

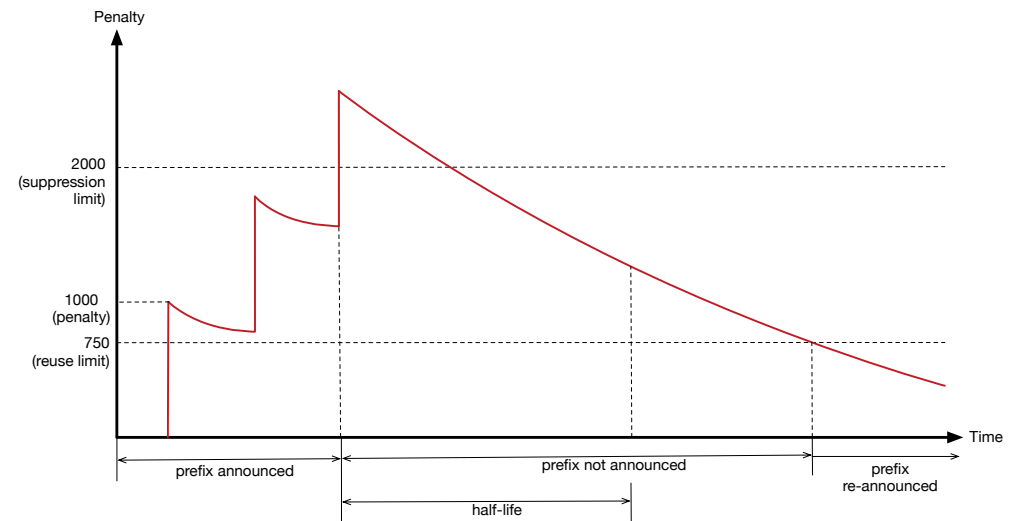


BGP Route Dampening

BGP route dampening is used to prevent constant BGP convergence events (updates and withdrawal) caused by unstable routes. This can be due to neighbors that flap frequently or misconfigurations that cause constant updates and withdrawals.

Route Dampening works by assigning a penalty to a route every time it flaps. A flap is when a route is removed from the BGP RIB, usually via a withdrawal message or from a timeout of a failed neighbor.

Should a given routes penalty exceed an upper *suppression limit*, that route will be removed from the global RIB (suppressed) for a period of time until it stabilises. Its penalty will drop over time and if it drops below the *reuse limit* the route becomes unsuppressed. However should the router flap again the penalty will increase and it could be dampened again. There is an upper limit (called the *max suppression limit*) on how long a prefix can be suppressed. See the image on the right for a graph of the process.



Route dampening works on eBGP peers only. Dampening acts on a per path basis (i.e. if a router has alternative path for the same route it *will* take it). Route-maps can be used to provide different dampening values to different matched prefixes.

Terms and Definitions

- **History State** – Route dampening maintains a route flap history for each prefix. After a flap, a routes dampening state is set to *History* in the BGP table.
- **Penalty** – 1000 for flap (500 if only attributes change). This is hardcoded and cannot be changed.
- **Supress Limit** – Penalty exceeds = state changed from *History* to *Damp* and supress the route. *Default 2000*. (configurable)
- **Damp State** – Not considered in best path and thus not advertised.
- **Half-life** - Time to get to half the current penalty value. 15 min default (configurable). The penalty is reduced every 5s.
- **Reuse Limit** – A route is unsuppressed when penalty falls below this. 750 default (configurable). When penalty reaches half reuse limit the history is cleared for that route.
- **Max suppress Limit** – Upper bound on penalty. Default 60 min (configurable).



Configuration

(IOS)

```
router bgp 100
```

```
    bgp dampening <half-life> <reuse-limit> <supress-limit> <max-sup-time>
```

If no arguments are entered the default values will be used.

Route dampening is enabled per AFI/SAFI, in the following configuration modes.

- IPv4 address family configuration
- IPv6 address family configuration
- VPNv4 address family configuration
- VRF IPv4 address family configuration
- VPNv6 address family configuration
- VRF IPv6 address family configuration

Verification and Clear Commands

- clear bgp dampening
- clear bgp flap-statistics
- show bgp dampened-paths
- show bgp flap-statistics
- show bgp neighbors

Route Dampening Formula

Use this formula to help configure the above settings. Make sure the maximum penalty is higher than the supression limit (otherwise the route will never be suppressed). The formula is as follows:

$$\mathbf{max-penalty = reuse-limit * 2 (max-suppression-time/half-life)}$$