Cisco TrustSec SGACL High Availability

Cisco TrustSec Security Group access control lists (SGACLs) support the high availability functionality in switches that support the Cisco StackWise technology. This technology provides stateful redundancy and allows a switch stack to enforce and process access control entries.

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Prerequisites for Cisco TrustSec SGACL High Availability

This document assumes the following:

- An understanding of Cisco TrustSec and the Security Group access control lists (SGACL) configuration.
- Devices are configured to function as a stack.
- All the devices in the stack are running an identical version of Cisco IOS XE software.

Restrictions for Cisco TrustSec SGACL High Availability

When both active and standby switches fail simultaneously, stateful switchover of SGACL does not occur.

Information About Cisco TrustSec SGACL High Availability

Cisco TrustSec Security Group access control lists (SGACLs) support the high availability functionality in switches that support the Cisco StackWise technology. This technology provides stateful redundancy and allows a switch stack to enforce and process access control entries.

There is no Cisco TrustSec-specific configuration to enable this functionality, which is supported in Cisco IOS XE Denali 16.2.1 and later releases.

High Availability Overview

In a switch stack, the stack manager assigns the switch with the highest priority as the active switch, and the switch with the next highest priority as the standby switch. During an automatic or a CLI-based stateful switchover, the standby switch becomes the active switch and the switch with the next highest priority becomes the standby switch and so on.

Operation data is synchronized from the active switch to the standby switch, during initial system bootup, changes in the operational data (also called Change of Authorization [CoA]), or operational data refresh.

During a stateful switchover, the newly active switch, requests and downloads the operation data. The environment data (ENV-data) and the Role-Based access control lists (RBACLs) are not updated until the refresh time is complete.

The following operation data is downloaded to the active switch:

- Environment Data (ENV-data)—A variable length field that consists of the preferred server list to get the RBACL information at the time of refresh or initialization.
- Protected Access Credential (PAC)—A shared secret that is mutually and uniquely shared between the switch and the authenticator to secure an Extensible Authentication Protocol Flexible Authentication via the Secure Tunneling (EAP-FAST) tunnel.
- Role-Based Policy (RBACL or SGACL)—A variable-length role-based policy list that consists of policy definitions for all the Security Group Tag (SGT) mappings on the switch.

Note Cisco TrustSec credential that consists of the device ID and password details is run as a command on the active switch.

Verifying Cisco TrustSec SGACL High Availability

To verify the Cisco TrustSec SGACL high availability configuration, run the **show cts role-based permissions** command on both the active and standby switches. The output from the command must be the same on both switches.

The following is sample output from the **show cts role-based permissions** command on the active switch:

```
Device# show cts role-based permissions

IPv4 Role-based permissions default (monitored):
        default_sgacl-01
        Deny IP-00
IPv4 Role-based permissions from group 10:SGT_10 to group 15:SGT_15:
        SGACL_3-01
IPv4 Role-based permissions from group 14:SGT_14 to group 15:SGT_15:
        multple_ace-14
RBACL Monitor All for Dynamic Policies : FALSE
RBACL Monitor All for Configured Policies : FALSE
```

The following is sample output from the show cts role-based permissions command on the standby switch:

```
Device-stby# show cts role-based permissions

IPv4 Role-based permissions default (monitored):
```

```
        default_sgacl-01
        Deny IP-00
IPv4 Role-based permissions from group 10:SGT_10 to group 15:SGT_15:
        SGACL_3-01
IPv4 Role-based permissions from group 14:SGT_14 to group 15:SGT_15:
        multple_ace-14
RBACL Monitor All for Dynamic Policies : FALSE
RBACL Monitor All for Configured Policies : FALSE
```

After a stateful switchover, run the following commands on the active switch to verify the feature:

The following is sample output from the **show cts pacs** command:

```
Device# show cts pacs

AID: A3B6D4D8353F102346786CF220FF151C
PAC-Info:
    PAC-type = Cisco Trustsec
    AID: A3B6D4D8353F102346786CF220FF151C
    I-ID: CTS_ED_21
    A-ID-Info: Identity Services Engine
    Credential Lifetime: 17:22:32 IST Mon Mar 14 2016
PAC-Opaque:
000200B80003000100040010A3B6D4D8353F102346786CF220FF151C0006009C00030100E044B2650D8351FD06
F23623C470511E0000001356DEA96C00093A80538898D40F633C368B053200D4C9D2422A7FEB4837EA9DBB89D1
E51DA4E7B184E66D3D5F2839C11E5FB386936BB85250C61CA0116FDD9A184C6E96593EEAF5C39BE08140AFBB19
4EE701A0056600CFF5B12C02DD7ECEAA3CCC8170263669C483BD208052A46C31E39199830F794676842ADEECBB
A30FC4A5A0DEDA93
Refresh timer is set for 01:00:05
```

The following is sample output from the **show cts environment-data** command:

```
Device# show cts environment-data

CTS Environment Data
====================
Current state = COMPLETE
Last status = Successful
Local Device SGT:
  SGT tag = 0:Unknown
Server List Info:
Installed list: CTSServerList1-000D, 1 server(s):
  *Server: 10.78.105.47, port 1812, A-ID A3B6D4D8353F102346786CF220FF151C
  Status = ALIVE
  auto-test = FALSE, keywrap-enable = FALSE, idle-time = 60 mins, deadtime = 20 secs
Multicast Group SGT Table:
Security Group Name Table:
0001-45 :
  0-00:Unknown
  2-ba:SGT_2
  3-00:SGT_3
  4-00:SGT_4
  5-00:SGT_5
  6-00:SGT_6
  7-00:SGT_7
  8-00:SGT_8
  9-00:SGT_9
  10-16:SGT_10
!
!
!
Environment Data Lifetime = 3600 secs
Last update time = 14:32:53 IST Mon Mar 14 2016
Env-data expires in 0:00:10:04 (dd:hr:mm:sec)
```

```
Env-data refreshes in 0:00:10:04 (dd:hr:mm:sec)
Cache data applied = NONE
State Machine is running
```

The following is sample output from the **show cts role-based permissions** command after a stateful switchover:

```
Device# show cts role-based permissions

IPv4 Role-based permissions default:
        default_sgacl-01
        Deny IP-00
IPv4 Role-based permissions from group 10:SGT_10 to group 15:SGT_15:
        SGACL_3-01
IPv4 Role-based permissions from group 14:SGT_14 to group 15:SGT_15:
        multple_ace-14
RBACL Monitor All for Dynamic Policies : FALSE
RBACL Monitor All for Configured Policies : FALSE
```

Feature History for SGACL High Availability

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

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

Release	Feature	Feature Information
Cisco IOS XE Everest 16.5.1a	SGACL High Availability	Cisco TrustSec SGACLs support the high availability functionality in switches that support the Cisco StackWise technology. This technology provides stateful redundancy and allows a switch stack to enforce and process access control entries. Support for this feature was introduced only on the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models of the Cisco Catalyst 9500 Series Switches.
Cisco IOS XE Fuji 16.8.1a	SGACL High Availability	Support for this feature was introduced on the C9500-32C, C9500-32QC, C9500-48Y4C, and C9500-24Y4C models of the Cisco Catalyst 9500 Series Switches.

Use 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.