

Network Working Group
Internet Draft
Expiration Date: September 2003

K. Ishiguro
IP Infusion Inc.
V. Hallivuori
Tellabs Oy
March 2003

Use of Multiple Instance of OSPF
for the PE/CE protocol in BGP/MPLS VPNs

[draft-ishiguro-ppvnp-pe-ce-ospf-02.txt](#)

Status of this Memo

This document is an Internet-Draft and is in full conformance with all provisions of [Section 10 of RFC2026](#).

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>.

Abstract

This document describes a simple way to use OSPF for Provider Edge (PE) router and Customer Edge (CE) router communication in BGP/MPLS VPNs [[RFC2547BIS](#)]. [[VPN-BGP-OSPF](#)] proposes a complicated way to achieve VPN route propagation as Type-3 LSAs. This document describes the use of multiple instances of OSPF in conjunction with standard BGP/OSPF route redistribution mechanisms to maintain reachability information throughout VPNs. With this mechanism, VPN routes are propagated as Type-5 LSAs.

[1](#). Conventions used in this document

Internet Draft [draft-ishiguro-ppvnp-pe-ce-ospf-02.txt](#)

March 2003

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](#) [ii].

2. Overview

[RFC2547BIS] is widely used to provide VPN services to customers. In [RFC2547BIS] architecture, a Customer Edge (CE) router can communicate with a Provider Edge (PE) router using any routing protocol. Use of OSPF for PE and CE communication is a little bit complicated due to the nature of OSPF protocol. OSPF has several types of routing information in the protocol. OSPF Link State Advertisements (LSAs) are categorized into different types. [RFC2547BIS] uses BGP for PE to PE communication. So when OSPF routes are exported and exchanged using BGP, some of OSPF information may be dropped.

[VPN-BGP-OSPF] provides a way to propagate customer OSPF routes as type 3 LSAs (intra-area routes) to other CE routers. To achieve this propagation, an additional mechanism is proposed for both OSPF and BGP. These mechanisms are only needed when customers want to propagate OSPF routes as type 3 LSAs to other CE routers. However, when customers do not require this propagation, the overall mechanism can be simplified.

This document proposes a light-weight method of using OSPF for the PE and CE protocol. In this mechanism, customer routes are exchanged as AS-External information in OSPF.

The benefit of this mechanism:

- Neither protocol changes nor additional features are required in OSPF and BGP.
- Any OSPF area configuration can be used between PE and CE communication.
- BGP does not carry any additional information over provider backbone.
- Same mechanism can be used by other IGPs such as IS-IS.

The drawback of this mechanism:

- Configuration where two VPN sites are connected by two links: a VPN link and direct (backdoor) link. Each site is in a different OSPF area and there is an OSPF adjacency over the backdoor link.

In this case, backdoor link routes will be the primary routes. This is because intra-area routes are preferred over AS external routes. If one wants the primary route to be the route via the VPN link, [\[VPN-BGP-OSPF\]](#) is needed.

- OSPF routes are exchanged as AS-External information. So the routes may be overlapped with real AS-External information

This mechanism does not provide any OSPF LSAs transparency among customer VPN sites. Because of the mechanism, VPN network reachability information can be exchanged with minimum effort .

[3.](#) Requirements

A PE router MUST have the capability of running multiple instances of OSPF, where each OSPF instance can be associated with a particular VRF.

Each OSPF instance MAY be bound to a specific VRF (1:1). Other formation such as a single OSPF to multiple VRFs (1:n) or multiple OSPF to the same VRF (n:1) is left for further study.

A PE router MUST have the capability to redistribute OSPF and BGP routes to/from a particular VRF. Import/export to/from particular VRFs to BGP is governed via Route Targets.

There is no special requirement for CE router.

[4.](#) OSPF/VRF/BGP Redistribute Procedure

PE router and CE router communicate by leveraging OSPF to exchange reachability information. Any OSPF area configuration can be used between PE and CE. Each VPN domain's OSPF route is distinguished by OSPF multiple instance.

Each OSPF instance is bound to a specific VRF, so that OSPF routes are installed into the proper VRF. The OSPF routes in VRF are exported to BGP governed via Route Targets configuration.

A PE router exchanges VPN reachability information using

Ishiguro

Expires September 2003

[Page 3]

Internet Draft [draft-ishiguro-ppvnp-pe-ce-ospf-02.txt](#)

March 2003

[[RFC2547BIS](#)]. Other PE routers have the reachability information in VRF. A PE router redistributes the routes from VRF to OSPF as Type-5 LSA originated from redistributed route.

Example Setup:

- OSPF instance 100 is bound to VRF foo.
- OSPF instance 200 is bound to VRF bar.
- Each OSPF instance's route is installed into each VRF.
- OSPF to BGP redistribute is done via VRF so that OSPF routes are imported to BGP with Route Targets configuration.
- PE sends a BGP update to another PE router.
- Another PE router installs the routes to particular VRF by Route Targets configuration.
- BGP to OSPF redistribute is done via VRF. OSPF has AS-External LSA of remote site network.

[5.](#) Security Considerations

Security issues are not discussed in this memo.

6. Acknowledgements

Thanks to Robert May and Eric Rosen for their comments.

7. Reference

[RFC2547BIS] Rosen, E., et. al., "BGP/MPLS VPNs",
<[draft-ietf-ppvpn-rfc2547bis-03.txt](#)>, October 2002.

[VPN-BGP-OSPF] Rosen, E. et al., "OSPF as the PE/CE Protocol in
BGP/MPLS VPNs,"
<[draft-rosen-vpns-ospf-bgp-mpls-06.txt](#)>,
February 2003.

8. Author's Address

Ishiguro

Expires September 2003

[Page 4]

Internet Draft [draft-ishiguro-ppvpn-pe-ce-ospf-02.txt](#)

March 2003

Kunihiro Ishiguro
IP Infusion Inc.
111 W. St. John Street, Suite 910
San Jose CA 95113
e-mail: kunihiro@ipinfusion.com

Ville Hallivuori
Tellabs Oy
Sinimaentie 6
FIN-02630 Espoo, Finland
e-mail: ville.hallivuori@tellabs.com

