Implementing UCMP

Table 1: Feature History Table

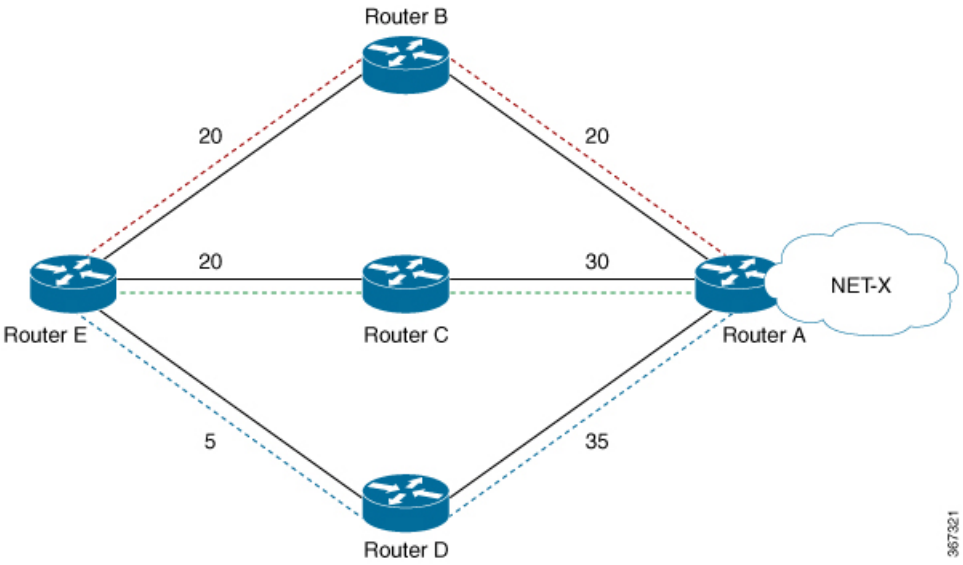
Feature Name	Release Information	Feature Description
Implementing UCMP	Release 24.4.1	Introduced in this release on: Fixed Systems (8700 [ASIC:K100])(select variants only*). UCMP enhances routing efficiency by allowing traffic distribution across multiple paths with different cost metrics. It effectively uses available bandwidth by distributing traffic proportionally based on path cost, optimizing network resource utilization. UCMP supports dynamic traffic load balancing, reducing congestion and improving overall network performance. This feature seamlessly integrates with existing routing protocols, providing a flexible and robust solution for complex network environments. *Previously this feature was supported on Q200 and Q100. It is now extended to Cisco 8712-MOD-M routers.

The unequal cost multipath (UCMP) load-balancing provides the capability to load balance traffic proportionally across multiple paths, with different cost. Generally, higher bandwidth paths have lower Interior Gateway Protocol (IGP) metrics configured, so that they form the shortest IGP paths.

With the UCMP load-balancing enabled, protocols can use even lower bandwidth paths or higher cost paths for traffic, and can install these paths to the forwarding information base (FIB). These protocols still install multiple paths to the same destination in FIB, but each path will have a 'load metric/weight' associated with it. FIB uses this load metric/weight to decide the amount of traffic that needs to be sent on a higher bandwidth path and the amount of traffic that needs to be sent on a lower bandwidth path.

In the following example, there are 3 paths to get to Network X as follows:

Figure 1: Topology for UCMP



Paths	Cost from Router E to Net -X
E-B-A	40
E-C-A	50
E-D-A	40

IGP selects the lowest path links, i.e E-B-A and E-D-A. The path E-C-A is not considered for load balancing because of higher cost. The lowest path link E-D (5) is not a tie breaker, as the end to end cost to the Network X is considered.

ECMP vs. UCMP Load Balancing

Table 2: Feature History Table

Feature Name	Release Information	Feature Description

ECMP vs. UCMP Load Balancing	Release 24.4.1	Introduced in this release on: Fixed Systems (8700 [ASIC:K100])(select variants only*). Enhanced ECMP improves routing scalability by supporting a higher number of equal-cost paths, facilitating efficient load distribution across the network. This feature allows you to maximize throughput by evenly distributing traffic across available paths, which minimizes potential bottlenecks. Enhanced ECMP is designed to work seamlessly with various routing protocols, ensuring consistent performance and reliability in large-scale network environments. *Previously this feature was supported on Q200 and Q100. It is now extended to Cisco 8712-MOD-M routers.

Load balancing is a forwarding mechanism that distributes traffic over multiple links based on certain parameters. Equal Cost Multi Path (ECMP) is a forwarding mechanism for routing packets along multiple paths of equal cost with the goal to achieve almost equally distributed link load sharing. This significantly impacts a router's next-hop (path) decision.

In ECMP, it is assumed that all links available are of similar speed which inherently means that the hash values that are computed are equally shared over the multiple paths available.

For instance, if we have two paths available, the buckets (which in the end identify the links to be chosen) will be assigned in a 50% / 50% loadsharing. This can be problematic when one path is say a 10G link and the other link is a 1G link. In this case, you probably want to assign a (near) 90/10 type deviation, but considering that BGP is not bandwidth aware, the 10G path is still chosen 50% of the time as much as the 1G link. In this scenario, not all paths are of equal cost path.

What UCMP does in this case is apply a *weight* to a path which means that we are giving more hash buckets to one path that has a higher weight. The weight applied is *static* in the sense that it is derived by the DMZ bandwidth extended community either assigned to a peer or as configured via the Route Policy Language (RPL) route manipulation functionality.

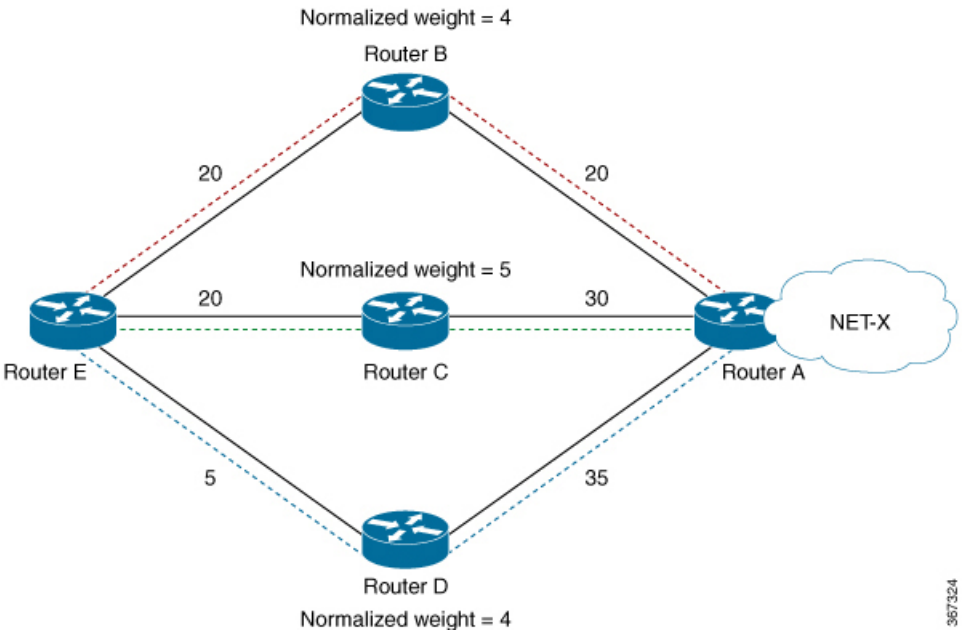
In general, a routing protocol decides a best path to a destination based on a metric. This metric is generally driven by the bandwidth of the circuit. When we have 3 paths available, say 1G/10G/100G, routing protocols generally discard the 1G/10G paths available. In defined cases, one may want to spread the load over the circuits based on the load they can carry. In this example, one may want to distribute traffic in a 1%/10%/89% fashion over the 1G/10G/100G paths available.

UCMP Minimum Integer Ratio

The UCMP Minimum Integer Ratio feature saves hardware resources when programming UCMP, by using an optimized number of buckets.

To calculate the UCMP minimum integer ratio, find the greatest common divisor (GCD) and divide all the calculated normalized weights.

In the following Figure, we have three configured weights 40, 50, and 40, with GCD as 10. To calculate the normalized weight, divide the configured weight by GCD. In this example, we need to divide 40 by 10, 50 by 10, and 40 by 10, which is 4, 5, and 4 respectively. Therefore 4, 5, and 4 are the new normalized weights.



New normalized weights are: 40/10 = 4, 50/10 = 5, and 40/10 = 4

If GCD is 1, then Normalized Weight = (Path weight/Total weight) * Maximum bucket size

BGP 256-way UCMP for enhanced bandwidth and load distribution

The unequal cost multipath (UCMP) load-balancing is a network traffic management method that:

- balances traffic proportionally across multiple paths with different costs
- allows higher bandwidth paths to have lower Interior Gateway Protocol (IGP) metrics, and
- enables the use of lower bandwidth or higher cost paths for traffic by installing them into the forwarding information base (FIB).
- The forwarding information base (FIB) is a routing component that:
  - installs multiple paths to the same destination
  - associates each path with a load metric or weight, and
  - uses this load metric or weight to distribute traffic across paths efficiently.

The BGP 256-way UCMP for enhanced bandwidth and load distribution feature allows BGP to allocate 256 hash buckets across multiple paths based on assigned weights. That allocation ensures that paths with higher weights receive more hash buckets, improving bandwidth use and distributing network load more evenly.

Benefits of BGP 256-way UCMP for enhanced bandwidth and load distribution

These are the key benefits of the BGP 256-way UCMP for enhanced bandwidth and load distribution:

- Optimized Network Performance: Smoother and more efficient network connectivity is experienced because traffic is better balanced across up to 256 paths, reducing potential bottlenecks and improving overall data flow.
- Enhanced configuration flexibility: Greater granularity in path configuration with up to 256 paths is provided, enabling a wider range of weight distribution options that enhance network management and optimization.

Restriction for BGP 256-way UCMP for enhanced bandwidth and load distribution

The BGP 256-way UCMP feature for enhanced bandwidth and load distribution feature is not supported on MPLS networks. If your network relies on MPLS, you can only utilize 64-way UCMP. This limitation impacts your traffic routing and management strategies, so it is crucial to consider it carefully when designing your network architecture to ensure compatibility and optimal functionality.

Configure BGP 256-way UCMP for enhanced bandwidth and load distribution

Set up the BGP 256-way UCMP for enhanced bandwidth and load distribution feature using:

- IGP Configuration
- BGP Configuration

This feature works with both IPv4 and IPv6 addresses, but the examples below are only for IPv4 addresses.

Procedure

Step 1 Configure the Interior Gateway Protocol (IGP) to enable UCMP to efficiently manage and optimize traffic flow across the network.

Configure two interfaces for IPv4 unicast routing in point-to-point mode with weights of 127 and 129, ensuring that the combined total of paths equals 256.

Example:

```
Router(config)# router isis 1
Router(config-isis)# is-type level-2-only
Router(config-isis)# net 50.0002.0000.0000.0001.00
Router(config-isis)# address-family ipv4 unicast
Router(config-isis-af)# address-family ipv4 unicast
Router(config-isis-af)# exit
Router(config-isis)# interface FourHundredGigE0/0/0/10
Router(config-isis-if)# point-to-point
Router(config-isis-if)# address-family ipv4 unicast
Router(config-isis-if-af)# weight 129
Router(config-isis-if-af)# exit
Router(config-isis-if)# exit
Router(config-isis)# interface FourHundredGigE0/0/0/11
Router(config-isis-if)# point-to-point
Router(config-isis-if)# address-family ipv4 unicast
Router(config-isis-if-af)# weight 127
```

```
Router(config-isis-if-af)# exit
Router(config-isis-if)# exit
```

As a result of this configuration, you've set up two interfaces for IPv4 unicast routing in point-to-point mode with specified weights, optimizing the distribution of these weights across the 256 buckets.

Step 2 Execute the **show cef *prefix* detail** command to verify that there are 256 multpaths available in total as configured in the IGP settings.

The weight distribution values displayed in the show output indicates that the total number of paths is 256.

```
Router# show cef 203.0.113.254 detail
203.0.113.254/24, version 30, internal 0x1000001 0x20 (ptr 0x9c537548) [1], 0x400 (0x9c506318), 0x0
 (0x0)
 local adjacency to FourHundredGigE0/0/0/10

 Prefix Len 24, traffic index 0, precedence n/a, priority 2
  gateway array (0x9c39f998) reference count 1, flags 0x0, source rib (7), 0 backups
                [2 type 3 flags 0x8401 (0x9c444918) ext 0x0 (0x0)]
  LW-LDI[type=3, refc=1, ptr=0x9c506318, sh-ldi=0x9c444918]
  gateway array update type-time 1 Feb 18 00:23:39.241
 LDI Update time Feb 18 00:23:39.241
 LW-LDI-TS Feb 18 00:23:39.245
   via 10.0.0.2/32, FourHundredGigE0/0/0/10, 5 dependencies, weight 129, class 0 [flags 0x0]
    path-idx 0 NHID 0x2 [0xb2f60210 0x0]
    next hop 10.0.0.2/32
    local adjacency
   via 172.31.255.254/32, FourHundredGigE0/0/0/11, 5 dependencies, weight 127, class 0 [flags 0x0]
    path-idx 1 NHID 0x1 [0xb2f60380 0x0]
    next hop 172.31.255.254/32
    local adjacency

/* These two paths carry a weight distribution designed to optimize allocation across 256 hash buckets.
 */
    slot 0, weight 129, normalized_weight 129, class 0
    slot 1, weight 127, normalized_weight 127, class 0


    Load distribution: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 (refcount 2)
```

Step 3 Configure BGP so you can effectively manage and optimize traffic distribution across multiple external paths with different costs, enhancing network performance and reliability.

Configure route policies BW1 and BW2 to attach a bandwidth-related extended community to BGP routes, ensuring that the combined bandwidth represented by these extended communities equals a total of 256.

Example:

```
Router(config)# route-policy BW1
Router(config-route-policy)# set extcommunity bandwidth (2906:127)
Router(config-route-policy)# end-policy

Router(config)# route-policy BW2
Router(config-route-policy)# set extcommunity bandwidth (2906:129)
Router(config-route-policy)# end-policy
```

As a result of this configuration, you set up two route policies, BW1 and BW2, to manage and optimize traffic distribution across BGP routes by adding specific bandwidth-related extended communities.

- **BW1 Policy**: This policy adds an extended community with the bandwidth attribute `(2906:127)` to the BGP routes it is applied to.
- **BW2 Policy**: This policy adds an extended community with the bandwidth attribute `(2906:129)` to the BGP routes it is applied to.

Step 4 Configure the BGP router to utilize multiple paths for routing traffic, thereby enhancing load balancing and redundancy across the network.

Set up a BGP instance with AS number 1, adjusts path selection criteria for multipath routing, establishes the IPv4 unicast address family, and allows for extensive multipath capabilities with up to 256 paths.

Example:

```
Router(config)# router bgp 1
Router(config-router)# bgp bestpath as-path multipath-relax
Router(config-router)# address-family ipv4 unicast
Router(config-router-af)# maximum-paths eibgp 256
Router(config-router-af)# exit
```

As a result of this configuration, you enable the BGP router to leverage 256 paths for routing traffic, which enhances load balancing and redundancy across the network.

Step 5 Execute the **show cef *prefix* detail** command to verify that there are 256 multpaths available in total as configured in the BGP settings.

```
Router# show cef 198.51.100.254 detail
198.51.100.254/24, version 56, internal 0x5000001 0x40 (ptr 0x9c538178) [1], 0x0 (0x0), 0x0 (0x0)
 Prefix Len 24, traffic index 0, precedence n/a, priority 4
  gateway array (0x9c3a0598) reference count 1, flags 0x2010, source rib (7), 0 backups
                [1 type 3 flags 0x48441 (0x9c445218) ext 0x0 (0x0)]
  LW-LDI[type=0, refc=0, ptr=0x0, sh-ldi=0x0]
  gateway array update type-time 1 Feb 18 01:32:57.940
 LDI Update time Feb 18 01:32:57.940

/* These two paths carry a weight distribution designed to optimize allocation across 256 hash buckets.
 */
    Weight distribution:
    slot 0, weight 129, normalized_weight 129
    slot 1, weight 127, normalized_weight 127


  Level 1 - Load distribution: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1
```

Configuring IS-IS With Weight

The following example shows the IS-IS weight configuration with IPv4. The same can be done for IPv6, with or without SR.

```
CPU0:router(config)# router isis 1
RP/0/RSP0/CPU0:router(config-isis)# interface HundredGigE 0/3/0/8
RP/0/RSP0/CPU0:router(config-isis-if)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-isis-if-af)# weight 200
RP/0/RSP0/CPU0:router(config-isis)# interface HundredGigE 0/3/0/9
RP/0/RSP0/CPU0:router(config-isis-if)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-isis-if-af)# weight 300
```

Verification

The following example verifies CEF entry. Then, for two paths with weights of 200 and 300 respectively, and GCD of 100; the expected normalized weights are 2 and 3.

```
Router# show cef ipv4 97.0.0.0 detail

97.0.0.0/24, version 537, internal 0x1000001 0x0 (ptr 0x71bcaee0) [1], 0x0 (0x71b98870),
0x0 (0x0)
 Updated Oct 16 06:34:46.197
 remote adjacency to HundredGigE 0/3/0/8
 Prefix Len 24, traffic index 0, precedence n/a, priority 2
  gateway array (0x71a6de10) reference count 13, flags 0x0, source rib (7), 0 backups
                [14 type 3 flags 0x8401 (0x71b02d90) ext 0x0 (0x0)]
  LW-LDI[type=3, refc=1, ptr=0x71b98870, sh-ldi=0x71b02d90]
  gateway array update type-time 1 Oct 16 06:34:46.196
 LDI Update time Oct 16 06:34:46.197
 LW-LDI-TS Oct 16 06:34:46.197
   via 1.0.0.2/32, HundredGigE0/3/0/8, 4 dependencies, weight 200, class 0 [flags 0x0]
    path-idx 0 NHID 0x0 [0x7244d2a4 0x0]
    next hop 1.0.0.2/32
    remote adjacency
   via 2.0.0.2/32, HundredGigE0/3/0/9, 4 dependencies, weight 300, class 0 [flags 0x0]
    path-idx 1 NHID 0x0 [0x7244d2f8 0x0]
    next hop 2.0.0.2/32
    remote adjacency

    Weight distribution:
    slot 0, weight 200, normalized_weight 2, class 0
    slot 1, weight 300, normalized_weight 3, class 0

    Load distribution: 0 1 0 1 1 (refcount 14)

    Hash  OK  Interface                 Address
    0     Y   HundredGigE0/3/0/8    remote
    1     Y   HundredGigE0/3/0/9    remote
    2     Y   HundredGigE0/3/0/8    remote
    3     Y   HundredGigE0/3/0/9    remote
    4     Y   HundredGigE0/3/0/9    remote
```

Configuring IS-IS With Metric

The following example shows IS-IS metric configuration with IPv4. The same can be done with IPv6.

```
Router# enable
RP/0/RSP0/CPU0:router(config)# router isis 1
RP/0/RSP0/CPU0:router(config-isis)# interface HundredGigE0/3/0/8
RP/0/RSP0/CPU0:router(config-isis-if)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-isis-if-af)# metric 1
RP/0/RSP0/CPU0:router(config-isis)# interface HundredGigE0/3/0/9
RP/0/RSP0/CPU0:router(config-isis-if)# address-family ipv4 unicast
```

```
RP/0/RSP0/CPU0:router(config-isis-if-af)# metric 100
```

Verification

The following example verifies CEF entry, and checks for the two paths with metric values of 1 and 100, respectively. In this example, the best path route metric is 21 and the UCMP path route metric is 120. Therefore, the calculation is as follows:

The best path route metric, 21 = (1 configured + 20 added by IS-IS), weight 0xFFFFFFFF (4294967295)

The UCMP path route metric, 120 = (100 + 20), weight = (21/120) * 4294967295 = 751619276

GCD is one. So Normalized Weight is:

(4294967295 * 64) / (4294967295 + 751619276) = 54

(751619276 * 64) / (4294967295 + 751619276) = 9

```
Router# show cef ipv4 97.0.0.0 detail


97.0.0.0/24, version 773, internal 0x1000001 0x0 (ptr 0x71bcaee0) [1], 0x0 (0x71b98870),
0x0 (0x0)
 Updated Oct 16 06:36:08.632
 remote adjacency to HundredGigE0/3/0/8
 Prefix Len 24, traffic index 0, precedence n/a, priority 2
  gateway array (0x71a6d9d0) reference count 2, flags 0x0, source rib (7), 0 backups
                [3 type 3 flags 0x8401 (0x71b02b90) ext 0x0 (0x0)]
  LW-LDI [type=3, refc=1, ptr=0x71b98870, sh-ldi=0x71b02b90]
  gateway array update type-time 1 Oct 16 06:36:08.632
 LDI Update time Oct 16 06:36:08.632
 LW-LDI-TS Oct 16 06:36:08.632
   via 1.0.0.2/32, HundredGigE0/3/0/8, 14 dependencies, weight 4294967295, class 0 [flags
0x0]
    path-idx 0 NHID 0x0 [0x7244d2a4 0x0]
    next hop 1.0.0.2/32
    remote adjacency
   via 2.0.0.2/32, HundredGigE0/3/0/9, 14 dependencies, weight 751619276, class 0 [flags
0x0]
    path-idx 1 NHID 0x0 [0x7244d2f8 0x0]
    next hop 2.0.0.2/32
    remote adjacency


    Weight distribution:
    slot 0, weight 4294967295, normalized_weight 54, class 0
    slot 1, weight 751619276, normalized_weight 9, class 0
```

Configuring BGP With Weights

The following example shows BGP configuration with weights.

```
RP/0/RSP0/CPU0:router(config)# route-policy BW1
RP/0/RSP0/CPU0:router(config-rpl)# set extcommunity bandwidth (2906:45750000)
RP/0/RSP0/CPU0:router(config-rpl)# end-policy
RP/0/RSP0/CPU0:router(config)# !
RP/0/RSP0/CPU0:router(config)# route-policy BW2
RP/0/RSP0/CPU0:router(config-rpl)# set extcommunity bandwidth (2906:47250000)
RP/0/RSP0/CPU0:router(config-rpl)# end-policy
RP/0/RSP0/CPU0:router(config)# !
RP/0/RSP0/CPU0:router(config)# route-policy pass-all
```

```
RP/0/RSP0/CPU0:router(config-rpl)# pass
RP/0/RSP0/CPU0:router(config-rpl)# end-policy
RP/0/RSP0/CPU0:router(config)# !
RP/0/RSP0/CPU0:router(config)# router bgp 1
RP/0/RSP0/CPU0:router(config-bgp)# bgp bestpath as-path multipath-relax
RP/0/RSP0/CPU0:router(config-bgp)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-bgp-af)# maximum-paths eibgp 64
RP/0/RSP0/CPU0:router(config-bgp-af)# !
RP/0/RSP0/CPU0:router(config-bgp-af)# neighbor 1.0.0.2
RP/0/RSP0/CPU0:router(config-bgp-nbr)# remote-as 2
RP/0/RSP0/CPU0:router(config-bgp-nbr)# ebgp-multihop 255
RP/0/RSP0/CPU0:router(config-bgp-nbr)# dmz-link-bandwidth
RP/0/RSP0/CPU0:router(config-bgp-nbr)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# multipath
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# route-policy BW1 in
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# route-policy pass-all out
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# !
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# neighbor 2.0.0.2
RP/0/RSP0/CPU0:router(config-bgp-nbr)# remote-as 2
RP/0/RSP0/CPU0:router(config-bgp-nbr)# ebgp-multihop 255
RP/0/RSP0/CPU0:router(config-bgp-nbr)# dmz-link-bandwidth
RP/0/RSP0/CPU0:router(config-bgp-nbr)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# multipath
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# route-policy BW2 in
RP/0/RSP0/CPU0:router(config-bgp-nbr-af)# route-policy pass-all out
```

Verification

Step 1: Verify CEF entry:

Via 1.0.0.2: set extcommunity bandwidth (2906:45750000) – Weight = 45750000/125=366000 (125 ratio because baud)

Via 2.0.0.2: set extcommunity bandwidth (2906:47250000) – Weight = 47250000/125=378000

GCD is 6, so norm_weight = 61 and 63. Though 61 + 63 > 64.

Step 2: GCD of weights 61 and 63 is 1. Therefore, Normalised Weight = (Path weight/Total weight) * Maximum bucket size. The maximum bucket size value is 64. Total weight = 61+63 = 124.

norm_weight1 = (61/124) * 64 = 31, norm_weight2 = (63/124) * 64 = 32

You can verify the weight distribution in BGP, using the following command:

```
Router # show cef vrf default ipv4 97.0.0.0 detail


97.0.0.0/24, version 1965, internal 0x5000001 0x0 (ptr 0x71bcb620) [1], 0x0 (0x0), 0x0 (0x0)
 Updated Oct 16 08:15:02.958
 Prefix Len 24, traffic index 0, precedence n/a, priority 4
  gateway array (0x72a5e2f8) reference count 10, flags 0x2010, source rib (7), 0 backups
                [1 type 3 flags 0x48441 (0x71b02cd0) ext 0x0 (0x0)]
  LW-LDI[type=0, refc=0, ptr=0x0, sh-ldi=0x0]
  gateway array update type-time 1 Oct 16 08:15:02.958
 LDI Update time Oct 16 08:15:02.959


    Weight distribution:
    slot 0, weight 366000, normalized_weight 31
    slot 1, weight 378000, normalized_weight 32


  Level 1 - Load distribution: 0 1 0 1 0 1 0
```

```
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1
0 1 0 1 0 1 0 1 0 1 1
  [0] via 1.0.0.2/32, recursive
  [1] via 2.0.0.2/32, recursive
```