

Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: November 24, 2013

J. Dong
M. Chen
Huawei Technologies
Z. Li
China Mobile
D. Ceccarelli
Ericsson
May 23, 2013

**GMPLS RSVP-TE Extensions for Lock Instruct and Loopback
draft-ietf-ccamp-rsvp-te-li-lb-01**

Abstract

This document specifies extensions to RSVP-TE to support lock instruct and loopback mechanism for LSPs. The mechanisms are applicable to technologies which use GMPLS as control plane.

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](#)].

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on November 24, 2013.

Copyright Notice

Copyright (c) 2013 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.	Extensions to RSVP-TE	3
3.	Operations	3
3.1.	Lock Instruct	3
3.2.	Loopback	4
4.	IANA Considerations	5
5.	Security Considerations	5
6.	Acknowledgements	6
7.	References	6
7.1.	Normative References	6
7.2.	Informative References	7
	Authors' Addresses	7

[1.](#) Introduction

The requirements for Lock Instruct (LI) and Loopback (LB) in Multiprotocol Label Switching Transport Profile (MPLS-TP) are specified in [[RFC5860](#)], and the framework of LI and LB is specified in [[RFC6371](#)].

In general the LI and LB are useful Operations, Administration and Maintenance (OAM) functions for technologies which use Generalized Multi-Protocol Label Switching (GMPLS) as control plane, e.g. time-division multiplexing, wavelength-division multiplexing, and packet switching. It is natural to use and extend the GMPLS control plane protocol to provide a unified approach for LI and LB provisioning in all these technologies.

This document specifies extensions to Resource Reservation Protocol Traffic Engineering (RSVP-TE) to support lock instruct and loopback mechanism for Label Switched Paths (LSPs). The mechanisms are applicable to technologies which use GMPLS as control plane. For MPLS-TP network, the mechanisms defined in this document are complementary to [[RFC6435](#)].

2. Extensions to RSVP-TE

The A (Administratively down) bit in ADMIN_STATUS object [[RFC3471](#)] [[RFC3473](#)] is used to indicate the lock/unlock of the LSP. Format of ADMIN_STATUS Object is as below:

```

0                               1                               2                               3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|                               | Class-Num(196)|  C-Type (1)  |
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|R|                               Reserved                |H|L|I|C|T|A|D|
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+

```

Reflect (R): 1 bit - see [[RFC3471](#)]

Handover (H): 1 bit - see [[RFC5852](#)]

Lockout (L): 1 bit - see [[RFC4872](#)]

Inhibit Alarm Indication (I): 1 bit - see [[RFC4783](#)]

Call Control (C): 1 bit - see [[RFC4974](#)]

Testing (T): 1 bit - see [[RFC3471](#)]

Administratively down (A): 1 bit - see [[RFC3471](#)], reused for Lock

Deletion in progress (D): 1 bit - see [[RFC3471](#)]

A new bit is defined in Attribute Flags TLV [[RFC5420](#)] to indicate the loopback mode. The bit number is TBA.

Bit Number	Name and Usage
TBA	Loopback mode desired. This flag indicates a particular node on the LSP is required to enter loopback mode. This MAY also be used for specifying the loopback state of the node.

3. Operations

3.1. Lock Instruct

When an ingress LSR wants to put an LSP into lock mode, it MUST send a Path message with the Administratively down (A) bit and the Reflect (R) bit in ADMIN_STATUS Object set. The intermediate nodes SHOULD forward the message with the A bit unchanged to the downstream .

On receipt of this Path message, the egress LSR SHOULD try to take the LSP out of service. If the egress Label Switching Router (LSR) locks the LSP successfully, it SHOULD send a Resv message with the A

bit in ADMIN_STATUS object set. Otherwise, it SHOULD send a PathErr message with the Error Code "OAM Problem"

[[I-D.ietf-ccamp-oam-configuration-fwk](#)] and the new Error Value "Lock Failure", and the following Resv messages SHOULD be sent with the A bit cleared. With this procedure, the intermediate nodes would also be aware of whether the LSP is in Lock mode or not.

When an LSP is put in lock mode, the subsequent Path and Resv messages SHOULD keep the A bit in ADMIN_STATUS Object set.

When the ingress LSR wants to take the LSP out of the lock mode, it MUST send a Path message with the A bit in ADMIN_STATUS Object cleared. The intermediate nodes SHOULD forward this message with the A bit unchanged to the downstream.

On receipt of this Path message, the egress LSR SHOULD try to bring the LSP back to service. If the egress LSR unlocks the LSP successfully, it SHOULD send a Resv message with the A bit in ADMIN_STATUS Object cleared. Otherwise, it SHOULD send a PathErr message with the Error Code "OAM Problem" [[I-D.ietf-ccamp-oam-configuration-fwk](#)] and the new Error Value "Unlock Failure", and the following Resv messages SHOULD be sent with the A bit set.

When an LSP is taken out of lock mode, the subsequent Path and Resv messages SHOULD keep the A bit in ADMIN_STATUS Object cleared.

3.2. Loopback

The loopback request can be sent either to the egress LSR or to a particular intermediate node. The mechanism defined in [[I-D.ietf-ccamp-lsp-attribute-ro](#)] is used for addressing the loopback request to a particular node on the LSP. The loopback request is acceptable only when the LSP is in lock mode.

When a ingress LSR wants to put a particular LSR on the LSP into loopback mode, it MUST send a Path message with the Loopback bit in the Attribute Flags TLV set. The mechanism defined in [[I-D.ietf-ccamp-lsp-attribute-ro](#)] is used to address the loopback request to the particular LSR. The Administratively down (A) bit in ADMIN_STATUS object SHOULD be set to keep the LSP in lock mode.

On receipt of this Path message, the target LSR of the loopback request SHOULD try to put the LSP into loopback mode. If the node puts the LSP into loopback mode successfully, it SHOULD set the Loopback (B) bit in the Record Route Object (RRO) Attribute subobject [[RFC5420](#)] and push this subobject onto the RRO object in the corresponding Resv message. The Administratively down (A) bit in

ADMIN_STATUS object SHOULD also be set in the Resv message. If the node cannot put the LSP into loopback mode, it SHOULD send a PathErr message with the Error Code "OAM Problem"

[[I-D.ietf-ccamp-oam-configuration-fwk](#)] and the new Error Value "Loopback Failure".

When the ingress LSR wants to take the LSP out of loopback mode, it MUST send a Path message with the Loopback (B) bit in the Attribute Flags TLV cleared. The mechanism defined in

[[I-D.ietf-ccamp-lsp-attribute-ro](#)] is used to indicate that the particular LSR SHOULD exit loopback mode for this LSP. The Administratively down (A) bit in ADMIN_STATUS object SHOULD be set.

On receipt of this Path message, the target LSR SHOULD try to take the LSP out of loopback mode. If the node takes the LSP out of loopback mode successfully, it SHOULD clear the Loopback (B) Bit in the RRO Attribute subobject and push this subobject onto the RRO object in the corresponding Resv message. The Administratively down (A) Bit in ADMIN_STATUS Object SHOULD be set. Otherwise, the node SHOULD send a PathErr message with the Error Code "OAM Problem" [[I-D.ietf-ccamp-oam-configuration-fwk](#)] and the new Error Value "Exit Loopback Failure".

4. IANA Considerations

One bit number "Loopback" needs to be assigned in the Attribute Flags registry.

Four new Error Values need to be allocated for "OAM Problem" Error Code:

Value	Error
TBA	Lock Failure
TBA	Unlock Failure
TBA	Loopback Failure
TBA	Exit Loopback Failure

5. Security Considerations

This document does not introduce any new security issues above those identified in [[RFC3209](#)] and [[RFC3473](#)].

6. Acknowledgements

The authors would like to thank Greg Mirsky, Lou Berger and Francesco Fondelli for their comments and suggestions.

7. References

7.1. Normative References

- [I-D.ietf-ccamp-lsp-attribute-ro]
Margaria, C., Martinelli, G., Balls, S., and B. Wright,
"LSP Attribute in ERO", [draft-ietf-ccamp-lsp-attribute-ro-01](#) (work in progress), February 2013.
- [I-D.ietf-ccamp-oam-configuration-fwk]
Takacs, A., Fedyk, D., and H. Jia, "GMPLS RSVP-TE
extensions for OAM Configuration", [draft-ietf-ccamp-oam-configuration-fwk-09](#) (work in progress), January 2013.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC3209] Awduche, D., Berger, L., Gan, D., Li, T., Srinivasan, V.,
and G. Swallow, "RSVP-TE: Extensions to RSVP for LSP
Tunnels", [RFC 3209](#), December 2001.
- [RFC3471] Berger, L., "Generalized Multi-Protocol Label Switching
(GMPLS) Signaling Functional Description", [RFC 3471](#),
January 2003.
- [RFC3473] Berger, L., "Generalized Multi-Protocol Label Switching
(GMPLS) Signaling Resource ReserVation Protocol-Traffic
Engineering (RSVP-TE) Extensions", [RFC 3473](#), January 2003.
- [RFC3945] Mannie, E., "Generalized Multi-Protocol Label Switching
(GMPLS) Architecture", [RFC 3945](#), October 2004.
- [RFC5420] Farrel, A., Papadimitriou, D., Vasseur, JP., and A.
Ayyangarps, "Encoding of Attributes for MPLS LSP
Establishment Using Resource Reservation Protocol Traffic
Engineering (RSVP-TE)", [RFC 5420](#), February 2009.
- [RFC5860] Vigoureux, M., Ward, D., and M. Betts, "Requirements for
Operations, Administration, and Maintenance (OAM) in MPLS
Transport Networks", [RFC 5860](#), May 2010.

- [RFC6371] Busi, I. and D. Allan, "Operations, Administration, and Maintenance Framework for MPLS-Based Transport Networks", [RFC 6371](#), September 2011.

7.2. Informative References

- [I-D.ietf-ccamp-rsvp-te-mpls-tp-oam-ext]
Bellagamba, E., Andersson, L., Skoldstrom, P., Ward, D., and A. Takacs, "Configuration of Pro-Active Operations, Administration, and Maintenance (OAM) Functions for MPLS-based Transport Networks using RSVP-TE", [draft-ietf-ccamp-rsvp-te-mpls-tp-oam-ext-11](#) (work in progress), December 2012.
- [RFC6435] Boutros, S., Sivabalan, S., Aggarwal, R., Vigoureux, M., and X. Dai, "MPLS Transport Profile Lock Instruct and Loopback Functions", [RFC 6435](#), November 2011.

Authors' Addresses

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

Email: jie.dong@huawei.com

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

Email: mach.chen@huawei.com

Zhenqiang Li
China Mobile
Unit2, Dacheng Plaza, No. 28 Xuanwumenxi Ave.
Beijing 100053
China

Email: lizhenqiang@chinamobile.com

Daniele Ceccarelli
Ericsson
Via A. Negrone 1/A
Genova - Sestri Ponente
Italy

Email: daniele.ceccarelli@ericsson.com