



Position Paper, April 2010

## **Who wants portable public IP addresses?**

### *Autonomous Number acquisition and Border Gateway Protocol*

Business IT managers have struggled with the fact that when they want to change internet service providers they must also renumber their network in regards to VPNs, web servers, firewalls, routers, and VoIP systems.

Therefore, IP number portability is frankly not an option, or is it?

Enter Border Gateway Protocol, which was developed to allow distinct IP networks to pass their IP traffic to and from a neighboring IP network. BGP is nothing more than a routing protocol in the same category as EIGRP, OSPF, or IS-IS when speaking of layer 3/4 mechanisms for intelligently routing IP packets to and from various points on either a public or private network. Now, BGP has some unique characteristics in that it allows disparate Autonomous Systems (AS) to pass IP traffic between networks (more on Autonomous Networks in a bit). The other common IP routing protocols mentioned above are mainly used for internal routing on a unique AS and often times are used on the same router sitting on the edge of an AS network. For example, many large service providers run OSPF or IS-IS on their backbone networks and use BGP at their edge routing devices where they physically connect to their IP peers. These IP peers have their own unique AS and thus BGP allows IP traffic to pass between these unique networks.

There are volumes and volumes of books that have been written on BGP and its applications and we will only brush the surface into its capabilities but suffice it to say any service provider or large enterprise is using BGP at the edge of their network essentially to send those IP packets to and from the "Internet".

BGP has a few inherent characteristics that create real value for service providers and enterprise business. The first most commonly understood benefit is BGP's ability to allow for either passive or active failover of IP routes over two or more Internet Service Providers. For example, say your company has a 100M ISP service from company A and a 100M ISP service from company B and you are "sharing" your AS and default routes with both providers (the default route is usually the /30 between your business' edge router and the service provider's router). You have configured your business' router to select a primary route to service provider A's /30 and service provider B's /30 is your failover route. If service provider A's network is damaged due to a "backhoe fade", your router will detect service provider A's /30 is not longer transmitting or receiving IP packets and will automatically switch it's "default" route over to service provider B's /30. This is an example of the most basic use of BGP's failover capabilities. We will next only touch on BGP's ability to actively balance both inbound and outbound traffic over multiple Service Providers or End Users.

A relatively more advanced use of BGP is active load balancing over multiple ISPs using either partial or full routing. Partial routing references the sharing between AS numbers, such as a service provider and enterprise, of business information about IP routes beyond the default route but stopping somewhere short of your peering partners' other AS peers. Sharing routes beyond your other AS peers as a service provider typically means a business is asking for full BGP routes. This essentially means, as a distinct AS, you want to see all internet routes. As of this writing there are approximately 200,000 routes on the internet with this number said to be growing exponentially.

*As a quick aside, routers running BGP with full routing must have the horsepower in regards to CPU and RAM to be able to process this growing number of internet routes.*



A somewhat more advanced use of BGP is traffic weighting via Multi Exit Discriminator which essentially allows you as a service provider or enterprise business to “weight” which path is used for routes to destinations on the internet or other remote AS.

Autonomous Systems, as briefly mentioned earlier, is a unique identifier for an IP network on the “internet”. For example, many service providers break their networks into multiple AS numbers for traffic segregation and aggregation. A real world example of an AS is “3356” which is one of Level 3’s unique network numbers which customers running BGP would have to input to their router configurations as an AS neighbor to Level 3’s network.

Obtaining AS numbers is not trivial and cannot simply be “picked” based on your favorite number. AS numbers in the US are requested and provided by the American Registry for Internet Numbers or ARIN (<https://www.arin.net/>). This is a pseudo governmental entity as these numbers are regulated and must be tracked.

The first step to portable IP addresses in obtaining your AS from ARIN here: <https://www.arin.net/resources/request.html>  
“Autonomous System (AS) number”

This process can take up to 4 weeks depending on the completeness of your original request and the suggestion is always to err on the side of completeness. ARIN’s website does a good job of outlining the timeframes and expectations for this step.

Once you have an AS number from ARIN you can participate in BGP sessions with Service Providers whom are providing you a minimum /24 of routable IP space. However, this doesn’t get us to having portable IP space just yet as the next step is to submit a request to ARIN to obtain your own IP space of /24 or larger.

This is the second step to portable IP addresses here: <https://www.arin.net/resources/request.html>

There are four options here depending on whether you are a Service Provider or End User and whether you seek IPv4 or IPv6 addresses.

This step typically takes up to four weeks as well and depends heavily on the completeness of your request or perhaps how the screener is feeling that day (remember pseudo government entity).

Once you have your IP space of /24 or larger from ARIN you can begin to announce this IP space to as many Service Providers or End Users as you prefer. If you choose to cancel or replace one service provider with another you take your IP space with you and gone are the days of network renumbering. The only IP address that will need to change is essentially the /30 between your edge router device and the Service Provider’s edge device when you move between carriers.

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