

# Chapter 8

## Configure Damping Parameters

BGP *route flapping* describes the situation in which BGP systems send an excessive number of update messages to advertise network reachability information. BGP *flap damping* is a way to reduce the number of update messages sent between BGP peers, thereby reducing the load on these peers without adversely affecting the route convergence time.

Flap damping reduces the number of update messages by better packing the information included in the update messages. Doing this leads to some delay, or *suppression*, in the propagation of route information, but the result is increased network stability. You typically apply flap damping to EBGp routes (that is, to routes in different ASs). You can also apply it within a confederation, between confederation member ASs. Because routing consistency within an AS is important, do not apply flap damping to IBGP routes. (If you do, it is ignored.)

To effect BGP flap damping, you define routing policy actions by creating a named set of damping parameters and include it in a policy with the damping action (described in Table 4 on page 41). For the damping policy to work, you also must enable BGP route flap damping, as described in “Enable Route Flap Damping” on page 333.

BGP flap damping is defined in the following RFC:

RFC 2439, *BGP Route Flap Damping*

This chapter describes the following:

Configure Flap Damping Parameters on page 77

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### Configure Flap Damping Parameters

To define damping parameters, include the damping statement at the [edit policy-options] hierarchy level:

```
[edit policy-options]
damping name {
  disable;
  half-life minutes;
  max-suppress minutes;
  reuse number;
  suppress number;
}
```

The name identifies the group of damping parameters. It can contain letters, numbers, and hyphens (-), and can be up to 255 characters. To include spaces in the name, enclose the entire name in quotation marks (double quotes).

You can specify one or more of the following damping parameters:

half-life—Decay half-life, in minutes

max-suppress—Maximum hold-down time, in minutes

reuse—Reuse threshold

suppress—Cutoff (suppression) threshold

To understand how to configure these parameters, you need to understand how damping suppresses routes. How long a route can be suppressed is based on a *figure of merit*, which is a value that correlates to the probability of future instability of a route. Routes with higher figure-of-merit values are suppressed for longer periods of time. The figure-of-merit value decays exponentially over time.

A figure-of-merit value of zero is assigned to each new route. The value is increased each time the route is withdrawn or readvertised, or when one of its path attributes changes. With each incident of instability, the value increases as follows:

Route is withdrawn—1000

Route is readvertised—1000

Route's path attributes change—500

When a route's figure-of-merit value reaches a particular level, called the *cutoff* or *suppression threshold*, the route is suppressed. This means that the routing table no longer installs the route into the forwarding table and no longer exports this route to any of the routing protocols. By default, a route is suppressed when its figure-of-merit value reaches 3000. To modify this default, include the suppress statement at the [edit policy-options damping *name*] hierarchy level. The threshold can be a value from 1 through 20,000. (It is unitless.)

If a route has flapped, but then becomes stable so that none of the incidents listed above occurs within a configurable amount of time, the figure-of-merit value for the route decays exponentially. The default half-life is 30 minutes. For example, for a route with a figure-of-merit value of 1500, if no incidents occur, its figure-of-merit value is reduced to 750 after 15 minutes and to 325 after another 15 minutes. To modify the default half-life, include the half-life statement at the [edit policy-options damping *name*] hierarchy level. The half-life can be a value from 1 through 45 minutes.

A suppressed route becomes reusable when its figure-of-merit value decays to a value below a *reuse threshold*, thus allowing routes that experience transient instability to once again be considered valid. The default reuse threshold is 750. When the figure-of-merit value passes below the reuse threshold, the route once again is considered usable and can be installed in the forwarding table and exported from the routing table. To modify the default reuse threshold, include the reuse statement at the [edit policy-options damping *name*] hierarchy level. The threshold can be a value from 1 through 20,000. (It is unitless.)

A route's figure-of-merit value stops increasing when it reaches a maximum suppression threshold, which is determined based on the route's suppression threshold level, half-life, reuse threshold, and maximum hold-down time. The maximum suppression time provides an upper bound on the time that a route can remain suppressed. The default maximum hold-down time is 60 minutes. To modify the default, include the max-suppress statement at the [edit policy-options damping *name*] hierarchy level. The time can be a value from 1 through 720 minutes.

The merit ceiling,  $\mathcal{E}_c$ , which is the maximum merit that a flapping route can collect, is calculated using the following formula:

$$\mathcal{E}_c \leq \mathcal{E}_r e^{(t/\lambda) (\ln 2)}$$

$\mathcal{E}_r$  is the figure-of-merit reuse threshold,  $t$  is the maximum hold-down time in minutes, and  $\lambda$  is the half-life in minutes. For example, if you use the default figure-of-merit values in this formula, but use a half-life of 30 minutes, the calculation is as follows:

$$\mathcal{E}_c \leq 750 e^{(60/30) (\ln 2)}$$

$$\mathcal{E}_c \leq 3000$$



**Note**

The cutoff threshold, which you configure using the suppress statement, must be less than or equal to the merit ceiling,  $\mathcal{E}_c$ . If the configured cutoff threshold or the default cutoff threshold is greater than the merit ceiling, the route is never suppressed and damping never occurs.

To display figure-of-merit information, use the show policy damping command.

A route that has been assigned a figure of merit is considered to have a damping state. To display the current damping information on the router, use the show route detail command.

## Disable Damping by Prefix

Normally, you enable or disable damping on a per-peer basis. However, you can disable damping for a specific prefix received from a peer by including the disable statement at the [edit policy-options damping *name*] hierarchy level:

```
[edit policy-options damping name]  
disable;
```

**Example: Disable by Prefix**

In this policy example, although damping is enabled for the peer, the policy damping none statement specifies that damping be disabled for prefix 3.0.0.0/8 in Policy A. This route is not damped because the policy statement named Policy-A filters on the prefix 3.0.0.0/8 and the action points to the damping statement named none. The remaining prefixes are damped using the default parameters.

```
[edit]
policy-options {
  policy-statement Policy-A {
    from {
      route-filter 3.0.0.0/8 exact;
    }
    then damping none;
  }
  damping none {
    disable;
  }
}
```

**Examples: Define Damping Parameters**

Enable BGP flap damping and configure damping parameters:

```
[edit]
routing-options {
  autonomous-system 666;
}
protocols {
  bgp {
    damping;
    group group1 {
      traceoptions {
        file bgp-log size 1m files 10;
        flag damping;
      }
      import damp;
      type external;
      peer-as 10458;
      neighbor 192.168.2.30;
    }
  }
}
policy-options {
  policy-statement damp {
    from {
      route-filter 11.0.0.0/8 exact damping high;
      route-filter 15.0.0.0/8 exact damping medium;
      route-filter 3.0.0.0/8 exact damping none;
    }
    then accept;
  }
  then accept;
}
```

```

damping high {
  half-life 30;
  suppress 3000;
  reuse 750;
  max-suppress 60;
}
damping medium {
  half-life 15;
  suppress 3000;
  reuse 750;
  max-suppress 45;
}
damping none {
  disable;
}
}

```

To display damping parameters for this configuration, use the `show policy damping` command:

```

user@host> show policy damping
Damping information for "high":
  Halflife: 30 minutes
  Reuse merit: 750 Suppress/cutoff merit: 3000
  Maximum suppress time: 60 minutes
  Computed values:
    Merit ceiling: 3008
    Maximum decay: 24933
Damping information for "medium":
  Halflife: 15 minutes
  Reuse merit: 750 Suppress/cutoff merit: 3000
  Maximum suppress time: 45 minutes
  Computed values:
    Merit ceiling: 6024
    Maximum decay: 12449
Damping information for "none":
  Damping disabled

```

