

VIRTUAL SWITCH REDUNDANCY PROTOCOL (VSRP)



Summary

Foundry's Virtual Switch Redundancy Protocol (VSRP) is designed as an alternative to STP based metro designs. VSRP is specifically designed for layer 2 mesh topologies, providing SONET like resiliency for Metro core and access environments. VSRP can be used in metro networks that deploy of mixture of different transport technologies including SONET, Gigabit Ethernet, and 10-gigabit Ethernet.

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Introduction

Using layer 2 technology for Metro networks provides a simple, low-cost solution, but it is not without its challenges. Failover times and redundancy are primary concerns in Metro networks. Traditionally, layer 2 networks rely on the Spanning Tree Protocol (STP) to provide loop-free, redundant environments. The standard STP can take up to 45 seconds to converge in the event of a failure. Foundry's Rapid Spanning Tree Protocol (RSTP) based on 802.1w provides a dramatic improvement, lowering the convergence time to the range of 50ms – 5 seconds. Some metro providers look for alternatives to a Spanning Tree based design.

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Note: Metro Ring Protocol (MRP) is a "sister" technology to VSRP, with the same objectives in mind: an alternative to STP with sub-second fail over, but specifically designed for ring topologies. Combining these two protocols can provide an extremely robust network design.

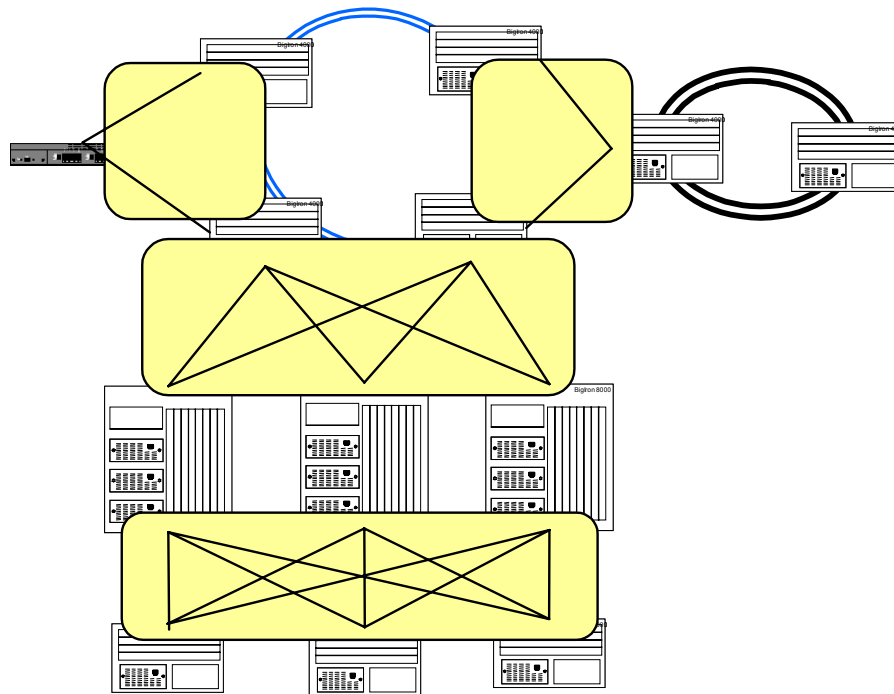


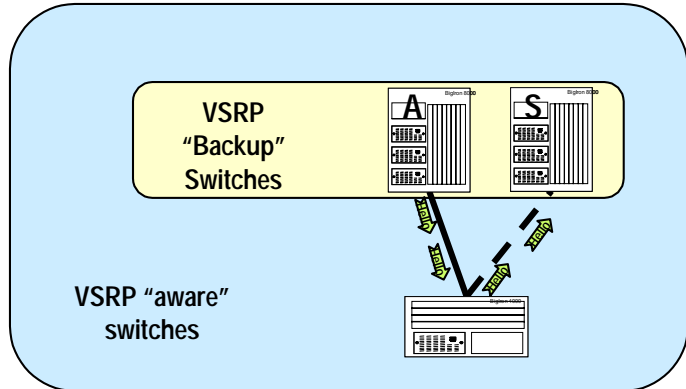
Figure 1 - VSRP providing a high-available mesh core, ring-to-ring connectivity, and Provider Edge (PE) access

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Figure 1 above shows VSRP providing a high-available mesh core, ring-to-ring connectivity, and Provider Edge (PE) access. The highlighted areas show where VSRP is running.

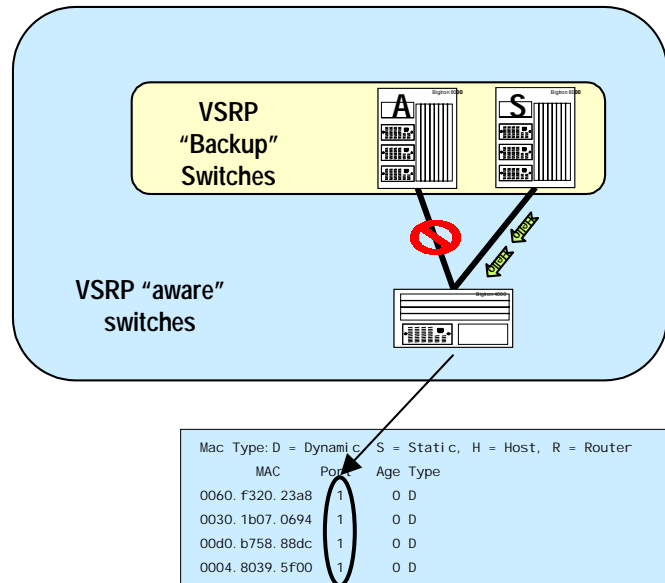
How VSRP Works

In order to provide a loop-free topology, multiple switches are configured as backup switches and maintain an active-standby relationship. One of the backup switches will be active and forwarding, while the others are in standby (blocking). The active switch sends out hello packets on all VSRP interfaces. The standby switch monitors these packets; when these packets are not seen by the standby for a configurable period of time, the standby switch becomes active.



Rapid Failover

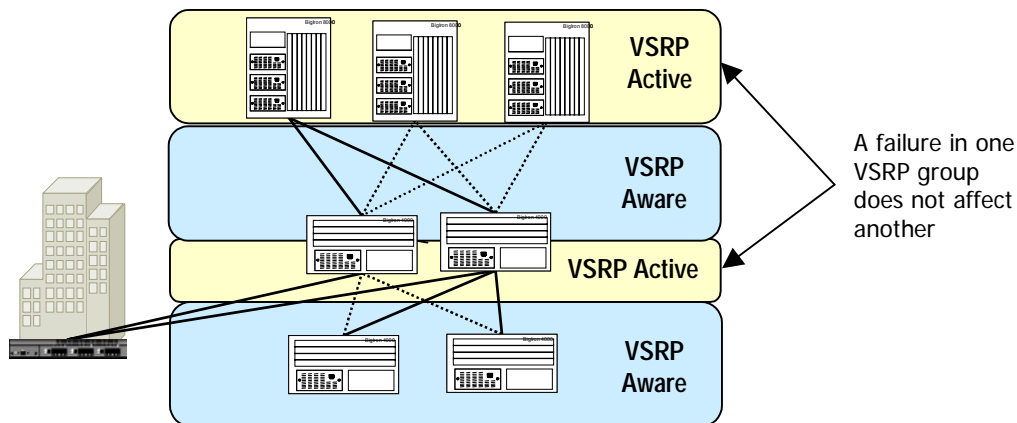
The edge VSRP switch knows which uplink port the active switch is connected to by monitoring the hello packets. When the active switch is transitioned over to another uplink, the hello packets will be seen on a different link. When this occurs, the edge switch moves the MAC addresses that were learned on the failed link to the new link.



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Multiple VSRP Zones

Foundry switches can be both VSRP backup switches for down-stream connectivity and VSRP aware for upstream connectivity. Failure detection and convergence is localized only to the VSRP backup switches and does not propagate down the network. A VLAN or VLAN group can span up to 255 VSRP "hops".

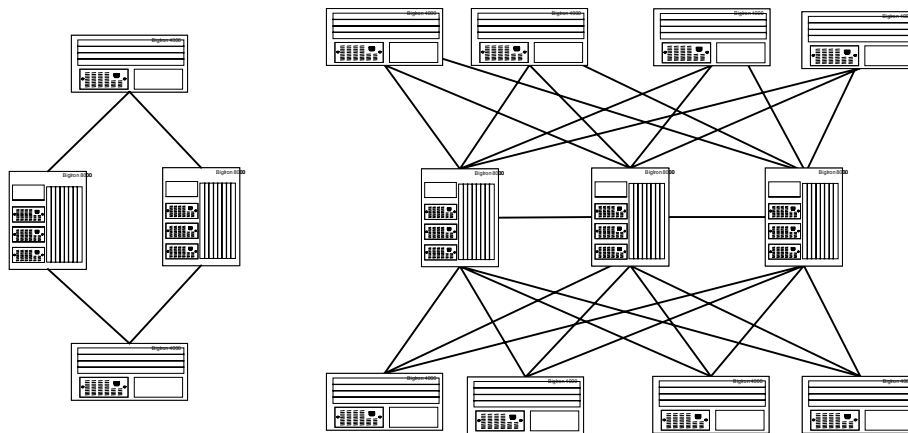


Down-stream customer connections can be VSRP aware, taking advantage of the VSRP active-standby core, or, both links can be active simultaneously (not participating in VSRP), relying on other protocols for loop detection (like RSTP and/or SuperSpan).

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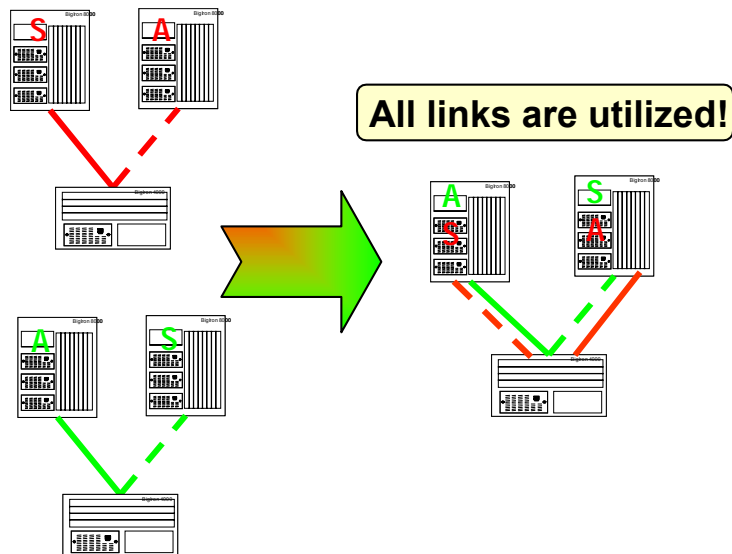
Layer 2 Mesh Topologies

VSRP supported topologies can be very simple or complex depending on the amount of redundancy and bandwidth needed. The requirement for this protocol is for all core VSRP "backup" switches to have links connecting to the edge (non-backup) switches. Even the simple topology in figure 2.1 is supported because this rule is true. VSRP runs over these interconnecting links to create loop-free environments, eliminating the need for Spanning Tree. It also provides less computational overhead, and sub-second failover.



VSRP and VLAN Topology Groups

VSRP interoperates with Foundry's VLAN grouping based on 802.1s. VSRP is VLAN or VLAN group significant. VSRP backup switches can be active for one VLAN or group while a standby for another. This distributes traffic load and provides efficient link utilization. VLANs can have unique L2 topologies and various degrees of redundancy. Certain VLAN or VLAN groups can have more VSRP backup switches than others for different service levels.



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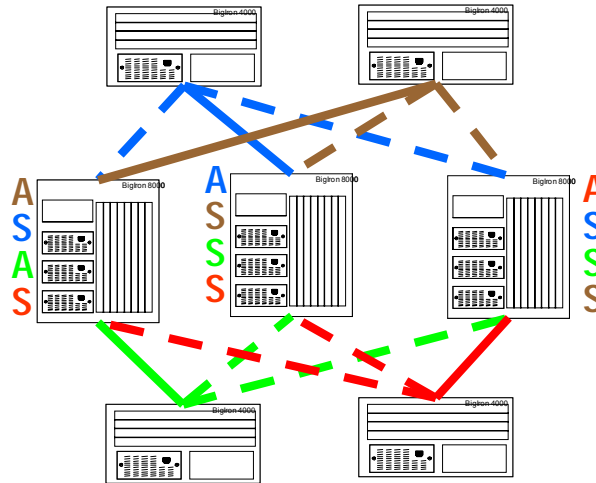


Figure 2 - VSRP backup switches both active and stand standby for separate VLAN groups

Summary

Foundry's VSRP protocol offers an alternative to spanning tree based metro designs and complements Foundry's RSTP and SuperSpan feature set. By using VSRP in conjunction with Foundry's MRP, 802.1s based VLAN grouping, and 802.3ad based link aggregation, metro service providers can build robust Metro networks that leverage Ethernet and SONET transports while providing SONET like resiliency.

Emerson Parker

Foundry Networks, Inc.
Headquarters
2100 Gold Street
P.O. Box 649100
San Jose, CA 95164-9100

U.S. and Canada Toll-free: (888) TURBOLAN
Direct telephone: +1 408.586.1700
Fax: 1-408-586-1900
Email: info@foundrynet.com
Web: <http://www.foundrynet.com>

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