Codification of AS 0 processing.
draft-ietf-idr-as0-06

Abstract

This document updates RFC 4271 and prescribes the use of Autonomous System (AS) 0 in the Border Gateway Protocol (BGP) OPEN and AS_PATH / AS4_PATH BGP attribute.

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1. Introduction

Autonomous System 0 is listed in the IANA Autonomous System Number Registry as "Reserved - May be use to identify non-routed networks" ([IANA.AS_Numbers]).

[RFC6491] specifies that AS number zero in a Route Origin Attestation (ROA) is used to mark a prefix and all its more specific prefixes as not to be used in a routing context. This allows a resource holder to signal that a prefix (and the more specifics) should not be routed by publishing a ROA listing AS0 as the only origin. To respond to this signal requires that BGP implementations do not accept or propagate routes containing AS0.

No clear statement that AS 0 was proscribed could be found in any BGP specification. This document corrects this omission, most importantly in the case of the AS_PATH. This represents an update to the error handling procedures given in [RFC4271] Sections 6.2 and 6.3 by specifying the behavior in the presence of AS0.

At least two implementations discard routes containing AS 0, and this document codifies this behavior.

1.1. Requirements notation

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 [RFC2119].

2. Behavior

A BGP speaker MUST NOT originate or propagate a route with an AS number of zero in the AS_PATH, AS4_PATH, AGGREGATOR or AS4_AGGREGATOR attributes.

An UPDATE message that contains the AS number of zero in the AS_PATH or AGGREGATOR attribute MUST be considered as malformed, and be handled by the procedures specified in [I-D.ietf-idr-error-handling].

An UPDATE message that contains the AS number of zero in the AS4_PATH or AS4_AGGREGATOR attribute MUST be considered as malformed, and be handled by the procedures specified in [I-D.ietf-idr-rfc4893bis].

If a BGP speaker receives zero as the peer AS in an OPEN message, it MUST abort the connection and send a NOTIFICATION with Error Code "OPEN Message Error" and subcode "Bad Peer AS" (see [RFC4271] Section 6.2). A router MUST NOT initiate a connection claiming to be AS
number zero.

Authors of future protocol extensions that carry the Autonomous System number are encouraged to keep in mind that AS number zero is reserved and to provide clear direction on how to handle AS number zero.

3. IANA Considerations

The IANA is requested to update the Reference for number 0 in the "Autonomous System (AS) Numbers" registry to reference this document.

4. Security Considerations

By allowing a Resource Public Key Infrastructure (RPKI) resource holder to issue a ROA saying that AS 0 is the only valid origin for a route, we allow them to state that a particular address resource is not in use. By ensuring that all implementations that see AS 0 in a route ignore that route, we prevent a malicious party from announcing routes containing AS 0 in an attempt to hijack those resources.

In addition, by standardizing the behavior upon reception of an AS_PATH (or AS4_PATH) containing AS 0, this document makes the behavior better defined.

5. Acknowledgements

The authors wish to thank Elwyn Davies, Enke Chen, Brian Dickson, Bruno Decraene, Robert Raszuk, Jakob Heitz, Danny McPherson, Chris Morrow, Ilya, John Scudder, Jeff Tantsura, Daniel Ginsburg and Susan Hares. Apologies to those we may have missed, it was not intentional.

6. References

6.1. Normative References

[I-D.ietf-idr-error-handling]
Scudder, J., Chen, E., Mohapatra, P., and K. Patel,
"Revised Error Handling for BGP UPDATE Messages",
draft-ietf-idr-error-handling-01 (work in progress),
December 2011.

[I-D.ietf-idr-rfc4893bis]

[IANA.AS_Numbers]


6.2. Informative References


Appendix A. Changes / Author Notes.

[RFC Editor: Please remove this section before publication ]

Draft accepted as IDR Doc, notes reset. Please see notes for draft-wkumari-idr-as0.xml for prior comments.

Changes -00.

  o Added AS4_PATH -- Robert Raszuk.
  o Change "bgp listener" to "bgp speaker" -- Enke Chen
  o Consistent use of AS_PATH (v., AS-PATH and AS PATH) -- Danny McPherson
  o New text for Sec 2 P1 -- Enke / Keyur / Scudder, http://www.ietf.org/mail-archive/web/idr/current/msg05786.html
  o I made a boo boo -- I had the file open in 2 editors, made changes in one and overwrote them by saving on the "other, then checked the broken one into SVN. Apologies to all whose comments I may have missed...

Changes -01

  o The WG thread http://www.ietf.org/mail-archive/web/idr/current/msg05685.html showed a very strong preference for separating the error definition and handling -- the chairs also showed a preference to Publish this and point to the error handling that Enke will write.
The originally suggested text ("An UPDATE message that contains the AS number of zero in the AS-PATH attribute MUST be...") only referenced the AS-PATH, readded AS4_PATH, *AGGREGATOR as suggested by Robert Raszak and Danny.

Changes -02

- Fixed the reference for *AGGREGATOR. This required breaking it out into two sentences / clauses.
- Added text on other places where an AS can show up (e.g: "4-Octet AS specific Extended Community" [5668]) -- thanks to Keyur.

Changes - 03

- Removed text on other places where an AS can show up (e.g: "4-Octet AS specific Extended Community" [5668]).
- Added *very* generic "Authors of future protocol extensions..." text

Changes -04

- Looks like the draft needs an 'Updates: RFC 4271' header. Can you make the change? -- JGS.
- "You have things a bit scrambled in these two paragraphs" -- JGS (whoops!).
- Editorial: I suggest dropping the parentheses in... JGS.
- Added "This document updates rfc 4271" to keep IDNITs happy...
- Bumped refs: draft-ietf-sidr-iana-objects has been published as RFC 6491, idr-error is now -01, 4893bis is now -06

Changes - 05

- Added something to the intro saying what we update and why. This was in the abstract, but I didn’t have it in the intro. Stupid.

Changes - 06

- Incorporated some comments / clarifications from Gen-ART review (Elwyn Davies)
- Expanded acronyms.
- RFC 6491 fix - clarified what it actually said and what implications are.
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