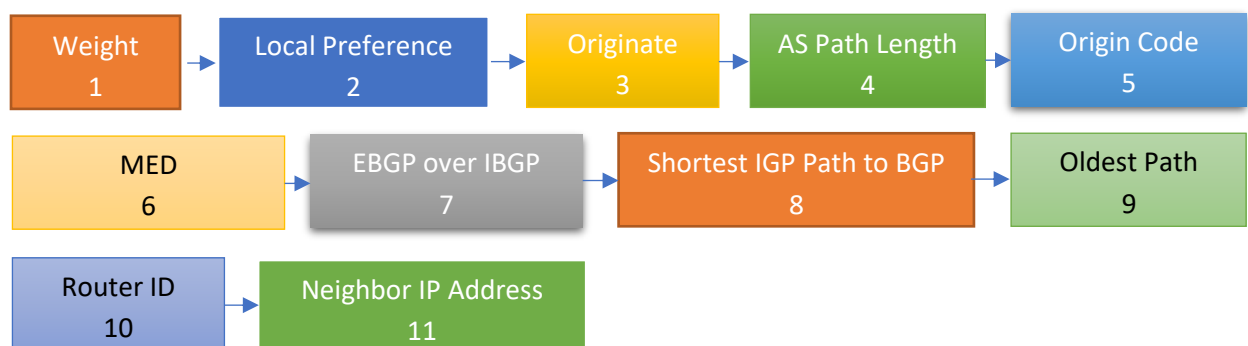


## BGP Best Path Selection:

- o BGP sends update packet to a peer with path attributes associated with prefix.
- o Border Gateway Protocol (BGP) selects the best path based on a list of attributes.
- o Border Gateway Protocol (BGP) attributes are similar to metrics in OSPF and EIGRP.
- o Border Gateway Protocol use path attributes to pick the best route to a destination.
- o Border Gateway Protocol (BGP) store multiple paths to a destination in BGP table.
- o Border Gateway Protocol (BGP) only install one best route in the routing table.
- o BGP path algorithm decides best path to install in the IP routing table of Router.
- o BGP path algorithm decides best path to use for traffic forwarding in Routers.
- o BGP goes through the following steps to select the best path route in Routers.

Priority	Attribute	Preference
1	Weight	Highest
2	Local Preference	Highest
3	Originate	Local
4	AS Path	Shortest
5	Origin Code	Lowest
6	MED	Lowest
7	EBGP Path Over IBGP Path	Prefer eBGP
8	Shortest IGP Path to BGP Next Hop	Lowest IGP Metric
9	Oldest Path	Received First
10	Router ID	Lowest
11	Neighbor IP Address	Lowest Neighbor IP



### 1. Weight:

- o Weight is Cisco-Proprietary value.
- o Weight is only local on the router.
- o Weight is not exchanged between BGP routers.
- o Weight is never advertised to other routers.
- o The path with the highest weight is preferred.
- o Weight for a route originated on the local router is **32768**.
- o Weight is **zero** for all other routes.

### 2. Local Preference:

- o Local Preference is the second BGP attribute.
- o Use local preference to choose the outbound external BGP path.
- o Local Preference is sent to all Internal BGP routers in AS.
- o Local Preference is not exchanged between external BGP routers.
- o Local preference is a Well-Known and Discretionary BGP attribute.
- o Local Preference Default value is 100.
- o The path with the highest Local Preference is preferred.

### 3. Originate:

- o Originate is the third BGP attribute.
- o Prefer the path that the local router originated.
- o In the BGP table, Local router originated see next hop 0.0.0.0.
- o Routes with weight set to "32768" is considered as local routes.
- o Path in the BGP table through Network Command, Aggregation, or Redistribution.
- o BGP router will prefer routes that it installed into BGP itself to another router installed.

### 4. AS Path:

- o AS Path is the fourth BGP attribute.
- o AS path is a mandatory attribute, describe path taken on the way to destination.
- o BGP prefers the shortest AS path to get to a destination.
- o BGP AS Path is a Well-Known mandatory attribute.
- o Ordered list of ASNs through which the update has passed.
- o The main purpose of the AS Path is to avoid loops.
- o AS-Path prepending is to make received prefix "Less Attractive".
- o Add own AS number multiple times so the as path becomes longer.
- o AS-Path prepending is a way to manipulate the AS-Path attribute of a BGP route.
- o AS-Path prepending can be applied to **inbound** and **outbound** direction using route-maps.
- o AS path 1 2 3 is preferred over AS path 1 2 3 4 5.

## 5. Origin Code:

- o BGP prefer the lowest Origin Code.
- o There are three origin codes: IGP, EGP & Incomplete.
- o IGP is lower than EGP and EGP is lower than Incomplete.
- o IGP (shows up as i) use the network command for BGP.
- o EGP (shows up as e) is an old routing protocol no more.
- o Incomplete (shows up as ?) means redistributed something into BGP.
- o Origin is a Well-known mandatory attribute.

## 6. MED:

- o MED (Multi-Exit Discriminator) is the sixth BGP attribute.
- o Multi-Exit Discriminator (MED) is optional non-transitive attribute.
- o The lowest MED is the preferred path.
- o The MED is exchanged between Autonomous Systems.
- o MED is used to advertise the neighbors how to enter the AS.
- o MED is propagated to all routers within the neighbor AS.
- o MED is not passed along any other Autonomous Systems.
- o MED can influence routers in the same AS but not on different AS.

## 7. EBGP Path Over iBGP Path:

- o Prefer eBGP (External BGP) over iBGP (Internal BGP) paths.
- o Routes learned via eBGP is more preferred than routes learned via iBGP.
- o If both routes are learned via eBGP then chooses the lowest IGP value to the next hop.

## 8. Shortest IGP Path to BGP Next Hop:

- o Prefer the path within the AS with the lowest IGP metric to the BGP next hop.

## 9. Oldest Path:

- o Prefer the path that received first, in other words, the oldest path.
- o The oldest route in the routing table is preferred over the new ones.

## 10. Router ID:

- o Prefer the path with the lowest BGP neighbor router ID.
- o Lowest router ID will be selected as the best path.
- o The router ID is based on the highest IP address.
- o If there is loopback interface, then the IP address of loopback will be used.
- o The router ID can also be manually configured.

### 11. Neighbor IP Address:

- o Prefer the path with the lowest neighbor IP address.
- o If two eBGP routers and two links in between then the router ID will be the same.
- o In this case, the neighbor IP address is the tiebreaker.