    Default External BGP (EBGP) Route Propagation Behavior without Policies

Abstract

   This document updates RFC 4271 by defining the default behavior of a
   BGP speaker when there is no Import or Export Policy associated with
   an External BGP session.

Status of This Memo

   This is an Internet Standards Track document.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 7841.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc8212.

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1. Introduction

   BGP routing security issues need to be addressed in order to make the
   Internet more stable. Route leaks [RFC7908] are part of the problem,
   but software defects or operator misconfiguration can also
   contribute. This document updates [RFC4271] so that routes are
   neither imported nor exported unless specifically enabled by
   configuration. This change reduces the consequences of these
   problems and improves the default level of Internet routing security.

   Many deployed BGP speakers send and accept any and all route
   announcements between their BGP neighbors by default. This practice
   dates back to the early days of the Internet, where operators were
   permissive in sending routing information to allow all networks to
   reach each other. As the Internet has become more densely
   interconnected, the risk of a misbehaving BGP speaker poses
   significant risks to Internet routing.

   This specification intends to improve this situation by requiring the
   explicit configuration of both BGP Import and Export Policies for any
   External BGP (EBGP) session such as customers, peers, or
   confederation boundaries for all enabled address families. Through
   codification of the aforementioned requirement, operators will
   benefit from consistent behavior across different BGP
   implementations.

   BGP speakers following this specification do not use or send routes
   on EBGP sessions, unless specifically configured to do so.

2. Terminology

   [RFC4271] describes a Policy Information Base (PIB) that contains
   local policies that can be applied to the information in the Routing
   Information Base (RIB). This document distinguishes the type of a
   policy based on its application.

   Import Policy: a local policy to be applied to the information
   contained in the Adj-RIBs-In. As described in Section 3.2 [RFC4271],
   the Adj-RIBs-In contain information learned from other BGP speakers,
   and the application of the Import Policy results in the routes that
   will be considered in the Decision Process by the local BGP speaker.

   Export Policy: a local policy to be applied in selecting the
   information contained in the Adj-RIBs-Out. As described in
   Section 3.2 [RFC4271], the Adj-RIBs-Out contain information that has
   been selected for advertisement to other BGP speakers.

2.1. Requirements Language

   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.

3. Changes to RFC 4271

   This section updates [RFC4271] to specify the default behavior of a
   BGP speaker when there are no Import or Export Policies associated
   with a particular EBGP session. A BGP speaker MAY provide a
   configuration option to deviate from the following updated behaviors.

   The following paragraph is added to Section 9.1 (Decision Process)
   after the fifth paragraph, which ends in "route aggregation and route
   information reduction":

      Routes contained in an Adj-RIB-In associated with an EBGP peer
      SHALL NOT be considered eligible in the Decision Process if no
      explicit Import Policy has been applied.

   The following paragraph is added to Section 9.1.3 (Phase 3: Route
   Dissemination) after the third paragraph, which ends in "by means of
   an UPDATE message (see 9.2).":

      Routes SHALL NOT be added to an Adj-RIB-Out associated with an
      EBGP peer if no explicit Export Policy has been applied.

4. Security Considerations

   Permissive default routing policies can result in inadvertent effects
   such as route leaks [RFC7908], in general resulting in routing of
   traffic through an unexpected path. While it is possible for an
   operator to use monitoring to detect unexpected flows, there is no
   general framework that can be applied. These policies also have the
   potential to expose software defects or misconfiguration that could
   have unforeseen technical and business impacting effects.

   The update to [RFC4271] specified in this document is intended to
   eliminate those inadvertent effects. Operators must explicitly
   configure Import and Export Policies to achieve their expected goals.
   There is of course no protection against a malicious or incorrect
   explicit configuration.

   The security considerations described in [RFC4271] and the
   vulnerability analysis discussed in [RFC4272] also apply to this
   document.

5. IANA Considerations

   This document does not require any IANA actions.

6. References

6.1. 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,
              <http://www.rfc-editor.org/info/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,
              <http://www.rfc-editor.org/info/rfc4271>.

   [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC
              2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174,
              May 2017, <http://www.rfc-editor.org/info/rfc8174>.

6.2. Informative References

   [RFC4272] Murphy, S., "BGP Security Vulnerabilities Analysis",
              RFC 4272, DOI 10.17487/RFC4272, January 2006,
              <http://www.rfc-editor.org/info/rfc4272>.

   [RFC7908] Sriram, K., Montgomery, D., McPherson, D., Osterweil, E.,
              and B. Dickson, "Problem Definition and Classification of
              BGP Route Leaks", RFC 7908, DOI 10.17487/RFC7908, June
              2016, <http://www.rfc-editor.org/info/rfc7908>.

Appendix A. Transition Considerations for BGP Implementers

   This appendix is not normative.

   For an implementer, transitioning to a compliant BGP implementation
   may require a process that can take several years.

   It is understood and acknowledged that operators who are taking
   advantage of an undefined behavior will always be surprised by
   changes to said behavior.

A.1. "N+1 N+2" Release Strategy

   An implementer could leverage an approach described as the "N+1 and
   N+2" release strategy. In release N+1, the implementer introduces a
   new default configuration parameter to indicate that the BGP speaker
   is operating in "ebgp insecure-mode". In addition to the
   introduction of the new parameter, an implementer could begin to
   display informational warnings to the operator that certain parts of
   the configuration are incomplete. In release N+1, operators of the
   BGP implementation become aware that a configurable default exists in
   the implementation, and can prepare accordingly. In release N+2 or
   later, the inverse of the previous default configuration parameter
   that was introduced in release N+1 becomes the new default.

   As a result, any new installation of release N+2 will adhere to this
   document. Installations upgraded from version release N+1 will
   adhere to the previous insecure behavior, if no modification was made
   to the "ebgp insecure-mode" configuration parameter.

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