Configuring the Address Resolution Protocol

This chapter describes how to configure Address Resolution Protocol (ARP) to statically configure the IP to Media Access Control (MAC) translations necessary for the CSS to send data to network nodes. You can configure static ARP mapping for any of the CSS Ethernet interface ports.

This chapter contains the following major sections:

- ARP Configuration Quick Start
- Configuring ARP
- Immediately Refreshing the Bridge Forwarding Table for a MAC Down Event
- Configuring ARP Timeout
- Configuring ARP Wait
- Updating ARP Parameters
- Clearing ARP Parameters
- Showing ARP Information

ARP Configuration Quick Start

Table 4-1 provides a quick overview of the steps required to configure a static ARP map. Each step includes the CLI command required to complete the task. For a complete description of each feature and all the options associated with the CLI command, see the sections following Table 4-1.

Table 4-1   ARP Configuration Quick Start

Task and Command Example
1. Define a static ARP mapping. `(config)# arp 192.168.11.1 00-60-97-d5-26-ab e2`
2. Set the time, in seconds, to hold an ARP resolution result. Note that this timeout period affects only dynamic ARP entries. Static ARP entries are permanent and are not affected by this timeout period. `(config)# arp timeout 120`
3. Set the time, in seconds, to wait for an ARP resolution. `(config)# arp wait 15`
4. (Optional) Update the file containing hosts reachable through ARP. `# update arp file` **Note**   This command is available only in SuperUser mode.
5. (Optional) Clear ARP parameters for the ARP file or ARP cache that contains known hosts reachable through ARP. `# clear arp file`
6. (Recommended) Display ARP information. For example, to display the complete ARP resolution table, enter: `# show arp`

The following running-configuration example shows the results of entering the commands in Table 4-1.

```
!*************************** GLOBAL ***************************
  arp 192.168.11.1 00-60-97-d5-26-ab e2
  arp timeout 120
  arp wait 15
```

Configuring ARP

To define a static ARP mapping, use the **arp** command. The syntax for this global configuration mode command is:

arp *ip_or_host mac_address interface* {*vlan*}

The variables and options are as follows:

- *ip_or_host* - The IP address of the system for static mapping. Enter an IP address in dotted-decimal notation (for example, 192.168.11.1) or in mnemonic host-name format (for example, myhost.mydomain.com).

- *mac_address* - The MAC address of the system mapped to the IP address. Enter the MAC address in hyphenated-hexadecimal notation (for example, 00-60-97-d5-26-ab).

- *interface* - The CSS Ethernet interface port that you want to configure. For a CSS 11501, enter the interface name in *interface port* format (for example, e2). For a CSS 11503 or CSS 11506, the interface format is *slot/port* (for example, 3/1).

- *vlan* - The number of the VLAN configured in a trunked interface on which the ARP address is configured (assuming trunking is enabled for the CSS Gigabit Interface port). Enter an integer from 1 to 4094 as the VLAN number.

For example:

```
(config)# arp 192.168.11.1 00-60-97-d5-26-ab e2
```

To remove a static mapping address, use the **no arp** command. For example:

```
(config)# no arp 192.168.11.1
```

Immediately Refreshing the Bridge Forwarding Table for a MAC Down Event

By default, when the CSS receives a Down event for a MAC address in the bridge forwarding table, it may not send an ARP request to an IP address associated with that MAC address for up to 60 seconds to refresh the table. During this time, the bridge flows through the CSS to the MAC address could fail.

You can configure the CSS to immediately send an ARP request for an IP address associated with that MAC address, thus immediately repopulating the entries in bridge forwarding table. Use the global configuration mode **arp mac-down-immediate** command.

For example, enter:

```
(config)# arp mac-down-immediate
```

Note Under certain network conditions, such as STP convergences, the CSS may appear to be causing an ARP storm.

To reset the default behavior, enter:

```
(config)# no arp mac-down-immediate
```

Configuring ARP Timeout

To set the time, in seconds, to hold an ARP resolution result, use the **arp timeout** command. When you change the timeout value, this value affects only new ARP entries. All previous ARP entries retain the old timeout value. This timeout value affects only dynamic ARP entries. Static ARP entries are permanent and are not affected by this timeout.

The timeout value is the number of seconds the CSS holds an ARP resolution result. To set a timeout value, enter an integer from 60 to 86400 (24 hours) seconds. The default is 14400 seconds (4 hours). If you do not want the ARP entries to time out, enter **none** or **86401**.

For example:

```
(config)# arp timeout 120
```

To restore the default timeout value of 14400 seconds, enter:

```
(config)# no arp timeout
```

To remove all entries with the old timeout value, enter the **clear arp cache** command.

Configuring ARP Wait

To set the time, in seconds, to wait for an ARP resolution, use the **arp wait** command. The wait time is the number of seconds the CSS waits for an ARP resolution in response to an ARP request to the network. Enter an integer from 5 to 30 seconds. The default is 5.

For example:

```
(config)# arp wait 15
```

To restore the default wait time of 5 seconds, enter:

```
(config)# no arp wait
```

Updating ARP Parameters

To update the file containing hosts reachable through ARP, use the **update arp** command. This command is available only in SuperUser mode.

For example:

```
# update arp file
```

Clearing ARP Parameters

The CSS enables you to clear ARP parameters for the ARP file or ARP cache. To clear the file that contains known hosts reachable through ARP, use the **clear arp file** command. This command is available only in SuperUser mode.

For example:

```
# clear arp file
```

Use the **clear arp cache** command to delete dynamic entries from the ARP cache. To specify an address for the single ARP entry you want to remove from the ARP cache, use the **clear arp cache** *ip_or_host* command. Enter the address in either dotted-decimal IP notation (for example, 192.168.11.1) or mnemonic host-name format (for example, myhost.mydomain.com).

For example:

```
# clear arp cache 192.168.11.1
```

Showing ARP Information

Use the **show arp** command to display ARP information. To show static ARP mapping when you use the **show arp** command, the IP route must exist in the routing table.

The syntax for this global configuration mode command is:

show arp {**config**|**file**|**management-port**|**summary**|*ip_or_host*}

The syntax and options for the command are as follows:

- **show arp** - Displays the complete ARP resolution table with IP addresses, MAC addresses, and resolution type, excluding entries from the CSS Ethernet management port.

- **config** - Displays ARP global configuration parameters. The screen displays the response timeout and the flush timeout, in seconds.

- **file** - Displays the hosts that are reachable using ARP. The screen displays the IP addresses of the host systems.

- **management-port** - Displays the ARP entries from the CSS Ethernet management port. The ARP resolution table displayed through the **show arp** command displays these entries.

Note   The CSS Ethernet management port IP address appears as an entry in the Management Port ARP cache. This is normal CSS behavior.

- **summary** - Displays the total number of static entries, total number of dynamic entries, and total number of entries in the ARP resolution table, excluding the entries from the CSS management port.
- *ip_or host* - The IP address for the system to display its resolution. Enter the address in dotted-decimal format (for example, 192.168.11.1) or mnemonic host-name format (for example, myname.mydomain.com). You cannot enter an ARP entry derived from the CSS Ethernet management port.

For example, to display the complete ARP resolution table, enter:

```
# show arp
```

Table 4-2 describes the fields in the **show arp** command output.

Table 4-2   Field Descriptions for the show arp Command

Field	Description
IP Address	The IP address of the system for ARP mapping.
MAC Address	The MAC address of the system mapped to the IP address.
Type	The resolution type for the entry: Dynamic or Static. The Dynamic resolution type indicates that the entry was discovered through the ARP protocol. The Static resolution type indicates that the entry is from a static configuration.
Port	The CSS interface configured as the egress logical port.

To display a summary of entries in the ARP resolution table, enter:

```
# show arp summary
```

Table 4-3 describes the fields in the **show arp summary** command output.

Table 4-3   Field Descriptions for the show arp summary Command

Field	Description
Static Entry	The total number of static map entries in the ARP resolution table (from a static configuration).
Dynamic Entry	The total number of dynamic map entries in the ARP resolution table (entries discovered through the ARP protocol).
Total Entry	The total number of static and dynamic entries in the ARP resolution table.

To display the global ARP configuration, enter:

```
# show arp config
```

Table 4-4 describes the fields in the **show arp config** command output.

Table 4-4   Field Descriptions for the show arp config Command

Field	Description
ARP Response Timeout	The time, in seconds, to wait for an ARP resolution response before discarding the packet waiting to be forwarded to an address. The time can be from 5 to 30 seconds. The default is 5 seconds.
ARP Flush Timeout	The time, in seconds, to hold an ARP resolution result in the ARP cache. The timeout period can be from 60 to 86400 seconds (24 hours). The default is 14400 seconds (4 hours). An entry of none or 86401 indicates the ARP entries will not timeout.

To display the host IP addresses entered at initialization or boot time through ARP, enter:

```
# show arp file
```

To display the ARP entries from the CSS management port, enter:

```
# show arp management-port
```

Table 4-5 describes the fields in the **show arp management-port** command
output.

Table 4-5   Field Descriptions for the show arp management-port Command

Field	Description
IP Address	The IP address of the system for ARP mapping.
MAC Address	The MAC address of the system mapped to the IP address.
Port	The CSS Ethernet management port.

To display the resolution for a host IP address, enter:

```
# show arp 192.50.1.6
```

To display the host IP addresses entered at initialization or boot time through
ARP, enter:

```
# show arp file
```