RBridge VLAN Mapping

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Abstract

Some bridge products perform a feature known as "VLAN mapping", in which a bridge translates a data frame’s VLAN ID from one VLAN to another when it forwards a frame from one port to another. This feature facilitates scenarios such as combining two bridged LANs with overlapping VLAN IDs into one bridged LAN without merging two communities just because they have been given the same VLAN ID in the original two clouds. This document describes how RBridges can achieve the same functionality.
INTERNET-DRAFT                                      RBridge VLAN Mapping

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1. Introduction

Bridges perform a feature known as "VLAN mapping", in which two or more layer 2 clouds are connected together using a set of bridges, but in which the VLAN IDs are not consistent in the different clouds.

The set of bridges interconnecting the clouds are known as the "cut set", meaning that if that set of bridges is removed, the clouds are separated.

Bridges in the cut set are configured to translate some set of VLAN IDs in one cloud to different VLAN IDs when forwarding from one cloud to the other.

One reason to do this is to intentionally not merge VLAN-A endnodes in one layer 2 cloud with the community of VLAN-A endnodes in the other cloud.

Another reason to do this is to intentionally merge two communities, marked with different VLAN IDs in the different clouds.

This feature is accomplished with bridges solely by configuring bridges on the cut set.

This document explains how to accomplish the same functionality with RBridges. In this document we will assume there are two clouds "East" and "West", and RBridges RB1, RB2, and RB3 that interconnect the two clouds.

We will refer to RBridges other than the cut set of RBridges as "internal RBridges".

General familiarity with the base TRILL protocol [RFCtrill] is assumed in this document.
1.1 Terminology

The same terminology and acronyms are used in this document as in [RFCtrill].

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. Internal RBridges and VLAN Mapping

Internal RBridges will not be aware that VLAN mapping is going on. They will behave exactly as they would without VLAN mapping. The only evidence they will have of VLAN mapping is the existence of an optional TLV field that a cut set RBridge, RB1, MAY include in its LSP, listing the VLAN mappings that RB1 is configured to be performing.

Internal RBridges will ignore this TLV field. It is only there for detection of misconfiguration.

3. Configuration of Cut Set VLAN Mapping RBridges

If VLAN A in cloud "East" is to be translated into VLAN B in cloud "West", a cut set RBridge RB1 must be configured, for each port, as to whether that port is in East or West, and configured with VLAN mappings, such as:

"East/VLAN A <----> West/VLAN B"

That mapping means that when RB1 forwards a frame on a port configured to be in East to a port configured to be in West, with the VLAN tag of A, it replaces the VLAN tag "A" with "B" in the inner encapsulated frame.

Note that mappings are always symmetric, meaning that if RB1 is translating tag "VLAN A" to tag "VLAN B" when forwarding from East to West, it will translate tag "VLAN B" to tag "VLAN A" when forwarding from West to East.

4. Advertisement of VLAN Mappings

To detect misconfiguration, a cut set RBridge RB1 MAY advertise its VLAN mappings. This would be done by assigning IDs to each of the clouds. All cut set RBridges SHOULD be configured with the same IDs for the clouds. So, in our example, if "East" is "1" and "West" is "2", and VLAN A in East is mapped to VLAN B in West, the TLV would report a set of mappings, including:

{(1:A,2:B))
5. Translation of VLAN IDs by Cut Set RBriges

If RB1 is configured to believe port a is in "East" and port b is in "West", and RB1 is configured such that "East/VLAN A ----> West/VLAN B", then when RB1 forwards data frames from port a to port b, if the received frame from port a has (inner header VLAN ID) VLAN x, then RB1 changes the VLAN tag from VLAN A to VLAN B as it forwards onto port b.

Note: This is true whether RB1 is the appointed forwarder on port a for VLAN x and the frame arrives unencapsulated, or whether the frame has arrived already encapsulated as a VLAN A frame.

Likewise, RB1 performs the same VLAN translation whether the frame is unicast or multicast.

6. Reporting Attached VLANs by Cut Set RBriges in LSPs

If RB1 is configured to translate VLAN A to VLAN B, then RB1 reports, in its LSP, that it is connected to both VLAN A and VLAN B, even if RB1 is not appointed forwarder for either or both VLAN A or VLAN B.

The reason RB1 must claim to be attached to VLAN A and VLAN B is so that multi-destination data frames for VLAN A originating in West will not get filtered before reaching RB1, and multi-destination data frames for VLAN B originating in East will also not get prematurely filtered.

7. Advertising of Multicast Groups by Cut Set RBriges

If RB1 is configured to translate VLAN A in East to VLAN B in West, then RB1 MUST do one of the following, in order to ensure that a multicast packet for group G in VLAN A will not be filtered inside the West cloud, if there are receivers for (VLAN A, group G) in East.

If the cut set RBriges do nothing, then a multicast for VLAN B, group G would be filtered inside the West cloud, since RBriges inside the East cloud will only be requesting receipt of VLAN A, group G.

Thus, RB1 MUST do one of the following for each mapped VLAN. It may use different strategies for different VLANs.

a) for all IP-derived multicast addresses that have been requested by any RBriges in East for VLAN A, RB1 reports connectivity to those multicast addresses in VLAN B. Likewise, for all IP-derived multicast addresses that have been requested by any RBriges in
West for VLAN B, RB1 reports connectivity to those multicast addresses in VLAN A.

b) RB1 reports connectivity to an IPv4 multicast router and an IPv6 multicast router.

8. Endnode Advertisements by cut set RBridges

TRILL allows RBridges to optionally advertise attached endnodes. This endnode advertisement uses the TRILL ESADI (End System Address Distribution Information) protocol.

If cut set RBridge RB1 is translating VLAN A (in East) to VLAN B (in West), and RB1 is doing ESADI for its attached endnodes in VLAN A, it should transmit the ESADI advertisement tagged with VLAN A when forwarding onto ports labeled as "East", and transmit the same ESADI advertisement when forwarding onto ports labeled as "West". An East VLAN-A ESADI generated by any RBridge in East will automatically get translated into a VLAN B ESADI when forwarding into West, because ESADIs are handled just like ordinary encapsulated data frames, the VLAN tag to which the ESADI belongs is the VLAN tag on the inner data frame, and that VLAN tag will be translated by (properly configured) cut set RBridges when forwarding between East and West.
9. IANA Considerations

This document requires no IANA actions. This section should be deleted by the RFC Editor before publication.

10. Security Considerations

See [RFCtrill] for general RBridge Security Considerations.

If cut set RBridges have misconfigured VLAN mappings, VLANs may be inadvertently partitioned or inadvertently merged and frames may be delivered in the wrong VLAN. However, misconfiguration of VLAN mapping will not cause loops.
11. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997


12. Informative References

None.
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