

Internet Engineering Task Force (IETF)
Request for Comments: 6608
Updates: [4271](#)
Category: Standards Track
ISSN: 2070-1721

J. Dong
M. Chen
Huawei Technologies
A. Suryanarayana
Cisco Systems
May 2012

Subcodes for BGP Finite State Machine Error

Abstract

This document defines several subcodes for the BGP Finite State Machine (FSM) Error that could provide more information to help network operators in diagnosing BGP FSM issues and correlating network events. This document updates [RFC 4271](#).

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 5741](#).

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/rfc6608>.

Copyright Notice

Copyright (c) 2012 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1. Introduction	2
2. Requirements Language	2
3. Definition of Finite State Machine Error Subcodes	2
4. Usage of FSM Error Subcodes	2
5. Security Considerations	3
6. IANA Considerations	3
7. Contributors	4
8. Acknowledgements	4
9. References	4
9.1. Normative References	4
9.2. Informative References	4

1. Introduction

This document defines several subcodes for the BGP [RFC4271] Finite State Machine (FSM) Error that could provide more information to help network operators in diagnosing BGP FSM issues and correlating network events. This information is also helpful to developers in lab situations. This document updates [RFC4271] by requiring that BGP implementations insert appropriate FSM Error subcodes in NOTIFICATION messages for BGP FSM errors.

2. 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].

3. Definition of Finite State Machine Error Subcodes

This document defines the following subcodes for the BGP Finite State Machine Error:

0 - Unspecified Error

1 - Receive Unexpected Message in OpenSent State

2 - Receive Unexpected Message in OpenConfirm State

3 - Receive Unexpected Message in Established State

4. Usage of FSM Error Subcodes

If a BGP speaker receives an unexpected message (e.g., KEEPALIVE/UPDATE/ROUTE-REFRESH message) on a session in OpenSent state, it MUST send to the neighbor a NOTIFICATION message with the Error Code

Finite State Machine Error and the Error Subcode "Receive Unexpected Message in OpenSent State". The Data field is a 1-octet, unsigned integer that indicates the type of the unexpected message.

If a BGP speaker receives an unexpected message (e.g., OPEN/UPDATE/ROUTE-REFRESH message) on a session in OpenConfirm state, it MUST send a NOTIFICATION message with the Error Code Finite State Machine Error and the Error Subcode "Receive Unexpected Message in OpenConfirm State" to the neighbor. The Data field is a 1-octet, unsigned integer that indicates the type of the unexpected message.

If a BGP speaker receives an unexpected message (e.g., OPEN message) on a session in Established State, it MUST send to the neighbor a NOTIFICATION message with the Error Code Finite State Machine Error and the Error Subcode "Receive Unexpected Message in Established State". The Data field is a 1-octet, unsigned integer that indicates the type of the unexpected message.

5. Security Considerations

Specification, implementation, and deployment of the proposed BGP FSM Error subcodes could make BGP implementation fingerprinting easier and probably more accurate. Operators using BGP need to consider this as an operational security consideration of their BGP deployment decisions.

[BFMR2010] discusses a number of BGP security issues and potential solutions that might be relevant both to BGP implementers and BGP operators.

6. IANA Considerations

IANA has created the registry "BGP Finite State Machine Error Subcodes", within the "BGP Error Subcodes" registry, with a Registration Procedure of "Standards Action" as defined in [RFC5226] (early allocation of such subcodes is allowed, in accordance with [RFC4020]).

The registry has been populated with the following values:

Value	Name
0	Unspecified Error
1	Receive Unexpected Message in OpenSent State
2	Receive Unexpected Message in OpenConfirm State
3	Receive Unexpected Message in Established State

7. Contributors

The following individuals contributed to this document:

Xiaoming Gu
EMail: guxiaoming@huawei.com

Chong Wang
EMail: chongwang@huawei.com

8. Acknowledgements

The authors would like to thank John Scudder, Jeffrey Haas, Susan Hares, Keyur Patel, Enke Chen, Ruediger Volk, and Ran Atkinson for their valuable suggestions and comments to this document.

9. References

9.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC4020] Kompella, K. and A. Zinin, "Early IANA Allocation of Standards Track Code Points", [BCP 100](#), [RFC 4020](#), February 2005.
- [RFC4271] Rekhter, Y., Ed., Li, T., Ed., and S. Hares, Ed., "A Border Gateway Protocol 4 (BGP-4)", [RFC 4271](#), January 2006.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 5226](#), May 2008.

9.2. Informative References

- [BFMR2010] Butler, K., Farley, T., Mcdaniel, P., and J. Rexford, "A Survey of BGP Security Issues and Solutions", January 2010.

Authors' Addresses

Jie Dong
Huawei Technologies
Huawei Building, No.156 Beiqing Rd
Beijing 100095
China

EMail: jie.dong@huawei.com

Mach Chen
Huawei Technologies
Huawei Building, No.156 Beiqing Rd
Beijing 100095
China

EMail: mach.chen@huawei.com

Anantharamu Suryanarayana
Cisco Systems
USA

EMail: asuryana@cisco.com