IPv6 Support for SGT and SGACL

The IPv6 Support for SGT and SGACL feature facilitates the mapping between IPv6 addresses and security group tags (SGTs). The mapped SGTs are later used to drive the Security Group Access Control List (SGACL) enforcement.

This module describes how to configure this feature.

Information About IPv6 Support for SGT and SGACL

Components of IPv6 Dynamic Learning

Dynamic learning of IPv6 addresses requires three components:

- Switch Integrated Security Features (SISF): An infrastructure built to take care of security, address assignment, address resolution, neighbor discovery, exit point discovery, and so on.
- Cisco Enterprise Policy Manager (EPM): A solution that registers with SISF to receive IPv6 address notifications. The Cisco EPM then uses the IPv6 addresses and SGTs downloaded from the Cisco Identity Services Engine (ISE) to generate IP-SGT bindings.
- Cisco TrustSec: A solution that protects devices from unauthorized access. Cisco TrustSec assigns an SGT to the ingress traffic of a device and enforces the access policy based on the tag anywhere in the network.

Mapping of IPv6 addresses to SGT can be done using the following methods, which are listed from lowest priority (1) to highest priority (6):

1. VLAN: IPv6 addresses learnt through SISF on the VLAN that has an SGT-VLAN mapping. Bindings are learned through ICMPv6 Neighbor Discovery.
2. CLI: Address bindings configured using the IP-SGT form of the **cts role-based sgt-map** global configuration command.

3. Layer 3 Interface: Bindings added due to forwarding information base (FIB) forwarding entries that have paths through one or more interfaces with consistent Layer 3 interface-SGT mapping or identity port mapping (IPM) on routed ports.
4. SXP: Bindings learned from SGT Exchange Protocol (SXP) peers.
5. Local: Bindings of authenticated hosts that are learned via EPM and device tracking. (Device tracking and SISF are the same.)
6. Internal: Bindings between locally configured IP addresses and the device SGT.

How to Configure IPv6 Support for SGT and SGACL

This section describes how to configure IPv6 support for SGT and SGACL.

Learning IPv6 Addresses for IP-SGT Bindings

SISF is a feature that learns IPv6 addresses for use in IP-SGT bindings.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**cts role-based sgt-map** *host-address*/*prefix* **sgt** *sgt-value* **Example:** `Device(config)# cts role-based sgt-map 2001::db8::1/64 sgt 120`	Manually maps a source IPv6 address to an SGT on either a host or a virtual routing and forwarding (VRF) instance.
Step 4	**device-tracking policy** *policy-name* **Example:** `Device(config)# device-tracking policy policy1`	Enables device tracking and enters device tracking configuration mode.
Step 5	**tracking enable** **Example:** `Device(config-device-tracking)# tracking enable`	Overrides the default tracking policy on a port.

	Command or Action	Purpose
Step 6	**exit** **Example:** `Device(config-device-tracking)# end`	Exits device tracking configuration mode and returns to privileged EXEC mode.

Configuring IPv6 IP-SGT Binding Using Local Binding

Before you begin

- In local binding, SGT values are downloaded from Cisco Identity Service Engine (ISE). For more information, see the Configuring Cisco Security Group Access Policies document.
- SISF must be enabled and populated before IPv6 address can be generated.

Note This task uses Cisco Identity Based Networking Services (IBNS) Version 2.0.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**policy-map type control subscriber** *control-policy-name* **Example:** `Device(config)# policy-map type control subscriber policy1`	Defines a control policy for subscriber sessions and enters control policy-map configuration mode.
Step 4	**event session-started match-all** **Example:** `Device(config-event-control-policymap)# event session-started match-all`	Specifies the type of event that triggers actions in a control policy if conditions are met.
Step 5	*priority-number* **class always do-until-failure** **Example:** `Device(config-class-control-policymap)# 10 class always do-until-failure`	Associates a control class with one or more actions in a control policy and enters action control policy-map configuration mode. • A named control class must first be configured before specifying it with the *control-class-name* argument.

	Command or Action	Purpose
Step 6	*action-number* **authenticate using mab** **Example:** `Device(config-action-control-policymap)# 10 authenticate using mab`	Initiates the authentication of a subscriber session using the specified method.
Step 7	**end** **Example:** `Device(config-action-control-policymap)# exit`	Exits action control policy-map configuration mode and returns to global configuration mode.
Step 8	**interface gigabitethernet** *interface-number* **Example:** `Device(config)# interface gigabitethernet 1/0/1`	Configures an interface and enters interface configuration mode.
Step 9	**description** *interface-description* **Example:** `Device(config-if)# description downlink to ipv6 clients`	Describes the configured interface.
Step 10	**switchport access vlan** *vlan-id* **Example:** `Device(config-if)# switchport access vlan 20`	Sets access mode characteristics of the interface and configures VLAN when the interface is in access mode.
Step 11	**switchport mode access** **Example:** `Device(config-if)# switchport mode access`	Sets the trunking mode to access mode.
Step 12	**device-tracking attach-policy** *policy-name* **Example:** `Device(config-if)# device-tracking attach-policy snoop`	Applies a policy to the IPv6 Snooping feature.
Step 13	**access-session port-control auto** **Example:** `Device(config-if)# access-session port-control auto`	Sets the authorization state of a port.
Step 14	**mab eap** **Example:** `Device(config-if)# mab eap`	Uses Extensible Authentication Protocol (EAP) for MAC authentication bypass.
Step 15	**dot1x pae authenticator** **Example:**	Enables dot1x authentication on the port.

	Command or Action	Purpose
	`Device(config-if)# dot1x pae authenticator`	
Step 16	**service-policy type control subscriber** *policy-name* **Example:** `Device(config-if)# service-policy type control subscriber policy`	Specifies the policy map that is used for sessions that come up on this interface. The policy map has rules for authentication and authorization.
Step 17	**end** **Example:** `Device(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.
Step 18	**show cts role-based sgt-map all ipv6** **Example:** `Device# show cts role-based sgt-map all ipv6`	Displays active IPv6 IP-SGT bindings.

Configuring IPv6 IP-SGT Binding Using a VLAN

In a VLAN, a network administrator assigns SGT values to a particular VLAN.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**cts role-based sgt-map vlan-list** *vlan-id* **sgt** *sgt-value* **Example:** `Device(config)# cts role-based sgt-map vlan-list 20 sgt 3`	Assigns an SGT value to the configured VLAN. **Note** The range of the *sgt-value* argument must be from 2 to 65519.
Step 4	**end** **Example:** `Device(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.
Step 5	**show cts role-based sgt-map all ipv6** **Example:**	Displays active IPv6 IP-SGT bindings.

	Command or Action	Purpose
	`Device# show cts role-based sgt-map all ipv6`	

Verifying IPv6 Support for SGT and SGACL

Procedure

Step 1 **enable**

Enables privileged EXEC mode.

- Enter your password if prompted.

Example:

```
Device> enable
```

Step 2 **show cts role-based sgt-map all**

Displays active IPv4 and IPv6 IP-SGT bindings.

Example:

```
Device# show cts role-based sgt-map all

Active IPv4-SGT Bindings Information

IP Address              SGT     Source
============================================
192.0.2.1                8       INTERNAL
192.0.2.2                8       INTERNAL
192.0.2.3                11      LOCAL

IP-SGT Active Bindings Summary
============================================
Total number of LOCAL    bindings = 1
Total number of INTERNAL bindings = 2
Total number of active   bindings = 3

Active IPv6-SGT Bindings Information

IP Address                                SGT     Source
============================================================================
2001:DB8:0:ABCD::1                        8       INTERNAL
2001:DB8:1::1                             11      LOCAL
2001:DB8:1::1                             11      LOCAL

IP-SGT Active Bindings Summary
============================================
Total number of LOCAL    bindings = 2
Total number of INTERNAL bindings = 1
Total number of active   bindings = 3
```

Step 3 **show cts role-based sgt-map all ipv6**

Displays active IPv6 IP-SGT bindings.

Example:

```
Device# show cts role-based sgt-map all ipv6

Active IP-SGT Bindings Information

IP Address                                    SGT     Source
============================================================
2001:DB8:1::1                                   10      CLI
2001:DB8:1:FFFF::1                              27      VLAN
2001:DB8:9798:8294:753F::1                      5       LOCAL
2001:DB8:8E99:DA94:8A6A::2                      5       LOCAL
2001:DB8:104:2001::139                          27      VLAN
2001:DB8:104:2001:14FE:9798:8294:753F           5       LOCAL

IP-SGT Active Bindings Summary
============================================
Total number of VLAN     bindings = 2
Total number of CLI      bindings = 1
Total number of LOCAL    bindings = 3
Total number of active   bindings = 6
```

Configuration Examples for IPv6 Support for SGT and SGACL

The following sections show how to configure IPv6 Support for SGT and SGACL.

Example: Learning IPv6 Addresses for IP-SGT Bindings

The following example shows how to learn IPv6 addresses for IP-SGT bindings:

```
Device> enable
Device# configure terminal
Device(config)# cts role-based sgt-map 2001::db8::1/64 sgt 120
Device(config)# device-tracking policy policy1
Device(config-device-tracking)# tracking enable
Device(config-device-tracking)# end
```

Example: Configuring IPv6 IP-SGT Binding Using Local Binding

The following example uses IBNS Version 2.0.

```
Device> enable
Device# configure terminal
Device(config)# policy-map type control subscriber policy1
Device(config-event-control-policymap)# event session-started match-all
Device(config-class-control-policymap)# 10 class always do-until-failure
Device(config-action-control-policymap)# 10 authenticate using mab
Device(config-action-control-policymap)# exit
```

```
Device(config)# interface gigabitethernet 1/0/1
Device(config-if)# description downlink to ipv6 clients
Device(config-if)# switchport access vlan 20
Device(config-if)# switchport mode access
Device(config-if)# device-tracking attach-policy snoop
Device(config-if)# access-session port-control auto
Device(config-if)# mab eap
Device(config-if)# dot1x pae authenticator
Device(config-if)# service-policy type control subscriber policy
Device(config-if)# end
```

Example: Configuring IPv6 IP-SGT Binding Using a VLAN

The following example shows how to configure IP-SGT binding using a VLAN:

```
Device> enable
Device# configure terminal
Device(config)# cts role-based sgt-map vlan-list 20 sgt 3
Device(config)# end
```

Feature History for IPv6 Support for SGT and SGACL

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Gibraltar 16.11.1	IPv6 Support for SGT and SGACL	The IPv6 Support for SGT and SGACL feature introduces dynamic learning of mappings between IP addresses and SGTs for IPv6 addresses. The SGTs are later used to derive the SGACL.
Cisco IOS XE Dublin 17.11.1	IPv6 Support for SGT and SGACL	Support for this feature was introduced on the Cisco Catalyst 9600 Series Supervisor 2 Module.

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn.