Configuring MAC Address Tables

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Information About MAC Addresses

To switch frames between LAN ports, the switch maintains an address table. When the switch receives a frame, it associates the media access control (MAC) address of the sending network device with the LAN port on which it was received.

The switch dynamically builds the address table by using the MAC source address of the frames received. When the switch receives a frame for a MAC destination address not listed in its address table, it floods the frame to all LAN ports of the same VLAN except the port that received the frame. When the destination station replies, the switch adds its relevant MAC source address and port ID to the address table. The switch then forwards subsequent frames to a single LAN port without flooding all LAN ports.

You can also enter a MAC address, which is termed a static MAC address, into the table. These static MAC entries are retained across a reboot of the switch.

Guidelines for Configuring the MAC Address Tables

See the following guidelines and limitations for configuring the MAC address tables:

- The aging of the mac-address is not incrementing in the output of the **show mac address-table** CLI command. Therefore, the proper age of the mac-address cannot be determined.
- The **show mac address-table** CLI command does not display the multicast MAC entries. Use the **show mac address-table multicast** CLI command to check the Layer 2 entries.
- Cisco Nexus 3232C, Cisco Nexus 3264Q, and Cisco Nexus 3164Q Series switch support disabling and re-enabling MAC address learning on Layer 2 interfaces.

Configuring MAC Addresses

Configuring Static MAC Addresses

You can configure static MAC addresses for the switch. These addresses can be configured in interface configuration mode or in VLAN configuration mode.

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **mac-address-table static** *mac_address* **vlan** *vlan-id* {**drop** | **interface** {*type slot*/*port*} | **port-channel** *number*} [**auto-learn**]
3. (Optional) switch(config)# **no mac address-table static** *mac_address* **vlan** *vlan-id*

DETAILED STEPS

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config) # **mac-address-table static** *mac_address* **vlan** *vlan-id* {**drop** | **interface** {*type slot*/*port*} | **port-channel** *number*} [**auto-learn**]	Specifies a static address to add to the MAC address table. If you enable the **auto-learn** option, the switch will update the entry if the same MAC address is seen on a different port.
Step 3	(Optional) switch(config)# **no mac address-table static** *mac_address* **vlan** *vlan-id*	Deletes the static entry from the MAC address table. Use the **mac address-table static** command to assign a static MAC address to a virtual interface.

Example

This example shows how to put a static entry in the MAC address table:

```
switch# configure terminal
switch(config) # mac address-table static 12ab.47dd.ff89 vlan 3 interface ethernet 1/4
switch(config) #
```

Configuring the Aging Time for the MAC Table

You can configure the amount of time that an entry (the packet source MAC address and port that packet ingresses) remains in the MAC table. MAC aging time can be configured in either interface configuration mode or in VLAN configuration mode.

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config)# **mac-address-table aging-time** *seconds*

DETAILED STEPS

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **mac-address-table aging-time** *seconds*	Specifies the time before an entry ages out and is discarded from the MAC address table. **Note** Starting with Release 7.0(3)I2(1), the aging of the mac-address is not incrementing in the output of the **show mac address-table** CLI command. Therefore, the proper age of the mac-address cannot be determined. The *seconds* range is from 0 to 1000000. The default is 300 seconds for Cisco NX-OS 5500 and 1800 for Cisco NX-OS 5600 and 6000 series. Entering the value 0 disables the MAC aging.

Example

This example shows how to set the aging time for entries in the MAC address table to 300 seconds:

```
switch# configure terminal
switch(config) # mac-address-table aging-time 300
switch(config) # show mac address-table
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link,
        (T) - True, (F) - False
   VLAN     MAC Address      Type      age     Secure NTFY Ports
---------+-----------------+--------+---------+------+----+------------------
*    1     c08c.60a7.4667   dynamic  0         F      F    Eth1/9
*  300     c08c.60a7.4667   dynamic  0         F      F    nve1(3.3.3.3)
G    -     7cad.74c8.d747   static   -         F      F    sup-eth1(R)
switch(config)#
```

Clearing Dynamic Addresses from the MAC Table

You can clear all dynamic entries in the MAC address table.

Command	Purpose
switch(config)# **clear mac-address-table dynamic** {**address** *mac-addr*} {**interface** [*type slot*/*port* | **port-channel** *number*} {**vlan** *vlan-id*}	Clears the dynamic address entries from the MAC address table.

This example shows how to clear the dynamic entries in the MAC address table:

```
switch# clear mac-address-table dynamic
```

Verifying the MAC Address Configuration

Use one of the following commands to verify the configuration:

Table 1: MAC Address Configuration Verification Commands

Command	Purpose
show mac-address-table aging-time	Displays the MAC address aging time for all VLANs defined in the switch.
show mac-address-table	Displays the contents of the MAC address table. **Note** IGMP snooping learned MAC addresses are not displayed.
show mac-address-table count	Displays the total number of the MAC addresses in use.
show mac address-table loop-detect	Displays the currently configured action.

This example shows how to display the MAC address table:

```
switch# show mac-address-table
VLAN      MAC Address       Type    Age       Port
---------+-----------------+-------+---------+------------------------------
1         0018.b967.3cd0    dynamic 10        Eth1/3
1         001c.b05a.5380    dynamic 200       Eth1/3
Total MAC Addresses: 2
```

This example shows how to display the current aging time:

```
switch# show mac-address-table aging-time
Vlan  Aging Time
----- ----------
1     300
13    300
42    300
```

This example shows how to display the currently configured action:

```
switch# configure terminal
switch(config)# show mac address-table loop-detect
Port Down Action Mac Loop Detect : enabled
```

```
switch# configure terminal
switch(config)# no mac address-table loop-detect port-down
switch(config)# show mac address-table loop-detect
Port Down Action Mac Loop Detect : disabled
```

MAC Move Loop Detection

Cisco Nexus Series switches leverage L2FM for software MAC learning (and, subsequently, loop detection). If a host (MAC address) moves between two interfaces within the same VLAN, it would trigger a MAC move.

If there are a large number of such MAC moves in a short duration of time, the control plane of the switch and the CPU performance could get impacted. L2FM protects the switch from such scenarios by disabling MAC learning on the specific VLAN once the number of MAC moves for the corresponding MAC address exceeds a threshold.

For Cisco Nexus switches, the MAC move learn disable threshold criteria is when a single MAC addresses moves 10 or more times in a duration of one second within the same VLAN. Once threshold limit is hit, all new MAC learning on the corresponding VLAN is disabled for a period between 120 seconds to 240 seconds within the same VLAN. After that, new MAC learning is re-enabled on that VLAN. There is no impact of this on rest of the VLANs on the switch.

Note If Cisco Nexus Series switches is operated in N9K mode, the generated syslog messages will be similar to Cisco Nexus 9000 Series switches.

Generating Syslog Error Messages

To see MAC move notifications in syslogs, follow the below steps:

SUMMARY STEPS

1. **config t**
2. **logging level l2fm 5**
3. (Optional) **mac address-table notification mac-move**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**config t**
	Example:
	`switch# config t`
	`switch(config)#`
		Enters configuration mode.

Step 2	**logging level l2fm 5** **Example:** `switch(config)# logging level l2fm 5`	Enables logging of all L2FM events from level 5 up to the highest severity events.
Step 3	(Optional) **mac address-table notification mac-move** **Example:** `switch(config)# mac address-table notification mac-move`	Enables MAC move notification on the switch. **Note** • MAC move notification is enabled by default. • This command ensures that the syslog for L2FM detect displays when there is a MAC address move.

Following are the sample generated syslog messages:

- When MAC move is detected:

```
2018 Nov 14 16:04:23.881 N9K %L2FM-4-L2FM_MAC_MOVE2: Mac XXXX.XXXX.XXXX
in vlan 741 has moved between Po6 to Eth1/3
```

- When MAC learning on VLAN is disabled:

```
2016 Apr 11 18:00:18 %L2FM-2-L2FM_MAC_FLAP_DISABLE_LEARN_N3K: Loops detected in the
network for mac XXXX.XXXX.XXXX among ports Eth1/48 and Eth1/50/3 on vlan 4 - Disabling
 dynamic learning notifications for a period between 120 and 240 second
```

- When MAC learning on VLAN is re-enabled:

```
2023 Nov 29 21:23:19 N-3164Q-40G %L2FM-2-L2FM_MAC_FLAP_RE_ENABLE_LEARN:
Re-enabling learning in vlan 500
```

Example

In order to check if the MAC addresses move, enter the command:

```
switch# show mac address-table notification mac-move
MAC Move Notify Triggers: 1206
Number of MAC Addresses added: 944088
Number of MAC Addresses moved: 265
Number of MAC Addresses removed: 943920
```

Note The following are the possible causes for MAC moves:

- MAC addresses move because of server NIC teaming and moving between Active-Active, Active-Standby states, etc.
- MAC addresses move because the source of the data is physically moved across all switches while STP states are converged and in correct states.
- Due to loops in the network.