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Abstract

This document discusses the issues of processing the AS_PATH attribute which provides sufficient information for constructing a
graph of AS connectivity, and defines the detailed procedure of fragmenting or merging a sequence of AS PATH segments. This is necessary for the robust implementation of Border Gateway Protocol (BGP) and the interoperation of vendors.

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1. Introduction

The Border Gateway Protocol (BGP) is an inter-Autonomous System routing protocol. And the AS_PATH attribute identifies the list of Autonomous Systems (ASes) through which routing information carried in UPDATE messages has passed. If the list of ASes exceeds length limit, the fragmentation of AS_PATH segments has to be dealt with, and the reasonable operation is needed. This document defines the detailed procedure of fragmenting or merging a sequence of AS_PATH segments. This is necessary for the robust implementation of Border Gateway Protocol (BGP) and the interoperation of vendors.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2. Attribute Processing

When BGP speaker modifies the route’s AS_PATH attribute received or adds the AS_PATH attribute to the newly originated route, the basic procedure should be followed according to RFC4271. The local system MAY include/prepend more than one instance of its own AS number in the AS_PATH attribute. This operation is controlled via local configuration. Whenas the overflow happens due to the act of prepending AS numbers to the path segment, then:

- If the available positions in the path segment of type AS_SEQUENCE are not enough for the AS numbers to be included, it SHOULD first fullfill the segment (255 totally), then prepend a new segment of type AS_SEQUENCE, and include the remaining AS numbers in the new segment. This operation MAY be repeated and more than one new segment MAY be created if the the AS numbers to be included are too many. The newer segment SHALL always be set as the first one of the AS_PATH.

- When the local system creates a path segment of type AS_SET, and if the AS numbers to be included exceed 255, it SHOULD first fullfill the segment (255 totally), then prepend a new segment of type AS_SET, and include the remaining AS numbers in the new segment. This operation MAY be repeated and more than one new segment MAY be created if the the AS numbers to be included are too many.

If multiple path segments are received, the local system SHOULD get them merged and refragmented (if needed) according to the procedure
discussed above unless all of the segments have been fullfilled.

Whenever the local system performs fragmenting or merging, the correct order of the AS_PATH elements MUST be assured.

3. Error Handling

The AS_PATH is checked for syntactic correctness.

The path segment value contains one or more As numbers matching exactly the length field in the segment. If the check determines this is not the case, the Error Subcode MUST be set to Malformed AS_PATH.

The AS_PATH contains one or more path segments of type AS_SEQUENCE and/or AS_SET but only one or one piece of continuous path segments of type AS_SET is allowed and MUST be placed at the end. If the check determines this is not the case, the Error Subcode MUST be set to Malformed AS_PATH.

For the robust implementation of BGP, it SHOULD have the capability of fragmenting the path segment of the AS_PATH when overflow happens, besides correctly checking the multiple segments orderly to structure the graph of the AS_PATH.

4. Implementation Recommendations

when the UPDATE message is built, and if the total length of the attribute exceeds size limit due to prepending too many fragmented path segments, an overload error notice MAY be sent up to the local system with the relevant prefix listed in the notice.

5. AS Confederations Considerations

TBD.

6. IANA Considerations

This memo includes no request to IANA.

7. Security Considerations

It SHOULD rely on the authentication mechanisms originally defined
to solve the security problems.

8. References

8.1. Normative References


8.2. Informative References


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