

# Appendix B

## BGP Attributes

BGP attaches path attributes (PAs) associated with each network path. The path attributes provide Border Gateway Protocol (BGP) with granularity and control of routing policies within BGP. The BGP prefix attributes are classified as follows:

- Well-known mandatory
- Well-known discretionary
- Optional transitive
- Optional nontransitive

Per RFC 4271, well-known attributes must be recognized by all BGP implementations. Well-known mandatory attributes must be included with every prefix advertisement, whereas well-known discretionary attributes may or may not be included with the prefix advertisement. Optional attributes do not have to be recognized by all BGP implementations. Optional attributes can be set so that they are *transitive* and stay with the route advertisement from autonomous system to autonomous system. Other PAs are *nontransitive* and cannot be shared from autonomous system to autonomous system.

The following table documents the most common BGP attributes in use today.

## 2 Appendix B : BGP Attributes

<b>Attribute</b>	<b>Attribute Code</b>	<b>Attribute Type</b>	<b>Advertised to EGP Peers</b>	<b>Advertised to IBGP Peers</b>	<b>Function</b>
Origin	1	Well-known mandatory	Yes	Yes	Defines the route's source of origin is for the prefix advertisement. There are three options: <b>IGP</b> : The route is interior to the originating autonomous system. <b>EGP</b> : The route is exterior to the originating autonomous system. <b>Incomplete</b> : The route cannot be identified as interior or exterior to the originating autonomous system. IGP is preferred over EGP and EGP is preferred over Incomplete.
AS_Path	2	Well-known mandatory	Yes	Yes	This attribute lists a combination of autonomous systems that the prefix has traveled through. The AS_Path consists of <b>AS_Sequence</b> : Ordered set of autonomous systems a prefix has traveled since its origination <b>AS_Set</b> : Unordered set of combined autonomous systems taken from networks within the aggregation range <b>AS_Confed_Set</b> : Unordered set of member autonomous systems that the prefix has traveled <b>AS_Confed_Sequence</b> : Ordered set of member autonomous system numbers in the local confederation that the prefix has traversed.
Next Hop	3	Well-known mandatory	Yes	Yes	Identifies the IP address used to reach the advertising router of the prefix.
Multi-Exit Discriminator (MED)	4	Well-known mandatory	Yes	Yes	Provides a suggestion to an external autonomous system to which path should be used to reach a network. The lower value is preferred to a higher value.

<b>Attribute</b>	<b>Attribute Code</b>	<b>Attribute Type</b>	<b>Advertised to EGP Peers</b>	<b>Advertised to IBGP Peers</b>	<b>Function</b>
Local Preference	5	Well-known discretionary	No	Yes	Indicates to routers within an autonomous system the preference that traffic leaves an autonomous system. Typically, local preference is set on edge routers when the prefix is received because the local preference is advertised to other routers within the autonomous system. The higher value is preferred to a lower value.
Atomic Aggregate	6	Well-known discretionary	Yes	Yes	Informs BGP routers that some of the BGP path attributes have been lost due to route aggregation.
Aggregator	7	Optional Transitive	Yes	Yes	Identifies the autonomous system and IP address that created the aggregate route.
Community	8	Optional Transitive	Yes, after configuration	Yes, automatic for IOS XR; IOS requires configuration	Provides a method of grouping or tagging destinations prefixes so that routing policies can be applied by other routers.
Originator ID	9	Optional nontransitive	No	Yes	Identifies the router that initially advertised the route as a loop-prevention mechanism when the route is reflected by a route reflector. Route reflectors add this attribute if the attribute does not already exist and is discarded if the router sees itself in the originator ID.
Cluster_List	10	Optional nontransitive	No	Yes	Route reflectors use this attribute to prevent routing loops. Route reflectors will append their cluster ID to the cluster list upon route reflection. In the event that a route reflector receives a route with its cluster ID in the cluster list, the route is discarded.

#### 4 Appendix B : BGP Attributes

<b>Attribute</b>	<b>Attribute Code</b>	<b>Attribute Type</b>	<b>Advertised to EGP Peers</b>	<b>Advertised to IBGP Peers</b>	<b>Function</b>
AS4_Path	17	Optional transitive	Yes	Yes	This attribute maintains the AS_Path information when 4-byte autonomous system numbers (ASNs) need to traverse an older BGP router that does not support 4-byte ASNs. AS4_Path cannot contain AS_Confed_Sequence or AS_Confed_Set.
AS4_Aggregator	18	Optional transitive	Yes	Yes	This attribute maintains the information as the aggregator attribute except that it allows for 4-byte ASNs that need to traverse an older BGP router that does not support 4-byte ASNs.
Accumulated Interior Gateway Protocol (AIGP) Metric	26	Optional nontransitive	Yes, but must be explicitly configured	Yes	AIGP enables the BGP to maintain and calculate a conceptual path metric in environments that use multiple autonomous systems with unique IGP routing domains in each autonomous system. The ability for BGP to make routing decisions based on a path metric is a viable option because all the autonomous systems are under the control of a single domain with consistent routing policies for BGP and IGP protocols.
Weight	Not applicable. Weight is not advertised.	Not applicable. Weight is not advertised.	No	No	Weight is a Cisco-defined attribute that is assigned locally on the router and is not advertised to other routers. The path with the higher weight is preferred. The attribute influences only outbound traffic from a router or autonomous system and should be used when other attributes should not influence the best path for a specific network.