

Networking Working Group  
Internet-Draft  
Intended status: Best Current  
Practice  
Expires: August 11, 2008

JP. Vasseur, Ed.  
George. Swallow  
Cisco Systems, Inc  
Adrian. Farrel  
Old Dog Consulting  
Ina. Minei  
Juniper Networks  
February 8, 2008

Node behavior upon originating and receiving Resource ReserVation  
Protocol (RSVP) Path Error message  
draft-ietf-mpls-3209-patherr-01.txt

#### Status of this Memo

By submitting this Internet-Draft, each author represents that any applicable patent or other IPR claims of which he or she is aware have been or will be disclosed, and any of which he or she becomes aware will be disclosed, in accordance with [Section 6 of BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

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."

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/lid-abstracts.txt>.

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>.

This Internet-Draft will expire on August 11, 2008.

#### Copyright Notice

Copyright (C) The IETF Trust (2008).

#### Abstract

The aim of this document is to describe a common practice with regard to the behavior of a node sending a Resource ReserVation Protocol (RSVP) Traffic Engineering (TE) Path Error message and to the

Internet-Draft

[draft-ietf-mpls-3209-patherr-01.txt](#)

February 2008

behavior of a node receiving an RSVP Path Error message for a preempted Multi-Protocol Label Switching (MPLS) Traffic Engineering Label Switched Path (TE LSP). This document does not define any new protocol extensions.

## 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](#)].

## Table of Contents

<a href="#">1.</a>	Protocol behavior . . . . .	<a href="#">3</a>
<a href="#">1.1.</a>	Behavior at Detecting Nodes . . . . .	<a href="#">4</a>
<a href="#">1.2.</a>	Behavior at Receiving Nodes . . . . .	<a href="#">4</a>
<a href="#">1.3.</a>	Data Plane Behavior . . . . .	<a href="#">5</a>
<a href="#">2.</a>	RSVP PathErr Messages For a Preempted TE LSP . . . . .	<a href="#">5</a>
<a href="#">3.</a>	Security Considerations . . . . .	<a href="#">5</a>
<a href="#">4.</a>	Acknowledgements . . . . .	<a href="#">5</a>
<a href="#">5.</a>	Normative References . . . . .	<a href="#">6</a>
	Authors' Addresses . . . . .	<a href="#">6</a>
	Intellectual Property and Copyright Statements . . . . .	<a href="#">8</a>

Internet-Draft

[draft-ietf-mpls-3209-patherr-01.txt](#)

February 2008

## 1. Protocol behavior

[RFC2205] defines two RSVP error message types: PathErr and ResvErr that are generated when an error occurs. Path Error Messages (PathErr) are used to report errors and travel upstream toward the head-end of the flow. Resv Error messages (ResvErr) travel downstream toward the tail-end of the flow.

This document describes only PathErr message processing for the specific case of a preempted Traffic Engineering Label Switched Path (TE LSP) where the term preemption is defined in [RFC3209]. PathErr messages are routed hop-by-hop using the path state established when a Path message is routed through the network from the head-end to its tail-end.

As stated in [RFC2205], PathErr messages do not modify the state of any node through which they pass; they are only reported to the head-end of the TE LSP (Traffic Engineering Label Switched Path).

The format of the PathErr message as defined in [RFC2205] is as follows:

```
<PathErr message> ::= <Common Header> [ <INTEGRITY> ]
                        <SESSION> <ERROR_SPEC>
                        [ <POLICY_DATA> ... ]
                        [ <sender descriptor> ]

<sender descriptor> ::= <SENDER_TEMPLATE> <SENDER_TSPEC>
                        [ <ADSPEC> ]
```

The ERROR\_SPEC object includes the IP address of the node that detected the error (Error Node Address), and specifies the error through two fields. The Error Code field encodes the category of the error, for example, Policy Control Failure or Unknown object class. The Error Value field qualifies the error code to indicate the error

with more precision. [RFC3209] extends RSVP as defined in [RFC2205] for the management of Multi-Protocol Label Switching (MPLS) Traffic Engineered Label Switched Paths (TE-LSPs). [RFC3209] specifies several additional conditions that trigger the sending of a RSVP PathErr message for which new error codes and error values have been defined that extend the list defined in [RFC2205]. The exact circumstances under which a TE LSP is preempted and such PathErr messages are sent are defined in [RFC3209] and will not be repeated here.

Values for the Error Code and Error Value fields defined in [RFC2205], [RFC3209], and other documents are maintained in a

registry by the IANA.

The error conditions fall into two categories:

- o Fatal errors represent disruptive conditions for a TE LSP,
- o Non-fatal errors are non-disruptive conditions which have occurred for this TE LSP

Additionally, PathErr messages may be used in two circumstances:

- o During TE LSP establishment,
- o After a TE LSP has been successfully established.

Nodal behavior is dependent on which combination of the four cases listed above applies. The following sections describe the expected behavior at nodes that perform a preemption action for a TE LSP (and therefore report using error PathErr messages), and at nodes that receive PathErr messages. This text is a clarification and re-statement of the procedures set out in [RFC3209] and does not define any new behavior.

### 1.1. Behavior at Detecting Nodes

In the case of fatal errors, the detecting node must send a PathErr message reporting the error condition, and must clear the corresponding Path and Resv (control plane) states. A direct implication is that the data plane resources of such a TE LSP are

also released, thus resulting in traffic disruption. It should be noted, however, that in fatal error cases, the LSP has usually already failed in the data plane, and traffic has already been disrupted. When the error arises during LSP establishment, the implications are different to when it arises on an active LSP since no traffic flows until the LSP has been fully established. In the case of non-fatal errors, the detecting node should send a PathErr message, and must not clear control plane or data plane state.

## 1.2. Behavior at Receiving Nodes

Nodes that receive PathErr messages are all of the nodes along the path of the TE LSP upstream of the node that detected the error. This includes the head-end node. In accordance with [\[RFC2205\]](#) a node receiving a PathErr message takes no action upon it and consequently it must not clear Path or Resv control plane or data plane state. This is true regardless of whether the error condition reported by the PathErr is fatal or non-fatal. RSVP states should only be affected upon receiving a PathTear or ResvTear message, or in the

event of a Path or Resv state timeout. Further discussion of the processing of these events is outside the scope of this document. Note that [\[RFC3473\]](#) defines a Path\_State\_Removed flag in the ERROR\_SPEC object carried on a PathErr message. This field may be set to change the behavior of upstream nodes that receive the PathErr message. When set, the flag indicates that the message sender has removed Path state (and any associated Resv and data plane state) for the TE LSP. The message receiver should do likewise before forwarding the message, but may retain state and clear the flag before forwarding the message.

## 1.3. Data Plane Behavior

Any node clearing either or both the Path or the Resv state of a TE LSP MUST also free up the data plane resources allocated to the corresponding TE LSP.

## 2. RSVP PathErr Messages For a Preempted TE LSP

Two Error-code can be used to report a preempted TE LSPs:

- o As defined in [[RFC2750](#)]:Error Code=2: "Policy Control Failure", Error Value=5 "Flow was preempted"
- o As defined in [[RFC2205](#)], Error Code=12: "Service preempted"

In both cases, these are fatal errors.

### [3.](#) Security Considerations

This document does not define any new procedures, but clarifies those defined in other documents where security considerations are already specified. This document does not raise specific security issues beyond those of existing MPLS-TE. By clarifying the procedures, this document reduces the security risk introduced by non-conformant implementations.

### [4.](#) Acknowledgements

The author would like to thank Carol Iturralde, Ashok Narayanan, Rom Reuther and Reshad Rahman.

### [5.](#) Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC2205] Braden, B., Zhang, L., Berson, S., Herzog, S., and S. Jamin, "Resource ReSerVation Protocol (RSVP) -- Version 1 Functional Specification", [RFC 2205](#), September 1997.
- [RFC2750] Herzog, S., "RSVP Extensions for Policy Control", [RFC 2750](#), January 2000.
- [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.

[RFC3473] Berger, L., "Generalized Multi-Protocol Label Switching (GMPLS) Signaling Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) Extensions", [RFC 3473](#), January 2003.

#### Authors' Addresses

JP Vasseur (editor)  
Cisco Systems, Inc  
1414 Massachusetts Avenue  
Boxborough, MA 01719  
USA

Email: [jpv@cisco.com](mailto:jpv@cisco.com)

George Swallow  
Cisco Systems, Inc  
1414 Massachusetts Avenue  
Boxborough, MA 01719  
USA

Email: [swallow@cisco.com](mailto:swallow@cisco.com)

Adrian Farrel  
Old Dog Consulting

Email: [adrian@olddog.co.uk](mailto:adrian@olddog.co.uk)

Vasseur, et al.

Expires August 11, 2008

[Page 6]

---

Internet-Draft

[draft-ietf-mpls-3209-patherr-01.txt](#)

February 2008

Ina Minei  
Juniper Networks  
1194 North Mathilda Ave.  
Sunnyvale, 94089

Email: [ina@juniper.net](mailto:ina@juniper.net)





Copyright (C) The IETF Trust (2008).

This document is subject to the rights, licenses and restrictions contained in [BCP 78](#), and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY, THE IETF TRUST AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

## Intellectual Property

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in [BCP 78](#) and [BCP 79](#).

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at [ietf-ipr@ietf.org](mailto:ietf-ipr@ietf.org).

## Acknowledgment

Funding for the RFC Editor function is provided by the IETF Administrative Support Activity (IASA).