IP Event Dampening

Table 1: Feature History Table

Feature Name	Release	Description
IP event dampening	Release 24.4.1	Introduced in this release on: Fixed Systems (8700 [ASIC:K100])(select variants only*). You can now enhance network stability by suppressing unnecessary flapping through IP Event Dampening. This feature prevents interfaces from repeatedly transitioning between up and down states due to intermittent issues, reducing operational disruptions. By configuring dampening parameters, network operators can control the penalty for each flap and set thresholds for interface recovery, thus ensuring smoother network performance and reliability. This proactive approach minimizes unnecessary alerts and interventions, allowing for focused attention on more critical network events, ultimately improving overall network uptime and efficiency. *Previously this feature was supported on Q200 and Q100. It is now extended to Cisco 8712-MOD-M routers.

The IP Event Dampening feature introduces a configurable exponential decay mechanism to suppress the effects of excessive interface flapping events on routing protocols and routing tables in the network. This

feature allows the network operator to configure a router to automatically identify and selectively dampen a local interface that is flapping.

Guidelines and Limitations

See the following guidelines and limitations before configuring IP Event Dampening feature:

- Due to changes in the netstack-IP component, all IP clients observe the impact of interface dampening.
- When dampening is enabled, a penalty value is assigned to an interface. This value starts at 0 and increases by 1000 each time the interface state transitions from up to down.
- For each flap of the interface, a certain penalty is added. The penalty decays exponentially when parameters are configured.
- When the penalty exceeds a certain high level, the interface is dampened. It is unsuppressed when the penalty decays below a low level.
- When an interface is dampened, the IP address and the static routes are removed from the interface. All the clients of IP get an IP delete notification.
- When an interface is unsuppressed, the IP address and the relevant routes are added back. All the clients of IP get an IP address add notification for all the IP addresses of the interface.
- All Layer 3 interfaces that are configured on the Ethernet interface, port changes, and SVI support this feature.

IP Event Dampening Overview

Interface state changes occur when interfaces are administratively brought up or down or if an interface changes state. When an interface changes state or flaps, routing protocols are notified of the status of the routes that are affected by the change in state. Every interface state change requires all affected devices in the network to recalculate best paths, install or remove routes from the routing tables, and then advertise valid routes to peer routers. An unstable interface that flaps excessively can cause other devices in the network to consume substantial amounts of system processing resources and cause routing protocols to lose synchronisation with the state of the flapping interface.

The IP Event Dampening feature introduces a configurable exponential decay mechanism to suppress the effects of excessive interface flapping events on routing protocols and routing tables in the network. This feature allows the network operator to configure a router to automatically identify and selectively dampen a local interface that is flapping. Dampening an interface removes the interface from the network until the interface stops flapping and becomes stable. Configuring the IP Event Dampening feature improves convergence times and stability throughout the network by isolating failures so that disturbances are not propagated. This, in turn, reduces the utilisation of system processing resources by other devices in the network and improves overall network stability.

Interface State Change Events

This section describes the interface state change events of the IP Event Dampening feature. This feature employs a configurable exponential decay mechanism that is used to suppress the effects of excessive interface flapping or state changes. When the IP Event Dampening feature is enabled, flapping interfaces are dampened from the perspective of the routing protocol by filtering excessive route updates. Flapping interfaces are identified, assigned penalties, suppressed if necessary, and made available to the network when the interface stabilizes.

Suppress Threshold

The suppress threshold is the value of the accumulated penalty that triggers the router to dampen a flapping interface. The flapping interface is identified by the router and assigned a penalty for each up and down state change, but the interface is not automatically dampened. The router tracks the penalties that a flapping interface accumulates. When the accumulated penalty reaches the default or preconfigured suppress threshold, the interface is placed in a dampened state.

Half-Life Period

The half-life period determines how fast the accumulated penalty can decay exponentially. When an interface is placed in a dampened state, the router monitors the interface for additional up and down state changes. If the interface continues to accumulate penalties and the interface remains in the suppress threshold range, the interface will remain dampened. If the interface stabilises and stops flapping, the penalty is reduced by half after each half-life period expires. The accumulated penalty will be reduced until the penalty drops to the reuse threshold. The configurable range of the half-life period timer is from 1 to 45 minutes. The default half-life period timer is 1 minute.

Reuse Threshold

When the accumulated penalty decreases until the penalty drops to the reuse threshold, the route is unsuppressed and made available to other devices in the network. The range of the reuse value is from 1 to 20000 penalties. The default value is 750 penalties.

Maximum Suppress Time

The maximum suppress time represents the maximum time an interface can remain dampened when a penalty is assigned to an interface. The maximum suppress time can be configured from 1 to 255 seconds. The maximum penalty is truncated to maximum 20000 unit. The maximum value of the accumulated penalty is calculated based on the maximum suppress time, reuse threshold, and half-life period.

Affected Components

When an interface is not configured with dampening, or when an interface is configured with dampening but is not suppressed, the routing protocol behavior as a result of interface state transitions is not changed by the IP Event Dampening feature. However, if an interface is suppressed, the routing protocols and routing tables are immune to any further state transitions of the interface until it is unsuppressed.

Route Types

The following interfaces are affected by the configuration of this feature:

- Connected routes:
  - The connected routes of dampened interfaces are not installed into the routing table.
  - When a dampened interface is unsuppressed, the connected routes will be installed into the routing table if the interface is up.
- Static routes:
  - Static routes assigned to a dampened interface are not installed into the routing table.
  - When a dampened interface is unsuppressed, the static route will be installed into the routing table if the interface is up.

Note Only the primary interface can be configured with this feature, and all subinterfaces are subject to the same dampening configuration as the primary interface. IP Event Dampening does not track the flapping of individual subinterfaces on an interface.

Supported Protocols

All the protocols that are used are impacted by the IP Event Dampening feature. The IP Event Dampening feature supports Border Gateway Protocol (BGP), Enhanced Interior Gateway Routing Protocol (EIGRP), Hot Standby Routing Protocol (HSRP), Open Shortest Path First (OSPF), Routing Information Protocol (RIP), and VRRP. Ping and SSH to the concerned interface IP address does not work.

Note The IP Event Dampening feature has no effect on any routing protocols if it is not enabled or an interface is not dampened.

How to Configure IP Event Dampening

Enabling IP Event Dampening

The `dampening` command is entered in interface configuration mode to enable the IP Event Dampening feature. If this command is applied to an interface that already has dampening configured, all dampening states are reset and the accumulated penalty will be set to 0. If the interface has been dampened, the accumulated penalty will fall into the reuse threshold range, and the dampened interface will be made available to the network. The flap counts, however, are retained.

Table 2: Procedure

Steps	Command or Action	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**interface** *type number*	Enters interface configuration mode and configures the specified interface.
Step 3	**dampening** [*half-life-period reuse-threshold*] [*suppress-threshold max-suppress* [*restart-penalty*]]	Enables interface dampening. • Entering the `dampening` command without any arguments enables interface dampening with default configuration parameters. • When manually configuring the timer for the *restart-penalty* argument, the values must be manually entered for all arguments.
Step 4	**end**	Exits interface configuration mode.

Verifying IP Event Dampening

Use the `show dampening interface` or `show interface dampening` commands to verify the configuration of the IP Event Dampening feature.

Table 3: Procedure

Steps	Command or Action	Purpose
Step 1	**show dampening interface**	Displays dampened interfaces.
Step 2	**show interface dampening**	Displays dampened interfaces on the local router.