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Abstract

The Designated forwarder concept is leveraged to prevent looping of BUM traffic into tenant network sourced across NVO fabric for multihoming deployments. [RFC7432] defines a preliminary approach to select the DF for an ES,VLAN or ES,Vlan Group spanning across multiple NVE's. [RFC8584] makes the election logic more robust and fine grained inculcating fair election of DF handling most of the prevalent use-cases. This document presents a deployment problem and a corresponding solution which cannot be easily resolved by rules mentioned in [RFC7432] and [RFC8584].

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Table of Contents

- [1. Important Terms](#)
- [2. Introduction](#)
- [3. Requirements Language](#)
- [4. Problem Description](#)
- [5. Solution\(s\)](#)
 - [5.1. Sending All PEs are DF mode](#)
 - [5.2. Receive All PEs are DF mode](#)
 - [5.3. Example of algorithm](#)
- [6. Interoperability with other Algos](#)
- [7. Backward Compatibility](#)
- [8. Impact on Local Bias](#)
- [9. Security Considerations](#)
- [10. IANA Considerations](#)
- [11. Acknowledgements](#)
- [12. References](#)
 - [12.1. Normative References](#)
 - [12.2. Informative References](#)
- [Authors' Addresses](#)

1. Important Terms

DF: Designated Forwarder as defined in [[RFC7432](#)].

VTEP: Virtual Tunnel End Point or Vxlan Tunnel End Point

2. Introduction

The Designated forwarder concept is leveraged to prevent looping of BUM traffic into tenant network sourced across NVO fabric for multihoming deployments. [[RFC7432](#)] defines a preliminary approach to select the DF for an ES,VLAN or ES,Vlan Group spanning across multiple NVE's. [[RFC8584](#)] makes the election logic more robust and fine grained inculcating fair election of DF handling most of the prevalent use-cases. This document presents a deployment problem and a corresponding solution which cannot be easily resolved by rules mentioned in [[RFC7432](#)] and [[RFC8584](#)].

3. 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 [[RFC2119](#)].

When used in lowercase, these words convey their typical use in common language, and they are not to be interpreted as described in [[RFC2119](#)].

4. Problem Description

It's a typical case of Firewall devices also configured as default gateway for the NVO fabric or default gateways inturn redirect traffic to firewalls over shared vlan. This example for simplicity assumes the former case wherein firewall is also configured as default gateway for all VLANs in the site (SITE-1 and SITE-2).

All PEs(Vtep1 and Vtep2 in below example) in the diagram are attached to same ES and both intend to act act as DF for the broadcast domain (BD-1) for their respective sites. As already mentioned, this is a typical case of firewall-gatewaus (active/active) across fabrics (sites), Where in, the preferred firewall-gateway is the one local to the site, whereas, upon failure, packets need to be redirected (over WAN, via DCI/VPN) towards the remote site firewall. The firewall-device is connected to it's first-hop vtep over the same bridge-domain and same ESI. All in all, it's an emulated multi-homing scenario. This is a scenario of firewall devices hosting same(IP and MAC) credentials.

Simplistic example : There are two sites, SITE-1 and SITE-2 in the below diagram. Traffic (including BUM) generated by Host1 (in SITE-1) (for a bridge-domain) should run through site-local firewall instance (firewall_1) preferably. Only in case of local-outage, the traffic should be send across over WAN to the remote firewall (firewall_2). Same should apply to traffic generated by Host2 (in SITE-2), wherein, it should preferably run through the local firewall (firewall_2) and over a failure should go over the WAN towards firewall_1.

Vtep1/2 learn the firewall MAC (MAC_F) as local learning and also from the remote Vtep2/1. But since both the learnings are over the same ESI, it should not lead to MAC move. Cometh the local firewall failure, Vteps (1 or 2) should start redirecting the traffic to remote SITE. Any ARP request (BUM traffic) for firewall credentials landing at either Vtep1 or Vtep2 should be flooded to network towards the local firewall.

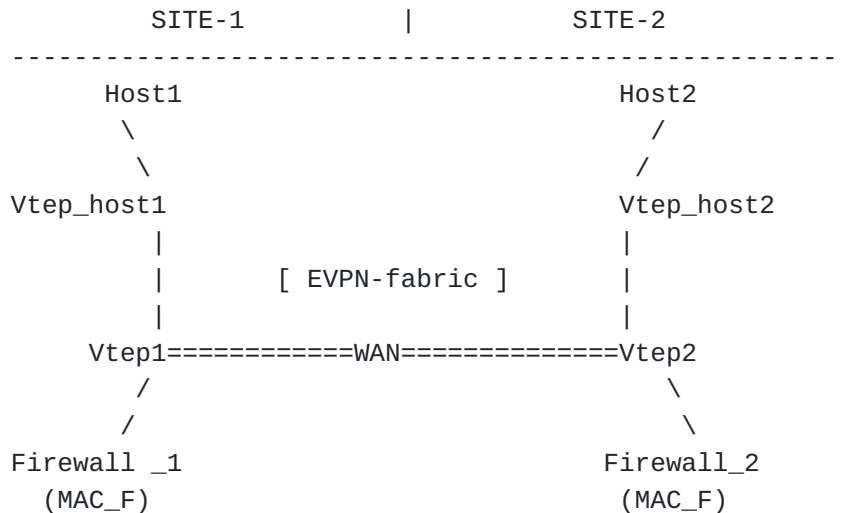


Figure 1: Figure 1: Active-Active Firewall Across Sites

5. Solution(s)

The control plane part of the solution can be leveraged from the 'DF Election Extended Community' described in [\[RFC8584\]](#). Since the requirement is to ensure all the PEs attached to ESI forward the BUM traffic arriving from NVO fabric towards the Attachment circuits (ACs) configured over the ES for a BD (broadcast domain) mapped to Vlan or bundle of Vlans. As explained in the above section that this is a case where PEs are in disparate networks and the ACs behind them are not connected to each other to a common physical device.

This document proposes a new mode of DF-election, ALL-PEs-DF where- in all of the participating PEs intend to play DF role for a vlan(s) enabled on an ESI. This requires "DF Election Extended Community" to carry this information with the ES route to indicate it to remote PEs. This ensures all PEs receiving BUM traffic over NVO fabric destined to ESI, BD, SHOULD flood it on the associated ES on the access/tenant side. PE MAY be explicitly configured to choose the ALL-PEs-DF mode.

5.1. Sending All PEs are DF mode

The All-PEs-DF mode is used as follows:

- (1) PEs configured to use ALL-PEs-DF mode SHOULD set "DF Alg" algorithm field in 'DF Election Extended Community' to appropriate value.
- (2) This document proposes value '2' for All-PEs-DF mode, as values '0' and '1' are already defined for usage in [\[RFC8584\]](#).

(3)

This algorithm is agnostic to the values carried in 'Bitmap' but does not discount any use-case(s) in future which may need extra information carried in 'Bitmap' along with All-PEs-DF mode.

5.2. Receive All PEs are DF mode

When a PE receives the ES routes from all the other PEs for the ES in question carrying the ALL-PEs-DF mode set in 'DF Election Extended Community', it SHOULD check to see if all the advertisements have the Extended Community with 'All-DF-mode' set as 'DF Alg'. If yes, then SHOULD ignore the 'Bitmap' and 'Rsvd' field in the extended community. As also mentioned in [\[RFC8584\]](#), if even a single advertisement for Route Type 4 is received without the locally configured DF Alg and capability, the default DF election algorithm MUST be used as prescribed in [\[RFC7432\]](#).

5.3. Example of algorithm

The BGP-EVPN control plane support prescribed in this document helps in resolving the problem described in [Section 4](#). If PEs Vtep1 and Vtep2 are configured to use ALL-PEs-DF mode, then any BUM traffic from respective hosts Host1/Host2 over the EVPN fabric, should get broadcasted towards the AC for the ESI, Vlan to which the firewall_1/firewall_2 (respectively) is attached. For example the arp-request for the Firewall IP will be honored by the Firewall_1 behind the Vtep1 which receives the ARP-request, whereas, when Vtep2 receives the arp-request it will be honored by Firewall_2. Vtep1 and Vtep2 will publish the arp-request in their respective ACs attached to the firewall on which Vlan, ESI is enabled

6. Interoperability with other Algos

Since All-DF-algo is special mode and not exactly an algorithm, which requires the participation of all PEs for an ESI, VLAN. Hence, even if one PE publishes an algo which is NOT "All-DF-mode", other PEs SHOULD revert back to default algorithm. The reason being that, if there are PE1, PE2, PE3 and PE4 in contention. PE1 and PE2 publishes DF Algo 'ALL-PEs-DF', PE3 publishes '0' and PE4 publishes '1'. Once this mismatch is perceived, all PEs SHOULD try and converge towards the default mode. An admin intervention may be required to achieve the same or to converge on any other supported 'DF Algo'.

7. Backward Compatibility

As prescribed in [\[RFC8584\]](#), PEs not supporting (hence not publishing) 'ALL-PEs-DF', SHOULD ignore the processing of the 'DF Election Extended Community' and SHOULD indulge in DF-election using

the default algorithm mentioned in [RFC7432]. The PEs configured with this new algorithm (hence publishing it), if receive Route Type 4 without 'DF Election Extended Community', SHOULD also revert back to default algorithm. If PEs receive Route Type 4 with another algorithm published in 'DF Election Extended Community', then it should follow procedures prescribed in [Section 6](#).

8. Impact on Local Bias

There is no impact on the local-bias handling, as the PE receiving the BUM from access side over {ESI, VLAN} and relays it to other PEs that published {ESI, VLAN} in Route Type 4; the receiving side PEs will not relay it to EVPN fabric nor will they redirect it to same ESI configured with same VLAN on the access/tenant side.

9. Security Considerations

This document inherits all the security considerations discussed in [RFC7432] and [RFC8584].

10. IANA Considerations

This document inherits all the IANA considerations discussed in [RFC7432] and [RFC8584].

11. Acknowledgements

12. References

12.1. Normative References

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