Lumen Enables BGP ADD-PATH in AS3356

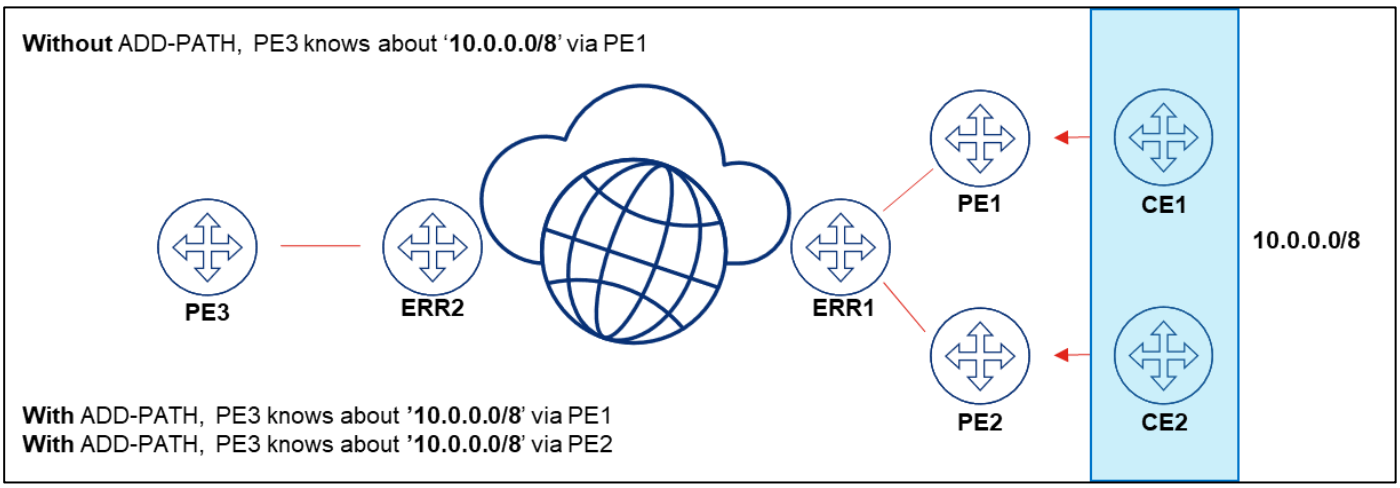
BGP ADD-PATH (RFC7911) has been enabled within the Lumen AS3356 internet network. The ADD-PATH feature is a BGP extension that allows Lumen Provider Edge (PE) and Route-Reflector (RR) routers to advertise multiple paths to the same IP prefix without the new paths implicitly replacing any previous paths. The extension enables Lumen and its customers the ability to achieve load-sharing and resiliency when homed to more than one PE in the same gateway. The Lumen implementation of the feature will allow BGP speakers within AS3356 to advertise and receive up to two paths for injection.

About BGP ADD-PATH

When a BGP speaker advertises a prefix to a neighbor, it sends only a single best path for that prefix based on BGP route selection criteria:

1. LOCAL_PREF (Highest is better)
2. Originated Locally.
3. AS_PATH (shortest)
4. ORIGIN Type (IGP is lower than EGP, and EGP is lower than Incomplete)
5. MED (lowest is better)
6. Paths (External > Internal)
7. RID (Router ID – lowest is better)

If the selection criteria between two paths comes down to the “RID” as the best path tie-breaker determination, then the paths are essentially considered equal. With ADD-PATH enabled, BGP speakers are allowed to send and receive more than the best/single BGP path to a destination to allow for load-sharing across diverse PEs within a gateway and assist in faster convergence due to having a backup path in place.



Benefits of BGP ADD-PATH:

In addition to the customer benefit of being able to load-share incoming traffic across multiple PEs within a gateway, other benefits of the ADD-PATH feature for Lumen, our customers and peers include:

- Aiding in peering capacity planning and augmentation by allowing connections to be spread across multiple PEs within a gateway.
- Reduces the potential for Multi Exit Discriminator (MED) oscillations (RFC3345) and promotes path diversity for maintaining service availability.
- Creates graceful shutdown schemes by having backup paths in place for maintenance activities and promotes faster BGP convergence.
- Static routed customers can also benefit from ECMP across multiple gateway PEs.

What to expect:

Add paths will only impact traffic destinations for customers or peers (or internal services like DDoS, CDN etc.) that are connected in major market gateways to two different PEs when identical routes are advertised to both PEs.

For example, consider a customer who has two DIA connections to Lumen in Denver, CO. If that customer is announcing the same prefix to both PEs without doing any deterministic manipulation of the announcement (i.e., local-pref, aspath length, MED), with ADD-PATH enabled, both paths will be sent to the RRs and other PEs to load-share traffic across both links. Customers may notice this shift in traffic through per-circuit utilization or billing reports.

If deterministic routing is in place across BGP speakers (i.e., local-pref, aspath length, MED), ADD-PATH should not influence those existing traffic flows as the path match will occur before the Router ID.

Frequently Asked Questions

Where is ADD-PATH being implemented?
The BGP ADD-PATH feature is being deployed across the global AS3356 network.

Will I notice anything?
The addition of ADD-PATH will only impact your network traffic if you have more than one internet circuit terminating on two separate PEs in a single Lumen gateway. In some circumstances, your traffic patterns may change once ADD-PATH is enabled.

Do I need to order ADD-PATH from Lumen?
ADD-PATH is not a feature that you can order. ADD-PATH is configured and enabled in our AS3356 network and can be utilized at your discretion.

How many paths are supported?
Two (2) paths are allowed in the Lumen ADD-PATH implementation.

Can ADD-PATH be disabled for my network?
No, ADD-PATH is being enabled across the entire AS3356 network. If you do not want to make use of ADD-PATH, we recommend you review our BGP Policy for attributes and communities you can use for deterministic routing of your traffic or reach out to your account team to assist.

When can I expect to see load balancing behavior?
As AS3356 is one of the largest internet networks in the world, we are deploying this functionality on a market-by-market basis, so any changes to your traffic will be incremental as each device is updated. We expect this to take up to two months to deploy across our AS3356 network.

What if I'm using static routing across two PEs in a gateway and not BGP?
You may also see an impact on your static routed network if there are two paths to your prefix within the same gateway. With ADD-PATH, both static routes are injected into the AS3356 BGP sessions for static load-sharing across the diverse gateway PEs.

With the addition of ADD-PATH, do I still need to request "BGP Multipath" on my BGP sessions?
ADD-PATH is invoked on the AS3356 PE and Route-Reflector (RR) BGP sessions to load-share across multiple gateway PEs. Specific session BGP Multipath configuration would still be required for load-sharing to two or more customer destinations on a single PE.

Where can I go for more information?
ADD-PATH is described in IETF RFC7911. Additionally, your Customer Success, Account Management, and technical Solutions Architecture teams will be able to provide additional support regarding BGP ADD-PATH.