IPv6 Access Control Lists

Access lists determine what traffic is blocked and what traffic is forwarded at device interfaces and allow filtering of traffic based on source and destination addresses, and inbound and outbound traffic to a specific interface. Standard IPv6 ACL functionality was extended to support traffic filtering based on IPv6 option headers and optional, upper-layer protocol type information for finer granularity of control. Standard IPv6 ACL functionality was extended to support traffic filtering based on IPv6 option headers and optional, upper-layer protocol type information for finer granularity of control.

This module describes how to configure IPv6 traffic filtering and to control access to virtual terminal lines.

- Finding Feature Information, page 1
- Information About IPv6 Access Control Lists, page 2
- How to Configure IPv6 Access Control Lists, page 3
- Configuration Examples for IPv6 Access Control Lists, page 8
- Additional References, page 9
- Feature Information for IPv6 Access Control Lists, page 10

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.
Information About IPv6 Access Control Lists

Access Control Lists for IPv6 Traffic Filtering

The standard ACL functionality in IPv6 is similar to standard ACLs in IPv4. Access lists determine what traffic is blocked and what traffic is forwarded at device interfaces and allow filtering based on source and destination addresses, inbound and outbound to a specific interface. Each access list has an implicit deny statement at the end. IPv6 ACLs are defined and their deny and permit conditions are set using the `ipv6 access-list` command with the `deny` and `permit` keywords in global configuration mode.

IPv6 extended ACLs augments standard IPv6 ACL functionality to support traffic filtering based on IPv6 option headers and optional, upper-layer protocol type information for finer granularity of control (functionality similar to extended ACLs in IPv4).

IPv6 Packet Inspection

The following header fields are used for IPv6 inspection: traffic class, flow label, payload length, next header, hop limit, and source or destination IP address. For further information on and descriptions of the IPv6 header fields, see RFC 2474.

Access Class Filtering in IPv6

Filtering incoming and outgoing connections to and from the device based on an IPv6 ACL is performed using the `ipv6 access-class` command in line configuration mode. The `ipv6 access-class` command is similar to the `access-class` command, except the IPv6 ACLs are defined by a name. If the IPv6 ACL is applied to inbound traffic, the source address in the ACL is matched against the incoming connection source address and the destination address in the ACL is matched against the local device address on the interface. If the IPv6 ACL is applied to outbound traffic, the source address in the ACL is matched against the local device address on the interface and the destination address in the ACL is matched against the outgoing connection source address. We recommend that identical restrictions are set on all the virtual terminal lines because a user can attempt to connect to any of them.
How to Configure IPv6 Access Control Lists

Configuring IPv6 Traffic Filtering

Creating and Configuring an IPv6 ACL for Traffic Filtering

IPv6 ACLs on the Cisco ASR 1000 platform do not contain implicit permit rules. The IPv6 neighbor discovery process uses the IPv6 network-layer service; therefore, to enable IPv6 neighbor discovery, you must add IPv6 ACLs to allow IPv6 neighbor discovery packets to be sent and received on an interface. In IPv4, the Address Resolution Protocol (ARP), which is equivalent to the IPv6 neighbor discovery process, uses a separate data-link-layer protocol; therefore, by default IPv4 ACLs implicitly allow ARP packets to be sent and received on an interface.

SUMMARY STEPS

1. enable
2. configure terminal
3. ipv6 access-list access-list-name
4. Do one of the following:
   - 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]] [dest-option-type [doh-number | doh-type]] [dscp value] [flow-label value] [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name]
   - deny 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] [dest-option-type [doh-number | doh-type]] [dscp value] [flow-label value] [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name] [undetermined-transport]

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Device&gt; enable</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> ipv6 access-list access-list-name</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong> Do one of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Enter your password if prompted.</td>
</tr>
</tbody>
</table>
### Purpose

**Command or Action**

- **configure terminal**
- **ipv6 access-list access-list-name**

**Purpose**

- Enters global configuration mode.
- Defines an IPv6 ACL, and enters IPv6 access list configuration mode.

**Example:**

- Device# configure terminal
- Device(config)# ipv6 access-list outbound

**Step 2**

**Step 3**

**Step 4**

Do one of the following:

- **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]] [dest-option-type [doh-number | doh-type]] [dscp value] [flow-label value] [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name]

- **deny 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]] [dest-option-type [doh-number | doh-type]] [dscp value] [flow-label value] [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name] [undetermined-transport]

**Example:**

- Device(config-ipv6-acl)# permit tcp 2001:DB8:0300:0201::/32 eq telnet any
- Device(config-ipv6-acl)# deny tcp host 2001:DB8:1::1 any log-input
Applying the IPv6 ACL to an Interface

SUMMARY STEPS

1. enable
2. configure terminal
3. interface type number
4. ipv6 traffic-filter access-list-name {in|out}

DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td></td>
<td>Example: Device&gt; enable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td>Step 2</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example: Device# configure terminal</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td>interface type number</td>
<td>Specifies the interface type and number, and enters interface configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example: Device(config)# interface gigabitethernet 0/0/0</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>ipv6 traffic-filter access-list-name {in</td>
<td>out}</td>
</tr>
<tr>
<td></td>
<td>Example: Device(config-if)# ipv6 traffic-filter outbound</td>
<td></td>
</tr>
</tbody>
</table>
Controlling Access to a vty

Creating an IPv6 ACL to Provide Access Class Filtering

SUMMARY STEPS

1. enable
2. configure terminal
3. ipv6 access-list access-list-name
4. Do one of the following:
   - **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]] [dest-option-type dest-option-type] [doh-number | doh-type] [dscp value] [flow-label value] [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name]
   - **deny** 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]] [dest-option-type dest-option-type] [doh-number | doh-type] [dscp value] [flow-label value] [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name] [undetermined-transport]

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| **Step 1** enable | Enables privileged EXEC mode.  
**Example:**  
Device> enable |
| **Step 2** configure terminal | Enters global configuration mode.  
**Example:**  
Device# configure terminal |
| **Step 3** ipv6 access-list access-list-name | Defines an IPv6 ACL, and enters IPv6 access list configuration mode.  
**Example:**  
Device(config)# ipv6 access-list cisco |
### Purpose

Command or Action | Purpose
---|---
Step 4 | Do one of the following:

- **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]} {dest-option-type [doh-number | doh-type]} {dscp value} {flow-label value} [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name]

- **deny 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]} {dest-option-type [doh-number | doh-type]} {dscp value} {flow-label value} [fragments] [log] [log-input] [mobility] [mobility-type [mh-number | mh-type]] [routing] [routing-type routing-number] [sequence value] [time-range name] [undetermined-transport]

Specifies permit or deny conditions for an IPv6 ACL.

---

### Applying an IPv6 ACL to the Virtual Terminal Line

**SUMMARY STEPS**

1. **enable**
2. **configure terminal**
3. **line [aux | console | tty | vty] line-number[ending-line-number]**
4. **ipv6 access-class ipv6-access-list-name {in | out}**

**DETAILED STEPS**

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td><strong>enable</strong></td>
</tr>
</tbody>
</table>

---

Example:

```
Device(config-ipv6-acl)# permit ipv6 host 2001:DB8:0:4::32 any eq telnet
```

Example:

```
Device(config-ipv6-acl)# deny ipv6 host 2001:DB8:0:6::6/32 any
```
### Command or Action

**Example:**

- `Device> enable`

  - Enter your password if prompted.

- `Device# configure terminal`

  - Enters global configuration mode.

**Step 2**

- `configure terminal`

  - Enters global configuration mode.

**Example:**

- `Device# configure terminal`

**Step 3**

- `line [aux| console| tty| vty] line-number[ending-line-number]`

  - Identifies a specific line for configuration and enters line configuration mode.

  - In this example, the `vty` keyword is used to specify the virtual terminal lines for remote console access.

**Example:**

- `Device(config)# line vty 0 4`

**Step 4**

- `ipv6 access-class ipv6-access-list-name {in|out}`

  - Filters incoming and outgoing connections to and from the device based on an IPv6 ACL.

**Example:**

- `Device(config-line)# ipv6 access-class cisco in`

### Configuration Examples for IPv6 Access Control Lists

#### Example: Verifying IPv6 ACL Configuration

In this example, the `show ipv6 access-list` command is used to verify that IPv6 ACLs are configured correctly:

```
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 Virtual-Access2.1#42781908151 (per-user)
  permit tcp host 2001:DB8:1::32 eq bgp host 2001:DB8:2::32 eq 11000 sequence 1
  permit tcp host 2001:DB8:1::32 eq telnet host 2001:DB8:2::32 eq 11001 sequence 2
```
Example: Creating and Applying an IPv6 ACL

The following example shows how to restrict HTTP access to certain hours during the day and log any activity outside of the permitted hours:

```
Device# configure terminal
Device(config)# time-range lunchtime
Device(config-time-range)# periodic weekdays 12:00 to 13:00
Device(config-time-range)# exit
Device(config)# ipv6 access-list OUTBOUND
Device(config-ipv6-acl)# permit tcp any any eq www time-range lunchtime
Device(config-ipv6-acl)# deny tcp any any eq www log-input
Device(config-ipv6-acl)# permit tcp 2001:DB8::/32 any
Device(config-ipv6-acl)# permit udp 2001:DB8::/32 any
Device(config-ipv6-acl)# end
```

Example: Controlling Access to a vty

In the following example, incoming connections to the virtual terminal lines 0 to 4 are filtered based on the IPv6 access list named acl1:

```
ipv6 access-list acl1
    permit ipv6 host 2001:DB8:0:4::2/32 any
!
line vty 0 4
    ipv6 access-class acl1 in
```

Additional References

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco IOS commands</td>
<td>Cisco IOS Master Command List, All Releases</td>
</tr>
<tr>
<td>IP access list commands</td>
<td>Cisco IOS Security Command Reference</td>
</tr>
<tr>
<td>Configuring IP access lists</td>
<td>“Creating an IP Access List and Applying It to an Interface”</td>
</tr>
</tbody>
</table>
Technical Assistance

<table>
<thead>
<tr>
<th>Description</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.</td>
<td><a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a></td>
</tr>
</tbody>
</table>

Feature Information for IPv6 Access Control Lists

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for IPv6 Access Control Lists

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPv6 Services: Extended Access Control Lists</td>
<td>Cisco IOS XE Release 2.1</td>
<td>Standard IPv6 ACL functionality was extended to support traffic filtering based on IPv6 option headers and optional, upper-layer protocol type information for finer granularity of control.</td>
</tr>
</tbody>
</table>