ï»¿

Internet Engineering Task Force (IETF)
Request for Comments: 9072
Updates: 4271
Category: Standards Track
ISSN: 2070-1721

E. Chen
Palo Alto Networks
J. Scudder
Juniper Networks

July 2021

Extended Optional Parameters Length for BGP OPEN Message

Abstract

The Optional Parameters in the BGP OPEN message as defined in the base BGP specification are limited to 255 octets due to a one-octet length field. BGP capabilities are carried in this field and may foreseeably exceed 255 octets in the future, leading to concerns about this limitation.

This document updates RFC 4271 by extending, in a backward-compatible manner, the length of the Optional Parameters in a BGP OPEN message. The Parameter Length field of individual Optional Parameters is also extended.

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 https://www.rfc-editor.org/info/rfc9072.

Table of Contents

1. Introduction

The Optional Parameters Length field in the BGP OPEN message is defined in the base BGP specification [RFC4271] as one octet, thus limiting the Optional Parameters field in the OPEN message to 255 octets. Since BGP capabilities [RFC5492] are carried in the Optional Parameters field, and new BGP capabilities continue to be introduced, the limitation is a concern for BGP development.

This document updates [RFC4271] by extending the length of the Optional Parameters in BGP OPEN in a backward-compatible manner. This is done by using Optional Parameter type code 255 as a distinguished value, which indicates an extended Optional Parameters Length field follows and that the parsing of the BGP OPEN should be modified according to these procedures. In this case, the Parameter Length field of the individual Optional Parameters in the BGP OPEN message is also extended.

1.1. 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.

2. Update to RFC 4271

This document reserves Optional Parameter type code 255 as the "Extended Length".

In the event that the length of the Optional Parameters in the BGP OPEN message does not exceed 255, the encodings of the base BGP specification [RFC4271] SHOULD be used without alteration. Configuration MAY override this to force the extended format to be used in all cases; this might be used, for example, to test that a peer supports this specification. (In any case, an implementation MUST accept an OPEN message that uses the encoding of this specification even if the length of the Optional Parameters is 255 or less.)

However, if the length of the Optional Parameters in the BGP OPEN message does exceed 255, the OPEN message MUST be encoded according to the procedure below.

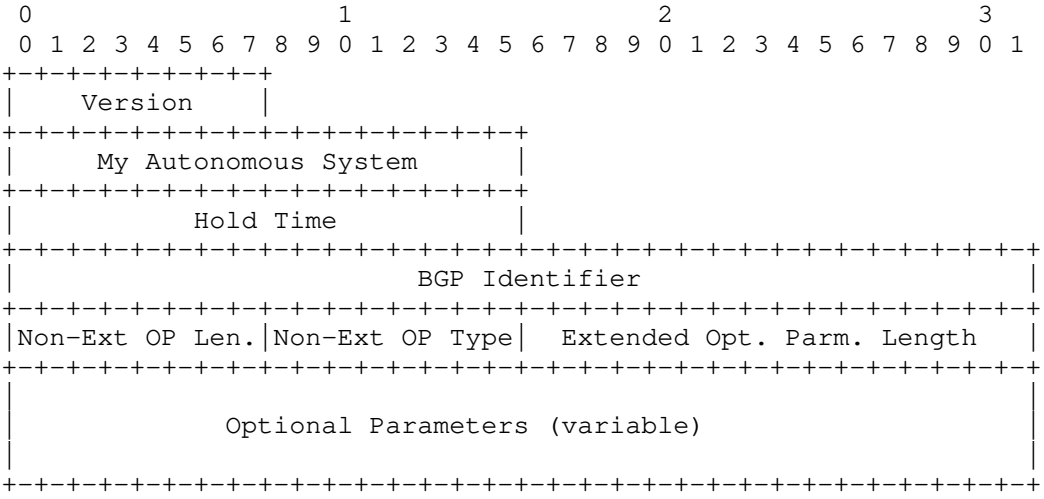

Figure 1: Extended Encoding OPEN Format

The Non-Extended Optional Parameters Length field (Non-Ext OP Len.) SHOULD be set to 255 on transmission and, in any event, MUST NOT be set to 0; it MUST be ignored on receipt once the use of the extended format is determined positively by inspection of the Non-Extended Optional Parameters Type (Non-Ext OP Type) field.

The subsequent one-octet field (which would be the first Optional Parameter Type field in the non-extended format and is called "Non-

Ext OP Type" in the figure above) MUST be set to 255 on transmission. On receipt, a value of 255 for this field is the indication that the extended format is in use.

In this extended encoding, the subsequent two-octet field, termed the "Extended Optional Parameters Length field", is an unsigned integer indicating the total length of the Optional Parameters field in octets. If the value of this field is zero, no Optional Parameters are present.

Likewise, in that situation, the Optional Parameters encoding is modified to be the following:

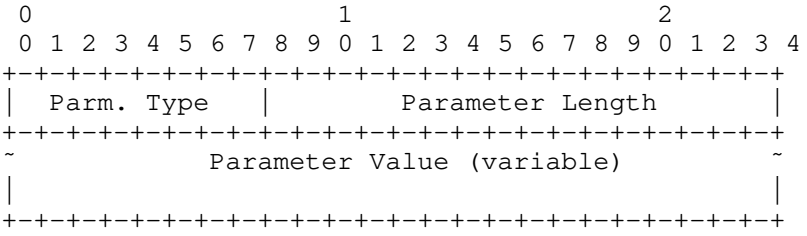

Figure 2: Extended Parameters Format

The rules for encoding Optional Parameters are unchanged with respect to those given in [RFC4271], except that the Parameter Length field is extended to be a two-octet unsigned integer.

In parsing an OPEN message, if the one-octet Optional Parameters Length field (labeled "Non-Ext OP Len." in Figure 1) is non-zero, a BGP speaker MUST use the value of the octet following the one-octet Optional Parameters Length field (labeled "Non-Ext OP Type" in Figure 1) to determine both the encoding of the Optional Parameters length and the size of the Parameter Length field of individual Optional Parameters. If the value of the "Non-Ext OP Type" field is 255, then the encoding described above is used for the Optional Parameters length. Otherwise, the encoding defined in [RFC4271] is used.

3. Backward Compatibility

If a BGP speaker supporting this specification (a "new speaker") is peering with one that does not (an "old speaker"), no interoperability issues arise unless the new speaker needs to encode Optional Parameters whose length exceeds 255. In that case, it will transmit an OPEN message that the old speaker will interpret as containing an Optional Parameter with type code 255. Since the old speaker will not recognize that type code by definition, the old speaker is expected to close the connection with a NOTIFICATION with an error code of "OPEN Message Error" and an error subcode of "Unsupported Optional Parameters", according to Section 6.2 of [RFC4271].

Although the Optional Parameter type code 255 is used in this specification as the indication that the extended encoding is in use, it is not a bona fide Optional Parameter type code in the usual sense and MUST NOT be used other than as described above. If encountered other than as the Non-Ext OP Type, it MUST be treated as an unrecognized Optional Parameter and handled according to [RFC4271], Section 6.2.

It is not considered an error to receive an OPEN message whose Extended Optional Parameters Length value is less than or equal to 255. It is not considered a fatal error to receive an OPEN message whose (non-extended) Optional Parameters Length value is not 255 and whose first Optional Parameter type code is 255 -- in this case, the encoding of this specification MUST be used for decoding the message.

4. IANA Considerations

IANA has assigned value 255 as the Extended Length type code in the

"BGP OPEN Optional Parameter Types" registry.

5. Security Considerations

This extension to BGP does not change the underlying security or confidentiality issues inherent in the existing BGP [RFC4272].

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, <https://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, <https://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, <https://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, <https://www.rfc-editor.org/info/rfc4272>.

[RFC5492] Scudder, J. and R. Chandra, "Capabilities Advertisement with BGP-4", RFC 5492, DOI 10.17487/RFC5492, February 2009, <https://www.rfc-editor.org/info/rfc5492>.

Acknowledgements

The authors would like to thank Yakov Rekhter and Srihari Sangli for discussing various options to enlarge the Optional Parameters field. We would also like to thank Matthew Bocci, Bruno Decraene, John Heasley, Jakob Heitz, Christer Holmberg, Pradosh Mohapatra, Keyur Patel, and Hannes Gredler for their valuable comments.

Authors' Addresses

Enke Chen
Palo Alto Networks

Email: enchen@paloaltonetworks.com

John Scudder
Juniper Networks

Email: jgs@juniper.net