for Layer 2 Cisco TrustSec if the connecting device does not support SAP.



Caution

For the data-path replay protection 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 authentication on the interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet *slot/port* [- *port2*]**
3. **cts dot1x**
4. **no replay-protection**
5. **exit**
6. **shutdown**
7. **no shutdown**
8. **exit**
9. (Optional) **show cts interface all**
10. (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 ethernet <i>slot/port</i> [- <i>port2</i>] Example: switch(config)# interface ethernet 2/2 switch(config-if)#	Specifies a single port or a range of ports and enters interface configuration mode.
Step 3	cts dot1x Example: switch(config-if)# cts dot1x switch(config-if-cts-dot1x)#	Enables 802.1X authentication for Cisco TrustSec and enters Cisco TrustSec 802.1X configuration mode.
Step 4	no replay-protection Example: switch(config-if-cts-dot1x)# no replay-protection	Disables data-path replay protection. The default is enabled. Use the replay-protection command to enable data-path replay protection on the interface.
Step 5	exit Example: switch(config-if-cts-dot1x)# exit switch(config-if)#	Exits Cisco TrustSec 802.1X configuration mode.

	Command or Action	Purpose
Step 6	shutdown Example: switch(config-if)# shutdown	Disables the interface.
Step 7	no shutdown Example: switch(config-if)# no shutdown	Enables the interface and disables the data-path reply protection feature on the interface.
Step 8	exit Example: switch(config-if)# exit switch(config)#	Exits interface configuration mode.
Step 9	show cts interface all Example: switch(config)# show cts interface all	(Optional) Displays the Cisco TrustSec configuration on the interface.
Step 10	copy running-config startup-config Example: switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling Cisco TrustSec Authentication](#) , page 19

Configuring SAP Operation Modes for Cisco TrustSec on Interfaces

You can configure the SAP operation mode on the interfaces for Layer 2 Cisco TrustSec. The default SAP operation mode is GCM-encrypt.



Caution

For the SAP operation 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 authentication on the interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet *slot/port* [- *port2*]**
3. **cts dot1x**
4. **sap modelist [gcm-encrypt | gmac | no-encap | null]**
5. **exit**
6. **shutdown**
7. **no shutdown**
8. **exit**
9. (Optional) **show cts interface all**
10. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
Step 2	interface ethernet <i>slot/port</i> [- <i>port2</i>] Example: <pre>switch(config)# interface ethernet 2/2 switch(config-if)#</pre>	Specifies a single interface or a range of interfaces and enters interface configuration mode.
Step 3	cts dot1x Example: <pre>switch(config-if)# cts dot1x switch(config-if-cts-dot1x)#</pre>	Enables 802.1X authentication for Cisco TrustSec and enters Cisco TrustSec 802.1X configuration mode.
Step 4	sap modelist [gcm-encrypt gmac no-encap null] Example: <pre>switch(config-if-cts-dot1x)# sap modelist gmac</pre>	<p>Configures the SAP authentication mode on the interface.</p> <p>gcm-encrypt Provides GCM encryption.</p> <p>gmac Provides GCM authentication only.</p> <p>no-encap Provides no encapsulation for SAP on the interface and does not insert an SGT.</p> <p>null Provides encapsulation without authentication or encryption for SAP on the interface. Only the SGT is encapsulated.</p> <p>The default is gcm-encrypt.</p>

	Command or Action	Purpose
Step 5	exit Example: <pre>switch(config-if-cts-dot1x)# exit switch(config-if)#</pre>	Exits Cisco TrustSec 802.1X configuration mode.
Step 6	shutdown Example: <pre>switch(config-if)# shutdown</pre>	Disables the interface.
Step 7	no shutdown Example: <pre>switch(config-if)# no shutdown</pre>	Enables the interface and SAP operation mode on the interface.
Step 8	exit Example: <pre>switch(config-if)# exit switch(config)#</pre>	Exits interface configuration mode.
Step 9	show cts interface all Example: <pre>switch(config)# show cts interface all</pre>	(Optional) Displays the Cisco TrustSec configuration on the interface.
Step 10	copy running-config startup-config Example: <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling Cisco TrustSec Authentication](#) , page 19

Configuring SGT Propagation for Cisco TrustSec on Interfaces

The SGT propagation feature on the Layer 2 interface is enabled by default. You can disable the SGT propagation feature on an interface if the peer device connected to the interface can not handle Cisco TrustSec packets tagged with an SGT.



Caution

For the SGT propagation 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 authentication on the interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *slot/port* [- *port2*]
3. **cts dot1x**
4. **no propagate-sgt**
5. **exit**
6. **shutdown**
7. **no shutdown**
8. **exit**
9. (Optional) **show cts interface all**
10. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
Step 2	interface ethernet <i>slot/port</i> [- <i>port2</i>] Example: <pre>switch(config)# interface ethernet 2/2 switch(config-if)#</pre>	Specifies a single port or a range of ports and enters interface configuration mode.
Step 3	cts dot1x Example: <pre>switch(config-if)# cts dot1x switch(config-if-cts-dot1x)#</pre>	Enables 802.1X authentication for Cisco TrustSec and enters Cisco TrustSec 802.1X configuration mode.
Step 4	no propagate-sgt Example: <pre>switch(config-if-cts-dot1x)# no propagate-sgt</pre>	Disables SGT propagation. The default is enabled. Use the propagate-sgt command to enable SGT propagation on the interface.
Step 5	exit Example: <pre>switch(config-if-cts-dot1x)# exit switch(config-if)#</pre>	Exits Cisco TrustSec 802.1X configuration mode.
Step 6	shutdown Example: <pre>switch(config-if)# shutdown</pre>	Disables the interface.

	Command or Action	Purpose
Step 7	no shutdown Example: switch(config-if)# no shutdown	Enables the interface and disables the data-path reply protection feature on the interface.
Step 8	exit Example: switch(config-if)# exit switch(config)#	Exits interface configuration mode.
Step 9	show cts interface all Example: switch(config)# show cts interface all	(Optional) Displays the Cisco TrustSec configuration on the interface.
Step 10	copy running-config startup-config Example: switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling Cisco TrustSec Authentication](#) , page 19

Regenerating SAP Keys on an Interface

You can trigger an SAP exchange to generate a new set of keys and protect the data traffic flowing on an interface.

Before You Begin

Ensure that you enabled Cisco TrustSec.

SUMMARY STEPS

1. **cts rekey ethernet *slot/port***
2. (Optional) **show cts interface all**

DETAILED STEPS

	Command or Action	Purpose
Step 1	cts rekey ethernet <i>slot/port</i> Example: switch# cts rekey ethernet 2/3	Generates the SAP keys for an interface.

	Command or Action	Purpose
Step 2	show cts interface all Example: switch# show cts interface all	(Optional) Displays the Cisco TrustSec configuration on the interfaces.

Related Topics

- [Enabling Cisco TrustSec Authentication](#) , page 19

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 or authentication is not needed because you have the MAC address authentication bypass feature enabled. You must manually configure the interfaces on both ends of the connection.

**Note**

You cannot enable Cisco TrustSec on interfaces in half-duplex mode. Use the **show interface** command to determine if an interface is configured for half-duplex mode.

**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 ethernet *slot/port***
3. **cts manual**
4. **sap pmk {*key* | use-dot1x} [modelist {gcm-encrypt | gmac | no-encap | null}]**
5. **policy dynamic identity *peer-name***
6. **policy static sgt *tag* [trusted]**
7. **exit**
8. **shutdown**
9. **no shutdown**
10. **exit**
11. (Optional) **show cts interface all**
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	interface ethernet <i>slot/port</i> Example: switch(config)# interface ethernet 2/2 switch(config-if)#	Specifies an interface and enters interface configuration mode.								
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	sap pmk {<i>key</i> use-dot1x} [<i>modelist</i> {<i>gcm-encrypt</i> <i>gmac</i> no-encap null}] Example: switch(config-if-cts-manual)# sap pmk fedbaa modelist gmac	Configures the SAP pairwise master key (PMK) and operation mode. SAP is disabled by default in Cisco TrustSec manual mode. The <i>key</i> argument is a hexadecimal value with an even number of characters and a maximum length of 32 characters. Use the use-dot1x keyword when the peer device does not support Cisco TrustSec 802.1X authentication or authorization but does support SAP data path encryption and authentication. The mode list configures the cipher mode for the data path encryption and authentication as follows: <table><tr><td>gcm-encrypt</td><td>GCM encryption mode</td></tr><tr><td>gmac</td><td>GCM authentication mode</td></tr><tr><td>no-encap</td><td>No encapsulation and no SGT insertion</td></tr><tr><td>null</td><td>Encapsulation of the SGT without authentication or encryption</td></tr></table> The default mode is gcm-encrypt .	gcm-encrypt	GCM encryption mode	gmac	GCM authentication mode	no-encap	No encapsulation and no SGT insertion	null	Encapsulation of the SGT without authentication or encryption
gcm-encrypt	GCM encryption mode									
gmac	GCM authentication mode									
no-encap	No encapsulation and no SGT insertion									
null	Encapsulation of the SGT without authentication or encryption									
Step 5	policy dynamic identity <i>peer-name</i> Example: switch(config-if-cts-manual)# policy dynamic identity MyDevice2	Configures dynamic authorization policy download. The <i>peer-name</i> 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.								
Step 6	policy static sgt <i>tag</i> [<i>trusted</i>] Example: switch(config-if-cts-manual)# policy static sgt 0x2	Configures a static authorization policy. The <i>tag</i> argument is in hexadecimal format and 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.								

	Command or Action	Purpose
Step 7	exit Example: switch(config-if-cts-manual)# exit switch(config-if)#	Exits Cisco TrustSec manual configuration mode.
Step 8	shutdown Example: switch(config-if)# shutdown	Disables the interface.
Step 9	no shutdown Example: switch(config-if)# no shutdown	Enables the interface and enables Cisco TrustSec authentication on the interface.
Step 10	exit Example: switch(config-if)# exit switch(config)#	Exits interface configuration mode.
Step 11	show cts interface all Example: switch# show cts interface all	(Optional) Displays the Cisco TrustSec configuration for the interfaces.
Step 12	copy running-config startup-config Example: switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)

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:

SUMMARY STEPS

1. For Layer 2 interfaces, enable SGACL policy enforcement for the VLANs with Cisco TrustSec-enabled interfaces.
2. For Layer 3 interfaces, enable SGACL policy enforcement for the VRFs with Cisco TrustSec-enabled interfaces.
3. If you are not using AAA on a Cisco Secure ACS to download the SGACL policy configuration, manually configure the SGACL mapping and policies.

DETAILED STEPS

Step 1	For Layer 2 interfaces, enable SGACL policy enforcement for the VLANs with Cisco TrustSec-enabled interfaces.
Step 2	For Layer 3 interfaces, enable SGACL policy enforcement for the VRFs with Cisco TrustSec-enabled interfaces.
Step 3	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.

Before You Begin

Ensure that you enabled Cisco TrustSec.

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 configuration mode.

	Command or Action	Purpose
Step 2	vlan <i>vlan-id</i> Example: <pre>switch(config)# vlan 10 switch(config-vlan)#</pre>	Specifies a VLAN and enters VLAN configuration mode.
Step 3	cts role-based enforcement Example: <pre>switch(config-vlan)# cts role-based enforcement</pre>	Enables Cisco TrustSec SGACL policy enforcement on the VLAN.
Step 4	exit Example: <pre>switch(config-vlan)# exit switch(config)#</pre>	Exits VLAN configuration mode.
Step 5	show cts role-based enable Example: <pre>switch(config)# show cts role-based enable</pre>	(Optional) Displays the Cisco TrustSec SGACL enforcement configuration.
Step 6	copy running-config startup-config Example: <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)

Enabling SGACL Policy Enforcement on VRFs

If you use SGACLs, you must enable SGACL policy enforcement in the VRFs that have Cisco TrustSec-enabled Layer 3 interfaces.



Note

You cannot enable SGACL policy enforcement on the management VRF.

Before You Begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled dynamic Address Resolution Protocol (ARP) inspection or Dynamic Host Configuration Protocol (DHCP) snooping.

SUMMARY STEPS

1. **configure terminal**
2. **vrf context** *vrf-name*
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: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	vrf context <i>vrf-name</i> Example: <pre>switch(config)# vrf context MyVrf switch(config-vrf)#</pre>	Specifies a VRF and enters VRF configuration mode.
Step 3	cts role-based enforcement Example: <pre>switch(config-vrf)# cts role-based enforcement</pre>	Enables Cisco TrustSec SGACL policy enforcement on the VRF.
Step 4	exit Example: <pre>switch(config-vrf)# exit switch(config)#</pre>	Exits VRF configuration mode.
Step 5	show cts role-based enable Example: <pre>switch(config)# show cts role-based enable</pre>	(Optional) Displays the Cisco TrustSec SGACL enforcement configuration.
Step 6	copy running-config startup-config Example: <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature](#) , page 12

Manually Configuring Cisco TrustSec SGTs

You can manually configure unique Cisco TrustSec security group tags (SGTs) for the packets subject to SGACL enforcement.


Note

You must also configure the Cisco TrustSec credentials for the Cisco NX-OS device on the Cisco Secure ACS.

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: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	cts sgt tag Example: <pre>switch(config)# cts sgt 0x00a2</pre>	Configures the SGT for packets sent from the device. The <i>tag</i> argument is a hexadecimal value in the format 0xhhhh . The range is from 0x2 to 0xffef.
Step 3	exit Example: <pre>switch(config)# exit switch#</pre>	Exits configuration mode.
Step 4	show cts environment-data Example: <pre>switch# show cts environment-data</pre>	(Optional) Displays the Cisco TrustSec environment data information.
Step 5	copy running-config startup-config Example: <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)

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

You can manually configure IPv4 address to SGACL SGT mapping on either a VLAN 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, dynamic ARP inspection, or DHCP snooping available on your Cisco NX-OS device.

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 configuration mode.
Step 2	vlan <i>vlan-id</i> Example: switch(config)# vlan 10 switch(config-vlan)#	Specifies a VLAN and enters VLAN configuration mode.
Step 3	cts role-based sgt-map <i>ipv4-address tag</i> 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)#	Exits VLAN configuration mode.

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

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Enabling SGACL Policy Enforcement on VLANs , page 31](#)
- [Enabling SGACL Policy Enforcement on VRFs , page 32](#)

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

You can manually configure IPv4 address to SGACL SGT mapping on either a VRF 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, dynamic ARP inspection, or DHCP snooping available on your Cisco NX-OS device.

Before You Begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled SGACL policy enforcement on the VRF.

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 configuration mode.

	Command or Action	Purpose
Step 2	vrf context <i>vrf-name</i> Example: <pre>switch(config)# vrf accounting switch(config-vrf)#</pre>	Specifies a VRF and enters VRF configuration mode.
Step 3	cts role-based sgt-map <i>ipv4-address tag</i> Example: <pre>switch(config-vrf)# cts role-based sgt-map 10.10.1.1 100</pre>	Configures SGT mapping for the SGACL policies for the VLAN.
Step 4	exit Example: <pre>switch(config-vrf)# exit switch(config)#</pre>	Exits VRF configuration mode.
Step 5	show cts role-based sgt-map Example: <pre>switch(config)# show cts role-based sgt-map</pre>	(Optional) Displays the Cisco TrustSec SGACL SGT mapping configuration.
Step 6	copy running-config startup-config Example: <pre>switch(config)# copy running-config startup-config</pre>	(Optional) 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.

Before You Begin

Ensure that you have enabled Cisco TrustSec.

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

SUMMARY STEPS

1. **configure terminal**
2. **cts role-based access-list** *list-name*
3. (Optional) **{deny | permit} all**
4. (Optional) **{deny | permit} icmp**
5. (Optional) **{deny | permit} igmp**
6. (Optional) **{deny | permit} ip**
7. (Optional) **{deny | permit} tcp** [{**dst** | **src**] [{**eq** | **gt** | **lt** | **neq**} *port-number* | **range** *port-number1* *port-number2*}]
8. **{deny | permit} udp** [{**dst** | **src**] [{**eq** | **gt** | **lt** | **neq**} *port-number* | **range** *port-number1* *port-number2*}]
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 <i>list-name</i> Example: switch(config)# cts role-based access-list MySGACL switch(config-rbacl)#	Specifies an SGACL and enters role-based access list configuration mode. The <i>list-name</i> argument value is alphanumeric, case sensitive, and has a maximum length of 32 characters.
Step 3	{deny permit} all Example: switch(config-rbacl)# deny all	(Optional) Denies or permits all traffic.
Step 4	{deny permit} icmp Example: switch(config-rbacl)# permit icmp	(Optional) Denies or permits Internet Control Message Protocol (ICMP) traffic.
Step 5	{deny permit} igmp Example: switch(config-rbacl)# deny igmp	(Optional) Denies or permits Internet Group Management Protocol (IGMP) traffic.

	Command or Action	Purpose
Step 6	{deny permit} ip Example: switch(config-rbacl)# permit ip	(Optional) Denies or permits IP traffic.
Step 7	{deny permit} tcp [{dst src} {{eq gt lt neq} port-number range port-number1 port-number2}] Example: switch(config-rbacl)# deny tcp dst eq 100	(Optional) Denies or permits TCP traffic. The default permits all TCP traffic. The range for the <i>port-number</i> , <i>port-number1</i> , and <i>port-number2</i> arguments is from 0 to 65535.
Step 8	{deny permit} udp [{dst src} {{eq gt lt neq} port-number range port-number1 port-number2}] Example: switch(config-rbacl)# permit udp src eq 1312	Denies or permits UDP traffic. The default permits all UDP traffic. The range for the <i>port-number</i> , <i>port-number1</i> , and <i>port-number2</i> arguments is from 0 to 65535.
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 <i>sgt-value</i> and <i>dgt-value</i> argument values range from 0 to 65520. Note You must create the SGACL before you can map SGTs to it.
Step 11	show cts role-based access-list Example: switch(config)# show cts role-based access-list	(Optional) Displays the Cisco TrustSec SGACL configuration.
Step 12	copy running-config startup-config Example: switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Enabling SGACL Policy Enforcement on VLANs , page 31](#)
- [Enabling SGACL Policy Enforcement on VRFs , page 32](#)

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 download the SGACL policies when it learns of a new SGT through authentication and authorization on an interface, from SXP, 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 Feature , page 12](#)

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

DETAILED STEPS

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

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)

Clearing Cisco TrustSec SGACL Policies

You can clear the Cisco TrustSec SGACL policies.

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	show <i>cts role-based policy</i> Example: switch# clear cts policy all	(Optional) Displays the Cisco TrustSec RBACL policy configuration.
Step 2	clear <i>cts policy {all peer device-name sgt sgt-value}</i> Example: switch# clear cts policy all	Clear the policies for Cisco TrustSec connection information.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)

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 SGACL policy enforcement on the VRF.
3. Enable Cisco TrustSec SXP.
4. Configure SXP peer connections.

DETAILED STEPS

-
- Step 1** Enable the Cisco TrustSec feature.
- Step 2** Enable SGACL policy enforcement on the VRF.
- Step 3** Enable Cisco TrustSec SXP.
- Step 4** Configure SXP peer connections.
- Note** You cannot use the management (mgmt 0) connection for SXP.
-

Related Topics

- [Enabling SGACL Policy Enforcement on VLANs , page 31](#)
- [Enabling SGACL Policy Enforcement on VRFs , page 32](#)
- [Manually Configuring IPv4-Address-to-SGACL SGT Mapping for a VLAN, page 35](#)
- [Manually Configuring SGACL Policies, page 37](#)
- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Enabling SGACL Policy Enforcement on VRFs , page 32](#)
- [Enabling Cisco TrustSec SXP , page 42](#)
- [Configuring Cisco TrustSec SXP Peer Connections, page 43](#)

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: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.

	Command or Action	Purpose
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 configuration mode.
Step 4	show cts sxp Example: switch# show cts sxp	(Optional) Displays the SXP configuration.
Step 5	copy running-config startup-config Example: switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)

Configuring Cisco TrustSec SXP Peer Connections

You must configure the SXP peer connection on both of the devices. One device is the speaker and the other is the listener. 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.

Before You Begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled SXP.

Ensure that you enabled RBACL policy enforcement in the VRF.

SUMMARY STEPS

1. **configure terminal**
2. **cts sxp connection peer** *peer-ipv4-addr* [**source** *src-ipv4-addr*] **password** {**default** | **none** | **required** *password*} **mode** {**speaker** | **listener**} [**vrf** *vrf-name*]
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: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	cts sxp connection peer <i>peer-ipv4-addr</i> [source <i>src-ipv4-addr</i>] password { default none required <i>password</i> } mode { speaker listener } [vrf <i>vrf-name</i>] Example: <pre>switch(config)# cts sxp connection peer 10.10.1.1 source 20.20.1.1 password default mode speaker</pre>	<p>Configures the SXP address connection.</p> <p>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.</p> <p>The password keyword specifies the password that SXP should use for the connection using the following options:</p> <p>default Uses the default SXP password you configured using the cts sxp default password command.</p> <p>none Does not use a password.</p> <p>required Uses the password specified in the command.</p> <p>The vrf keyword specifies the VRF to the peer. The default is the default VRF.</p> <p>The mode keyword specifies the role of the remote peer device:</p> <p>speaker Specifies that the peer is the speaker in the connection.</p> <p>listener Specifies that the peer is the listener in the connection.</p> <p>Note You cannot use the management (mgmt 0) interface for SXP.</p>
Step 3	exit Example: <pre>switch(config)# exit switch#</pre>	Exits configuration mode.

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

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Enabling Cisco TrustSec SXP , page 42](#)
- [Enabling SGACL Policy Enforcement on VRFs , page 32](#)

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 configuration mode.

	Command or Action	Purpose
Step 2	cts sxp default password <i>password</i> Example: switch(config)# cts sxp default password A2Q3d4F5	Configures the SXP default password.
Step 3	exit Example: switch(config)# exit switch#	Exits configuration mode.
Step 4	show cts sxp Example: switch# show cts sxp	(Optional) Displays the SXP configuration.
Step 5	show running-config cts Example: switch# show running-config cts	(Optional) Displays the SXP configuration in the running configuration.
Step 6	copy running-config startup-config Example: switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Enabling Cisco TrustSec SXP , page 42](#)

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. There is no effect on existing TCP connections when you configure the default SXP source IPv4 address.

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: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	cts sxp default source-ip <i>src-ip-addr</i> Example: <pre>switch(config)# cts sxp default source-ip 10.10.3.3</pre>	Configures the SXP default source IPv4 address.
Step 3	exit Example: <pre>switch(config)# exit switch#</pre>	Exits configuration mode.
Step 4	show cts sxp Example: <pre>switch# show cts sxp</pre>	(Optional) Displays the SXP configuration.
Step 5	copy running-config startup-config Example: <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Enabling Cisco TrustSec SXP , page 42](#)

Changing the SXP Reconcile Period

After a peer terminates an SXP connection, an internal hold-down timer starts. If the peer reconnects before the internal hold-down timer expires, the SXP reconcile period timer starts. While the SXP reconcile period timer is active, the Cisco NX-OS software retains the SGT mapping entries learned from the previous connection and removes invalid entries. The default value is 120 seconds (2 minutes). Setting the SXP reconcile period to 0 seconds disables the timer and causes all entries from the previous connection to be removed.

Before You Begin

Ensure that you enabled Cisco TrustSec.

Ensure that you enabled SXP.

SUMMARY STEPS

1. **configure terminal**
2. **cts sxp reconcile-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: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	cts sxp reconcile-period <i>seconds</i> Example: <pre>switch(config)# cts sxp reconcile-period 180</pre>	Changes the SXP reconcile timer period. The default value is 120 seconds (2 minutes). The range is from 0 to 64000.
Step 3	exit Example: <pre>switch(config)# exit switch#</pre>	Exits configuration mode.
Step 4	show cts sxp Example: <pre>switch# show cts sxp</pre>	(Optional) Displays the SXP configuration.
Step 5	copy running-config startup-config Example: <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature , page 12](#)
- [Enabling Cisco TrustSec SXP , page 42](#)

Changing the SXP Retry Period

The SXP retry period determines how often the NX-OS software retries an SXP connection. When an SXP connection is not successfully set up, the 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: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	cts sxp retry-period <i>seconds</i> Example: <pre>switch(config)# cts sxp retry-period 120</pre>	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: <pre>switch(config)# exit switch#</pre>	Exits configuration mode.
Step 4	show cts sxp Example: <pre>switch# show cts sxp</pre>	(Optional) Displays the SXP configuration.
Step 5	copy running-config startup-config Example: <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

Related Topics

- [Enabling the Cisco TrustSec Feature](#) , page 12
- [Enabling Cisco TrustSec SXP](#) , page 42

Verifying 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	Displays the Cisco TrustSec configuration for the interfaces.
show cts pacs	Displays Cisco TrustSec authorization information and PACs in the device key store.
show cts role-based access-list	Displays Cisco TrustSec SGACL information.
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 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.

Enabling Cisco TrustSec

The following example shows how to enable Cisco TrustSec:

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

Configuring AAA for Cisco TrustSec on a Seed Cisco NX-OS Device

The following example shows how to configure AAA for Cisco TrustSec on the seed 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 dot1x default group Rad1
```

```
aaa authorization cts default group Rad1
```

Enabling Cisco TrustSec Authentication on an Interface

The following example shows how to enable Cisco TrustSec authentication with a clear text password on an interface:

```
interface ethernet 2/1
  cts dot1x
  shutdown
  no shutdown
```

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
  sap pmk abcdef modelist gmac
  policy static sgt 0x20
```

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
```

Configuring Cisco TrustSec Role-Based Policy Enforcement for the default VRF

The following example shows how to enable Cisco TrustSec role-based policy enforcement for the default VRF:

```
cts role-based enforcement
```

Configuring Cisco TrustSec Role-Based Policy Enforcement for a Nondefault VRF

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

```
vrf context test
  cts role-based enforcement
```

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
```

Configuring IPv4 Address to SGACL SGT Mapping for the Default VRF

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

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

Configuring IPv4 Address to SGACL SGT Mapping for a Nondefault VRF

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

```
vrf context test
  cts role-based sgt-map 30.1.1.1 30
```

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
```

Manually Configuring Cisco TrustSec SGACLs

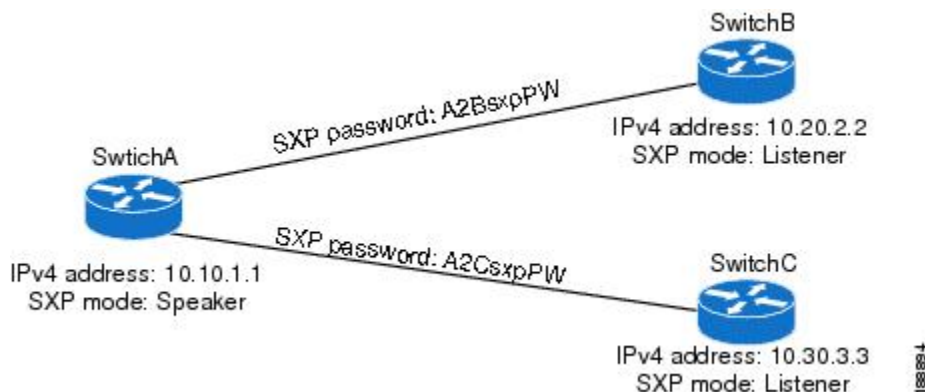
The following example shows how to manually configure Cisco TrustSec SGACLs:

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

Manually Configuring SXP Peer Connections

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

Figure 7: Example SXP Peer Connections



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

```

feature cts
cts role-based enforcement
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 role-based enforcement
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 role-based enforcement
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	<i>Cisco Nexus 7000 Series NX-OS Licensing Guide, Release 4.2</i>

Related Topic	Document Title
Command Reference	Cisco Nexus 7000 Series NX-OS Security Command Reference, Release 4.2

Feature History for Cisco TrustSec

This table lists the release history for this feature.

Table 2: Feature History for Cisco TrustSec

Feature Name	Releases	Feature Information	
Cisco TrustSec	4.2(1)	No change from Release 4.1.	