Network Working Group
Internet-Draft
Expires: August 5, 2006

C. Martin, Ed.
iPath Technologies
A. Atlas, Ed.
Google, Inc.
R. Torvi
Avici Systems, Inc.
D. Fedyk
Nortel Networks

February 2006

ISIS Extensions to support U-turn Alternates for IP/LDP Fast-Reroute draft-martin-isis-local-protect-cap-02

Status of this Memo

Copyright Notice

Abstract

This document specifies additional information that can inserted in IS-IS LSPs to convey link capabilities that may be useful in certain applications. In particular, an IS may convey that zero or more of

its links are explicit marked and/or implicit U-turn recipient capable, which may be described as capable of identifying traffic as U-turn traffic and redirecting the traffic to a suitable alternate. The immediate applicability for these two link capabilities is in support of local protection, provided by a U-turn alternate, in the event of a link and/or node failure while the IS-IS area is reconverging onto a new topology.

Table of Contents

1. Introduction

Recently, an increasing interest in IGP traffic engineering using intelligent metric assignment has led to the development and deployment of techniques and methods to manage traffic distribution and capacity expansion without explicit source routing [ref]. The fundamental premise to this approach is that it reduces operational complexity by leveraging existing and well-understood routing methods to achieve effectivey the same ends as are possible using explicit source routing, without adding any new technology to the routing system. Many carriers have adopted this approach as a means to better manage bandwidth utilization and overall network efficiency. However, in many environments and under certain failure scenarios, the IGP TE approach does not allow for fast restoration, as the IGP must reconverge. While fast IGP convergence is a topic of great interest, there is concern that a lower floor exists that, if crossed, may have a negative impact on the stability of a network. As the network diameter and node degree increase, this floor invariably raises in some proportionate manner - that is, the bigger the network, the slower the overall convergence.

Depending on the application, restoration time-tolerance varies. For real-time applications, it is certainly reasonable to expect restoration times in the &lt50 msec range. The Fast Reroute method specified in [RFC4090] is one such mechanism to achieve these restoration times, as a precomputed alternate path can service the offered load that was destined for a failed link in a loop-free fashion. However, this requires MPLS TE tunnels, which may not be a desirable option for reasons mentioned above - namely, the increase in complexity.

[I-D.ietf-rtgwg-ipfrr-spec-base], [I-D.ietf-rtgwg-ipfrr-framework], and [U-TURN] have proposed an alternative to tunnel-based restoration in IP networks that is independent of MPLS. Clearly, the ability to traffic engineer for bandwidth efficiency and fast restoration are attractive to network operators that are opposed to deploying MPLS-based RSVP-TE. Nevertheless, the destination-based nature of the classical IP routing paradigm does not afford any guarantee that an alternate path around a failure is loop-free. [U-TURN] proposes such a mechanism, however, this mechanism requires additional information to be distributed via IS-IS flooding so as to convey to routers in an area that the capability exists.

2. Signaling Link Capabilities

[RFC3784] defines extensions to IS-IS as specified in [IS-IS] and extended in [RFC1195] to allow for traffic engineering parameters to

be flooded throughout an area. TLV 22, the extended IS-reachability TLV is used to add additional information about an IS's connections to other IS's, such as available bandwidth and color, by creating sub TLVs within TLV 22. [I-D.ietf-isis-link-attr] introduces the notion of extending TLV 22, sub-TLV 19 to signal an IS's capabilities. The initial capabilities proposed in [I-D.ietf-isis-link-attr] are orthogonal to the two proposed here; the "link excluded from local protection path" flag is also used for U-turn alternates [U-TURN].

This draft proposes the creation of two new flags in TLV 22, Sub TLV 19 for indicating an IS's ability to be a U-turn recipient. The following bits are defined:

0x6: Explicit Marked U-turn Recipient Capable: When this bit is set, an IS can apply the explicitly marked U-turn packet identification method [U-TURN] to identify packets as U-turn packets and redirect those U-turn packets towards an appropriate alternate next-hop, if such is available. A neighbor, which wishes to use this link as a U-turn alternate next-hop, should mark traffic sent on the link into a U-turn alternate.

0x7: Implicit U-turn Recipient Capable: When this bit is set, an IS can apply the implicit U-turn packet identification method [U-TURN] to identify packets as U-turn packets and redirect those U-turn packets towards an appropriate alternate next-hop, if such is available. A neighbor, which wishes to use this link as a U-turn alternate next-hop, should not mark traffic sent on the link into a U-turn alternate.

3. Security Considerations

This document does not introduce any new security issues.

4. References

[I-D.ietf-isis-link-attr]
Vasseur, J. and S. Previdi, "Definition of an IS-IS Link Attribute sub-TLV", draft-ietf-isis-link-attr-01 (work in progress), May 2005.

[I-D.ietf-rtgwg-ipfrr-framework]
Shand, M. and S. Bryant, "IP Fast Reroute Framework", draft-ietf-rtgwg-ipfrr-framework-05 (work in progress), March 2006.

[I-D.ietf-rtgwg-ipfrr-spec-base]
Atlas, A. and A. Zinin, Ed., "Basic Specification for IP Fast-Reroute: Loop-free Alternates",

draft-ietf-rtgwg-ipfrr-spec-base-05.txt (work in progress), February 2006.

[IS-IS] "Intermediate System to Intermediate System Intra-Domain Routing Exchange Protocol for use in Conjunction with the Protocol for Providing the Connectionless-mode Network Service (ISO 8473)", ISO 10589.

[RFC1195] Callon, R., "Use of OSI IS-IS for routing in TCP/IP and dual environments", RFC 1195, December 1990.

[RFC3784] Smit, H. and T. Li, "Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)", RFC 3784, June 2004.

[RFC4090] Pan, P., Swallow, G., and A. Atlas, "Fast Reroute Extensions to RSVP-TE for LSP Tunnels", RFC 4090, May 2005.

[U-TURN] Atlas, A., Ed., "U-turn Alternates for IP/LDP Fast-Reroute", draft-atlas-ip-local-protect-uturn-03.txt (work in progress), February 2006.

Authors' Addresses

Christian Martin (editor)
iPath Technologies

Email: chris@ipath.net

Alia K. Atlas (editor)
Google, Inc.
1600 Amphitheatre Parkway
Mountain View, CA 94043
USA

Email: akatlas@alum.mit.edu

Raveendra Torvi
Avici Systems, Inc.
101 Billerica Avenue
N. Billerica, MA 01862
USA

Phone: +1 978 964 2026
Email: rtorvi@avici.com

Don Fedyk
Nortel Networks
600 Technology Park
Billerica, MA 01821
USA

Phone: +1 978 288 3041
Email: dwfedyk@nortelnetworks.com

Intellectual Property Statement

Disclaimer of Validity

Copyright Statement

Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.