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BGP-4 Path Attribute Filtering Capability  
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## Abstract

Path Attributes in the BGP-4 protocol (RFC 4271) carry data associated with BGP routes. Many of the Path Attributes carried in BGP are intended for limited scope deployment. However, the extension mechanism defined by BGP that carries these attributes often carries them farther than necessary, sometimes with unfortunate results.

This document defines a mechanism using BGP Capabilities (RFC 5492) that permits eBGP speakers to determine what Path Attributes should be permitted to cross external BGP routing boundaries.

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## 1. Introduction

A BGP Route (Section 1.1 of [RFC4271]) is a tuple consisting of a set of Path Attributes (Section 5 of [RFC4271]) and sets of network reachability carried as Network Layer Reachability Information (NLRI). Some of these Path Attributes are defined as part of the core BGP-4 protocol. Path Attributes are the main extension mechanism defined by BGP, and may be scoped as "transitive" or "non-transitive."

Non-Transitive Path Attributes require the BGP speaker to understand the attribute in order to determine if it will be locally used and perhaps later propagated to additional BGP speakers. Unrecognized non-transitive Path Attributes are discarded by the receiving BGP speaker.

Transitive Path Attributes, when not understood by the receiving BGP speaker, are required to be propagated to other BGP speakers.

Some Path Attributes defined by BGP extensions are intended to be used in limited scopes, such as a single BGP Autonomous System (AS). When such attributes are distributed beyond the expected scope, this is called an "Attribute Escape" [I-D.haas-idr-bgp-attribute-escape].

Such attribute escapes may lead to improper BGP protocol behavior when received outside of their expected scope, and may lead to incorrect forwarding, or be a serious security consideration.

This document defines a mechanism exchanged through BGP Capabilities [RFC5492] where BGP speakers can more appropriately scope both Path Attributes to prevent escape, and to limit the distribution of routes that carry escaped Path Attributes.

### 1.1. Specification of Requirements

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

## 2. BGP Path Attribute Filtering Capability

The BGP Path Attribute Filtering Capability is encoded as follows:

- \* Capability Code of (TBD).
- \* Capability Length of 0..32 octets.
- \* Capability Value contains a bit-string padded to an octet boundary where a bit is set if this BGP speaker considers the corresponding BGP Path Attribute from the remote BGP speaker to be unwanted.

```

      0               1               2
    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3
+-----+-----+-----+-----+-----+-----+
|1|0|0|0|0|1|0|0|0|1|1|1|1|1|0|0|1|0|0|1|1|1|1|1|
+-----+-----+-----+-----+-----+-----+

```

In this example, bits are clear for Path Attributes:

```

Origin (1),
AS_PATH (2),
NEXT_HOP (3),
MULTI_EXIT_DISCR (4),
ATOMIC_AGGREGATE (6),
AGGREGATOR (7),
COMMUNITIES (8),
MP_REACH_NLRI (14),
MP_UNREACH_NLRI (15),
AS4_PATH (17),
AS4_AGGREGATOR (18).

```

Other path attributes through attribute 23 are unwanted.  
Path attributes 24 and beyond are accepted.

Figure 1: Example encoding for Capability Value

Bits 1, 2, 3, 6, 7, 14, 15, 17, 18 MUST be clear (value 0), because support for [RFC4271], [RFC4760], and [RFC6793] procedures are required when this specification is in use.

Any bit not explicitly represented (e.g., bits 24 and beyond in the above example) is deemed to be clear (value 0). That is, the default is to accept any path attribute not explicitly unwanted.

### 3. Operation

A clear (value 0) bit in the Path Attribute Filtering capability indicates that the BGP speaker advertising it is willing to accept the corresponding Path Attribute and will process it according to the normal rules of the BGP protocol and the attribute in question.

A set (value 1) bit in the Path Attribute Filtering capability indicates that the BGP speaker advertising it is not willing to accept the corresponding Path Attribute. We refer to such Path Attributes as "unwanted Path Attributes".

A BGP speaker MUST NOT send an unwanted Path Attribute to its peer. (Of course, this expectation will be met only by BGP speakers that support this specification; therefore a BGP speaker that implements this specification SHOULD be prepared for the possibility it will receive unwanted Path Attributes; this is discussed below.)

One strategy to accomplish the above requirement is for the BGP speaker to not advertise BGP routes containing the unwanted Path Attribute in question. This might require a withdraw to be sent instead. This is similar to treat-as-withdraw as defined in [RFC7606].

Another strategy that could be used, when appropriate for the procedure covering a given BGP Path Attribute, is for the BGP speaker to remove the unwanted Path Attributes when it distributes the route to the remote BGP speaker. This is similar to the Attribute Discard behavior defined in [RFC7606].

Receiving BGP speakers SHOULD filter routes or discard unwanted Path Attributes if they are incorrectly sent by the remote BGP speaker. Minimally, a receiving BGP speaker receiving an unwanted Path Attribute SHOULD use treat-as-withdraw procedures. Receiving BGP speakers MAY accept the route and discard the unwanted Path Attribute if permitted to by local configuration.

#### 4. Selecting supported Path Attributes

Implementations MUST, as described in Figure 1, clear the bits covering required core eBGP Path Attributes.

Common BGP features that are defined for Internet use SHOULD be clear by default between two BGP speakers. These include:

- \* Communities (8)
- \* Extended Communities (16)
- \* Large BGP Communities (32)
- \* BGPsec\_Path (33)
- \* Only To Customer (OTC) (35)

BGP features required to support a given AFI/SAFI MUST also be clear when that address family is configured. An example of this is the BGP-LS attribute (29) when the BGP-LS feature is in use.

## 5. Operational Considerations

The feature described in this document does not change the semantics of when a Path Attribute is intended to be transitive per RFC-4271 definition. However, it does act as a policy to limit the distribution of routes containing a transitive Path Attribute, or may cause that attribute to be filtered.

eBGP speakers using this features must be cognizant of the impact their filtering policies will have on the incremental deployment of new BGP features.

## 6. IANA Considerations

This document requests a new BGP Capability Code to be allocated from the First Come First Served range of the Capability Codes registry.

## 7. Security Considerations

The motivation for this feature is to attempt to address the numerous BGP security implications where BGP Path Attributes propagate beyond their intended scope.

The definition of a feature that limits the distribution of BGP Path Attributes unfortunately moves BGP's default behavior away from "distribute unknown things easily" and thus hampers incremental deployment of new features. However, operators have already begun indiscriminate filtering of Path Attributes they do not themselves require. This feature attempts to provide a more flexible negotiated mode to permit such filtering while at the same time not completely precluding incremental deployment of new features.

## 8. Recommendations for Filtering Path Attributes

BGP Path Attributes that are in the table below have a suggested default filtering behavior. It is recommended that they should not be filtered by default.

It is not recommended that BGP Path Attributes that are deprecated should be filtered by default. This permits their long term reassignment and re-use. Operators with a strong filtering policy may consider filtering these to block routes from older implementations of these features that may still be deployed.

Code Point	Name	Should Filter By Default
0	Reserved	Yes
1	ORIGIN [RFC4271]	Never
2	AS_PATH [RFC4271]	Never
3	NEXT_HOP [RFC4271]	Never
4	MULTI_EXIT_DISC [RFC4271]	No
5	LOCAL_PREF [RFC4271]	Yes
6	ATOMIC_AGGREGATE [RFC4271]	No
7	AGGREGATOR [RFC4271]	No
8	COMMUNITIES [RFC1997]	No
9	ORIGINATOR_ID [RFC4456]	Yes
10	CLUSTER_LIST [RFC4456]	Yes
11	DPA (deprecated) [RFC6938]	-
12	ADVERTISER (historic) (deprecated) [RFC1863][RFC4223][RFC6938]	-
13	RCID_PATH / CLUSTER_ID (Historic) (deprecated) [RFC1863][RFC4223][RFC6938]	-
14	MP_REACH_NLRI [RFC4760]	Never
15	MP_UNREACH_NLRI [RFC4760]	Never
16	EXTENDED COMMUNITIES [Eric_Rosen][draft- ramachandra-bgp-ext-communities-00][RFC4360]	No
17	AS4_PATH [RFC6793]	Never
18	AS4_AGGREGATOR [RFC6793]	Never
19	SAFI Specific Attribute (SSA) (deprecated)	-

	[Gargi_Nalawade][draft-kapoor-nalawade-idr-bgp-ssa-00][draft-nalawade-idr-mdt-safi-00][draft-wijnands-mt-discovery-00]	
20	Connector Attribute (deprecated) [RFC6037]	-
21	AS_PATHLIMIT (deprecated) [draft-ietf-idr-as-pathlimit-02]	-
22	PMSI_TUNNEL [RFC6514]	Yes
23	Tunnel Encapsulation [RFC9012]	Yes
24	Traffic Engineering [RFC5543]	Yes
25	IPv6 Address Specific Extended Community [RFC5701]	No
26	AIGP [RFC7311]	Yes
27	PE Distinguisher Labels [RFC6514]	Yes
28	BGP Entropy Label Capability Attribute (deprecated) [RFC6790][RFC7447]	-
29	BGP-LS Attribute [RFC9552]	Yes
30	Deprecated [RFC8093]	-
31	Deprecated [RFC8093]	-
32	LARGE_COMMUNITY [RFC8092]	No
33	BGPsec_Path [RFC8205]	Never
34	BGP Community Container Attribute (TEMPORARY - registered 2017-07-28, extension registered 2024-08-22, expires 2025-07-28) [draft-ietf-idr-wide-bgp-communities-11]	No
35	Only to Customer (OTC) [RFC9234]	Never
36	BGP Domain Path (D-PATH) (TEMPORARY - registered 2019-07-08, extension registered 2025-06-06, expires 2026-07-08) [draft-ietf-bess-evpn-ipvpn-interworking-10]	Yes
37	SFP attribute [RFC9015]	Yes



38	BFDDiscriminator [RFC9026]	Yes
39	BGP Next Hop Dependent Capabilities (NHC) (TEMPORARY - registered 2022-12-20, extension registered 2024-12-10, expires 2025-12-20) [draft-ietf-idr-entropy-label-13]	Yes
40	BGP Prefix-SID [RFC8669]	Yes
41	BIER [RFC9793]	Yes
42	Edge Metadata Path Attribute (TEMPORARY - registered 2025-04-23, expires 2026-04-23) [draft-ietf-idr-5g-edge-service-metadata-27]	Yes
128	ATTR_SET [RFC6368]	Yes
129	Deprecated [RFC8093]	-
241	Deprecated [RFC8093]	-
242	Deprecated [RFC8093]	-
243	Deprecated [RFC8093]	-
255	Reserved for development [RFC2042]	Yes

Table 1

## Acknowledgements

TBD.

## References

## Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/rfc/rfc2119>>.
- [RFC4271] Rekhter, Y., Ed., Li, T., Ed., and S. Hares, Ed., "A Border Gateway Protocol 4 (BGP-4)", RFC 4271, DOI 10.17487/RFC4271, January 2006, <<https://www.rfc-editor.org/rfc/rfc4271>>.

- [RFC5492] Scudder, J. and R. Chandra, "Capabilities Advertisement with BGP-4", RFC 5492, DOI 10.17487/RFC5492, February 2009, <<https://www.rfc-editor.org/rfc/rfc5492>>.
- [RFC6793] Vohra, Q. and E. Chen, "BGP Support for Four-Octet Autonomous System (AS) Number Space", RFC 6793, DOI 10.17487/RFC6793, December 2012, <<https://www.rfc-editor.org/rfc/rfc6793>>.
- [RFC7606] Chen, E., Ed., Scudder, J., Ed., Mohapatra, P., and K. Patel, "Revised Error Handling for BGP UPDATE Messages", RFC 7606, DOI 10.17487/RFC7606, August 2015, <<https://www.rfc-editor.org/rfc/rfc7606>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/rfc/rfc8174>>.

#### Informative References

- [I-D.haas-idr-bgp-attribute-escape]  
Haas, J., "BGP Attribute Escape", Work in Progress, Internet-Draft, draft-haas-idr-bgp-attribute-escape-03, 9 April 2025, <<https://datatracker.ietf.org/doc/html/draft-haas-idr-bgp-attribute-escape-03>>.
- [RFC4760] Bates, T., Chandra, R., Katz, D., and Y. Rekhter, "Multiprotocol Extensions for BGP-4", RFC 4760, DOI 10.17487/RFC4760, January 2007, <<https://www.rfc-editor.org/rfc/rfc4760>>.

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