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Differentiated Services Codepoint (DSCP) mapping

A codepoint must have an 802.1p priority assignment (0 - 7) before you can configure a policy for prioritizing packets. If a codepoint you want to use shows `No-override` in the `Priority` column of the DSCP map (`show qos dscp-map`), then you must assign a 0 - 7 priority before proceeding (`qos dscp-map priority` command).

The DSCP Policy Table associates an 802.1p priority with a specific ToS byte codepoint in an IPv4 packet. This enables you to set a LAN policy that operates independently of 802.1Q VLAN-tagging.

In the default state, most of the 64 codepoints do not assign an 802.1p priority, as indicated by `No-override` in The default DSCP Policy Table.

You can use the following command to list the current DSCP Policy table.

Syntax:

`show qos dscp-map`

Displays the DSCP Policy Table.

The default DSCP Policy Table

DSCP policy	802.1p priority	DSCP policy	802.1p priority	DSCP policy	802.1p priority
000000	No-override	010110	3*	101011	No-override
000001	No-override	010111	No-override	101100	No-override
000010	No-override	011000	No-override	101101	No-override
000011	No-override	011001	No-override	101110	7**
000100	No-override	011010	4*	101111	No-override
000101	No-override	011011	No-override	110000	No-override
000110	No-override	011100	4*	110001	No-override
000111	No-override	011101	No-override	110010	No-override
001000	No-override	011110	5*	110011	No-override
001001	No-override	011111	No-override	110100	No-override
001010	1*	100000	No-override	110101	No-override
001011	No-override	100001	No-override	110110	No-override
001100	1*	100010	6*	110111	No-override
001101	No-override	100011	No-override	111000	No-override
001110	2*	100100	6*	111001	No-override

DSCP policy	802.1p priority	DSCP policy	802.1p priority	DSCP policy	802.1p priority
001111	No-override	100101	No-override	111010	No-override
010000	No-override	100110	7*	111011	No-override
010001	No-override	100111	No-override	111100	No-override
010010	0*	101000	No-override	111101	No-override
010011	No-override	101001	No-override	111110	No-override
010100	0*	101010	No-override	111111	No-override
010101	No-override				

*Assured Forwarding codepoints; configured by default on the switches covered in this guide.

**Expedited Forwarding codepoint configured by default.

Configuring DSCP policies for codepoints

Use the following commands to configure or reconfigure DSCP policies for codepoints.

Syntax:

`qos dscp-map <codepoint> priority <0-7> [name <ascii-string>]`

(Optional) This command is required only if an 802.1p priority is not already assigned to the specified *<codepoint>* in the DSCP Policy table (see The default DSCP Policy Table).

Valid values for a DSCP codepoint are as follows:

- A binary value for the six-bit codepoint from `000000` to `111111`.
- A decimal value from `0` (low priority) to `63` (high priority) that corresponds to a binary DSCP bit set
- An ASCII standard (hexadecimal) name for a binary DSCP bit set. The following are assigned by default:

`af11` (001010) `af43` (100110)
`af12` (001100) `ef` (101110)
`af13` (001110) `cs0` (000000)
`af21` (010010) `cs1` (001000)
`af22` (010100) `cs2` (010000)
`af23` (010110) `cs3` (011000)
`af31` (011010) `cs4` (100000)
`af32` (011100) `cs5` (101000)
`af33` (011110) `cs6` (110000)
`af41` (100010) `cs7` (111000)
`af42` (100100)

Enter **?** to display the list of valid codepoint entries.

When the switch applies the specified DSCP policy to a packet, the priority determines the packet's queue in the outbound port to which it is sent. If the packet leaves the switch on a tagged port, it carries the 802.1p priority with it to the next downstream device. For IP packets, the DSCP will be replaced by the codepoint specified in this command.

Default: `No-override` for most codepoints.

`no qos dscp-map <codepoint>`

Reconfigures the 802.1p priority for *<codepoint>* to `No-override`. Also deletes the codepoint policy name, if configured.

`no qos dscp-map <codepoint> name`

Deletes only the policy name, if configured, for *<codepoint>*.

Steps for configuring codepoints:

1. Determine whether the DSCPs already have priority assignments, which could indicate use by existing applications. (Also, a DSCP must have a priority configured before you can assign any QoS classifiers to use it.)

   Display the current DSCP map configuration

```
HP Switch(config)# show qos dscp-map

  DSCP -> 802.p priority mappings

  NOTE: 'qos type-of-service diff-services' must be configured
        before DSCP is honored on inbound trafic.

  DSCP CodePoint DSCP Value 802.1p tag    DSCP Policy name
  -------------- ---------- -----------   --------------------------
  000000         0          0             cs0
  000001         1          No-override
  000010         2          No-override
  000011         3          No-override
  000100         4          No-override
  000101         5          No-override
  000110         6          No-override
  000111         7          No-override
  001000         8          1             cs1
  001001         9          No-override
  001010         10         No-override   af11
  001011         11         No-override
  001100         12         No-override   af12
  001101         13         No-override
  001110         14         No-override   af13
  001111         15         No-override
  010000         16         2             cs2
  010001         17         No-override
    .              .              .
    .              .              .
    .              .              .
```

The DSCPs for this example have not yet been assigned an 802.1p priority level.

2. Configure the DSCP policies for the codepoints you want to use.

   Assign priorities to the selected DSCPs

```
HP Switch(config)# qos dscp-map 2 priority 7
HP Switch(config)# qos dscp-map 3 priority 5

HP Switch(config)# show qos dscp-map

DSCP -> 802.p priority mappings

  NOTE: 'qos type-of-service diff-services' must be configured
        before DSCP is honored on inbound traffic.

  DSCP CodePoint DSCP Value 802.1p tag    DSCP Policy name
  -------------- ---------- -----------   ---------------------------
  000000         0          0             cs0
  000001         1          No-override
  000010         2          7
  000011         3          5
  000100         4          No-override
  000101         5          No-override
  000110         6          No-override
  000111         7          No-override
  001000         8          1             cs1
  001001         9          No-override
  001010         10         No-override   af11
  001011         11         No-override
  001100         12         No-override   af12
  001101         13         No-override
     .           .               .
```

DSCP Policies Configured in this Step

Default priority settings for selected codepoints

In a few cases, such as 001010 (af21) and 001100 (af43), a default policy (implied by the DSCP standards for Assured-Forwarding and Expedited-Forwarding) is used.

You can change the priorities for the default policies by using `qos dscp-map <codepoint> priority <0-7>`. (These policies are not in effect unless you have either applied the policies to a QoS classifier or configured QoS Type-of-Service to be in `diff-services` mode.)

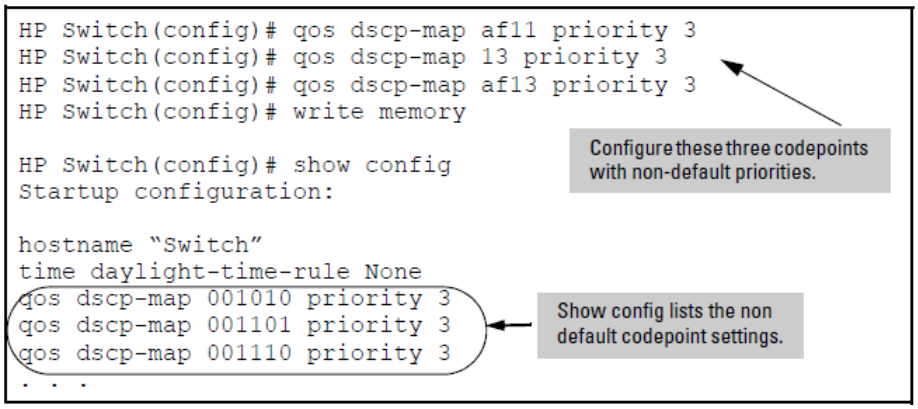
Quickly listing non-default codepoint settings

The default DSCP Policy Table lists the switch's default codepoint/priority settings. If you change the priority of any codepoint setting to a non-default value and then execute `write memory`, the switch will list the non-default setting in the `show config` display. For example, in the default configuration, the following codepoint settings are true:

Codepoint	Default priority
001100	1
001101	No-override
001110	2

If you change all three settings to a priority of 3, and then execute `write memory`, the switch will reflect these changes in the `show config` listing:

Example of show config listing with non-default priority settings in the DSCP table



Effect of `No-override`: In the QoS Type-of-Service differentiated services mode, a `No-override` assignment for the codepoint of an outbound packet means that QoS is effectively disabled for such packets. That is, QoS does not affect the packet queuing priority or VLAN tagging.

In this case, the packets are handled as follows (as long as no other QoS feature creates priority assignments for them):

802.1Q status	Outbound 802.1p priority
Received and Forwarded on a tagged port member of a VLAN.	Unchanged
Received on an Untagged port member of a VLAN; Forwarded on a tagged port member of a VLAN.	0 (zero)—"normal"
Forwarded on an Untagged port member of a VLAN.	None

Note on changing a priority setting

If a QoS classifier is using a policy (codepoint and associated priority) in the DSCP Policy table, you must delete or change this usage before you can change the priority setting on the codepoint. Otherwise the switch blocks the change and displays this message:

```
Cannot modify DSCP Policy <

codepoint > - in use by other
qos rules.
```

In this case, use `show qos <classifier>` to identify the specific classifiers using the policy you want to change; that is:

```
show qos device-priority

show qos port-priority

show qos tcp-udp-port-priority

show qos vlan-priority

show qos type-of-service
```

For example, suppose that the 000001 (dscp 1) codepoint has a priority of 6, and several classifiers use the 000001 codepoint to assign a priority to their respective types of traffic. If you wanted to change the priority of codepoint 000001 you would do the following:

1. Identify which QoS classifiers use the codepoint.
2. Change the classifier configurations by assigning them to a different DSCP policy, or to an 802.1p priority, or to `No-override`.

3. Reconfigure the desired priority for the 000001 (dscp 1) codepoint.
4. Either reassign the classifiers to the 000001 (dscp 1) codepoint policy or leave them as they were after step 2, above.

Changing the priority setting on a policy when one or more classifiers are currently using the policy (example)

Suppose that codepoint 1 is in use by one or more classifiers. If you try to change its priority, you see a result similar to the following:

Trying to change the priority on a policy in use by a classifier

```
HP Switch(config)# qos dscp-map 1 priority 2
Cannot modify DSCP Policy 1 - in use by other qos rules.
```

In this case, you would use steps similar to the following to change the priority.

1. Identify which classifiers use the codepoint you want to change.

   ### A search to identify classifiers using a codepoint you want to change

   ```
   HP Switch(config)#

   show qos device-priority

    Device priorities

    Device Address Apply Rule | DSCP Priority
    -------------- ---------- - ---- -----------
    10.26.50.104   DSCP       |

   1    6

   HP Switch(config)#

   show qos port-priority

    Port priorities

    Port Apply rule  | DSCP  Priority     Radius Override
    ---- ----------    ----- ----------   ---------------
    1    No-override |       No-override  No-override
    2    No-override |       No-override  No-override
    3    DSCP        |

   1     6            No-override
    4    No-override |       No-override  No-override
    .
    .
    .
   HP Switch(config)#

   show qos tcp-udp-port-priority

    TCP/UDP port based priorities

             | IP Packet  Application
    Protocol | Type       Port       Apply rule | DSCP   Priority
    -------- + ---------- ---------- ---------- + ------ --------
    UDP      | IPv4       1260       DSCP       |

   1      6
   ```

2. Change the classifier configurations by assigning them to a different DSCP policy, or to an 802.1p priority, or to `No-override`. For example:

   a. Delete the policy assignment for the `device-priority` classifier. (That is, assign it to `No-override`.)

   b. Create a new DSCP policy to use for re-assigning the remaining classifiers.

   c. Assign the `port-priority` classifier to the new DSCP policy.

   d. Assign the `udp-port 1260` classifier to an 802.1p priority.

   ```
   a) HP Switch(config)# no qos device-priority 10.26.50.104

   b) HP Switch(config)# qos dscp-map 5 priority 6

   c) HP Switch(config)# int 3 qos dscp 5

   d) HP Switch(config)# qos udp-port 1260 priority 2
   ```

3. Reconfigure the desired priority for the 000001 (dscp 1) codepoint.

   ```
   HP Switch(config)# qos dscp-map 1 priority 4
   ```

4. You could now re-assign the classifiers to the original policy codepoint or leave them as currently configured.

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Using classifiers to configure QoS for outbound traffic home IP Multicast (IGMP) interaction with QoS

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