



## IPv6 ACL

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## Information About IPv6 ACL

An access control list (ACL) is a set of rules used to limit access to a particular interface (for example, if you want to restrict a wireless client from pinging the management interface of the embedded wireless controller). ACLs are configured on the device and applied to the management interface, the AP-manager interface, any of the dynamic interfaces, or a WLAN to control data traffic to and from wireless clients or to the embedded wireless controller central processing unit (CPU) to control all traffic destined for the CPU.

You can also create a preauthentication ACL for web authentication. Such an ACL is used to allow certain types of traffic before authentication is complete.

IPv6 ACLs support the same options as IPv4 ACLs including source, destination, source and destination ports.



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**Note** You can enable only IPv4 traffic in your network by blocking IPv6 traffic. That is, you can configure an IPv6 ACL to deny all IPv6 traffic and apply it on specific or all WLANs.

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## Understanding IPv6 ACLs

### Types of ACL

#### Per User IPv6 ACL

For the per-user ACL, the full access control entries (ACE) as the text strings are configured on the Cisco Secure Access Control Server (Cisco Secure ACS).

The ACE is not configured on the Controller Embedded Wireless Controller. The ACE is sent to the device in the `ACCESS-Accept` attribute and applies it directly for the client. When a wireless client roams into an foreign device, the ACEs are sent to the foreign device as an AAA attribute in the mobility Handoff message. Output direction, using per-user ACL is not supported.

## Filter ID IPv6 ACL

For the filter-Id ACL, the full ACEs and the `acl name(filter-id)` is configured on the device and only the `filter-id` is configured on the Cisco Secure ACS.

The `filter-id` is sent to the device in the `ACCESS-Accept` attribute, and the device looks up the `filter-id` for the ACEs, and then applies the ACEs to the client. When the client L2 roams to the foreign device, only the `filter-id` is sent to the foreign device in the mobility Handoff message. Output filtered ACL, using per-user ACL is not supported. The foreign device has to configure the `filter-id` and ACEs beforehand.

## Downloadable IPv6 ACL

For the downloadable ACL (dACL), all the full ACEs and the `dACL name` are configured only on the Cisco Secure ACS.

The Cisco Secure ACS sends the `dACL name` to the device in its `ACCESS-Accept` attribute, which takes the `dACL name` and sends the `dACL name` back to the Cisco Secure ACS for the ACEs, using the `ACCESS-request` attribute.

# Prerequisites for Configuring IPv6 ACL

You can filter IP Version 6 (IPv6) traffic by creating IPv6 access control lists (ACLs) and applying them to interfaces similarly to the way that you create and apply IP Version 4 (IPv4) named ACLs. You can also create and apply input router ACLs to filter Layer 3 management traffic when the switch is running the Network Essentials license.

# Restrictions for Configuring IPv6 ACL

With IPv4, you can configure standard and extended numbered IP ACLs, named IP ACLs, and MAC ACLs. IPv6 supports only named ACLs.

The device supports most of the Cisco IOS-supported IPv6 ACLs with some exceptions:

- The device does not support matching on these keywords: **flowlabel**, **routing header**, and **undetermined-transport**.
- The device does not support reflexive ACLs (the **reflect** keyword).
- The device does not apply MAC-based ACLs on IPv6 frames.
- When configuring an ACL, there is no restriction on keywords entered in the ACL, regardless of whether or not they are supported on the platform. When you apply the ACL to an interface that requires hardware forwarding (physical ports or SVIs), the device checks to determine whether or not the ACL can be supported on the interface. If not, attaching the ACL is rejected.

- If an ACL is applied to an interface and you attempt to add an access control entry (ACE) with an unsupported keyword, the device does not allow the ACE to be added to the ACL that is currently attached to the interface

## Configuring IPv6 ACLs

Follow the procedure given below to filter IPv6 traffic:

1. Create an IPv6 ACL, and enter IPv6 access list configuration mode.
2. Configure the IPv6 ACL to block (deny) or pass (permit) traffic.
3. Apply the IPv6 ACL to the interface where the traffic needs to be filtered.
4. Apply the IPv6 ACL to an interface. For router ACLs, you must also configure an IPv6 address on the Layer 3 interface to which the ACL is applied.

## Default IPv6 ACL Configuration

There are no IPv6 ACLs configured or applied.

## Interaction with Other Features and Switches

- If an IPv6 router ACL is configured to deny a packet, the packet is not routed. A copy of the packet is sent to the Internet Control Message Protocol (ICMP) queue to generate an ICMP unreachable message for the frame.
- If a bridged frame is to be dropped due to a port ACL, the frame is not bridged.
- You can create both IPv4 and IPv6 ACLs on a switch or switch stack, and you can apply both IPv4 and IPv6 ACLs to the same interface. Each ACL must have a unique name; an error message appears if you try to use a name that is already configured.

You use different commands to create IPv4 and IPv6 ACLs and to attach IPv4 or IPv6 ACLs to the same Layer 2 or Layer 3 interface. If you use the wrong command to attach an ACL (for example, an IPv4 command to attach an IPv6 ACL), you receive an error message.

- You cannot use MAC ACLs to filter IPv6 frames. MAC ACLs can only filter non-IP frames.
- If the hardware memory is full, for any additional configured ACLs, packets are dropped to the CPU, and the ACLs are applied in software. When the hardware is full a message is printed to the console indicating the ACL has been unloaded and the packets will be dropped on the interface.

# How To Configure an IPv6 ACL

## Creating an IPv6 ACL

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>ipv6 access-list <i>acl_name</i></b> <b>Example:</b> Device# <b>ipv6 access-list access-list-name</b>	Use a name to define an IPv6 access list and enter IPv6 access-list configuration mode.
<b>Step 4</b>	<b>{deny permit} protocol</b> <b>Example:</b> <pre>{deny   permit} protocol {source-ipv6-prefix/prefix-length   any    host source-ipv6-address} [operator [port-number]](destination-ipv6-prefix/prefix-length    any  host destination-ipv6-address} [operator [port-number]][dscp value] [fragments][log] [log-input] [routing][sequence value] [time-range name]</pre>	Enter deny or permit to specify whether to deny or permit the packet if conditions are matched. These are the conditions: <ul style="list-style-type: none"> <li>• For protocol, enter the name or number of an Internet protocol: ahp, esp, icmp, ipv6, pcp, stcp, tcp, or udp, or an integer in the range 0 to 255 representing an IPv6 protocol number.</li> <li>• The source-ipv6-prefix/prefix-length or destination-ipv6-prefix/ prefix-length is the source or destination IPv6 network or class of networks for which to set deny or permit conditions, specified in hexadecimal and using 16-bit values between colons (see RFC 2373).</li> <li>• Enter any as an abbreviation for the IPv6 prefix ::/0.</li> <li>• For host source-ipv6-address or destination-ipv6-address, enter the source or destination IPv6 host address for which to set deny or permit conditions, specified</li> </ul>

	Command or Action	Purpose
		<p>in hexadecimal using 16-bit values between colons.</p> <ul style="list-style-type: none"> <li>• (Optional) For operator, specify an operand that compares the source or destination ports of the specified protocol. Operands are lt (less than), gt (greater than), eq (equal), neq (not equal), and range.</li> </ul> <p>If the operator follows the source-ipv6-prefix/prefix-length argument, it must match the source port. If the operator follows the destination-ipv6-prefix/prefix-length argument, it must match the destination port.</p> <ul style="list-style-type: none"> <li>• (Optional) The port-number is a decimal number from 0 to 65535 or the name of a TCP or UDP port. You can use TCP port names only when filtering TCP. You can use UDP port names only when filtering UDP.</li> <li>• (Optional) Enter dscp value to match a differentiated services code point value against the traffic class value in the Traffic Class field of each IPv6 packet header. The acceptable range is from 0 to 63.</li> <li>• (Optional) Enter fragments to check noninitial fragments. This keyword is visible only if the protocol is ipv6.</li> <li>• (Optional) Enter log to cause an logging message to be sent to the console about the packet that matches the entry. Enter log-input to include the input interface in the log entry. Logging is supported only for router ACLs.</li> <li>• (Optional) Enter routing to specify that IPv6 packets be routed.</li> <li>• (Optional) Enter sequence value to specify the sequence number for the access list statement. The acceptable range is from 1 to 4294967295</li> <li>• (Optional) Enter time-range name to specify the time range that applies to the deny or permit statement.</li> </ul>

	Command or Action	Purpose
Step 5	<p><b>{deny permit} tcp</b></p> <p><b>Example:</b></p> <pre>{deny   permit} tcp {source-ipv6-prefix/prefix-length   any    hostsource-ipv6-address} [operator [port-number]]{destination-ipv6-prefix/prefix-length    any   hostdestination-ipv6-address} [operator [port-number]][ack] [dscp value][established] [fin] [log][log-input] [neq {port   protocol}]  [psh] [range{port   protocol}] [rst][routing] [sequence value] [syn] [time-range name][urg]</pre>	<p>(Optional) Define a TCP access list and the access conditions.</p> <p>Enter tcp for Transmission Control Protocol. The parameters are the same as those described in Step 3, with these additional optional parameters:</p> <ul style="list-style-type: none"> <li>• ack—Acknowledgment bit set.</li> <li>• established—An established connection. A match occurs if the TCP datagram has the ACK or RST bits set.</li> <li>• fin—Finished bit set; no more data from sender.</li> <li>• neq {port   protocol}—Matches only packets that are not on a given port number.</li> <li>• psh—Push function bit set.</li> <li>• range {port   protocol}—Matches only packets in the port number range.</li> <li>• rst—Reset bit set.</li> <li>• syn—Synchronize bit set.</li> <li>• urg—Urgent pointer bit set.</li> </ul>
Step 6	<p><b>{deny permit} udp</b></p> <p><b>Example:</b></p> <pre>{deny   permit} udp {source-ipv6-prefix/prefix-length   any    hostsource-ipv6-address} [operator [port-number]]{destination-ipv6-prefix/prefix-length    any   hostdestination-ipv6-address} [operator [port-number]][dscp value] [log][log-input] [neq {port   protocol}] [range {port  protocol}] [routing][sequence value][time-range name]</pre>	<p>(Optional) Define a UDP access list and the access conditions.</p> <p>Enter udp for the User Datagram Protocol. The UDP parameters are the same as those described for TCP, except that the operator [port] port number or name must be a UDP port number or name, and the established parameter is not valid for UDP.</p>
Step 7	<p><b>{deny permit} icmp</b></p> <p><b>Example:</b></p> <pre>{deny   permit} icmp {source-ipv6-prefix/prefix-length   any    hostsource-ipv6-address} [operator [port-number]] {destination-ipv6-prefix/prefix-length    any   hostdestination-ipv6-address} [operator [port-number]][icmp-type]</pre>	<p>(Optional) Define an ICMP access list and the access conditions.</p> <p>Enter icmp for Internet Control Message Protocol. The ICMP parameters are the same as those described for most IP protocols in Step 3a, with the addition of the ICMP message type and code parameters. These optional keywords have these meanings:</p>

	Command or Action	Purpose
	[icmp-code] [icmp-message] [dscpvalue] [log] [log-input] [routing] [sequence value] [time-range name]	<ul style="list-style-type: none"> <li>icmp-type—Enter to filter by ICMP message type, a number from 0 to 255.</li> <li>icmp-code—Enter to filter ICMP packets that are filtered by the ICMP message code type, a number from 0 to 255.</li> <li>icmp-message—Enter to filter ICMP packets by the ICMP message type name or the ICMP message type and code name. To see a list of ICMP message type names and code names, use the ? key or see command reference for this release.</li> </ul>
<b>Step 8</b>	<b>end</b> <b>Example:</b> Device(config)# <b>end</b>	Returns to privileged EXEC mode. Alternatively, you can also press <b>Ctrl-Z</b> to exit global configuration mode.
<b>Step 9</b>	<b>show ipv6 access-list</b> <b>Example:</b> show ipv6 access-list	Verify the access list configuration.
<b>Step 10</b>	<b>copy running-config startup-config</b> <b>Example:</b> copy running-config startup-config	(Optional) Save your entries in the configuration file.

## Creating WLAN IPv6 ACL

## Verifying IPv6 ACL

## Displaying IPv6 ACLs

To display IPv6 ACLs, perform this procedure:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password if prompted.

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>show access-list</b> <b>Example:</b> Device# <b>show access-lists</b>	Displays all access lists configured on the device
<b>Step 4</b>	<b>show ipv6 access-list <i>acl_name</i></b> <b>Example:</b> Device# <b>show ipv6 access-list</b> [ <i>access-list-name</i> ]	Displays all configured IPv6 access list or the access list specified by name.

## Configuration Examples for IPv6 ACL

### Example: Creating an IPv6 ACL

This example configures the IPv6 access list named CISCO. The first deny entry in the list denies all packets that have a destination TCP port number greater than 5000. The second deny entry denies packets that have a source UDP port number less than 5000. The second deny also logs all matches to the console. The first permit entry in the list permits all ICMP packets. The second permit entry in the list permits all other traffic. The second permit entry is necessary because an implicit deny -all condition is at the end of each IPv6 access list.



**Note** Logging is supported only on Layer 3 interfaces.

```
Device(config)# ipv6 access-list CISCO
Device(config-ipv6-acl)# deny tcp any any gt 5000
Device (config-ipv6-acl)# deny ::/0 lt 5000 ::/0 log
Device(config-ipv6-acl)# permit icmp any any
Device(config-ipv6-acl)# permit any any
```

### Example: Displaying IPv6 ACLs

This is an example of the output from the **show access-lists** privileged EXEC command. The output shows all access lists that are configured on the switch or switch stack.

```
Device #show access-lists
Extended IP access list hello
10 permit ip any any
IPv6 access list ipv6
permit ipv6 any any sequence 10
```



This is an example of the output from the **show ipv6 access-lists** privileged EXEC command. The output shows only IPv6 access lists configured on the switch or switch stack.

```
Device# show ipv6 access-list
IPv6 access list inbound
permit tcp any any eq bgp (8 matches) sequence 10
permit tcp any any eq telnet (15 matches) sequence 20
permit udp any any sequence 30

IPv6 access list outbound
deny udp any any sequence 10
deny tcp any any eq telnet sequence 20
```

