White Paper

VLAN Routing Over Raptor Adaptive Switch Technology (RAST™) Networks

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VLAN OVERVIEW

To understand the differences that occur when routing over Virtual LANs (VLANs) using Raptor Adaptive Switch Technology (RAST™), it is necessary to revisit common multilayer switch routing between VLANs. In common VLAN routing, VLANs are created in a specific switch and extended over tagged interfaces to other switches. This means that one particular switch "owns" these VLANS.

When routing is carried out between these VLANs, the point at which the route operation is created is the VLAN's "home." Figure 1 shows three switches in which VLAN blue and VLAN red exist in all switches, due to tagging between them and dynamic VLAN learning. The VLANs are actually created in switch 1 and are routed in switch 1. Packets entering switch 2 or switch 3 and destined for inter-VLAN routing will all travel to switch 1 for resolution and then have to travel to the egress switch for final delivery. In some cases, major congestion can result in the switch 1-2 and the switch 2-3 interlinks because the data travels over these interlinks twice for a final resolution.

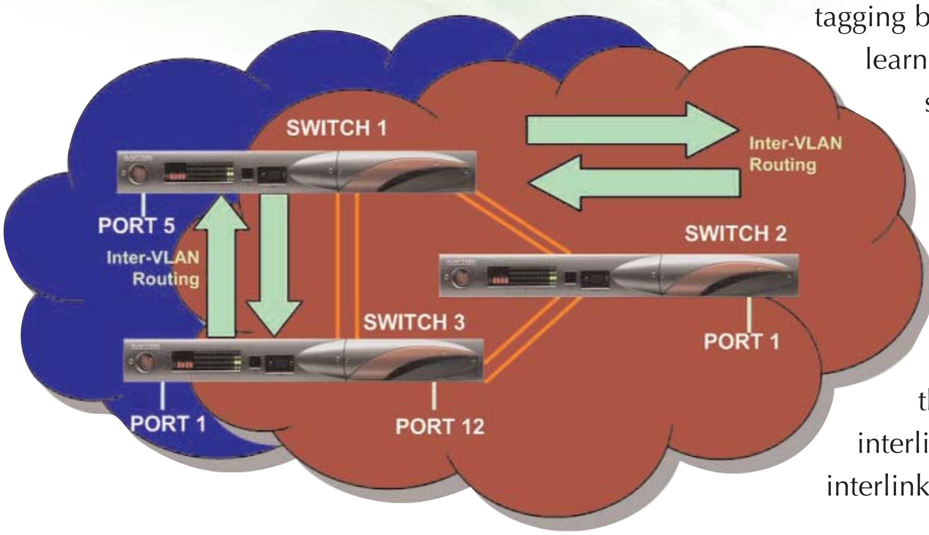

Figure 1: Normal Multilayer Routing Connections

RAST SWITCH ROUTING

In RAST-connected switches, where all switches act like one switch, when a VLAN is created with ports from multiple devices, they exist IN the same VLAN, not an extension of the VLAN over tagged ports. For this reason, when a packet enters any RAST-connected device, including VLANs for which routing is enabled, the route resolution and delivery are decided on that device. The need to travel over the interlink connections to be routed at a specific switch device is eliminated.

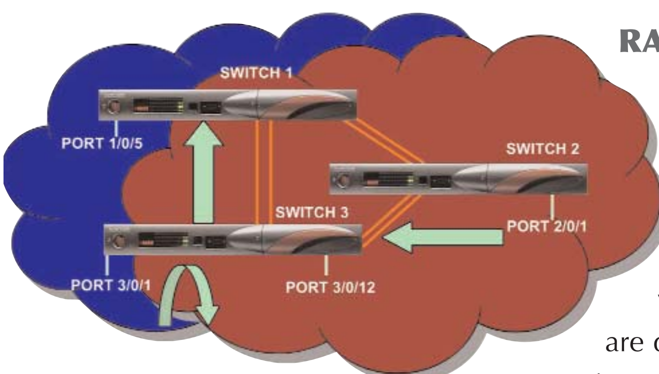

Figure 2: RAST Inter-VLAN Routing

In Figure 2, switch 1, switch 2, and switch 3 perform inter-VLAN routing in their local switches. Therefore, on switch 3, when port 3/0/1 (VLAN blue) needs to route to port 3/0/12 (VLAN red), the data is routed in switch 3. If port 2/0/1 (VLAN red) needs to route to port 3/0/1 (VLAN blue), the data travels over the interlink and routes in switch 3. Conversely, if port 3/0/12 (VLAN red) needs to route to port 1/0/5 (VLAN blue), the data travels over the interlink and routes in switch 1.

In a standard VLAN routing scenario, the user must be careful not to create too many inter-VLAN routes that traverse the interswitch links because a significant amount of expensive bandwidth is wasted and latency increases, especially when employing Voice over Internet Protocol (VoIP).

SUMMARY

Because RAST-connected switches act as a single-switch device, the routing between VLANs is much more efficient than standard multilayer switches. When standard multilayer (layer 2/3/4) or VLAN-capable layer 2 switches are connected to a RAST network, the point at which routing is resolved and delivered is where the VLANs exist—in the entire RAST network. Therefore, RAST networks "force" standard networks to use inter-VLAN routes more efficiently. See Figure 3 .

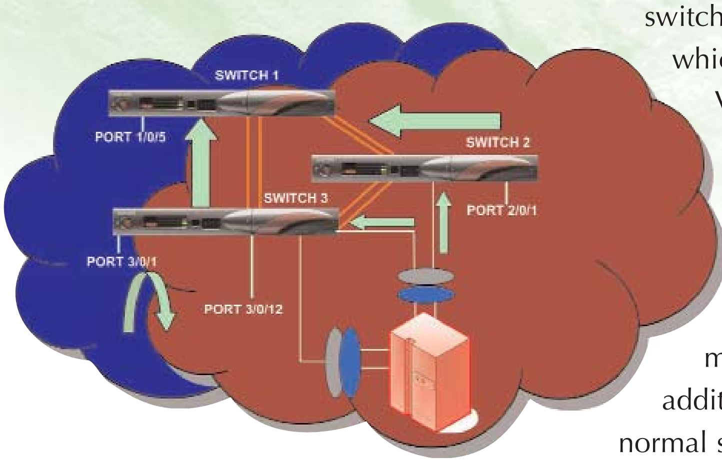

Figure 3: RAST-Compatible VLAN Switch Network

In a RAST network, VLAN routing using interswitch links occurs only when absolutely necessary, making more efficient use of the bandwidth provided. In addition, when using RAST-compatible switches with normal switches, inter-VLAN routing is more efficient because the standard switch diverts inter-VLAN routes to a RAST switch. The RAST switch performs VLAN routing at the switch because the "point at the which the route exists is the single-switch RAST network."

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