Change of Authorization

This chapter contains the following sections:

Change of authorization

A Change of authorization (CoA) is a network policy mechanism to change the attributes of an authentication, authorization, and accounting (AAA) session. When a policy changes for a user or user group in AAA, administrators can send the CoA packets from the AAA server such as a Cisco Secure Access Control Server (ACS) to reinitialize authentication and apply the new policy.

CoA also helps in:

- Supporting actions such as session query, reauthentication, termination, port bounce, and port shutdown.
- Enabling dynamic activation or deactivation of service templates.

Change of authorization is part of Identity-Based Networking Services and helps enforce policy changes in real time. This feature allows administrators to respond to changes in user roles, device states, or network conditions.

Table 1: Feature History Table

Feature name	Release information	Feature description
CoA Support	Release 26.1.1	This feature supports Change of Authorization (CoA), which is a network policy mechanism that: • Modifies session attributes for active authentication, authorization, and accounting sessions. actions such as session query and reauthentication termination, port bounce, and port shutdown. • Enables dynamic activation or deactivation of service templates ass part of Identity-Based Networking Services. Change of Authorization enforces policy changes in real time, allowing administrators to respond promptly to changes in user roles, device states, or network conditions.

Information about change of authorization

How change of authorization reauthentication work

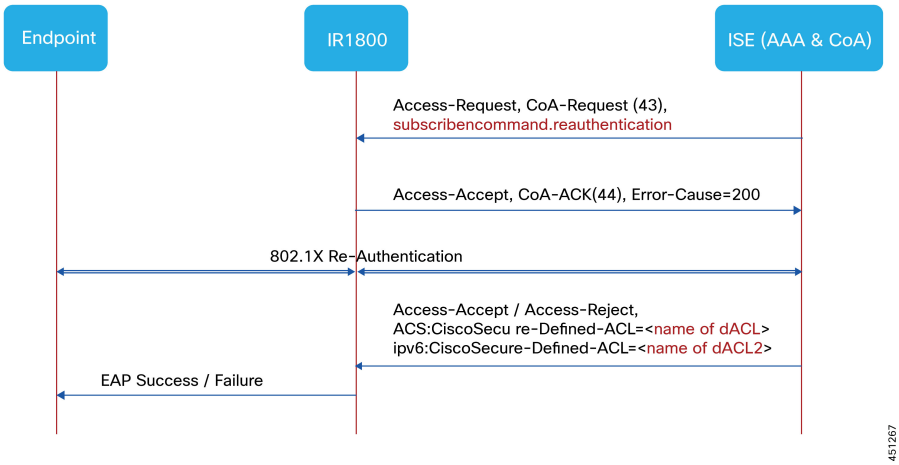
Summary

Change of authorization reauthentication enables dynamic policy changes in AAA sessions after initial authentication.

- When a policy changes for a user or user group in AAA, administrators can send RADIUS CoA packets from the AAA server.
- The AAA server, such as Cisco Identity Services Engine, uses CoA packets to reinitialize authentication and apply the new policy.
- The RADIUS interface provides various primitives that can be used during a CoA event.
- These primitives and their functions are essential for effectively applying new policies to users or groups during a session.

Workflow

Figure 1: Workflow



1. The administrator changes a user or user group policy in the AAA system.
2. The AAA server sends a RADIUS CoA packet to the network device, specifying policy updates.
3. The device receives the CoA packet and reinitializes authentication, applying the new policy.
4. The RADIUS interface returns either a CoA-ACK (acknowledgement) or CoA-NAK (nonacknowledgement) as a response.

Result

By default, the RADIUS interface is enabled on the device. However, some basic configuration is required for the following attributes:

- Security and Password
- Accounting
- CoA acknowledgement (ACK) [CoA-ACK]
- CoA nonacknowledgement (NAK) [CoA-NAK]

What's next

After posture assessment is succeessful, full network access is pushed down to the device for specific client through CoA re-authentication command based on its compliance state derived from last assessment. It is optional to enforce downloadable ACLs with Permit-ALL or limited access to certain resources to corresponding clients. Per-session CoA requests are supported for session identification, session termination, host reauthentication, port shutdown, and port bounce. This model comprises one request (CoA-Request) and two possible response codes:

Change of authorization requests

A Change of authorization is a network policy mechanism that:

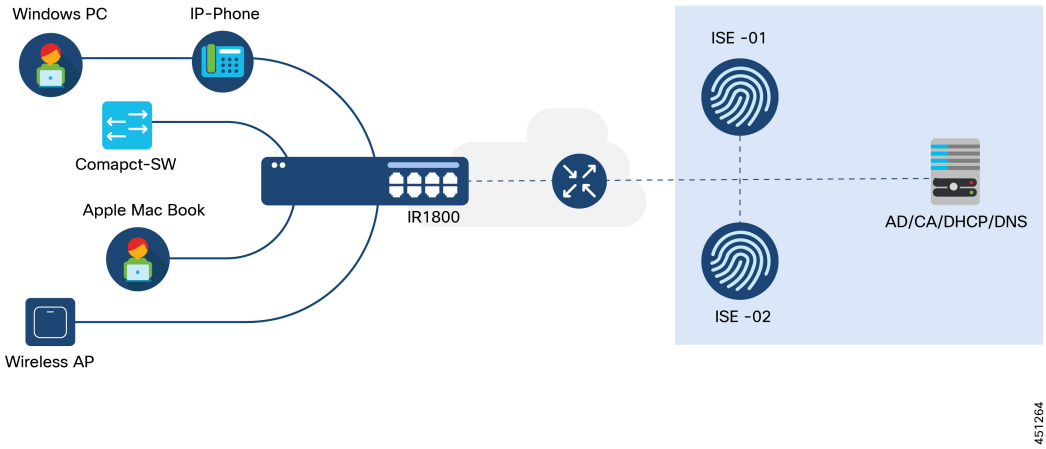
- facilitates endpoint re-authentication based on posture assessment,

- integrates with Cisco AnyConnect and Cisco ISE, version 2.6 and
- enhances security through customizable security policies per client.

Topology diagram of Cisco IR1800 Router as a branch router

The network topology below shows a typical Cisco IR1800 Series Router as a branch router in a network for secure access with ISE and other network services deployed in Campus or Data Center. CoA is critical part of the solution to initiate re-authentication or re-authorization to endpoint's network access based on its posture assessment result. Downloadable ACL is the target or purpose of the entire solution.

Figure 2: Network topology of Cisco IR1800 with ISE and other Network Services



Limitations for change of authorization

When configuring the Change of Authorization feature, ensure that you observe these restrictions:

- Only platforms with SKUs that support TCAM can use downloadable ACLs (DACL) and redirect ACLs with change of authorization.
- The switch ASIC TCAM supports a maximum of 255 IPv4 ACL entries in total.
- Multi-Auth VLAN is not supported with change of authorization.
- VLAN changes may not occur consistently with multiple iterations on the same client interface.

How to configure change of authorization

Create RADIUS server group

Use this procedure to create a RADIUS server group and add a RADIUS server to the group.

Procedure

Step 1 Use the **configure terminal** command to enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Use the **radius server** *server-name* command to configure a RADIUS server.

Example:

```
Device(config)# radius server ise
```

Step 3 Use the **address ipv4** *ip* **auth-port** *port* **acct-port** *port* command to set the RADIUS server's IP address and authentication/accounting ports.

Example:

```
Device(config-radius-server)# address ipv4 10.0.0.10 auth-port 1812 acct-port 1813
```

Step 4 Use the **aaa group server radius** *radius-group* **server name** *RADIUS-server-name* command to create a RADIUS server group and add the RADIUS server to it.

Example:

```
Device(config-radius-server)# aaa group server radius ise-group
 server name ise
```

Step 5 Use the **key** <*secret-key*> command to specify the shared secret key (encrypted) for the RADIUS server.

Example:

```
Device(config-radius-server)# key secret-key
```

What to do next

Configure 802.1X authentication using a RADIUS server

Configure 802.1X authentication using a RADIUS server

Follow this procedure to enable and set up 802.1X authentication using a RADIUS server on a Cisco device.

Before you begin

- Ensure that your device is in global configuration mode.
- Ensure that the RADIUS server is reachable from the device and is configured to accept requests.
- Ensure that a RADIUS server group is already created.

Procedure

Step 1 Use the **dot1x system-auth-control** command to enable 802.1X authentication on the router.

Example:

```
Device(config)# dot1x system-auth-control
```

Step 2 Use the **aaa new-model** command to enable authentication, authorization, and accounting (AAA) globally.

Example:

```
Device(config)# aaa new-model
```

Step 3 Use the **aaa authentication dot1x default group** *radius-server-group-name* command to specify that 802.1X authentication requests use the RADIUS server group by default.

Example:

```
Device(config)# aaa authentication dot1x default group ise-group
```

Step 4 Use the **aaa authorization network default group** *radius-server-group-name* command to specify that 802.1X authorization requests use the RADIUS server group by default.

Example:

```
Device(config)# aaa authorization network default group ise-group
```

Step 5 Use the **aaa authorization auth-proxy default group** *radius-server-group-name* command to specify that the authorization of the authentication proxy requests use RADIUS server group by default, enabling dynamic user access control via the specified RADIUS server group.

Example:

```
Device(config)# aaa authorization auth-proxy default group ise-group
```

Step 6 Use the **aaa accounting auth-proxy default start-stop group** *radius-server-group-name* command to specify that the accounting of the authentication proxy requests use RADIUS server group by default, enabling dynamic user access control via the specified RADIUS server group.

Example:

```
Device(config)# aaa accounting auth-proxy default start-stop group ise-group
```

This command enables the device to generate accounting records when an authentication proxy cache is created and deleted, capturing user session information dynamically via the specified RADIUS server group.

Step 7 Use the **aaa accounting dot1x default start-stop group** *radius-server-group-name* command to enable accounting for 802.1X authentication sessions.

Example:

```
Device(config)# aaa accounting dot1x default start-stop group ise-group
```

This command sends both start and stop accounting records to the specified RADIUS server group, allowing tracking of user authentication sessions on the network.

Step 8 Use the **key** <*secret-key*> command to specify the shared secret key (encrypted) for the RADIUS server.

Example:

```
Device(config-radius-server)# key secret-key
```

Configure 802.1X authentication on an access port

Follow this procedure to configure a switch interface for 802.1X authentication in single-host mode with port security.

Before you begin

- Ensure that your device is in global configuration mode.
- Ensure that global AAA and 802.1X configurations are completed prior to configuring the interface.

Procedure

Step 1 Use the **interface** *interface-type port* command to enter the interface configuration mode for the specified interface.

Example:

```
Device(config)# interface GigabitEthernet0/1/0
```

Step 2 Use the **switchport mode access** command to set the port to access mode for end devices.

Example:

```
Device(config-if)# switchport mode access
```

Step 3 Use the **switchport access vlan** *vlan-id* command to assign the specified VLAN as the access port.

Example:

```
Device(config-if)# switchport access vlan 100
```

Step 4 Use the **authentication order dot1x mab** command to specify the order in which authentication methods are attempted.

Example:

```
Device(config-if)# authentication order dot1x mab
```

In this case, the switch first tries 802.1X (dot1x) authentication, and if that fails or is not supported by the device, it falls back to MAC Authentication Bypass (MAB).

Step 5 Use the **authentication priority dot1x mab** command to set the priority order of authentication methods on a port.

Example:

```
Device(config-if)# authentication priority dot1x mab
```

In this case, the switch first configures the port to prioritize dot1x authentication first, and if that method is interrupted or fails, it will then attempt MAB.

Step 6 Use the **authentication port-control auto** command to require dot1x authentication before granting access.

Example:

```
Device(config-if)# authentication port-control auto
```

Step 7 Use the **mab** command to enable MAC-based authentication on the interface.

Example:

```
Device(config-if)# mab
```

Step 8 Use the **dot1x pae authenticator** command to enable 802.1X authentication in authenticator mode.

Example:

```
Device(config-if)# dot1x pae authenticator
```

Step 9 Use the **access-session host-mode single-host** command to limit the port to one authenticated device at a time.

Example:

```
Device(config-if)# access-session host-mode single-host
```

Step 10 Use the **description** *text* command to add a descriptive label to the interface configuration.

Example:

```
Device(config-if)# description 802.1X Test Port
```

Configure RADIUS change of authorization

Use this procedure to configure RADIUS change of authorization.

Procedure

Step 1 Use the **configure terminal** command to enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Use the **aaa new-model** command to enable authentication, authorization, and accounting (AAA) globally.

Example:

```
Device(config)# aaa new-model
```

Step 3 Use the **aaa server radius dynamic-author** command to enter dynamic authorization local server configuration mode and specify a RADIUS client from which a device accepts Change of Authorization (CoA) and disconnect requests.

Example:

```
Device(config)# aaa server radius dynamic-author
```

This command configures the device as a AAA server to facilitate interaction with an external policy server.

Step 4 Use the **client** { *ip-address* | *name* [**vrf** *vrf-name*]} **server-key** *string* command to configure the RADIUS key to be shared between a device and RADIUS clients.

Example:

```
Device(config-locsvr-da-radius)# client 10.0.0.1 server-key cisco123
```

Step 5 (Optional) Use the **port** *port-number* command to specify the port on which a device listens for RADIUS requests from configured RADIUS clients.

Example:

```
Device(config-locsvr-da-radius)# port 3799
```

Note

The default port for packet of disconnect is 1700.

Configuration examples for change of authorization

RADIUS server status example

This example shows how to check if the RADIUS server is active.

```
Device# show aaa servers
RADIUS: id 1, priority 1, host 10.75.28.231, auth-port 1812, acct-port 1813, hostname host
State: current UP
duration 188755s, previous duration 0s
Dead: total time 0s, count 0
Platform State from SMD: current UP, duration 188755s, previous duration 0s
```

Verification of change of authorization

Successful 802.1X authentication and CoA reauthentication

Verify successful 802.1X authentication and CoA reauthentication

```
Device# show access-session interface GigabitEthernet0/1/0 details
Interface:  GigabitEthernet0/1/0
MAC Address:  00a1.b2c3.d4e5
IPv4 Address: 10.10.10.25
User-Name:  host_8021x_client
Status:  Authorized
Domain:  DATA
Oper host mode:  single-host
Oper control dir:  both
Session timeout:  N/A
Idle timeout:  N/A
Common Session ID:  0A01000A00000012A4E3D6B7
Acct Session ID:  0x00000012
Handle:  0xB4000012
Current Policy:  802.1X_AUTH_POLICY

Local Policies:
Service Template:  DOT1X-DEFAULT (activated)

Server Policies:
VLAN Group:  VLAN_10
ACL:  ACL_PERMIT_ALL
URL Redirect ACL:  N/A
```

Troubleshoot RADIUS change of authorization configuration

Use these comands to monitor and troubleshoot the RADIUS Change of Authorization feature.

Table 2: Monitoring and Troubleshooting RADIUS Change of Authorization

Command	Purpose
debug aaa coa	Displays debug information for CoA processing.
debug aaa authentication	Displays debug information related to AAA (Authentication, Authorization, and Accounting) authentication processes. It helps to learn the methods of authentication being used and troubleshoot authentication issues by showing detailed logs of authentication events as they occur.
show aaa attributes protocol radius	Displays the mapping between an authentication, authorization, and accounting (AAA) attribute number and the corresponding AAA attribute name.