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Dual Homed Access in Virtual Private Multicast Service
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Status of this Memo

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Abstract

Virtual Private Multicast Service (VPMS) is defined as a Layer 2 VPN service. It provides point-to-multipoint connectivity for a variety of Layer 2 technologies, including Frame Relay, ATM, Ethernet, PPP, etc, across an IP or MPLS-enabled IP Packet Switch Network (PSN).

It is often required for redundant access between two VPMS PEs to which a CE is attached, called "dual-homed". This document describes how dual-homed access can be achieved in the context of BGP-based VPMS.

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1. Specification of requirements

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 [RFC2119].

2. Introduction

Virtual Private Multicast Service (VPMS) is categorized as a class of provider-provisioned Layer 2 Virtual Private Networks (L2VPN). VPMS is defined as a Layer 2 VPN service that provides point-to-multipoint connectivity for a variety of Layer 2 link layers across an IP or MPLS-enabled PSN.

It is often required for redundant access between the different PEs to which a CE is attached, called "dual-homing". When CE dual-home to two VPMS PEs, it is desired to make a particular PE as the active PE and the other as the backup PE. In the case of the dual-homing access, the backup ingress PE SHOULD be able to filter the incoming traffic which is unnecessary to forward while active PE is working.

[VPMS-REQ] explains the requirement of the dual-homing access. This document describes how dual-homing can be achieved in the context of BGP-based VPMS. Section 3 lays out the overview of dual-homing. Section 4 describes the procedures of electing a active PE between the PEs that are dual-homed by a customer site. Section 5 describes How to deal with scenarios in which VPMS spans multiple ASes. Section 6 is about how to do when the link fails to ensure that traffic continues to be transfered.

3. Overview

This section describes the basic scenario where dual-homed may be required.

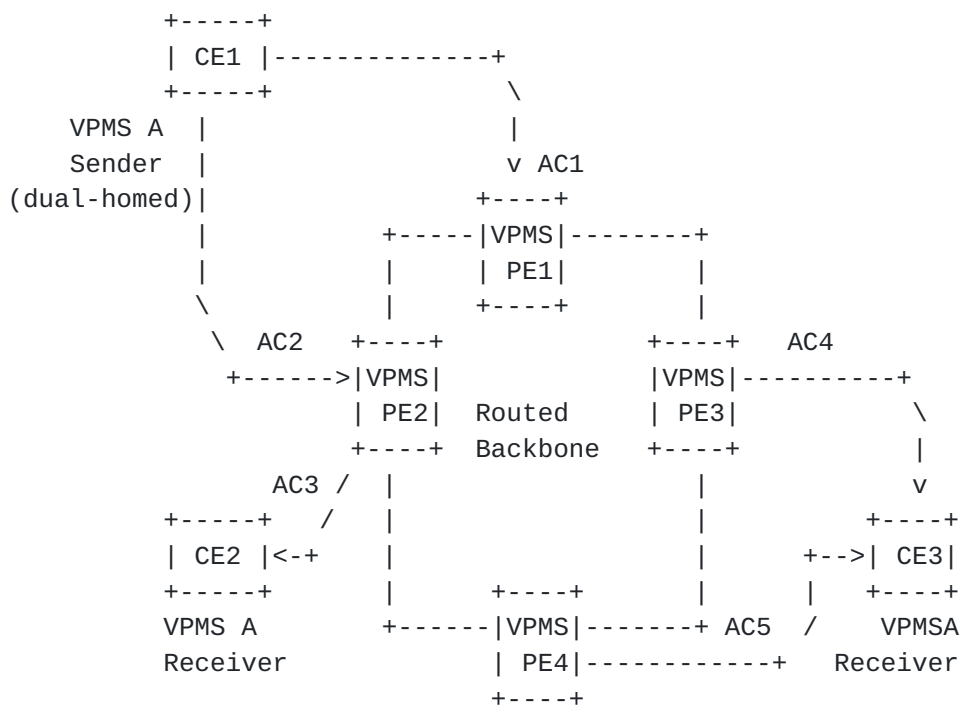

Figure 1: Dual-homed access support

Figure 1 is an example for the dual-homing access topology. The sender CE1 is dual-homed to PE1 and PE2 for redundant connectivity,and receiver CE3 is dual-homed to PE3 and PE4 for redundant connectivity.

Sender CE1 may transmit just a single copy of the traffic to either one of the two sender PEs,or to transmit a copy of the traffic to both the PEs simultaneously. According to the [VPMS-REQ], In the dual traffic case, the backup sender PE SHOULD be able to filter the incoming unnecessary traffic while active PE is working. In either case, a protection mechanism of sender PEs will be necessary to handle the traffic appropriately.

According to the [VPMS-REQ], in the case of dual-homed access to receiver PEs, PE3 and PE4, a solution MAY allow a receiver CE to receive a single copy of the traffic from either one of the two egress PEs, or receive a copy of the traffic from both PEs simultaneously. This document only describes receiver backup PE will filter the unnecssary traffic while active receiver PE is working.

4. Dual-homed Operation

4.1. Sender Dual-homed Access

In the case of dual-homed access to sender PEs, each sender PE belongs to different P2MP PW, and is based on different P2MP PSN, though both sender PEs are belonged to the same VPMS instance.

Only one of the two sender PE will be the active PE in case of the sender CE send the traffic to both the PE. [raggarwa-l2vpn-p2mp-pw] provides auto-discovery and signalling based on BGP.This document uses the same procedures. [VPLS-MULTIHOMING] introduces a method to elect one single designated forwarder. This document reuses the procedures described in [VPLS-MULTIHOMING] for designated forwarder election. For details on the procedures, please refer to the above two documents.

Based on [VPLS-MULTIHOMING],because all VPMS PEs within the same VPMS domain MUST elect one of the dual-homed sender PEs as the active PE, there SHOULD be an indicator which indicates that the PEs are multi-homed. Such an indicator can be achieved by assigning the same CE ID on PE1 and PE2 for CE1. When remote VPMS PEs receive NLRI advertisement from PE1 and PE2 for CE1, the two NLRI advertisements for CE1 are identified as candidates for designated forwarder selection due to the same CE ID. Thus, same CE ID MUST be assigned on all VPMS PEs that are dual-homed to the same customer site.

This doucument assumes the active and backup PSNs are already established.After the election, all the receiver PEs including PE2 in Figure 1 will setup the signalling with the active PE. And all the receiver PEs except PE2 will setup the signalling with the backup PE.

When Sender CE1 starts to transmit a copy of the traffic to both the PEs simultaneously.The backup sender PE2 will not forward traffic received from CE1, but as a receiver PE, it will forward the P2MP PW data from the PE1 while active PE is working,including the .

4.2. Receiver Dual-homed Access

In the case of dual-homed access to receiver PEs, both receiver PEs belongs to the same P2MP PW.

The election procedure is same with the upper section.

After the election, the backup receiver PE4 will also setup the signalling with the sender PE like the active receiver PE3 ,but the backup receiver PE4 will filter the incoming unnecessary traffic while active PE3 is working.

5. Handling Failures

There are three kinds of common failurs:PE-CE link error, PE node error and PSN core network error. this document only deals with former two error events.

5.1. PE-CE link error

5.1.1. Sender Dual-homed Access

In case of link error, In Figure 1, when AC from CE1 to PE1 goes down, this document will use the method in [VPLS-MULTIHOMING], PE1 MUST re-advertise NLRI advertisements with 'D' bit set to one in the control flags instead of withdrawing the advertisements, which means that PE1 is no longer an active PE for CE1.

When PE2 receives the advertisement from PE1 with the 'D' bit set, it MUST elect itself as an active PE for CE1 based on the dual-homing path selection rules.

Assume that PE1 in figure 1 is the active PE and PE2 is the backup PE, then when PE1 fails, PE2 will deliver the traffic instead.PE2 deliver traffic directly to receiver CE2.

5.1.2. Receiver Dual-homed Access

This document uses the same method in the upper section.

When PE3 receives the advertisement from PE4 with the 'D' bit set, it MUST elect itself as an active receiver PE for CE4 based on the dual-homed path selection rules.

Assume that PE3 in figure 1 is the active receiver PE and PE4 is the backup PE, then when PE3 fails, PE2 will deliver the traffic instead.

5.2. PE node error

This section will be described in a future version.

6. Multi-AS VPMS

This section will be described in a future version.

7. Security Considerations

This section will be described in a future version.

8. IANA Considerations

This section will be described in a future version.

9. Acknowledgement

Acknowledgement of Fangwei Hu for his input and contributions to initial discussion on BGP.

10. References

10.1. Normative References

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