



Avaya Switch Clustering

Virtual Services Platform

Ethernet Routing Switch

**Engineering**

> Switch Clustering Supported  
Topologies and Interoperability with  
Virtual Services Platform 9000 &  
Ethernet Routing Switches

**Avaya Data Solutions**

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## Abstract

This document is intended to show the various supported topologies and features for switch clustering on the Virtual Services Platform 9000 and Ethernet Routing Switch portfolio. With each topology, please take note to where bridging, routing, and multicast are configured as support will vary between switch types.

## Acronym Key

Throughout this guide the following acronyms will be used:

### **Switch Clustering (SC)**

Switch Clustering is the logical aggregation of two Virtual Services Platform 9000s or Ethernet Routing Switch nodes forming one logical entity known as the Switch Cluster (SC). The two peer nodes in a SC are connected via an Inter-Switch Trunk (IST). The IST is used to exchange forwarding and routing information between the two peer nodes in the SC. Switch Clustering uses SMLT, SLT, RSMLT, or MSMLT depending on the physical and logical network requirements. Switch Clustering is completely transparent to edge devices which connect to the Switch Cluster.

### **SLT**

Single Link Trunking uses port-based connections at the Switch Cluster core. This feature allows for two uplinks per SLT group, one on each SC peer. The total number of SLT groups is based on the number of ports on the core switch less two which are required for the IST.

### **SMLT**

Split MultiLink Trunking uses MLT-based connections at the Switch Cluster core. This feature allows for more than two uplinks per SMLT group. The total number of uplinks per group is limited by the number of links per group supported on the edge device. The total number of groups is based on the number of MLT groups supported on the core less one which is required for the IST.

### **RSMLT**

Routed-SMLT (RSMLT) is an enhancement to SMLT enabling the exchange of Layer 3 information between peer nodes in a Switch Cluster for unparalleled resiliency and simplicity for both L3 and L2. RSMLT is deployed in any Layer 3 environment on the Switch Cluster; between multiple Switch Clusters in a core, between a layer 3 device and the Switch Cluster, or between a layer 2 device and the Switch Cluster. When deployed with a layer 2 edge, RSMLT is a superior alternative to VRRP – this feature is known as RSMLT-Edge.

### **MSMLT**

Multicast SMLT combines Switch Clustering with Layer 3 PIM-SM Multicast. The supported topologies will vary based on the need for Layer 3 multicast routing in the core. These supported topologies are not bound by the unicast bridging and routing functionality, but work in conjunction with them to create useful design alternatives when both are required.

## Revision Control

No	Date	Version	Revised By	Remarks
1	July 2008	1.2	D. DeBacker	Various Changes & Updates
2	March 2011	1.3	K. Marshall	Added VSP 9000
3	June 2011	1.4	K. Marshall	Added ERS 5000 Mesh Support
4	July 2011	1.5	K. Marshall	Minor Corrections

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## Conventions

This section describes the text, image, and command conventions used in this document.

### Symbols



Tip – Highlights a configuration or technical tip.



Note – Highlights important information to the reader.



Warning – Highlights important information about an action that may result in equipment damage, configuration or data loss.

### Text

**Bold** text indicates emphasis.

*Italic* text in a Courier New font indicates text the user must enter or select in a menu item, button or command:

```
ERS5520-48T# show running-config
```

Output examples from Avaya devices are displayed in a Lucida Console font:

```
ERS5520-48T# show sys-info
```

```

Operation Mode:           Switch
MAC Address:             00-12-83-93-B0-00
PoE Module FW:          6370.4
Reset Count:             83
Last Reset Type:        Management Factory Reset
Power Status:           Primary Power
Autotopology:           Enabled
Pluggable Port 45:      None
Pluggable Port 46:      None
Pluggable Port 47:      None
Pluggable Port 48:      None
Base Unit Selection:    Non-base unit using rear-panel switch
sysDescr:               Ethernet Routing Switch 5520-48T-PWR
                        HW:02           FW:6.0.0.10   SW:v6.2.0.009
                        Mfg Date:12042004   HW Dev:H/W rev.02

```

## 1. Overview

This document is intended to show the various supported topologies and features for switch clustering on the Virtual Services Platform 9000 and Ethernet Routing Switch portfolio. With each topology, please take note to where bridging, routing, and multicast are configured as support will vary between switch types.

The topologies shown in each example do not indicate the scalability of the solution. They are only representative to provide the topology architecture. Additionally this document is not intended to show specific design or configuration parameters. For this information please refer to the Small Campus Technical Solutions Guide (NN48500-573), Medium Campus Technical Solutions Guide (NN48500-574), Large Campus Technical Solutions Guide (NN48500-575), Super Large Campus Technical Solutions Guide (NN48500-609) and the Switch Clustering using SMLT Technical Configuration Guide (NN48500-518).

## 2. Platforms / Software Releases

The following table provides the baseline software releases for each switching platform used to validate the switch cluster topologies in this guide. If prior versions of software are being used, please refer to the product release notes and product documentation for known issues or limitations with the specific software release. Older switching software should be used at your own risk.

Platform	Software Release
Virtual Services Platform 9000	Release 3.0.0.0
Ethernet Routing Switch 8800/8600	Release 7.1
Ethernet Routing Switch 8300	Release 4.2.2.2
Ethernet Routing Switch 5000 Series	Release 6.2.0.200
Ethernet Routing Switch 1600 Series	Release 2.1.8.1

**Table 2.0 – Platforms / Software Releases**



Note – SMLT support on the Ethernet Routing Switch 5000 requires an Advanced software license.



Note – SMLT, RSMLT or RSMLT Edge support on the Ethernet Routing Switch 8300 requires an Advanced or Premier software license.



Note – SMLT, RSMLT or RSMLT Edge scaling beyond 32 groups on a Virtual Services Platform 9000 requires an Advanced or Premier software license.

## 3. Triangle Topologies

### 3.1 Layer 2 Core & Edge

Switch Clustering configuration with a single Switch Cluster Core and dual-connected edge devices. This topology represents a single VLAN spanning the edge devices. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported

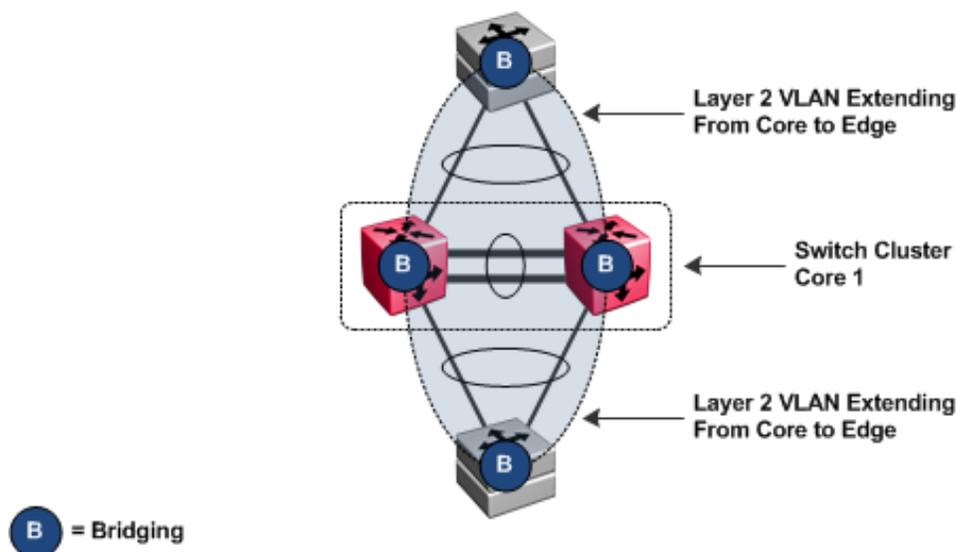


Figure 3.1 – Triangle Layer 2 Core & Edge

Switch Cluster Core 1	Triangle Topology	Notes
VSP 9000	✓	
ERS 8800/8600	✓	
ERS 8300	✓	
ERS 5000	✓	▪ Standalone and Stack
ERS 1600	✓	

Table 3.1 – Triangle Layer 2 Core & Edge

## 3.2 Layer 3 Core (VRRP) & Layer 2 Edge

Switch Clustering configuration with a single Switch Cluster Core and dual-connected edge devices. This topology represents different VLAN(s) spanning from each edge device(s) and those VLANs being routed at the Switch Cluster Core. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- The Switch Cluster core will have VRRP and Backup Master enabled per Layer 2 VLAN(s)

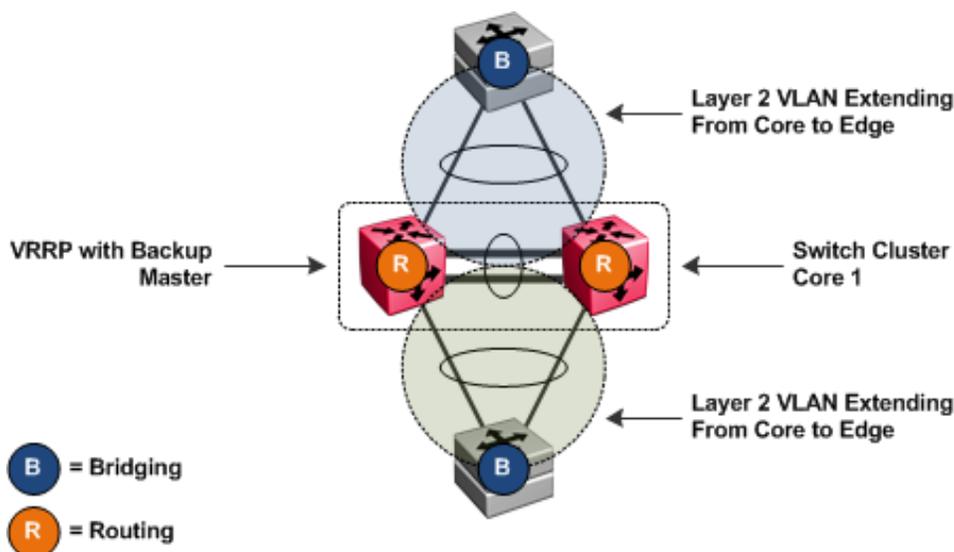


Figure 3.2 – Triangle Layer 3 Core (VRRP) & Layer 2 Edge

Switch Cluster Core 1	Triangle Topology	Notes
VSP 9000	✓	
ERS 8800/8600	✓	
ERS 8300	✓	
ERS 5000	✓	▪ Standalone and Stack.
ERS 1600	✓	

Table 3.2 – Triangle Layer 3 Core (VRRP) & Layer 2 Edge

## 3.3 Layer 3 Core (RSMLT) & Layer 2 Edge

Switch Clustering configuration with a single Switch Cluster Core and dual-connected edge devices. This topology represents different VLAN(s) spanning from each edge device(s) and those VLANs being routed at the Switch Cluster Core. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- The Switch Cluster core will have RSMLT Layer 2 Edge enabled per Layer 2 Edge VLAN(s)
- The RSMLT Layer 2 Edge feature is recommended as an alternative to VRRP
- RSMLT Layer 2 Edge and VRRP should not be enabled simultaneously on the same VLAN

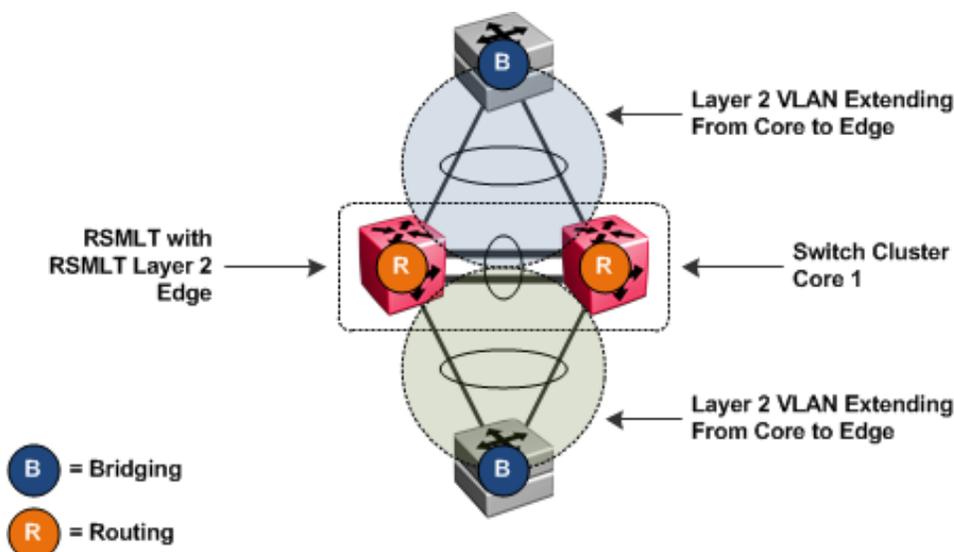


Figure 3.3 – Triangle Layer 3 Core (RSMLT) & Layer 2 Edge

Switch Cluster Core 1	Triangle Topology	Notes
VSP 9000	✓	
ERS 8800/8600	✓	
ERS 8300	✓	<ul style="list-style-type: none"> <li>▪ RSMLT support requires Release 4.1.0.0 or later.</li> <li>▪ RSMLT Edge support requires Release 4.1.4.0 or later.</li> </ul>

Table 3.3 – Triangle Layer 3 Core (RSMLT) & Layer 2 Edge

## 3.4 Layer 3 Core (RSMLT) & Layer 3 Edge

Switch Clustering configuration with a single Switch Cluster Core and dual-connected edge devices. This topology represents routing from each the edge device(s) into the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- The Switch Cluster core will have RSMLT enabled on the VLANs routed to the edge devices
- The RSMLT feature will also permit VLANs to be bridged from the edge to the Switch Cluster Core if necessary

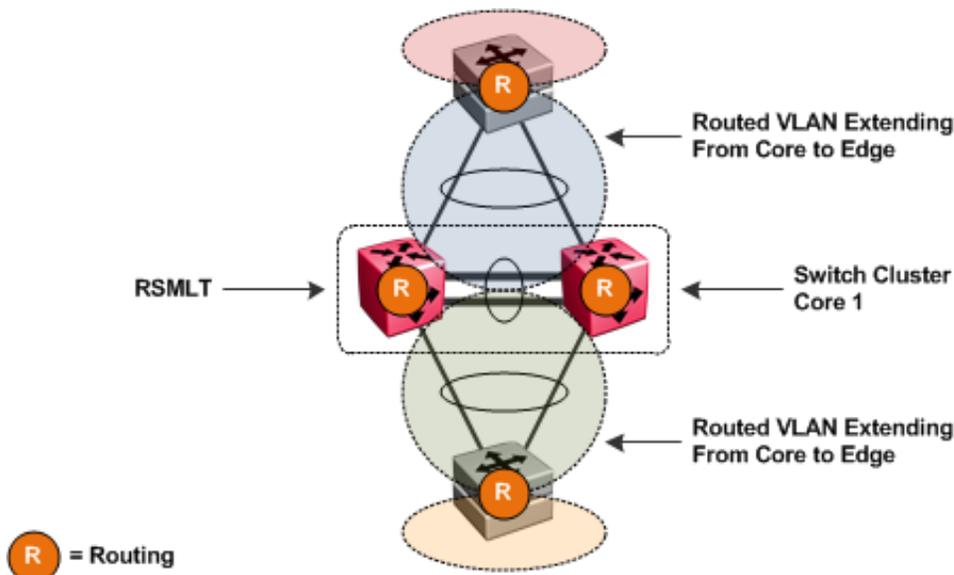


Figure 3.4 – Triangle Layer 3 Core (RSMLT) & Layer 3 Edge

Switch Cluster Core 1	Triangle Topology	Notes
VSP 9000	✓	
ERS 8800/8600	✓	
ERS 8300	✓	▪ RSMLT support requires Release 4.1.0.0 or later.

Table 3.4 – Triangle Layer 3 Core (RSMLT) & Layer 3 Edge

## 3.5 Multicast Layer 2 Core (IGMP) & Edge (IGMP)

Switch Clustering configuration with a single Switch Cluster Core and dual-connected edge devices. This topology represents a single VLAN spanning from each edge device(s). Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- The Switch Cluster Core and edge device(s) will have IGMP enabled on the Layer 2 VLAN(s).
- A multicast router or multicast querier function must be present on the network for IGMP snooping and proxy to work

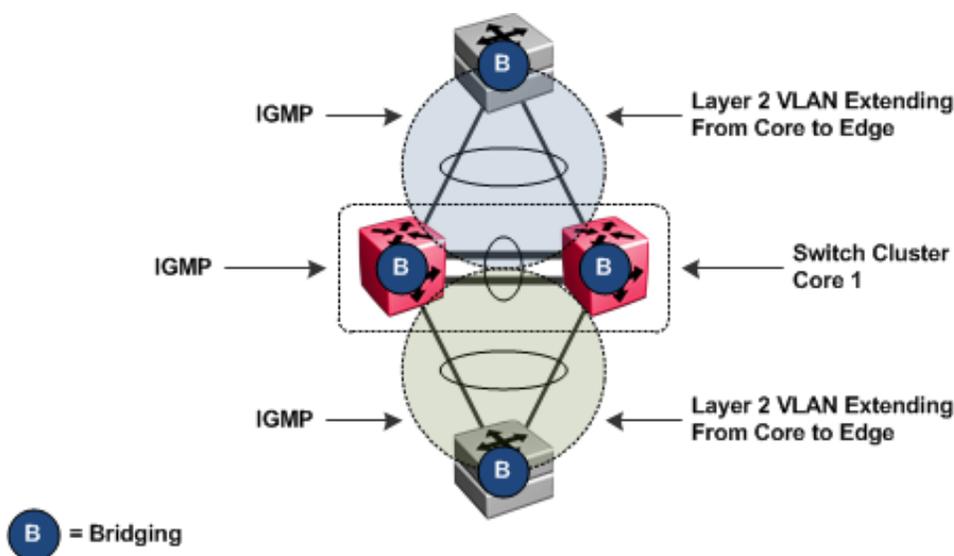


Figure 3.5 – Triangle Multicast Layer 2 Core (IGMP) & Edge (IGMP)

Switch Cluster Core 1	Triangle Topology	Notes
VSP 9000	✓	
ERS 8800/8600	✓	
ERS 8300	✓	▪ IGMP Querier Requires Release 4.0.x or later.
ERS 1600	✓	

Table 3.5 – Triangle Multicast Layer 2 Core (IGMP) & Edge (IGMP)

**Additional Notes:**

1. The ERS 8300 (Release 4.0.x or later) supports an IGMP Querier function. This can be enabled in layer 2 and therefore negates the requirement of a multicast router to perform the querier functionality.
2. The ERS 5000 does not support IGMP over SMLT/SLT at this time and therefore cannot be used as a Switch Cluster Core in this topology.

## 3.6 Multicast Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP)

Switch Clustering configuration with a single Switch Cluster Core and dual-connected edge devices. This topology represents different VLAN(s) spanning from each edge device(s) and those VLANs being routed at the Switch Cluster Core. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- The edge device(s) will have IGMP enabled on the Layer 2 VLAN(s)
- The Switch Cluster Core will have PIM-SM enabled on the VLAN(s)

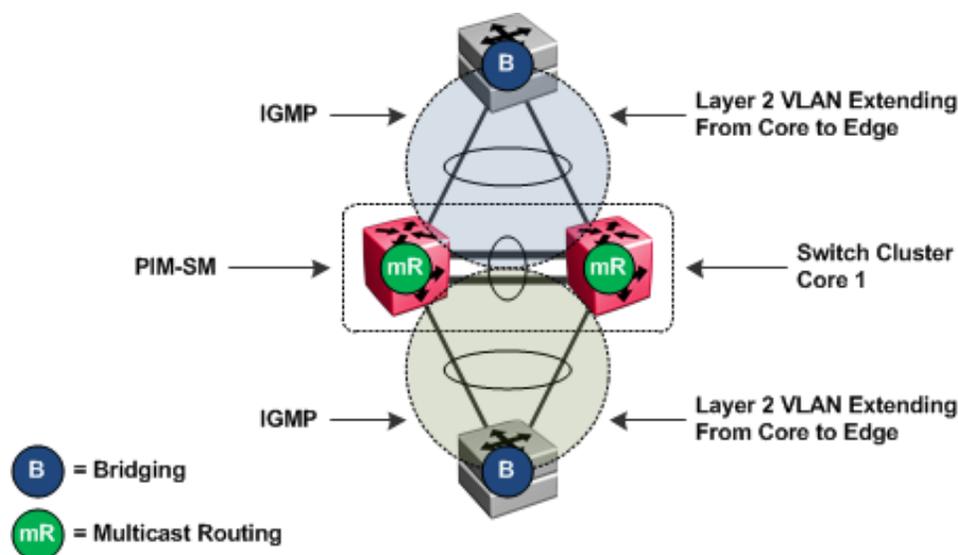


Figure 3.6 – Triangle Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP)

Switch Cluster Core 1	Triangle Topology	Notes
VSP 9000	✓	
ERS 8800/8600	✓	
ERS 8300	✓	
ERS 1600	✓	

Table 3.6 – Triangle Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP)

**Additional Notes:**

- 1) The ERS 5000 does not support IGMP over SMLT/SLT at this time and therefore cannot be used as a Switch Cluster Core in this topology.

## 3.7 MSMLT Layer 3 Core (PIM-SM) & Edge (PIM-SM)

Switch Clustering configuration with a single Switch Cluster Core and dual-connected edge devices. This topology represents different VLAN(s) spanning from each edge device(s) and those VLANs being routed at the Switch Cluster Core. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- The Switch Cluster Core and edge device(s) will have PIM-SM enabled on the VLAN(s)
- Switch Cluster Core 1 will have either VRRP/Backup Master or RSMLT Layer 2 Edge enabled per Layer 2 Edge VLAN(s)

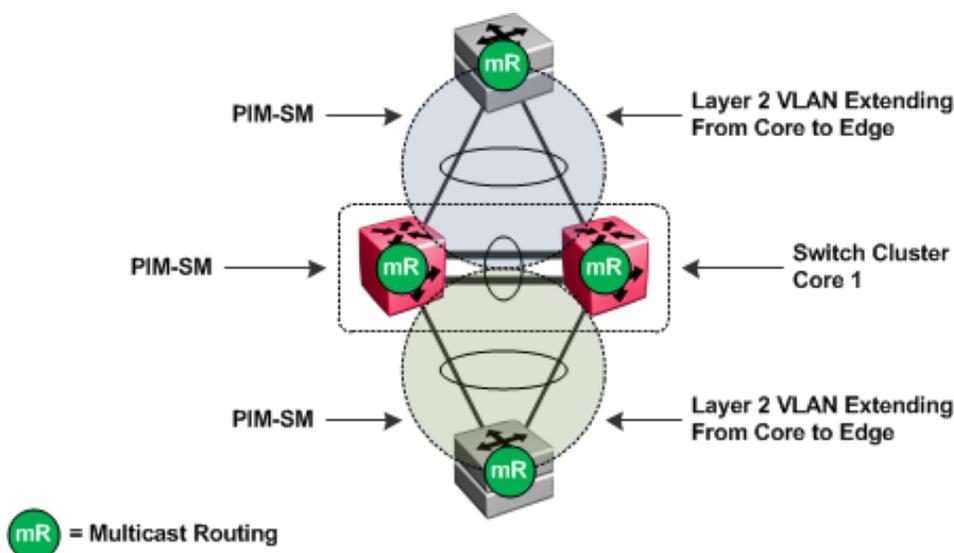


Figure 3.7 – Triangle MSMLT Layer 3 Core (PIM-SM) & Edge (PIM-SM)

Switch Cluster Core 1	Triangle Topology	Notes
VSP 9000	✓	
ERS 8800/8600	✓	

Table 3.7 – Triangle MSMLT Layer 3 Core (PIM-SM) & Edge (PIM-SM)

### Additional Notes:

- 1) The ERS 5000 does not support IGMP over SMLT/SLT at this time and therefore cannot be used as a Switch Cluster Core in this topology.

## 4. Square / Full Mesh Topologies

### 4.1 Layer 2 Core & Edge

Switch Clustering configuration with two Switch Cluster Cores and dual-connected edge devices. This topology represents a single VLAN spanning the edge devices and the Switch Cluster Cores. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported

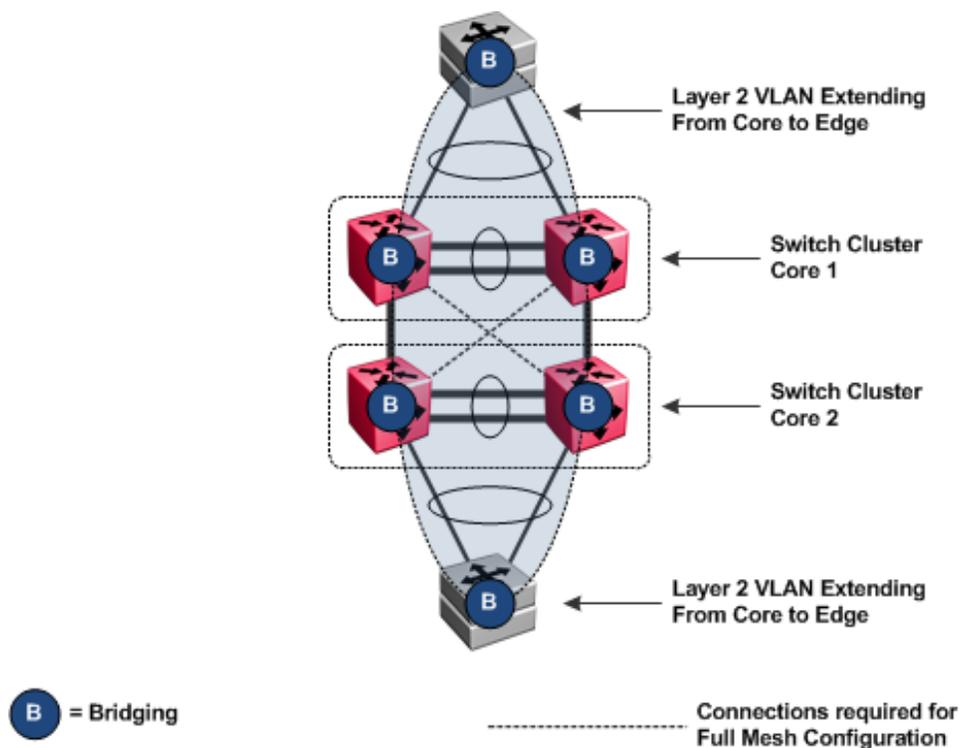


Figure 4.1 – Square / Full Mesh Layer 2 Core & Edge

Switch Cluster Core 1	Switch Cluster Core 2	Square Topology	Full Mesh Topology	Notes
VSP 9000	VSP 9000	✓	✓	
VSP 9000	ERS 8800/8600	✓	✓	
VSP 9000	ERS 8300	✓	✓	
VSP 9000	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>Standalone and Stack</li> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 8800/8600	VSP 9000	✓	✓	
ERS 8800/8600	ERS 8800/8600	✓	✓	
ERS 8800/8600	ERS 8300	✓	✓	
ERS 8800/8600	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>Standalone and Stack</li> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 8800/8600	ERS 1600	✓		
ERS 8300	VSP 9000	✓	✓	
ERS 8300	ERS 8800/8600	✓	✓	
ERS 8300	ERS 8300	✓	✓	
ERS 5000	ERS 8800/8600	✓	✓	<ul style="list-style-type: none"> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 5000	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>Standalone and Stack</li> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 1600	ERS 8800/8600	✓		
ERS 1600	ERS 1600	✓		

**Table 4.1 – Square / Full Mesh Layer 2 Core & Edge**

## 4.2 Layer 3 Core (RSMLT/VRRP) & Layer 2 Edge Scenario 1

Switch Clustering configuration with two Switch Cluster Cores and dual-connected edge devices. This topology represents different VLANs spanning the edge devices and the Switch Cluster Cores. Only one of the Switch Cluster Cores performs Layer 3 routing, while the other is strictly Layer 2. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Cores.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- Switch Cluster Core 1 will have either VRRP/Backup Master or RSMLT Layer 2 Edge enabled per Layer 2 Edge VLAN(s)

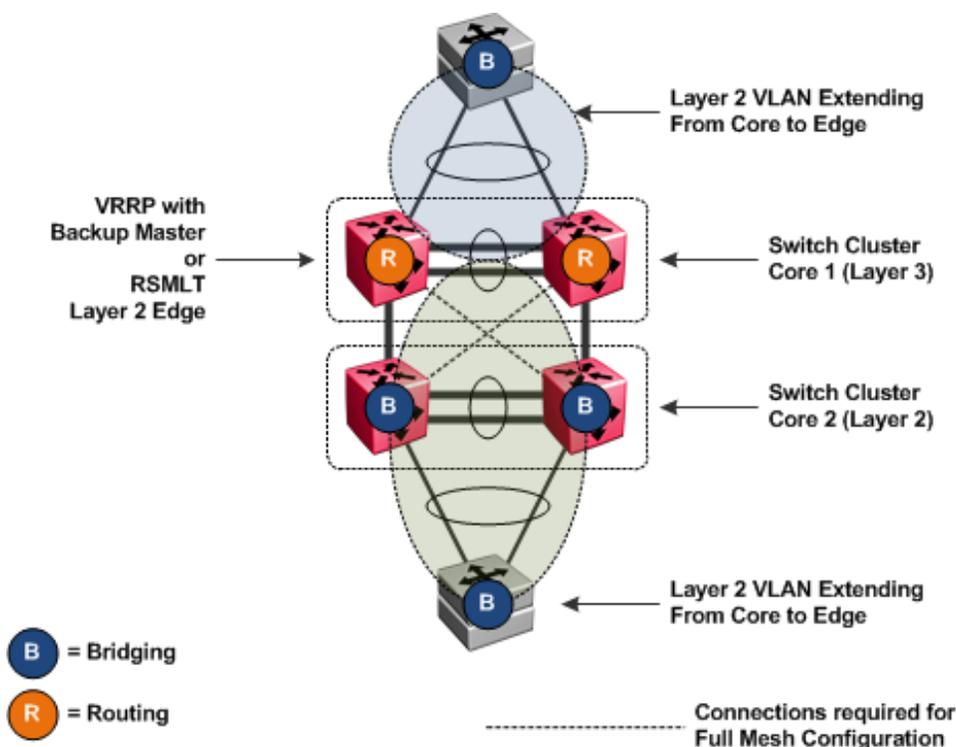


Figure 4.2 – Square / Full Mesh Layer 3 Core (RSMLT/VRRP) & Layer 2 Edge Scenario 1

Switch Cluster Core 1	Switch Cluster Core 2	Square Topology	Full Mesh Topology	Notes
VSP 9000	VSP 9000	✓	✓	
VSP 9000	ERS 8800/8600	✓	✓	
VSP 9000	ERS 8300	✓	✓	
VSP 9000	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>Standalone and Stack</li> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 8800/8600	VSP 9000	✓	✓	
ERS 8800/8600	ERS 8800/8600	✓	✓	
ERS 8800/8600	ERS 8300	✓	✓	
ERS 8800/8600	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>Standalone and Stack</li> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 8800/8600	ERS 1600	✓		
ERS 8300	VSP 9000	✓	✓	
ERS 8300	ERS 8800/8600	✓	✓	
ERS 8300	ERS 8300	✓	✓	
ERS 8300	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>Standalone and Stack</li> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 8300	ERS 1600	✓		
ERS 5000	ERS 8800/8600	✓		<ul style="list-style-type: none"> <li>Standalone and Stack</li> </ul>
ERS 5000	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>Standalone and Stack</li> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 1600	ERS 8800/8600	✓		
ERS 1600	ERS 8300	✓		
ERS 1600	ERS 5000	✓	✓	<ul style="list-style-type: none"> <li>ERS 5000 Full Mesh requires 6.1 or later.</li> </ul>
ERS 1600	ERS 1600	✓		

**Table 4.2 – Square / Full Mesh Layer 3 Core (RSMLT/RRP) & Layer 2 Edge Scenario 1**



Switch Cluster Core 1	Switch Cluster Core 2	Square Topology	Full Mesh Topology	Notes
VSP 9000	VSP 9000	✓	✓	
VSP 9000	ERS 8800/8600	✓	✓	
VSP 9000	ERS 8300	✓	✓	<ul style="list-style-type: none"> <li>ERS 8300 RSMLT support requires Release 4.1.0.0 or later.</li> <li>ERS 8300 RSMLT Edge support requires Release 4.1.4.0 or later.</li> </ul>
ERS 8800/8600	VSP 9000	✓	✓	
ERS 8800/8600	ERS 8800/8600	✓	✓	
ERS 8800/8600	ERS 8300	✓	✓	<ul style="list-style-type: none"> <li>ERS 8300 RSMLT support requires Release 4.1.0.0 or later.</li> <li>ERS 8300 RSMLT Edge support requires Release 4.1.4.0 or later.</li> </ul>
ERS 8300	VSP 9000	✓	✓	
ERS 8300	ERS 8800/8600	✓	✓	
ERS 8300	ERS 8300	✓	✓	<ul style="list-style-type: none"> <li>ERS 8300 RSMLT support requires Release 4.1.0.0 or later.</li> <li>ERS 8300 RSMLT Edge support requires Release 4.1.4.0 or later.</li> </ul>

**Table 4.3 – Square / Full Mesh Layer 3 Core (RSMLT/VRRP) & Layer 2 Edge Scenario 2**

## 4.4 Multicast Layer 2 Core (IGMP) & Edge (IGMP)

Switch Clustering configuration with two Switch Cluster Cores and dual-connected edge devices. This topology represents a single VLAN spanning from each edge device(s). Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Core.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- The Switch Cluster Cores and edge device(s) will have IGMP enabled on the Layer 2 VLAN(s)
- A multicast router or multicast querier function must be present on the network for IGMP snooping and proxy to work

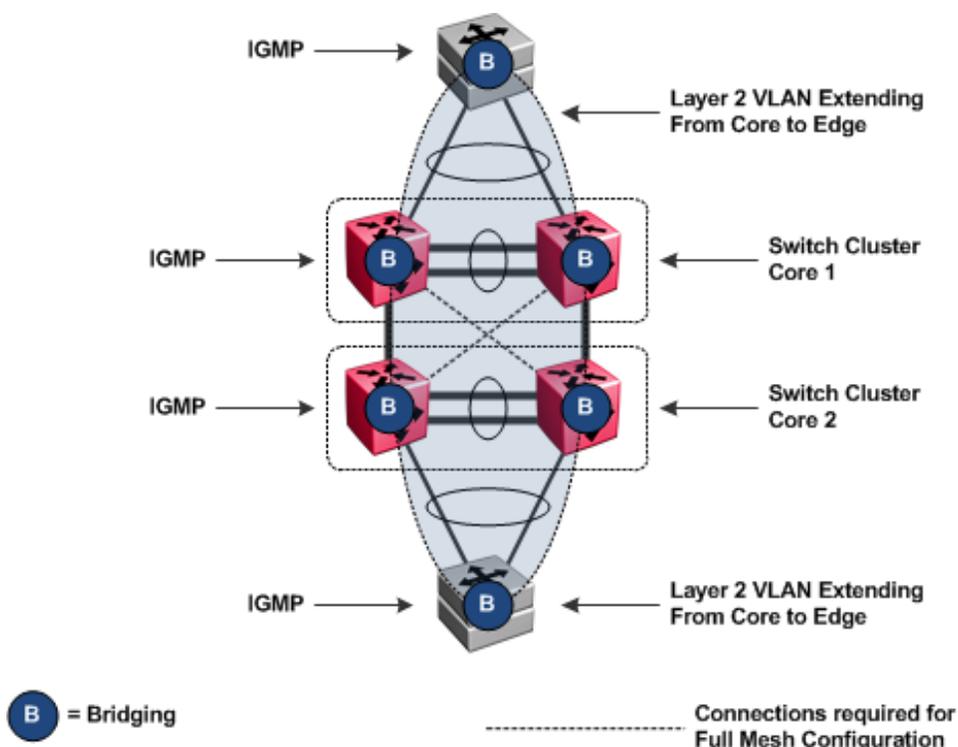


Figure 4.4 – Square / Mesh Multicast Layer 2 Core (IGMP) & Edge (IGMP)

Switch Cluster Core 1	Switch Cluster Core 2	Square Topology	Full Mesh Topology	Notes
VSP 9000	VSP 9000	✓	✓	
VSP 9000	ERS 8800/8600	✓	✓	
VSP 9000	ERS 8300	✓	✓	<ul style="list-style-type: none"> <li>ERS 8300 IGMP Querier Requires Release 4.0.x or later.</li> </ul>
ERS 8800/8600	VSP 9000	✓	✓	
ERS 8800/8600	ERS 8800/8600	✓	✓	
ERS 8800/8600	ERS 8300	✓	✓	<ul style="list-style-type: none"> <li>ERS 8300 IGMP Querier Requires Release 4.0.x or later.</li> </ul>
ERS 8800/8600	ERS 1600	✓		
ERS 8300	VSP 9000	✓	✓	
ERS 8300	ERS 8800/8600	✓	✓	
ERS 8300	ERS 8300	✓	✓	<ul style="list-style-type: none"> <li>ERS 8300 IGMP Querier Requires Release 4.0.x or later.</li> </ul>
ERS 1600	ERS 8800/8600	✓		
ERS 1600	ERS 1600	✓		

**Table 4.4 – Square / Mesh Multicast Layer 2 Core (IGMP) & Edge (IGMP)**

## 4.5 MSMLT Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP) Scenario 1

Switch Clustering configuration with two Switch Cluster Cores and dual-connected edge devices. This topology represents different VLANs spanning the edge devices and the Switch Cluster Cores. Only one of the Switch Cluster Cores performs Layer 3 multicast routing, while the other is strictly Layer 2. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Cores.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- Switch Cluster Core 1 will have PIM-SM enabled per Layer 2 VLAN(s)
- Switch Cluster Core 2 and the edge device(s) will have IGMP enabled
- Switch Cluster Core 1 will have either VRRP/Backup Master or RSMLT Layer 2 Edge enabled per Layer 2 Edge VLAN(s)

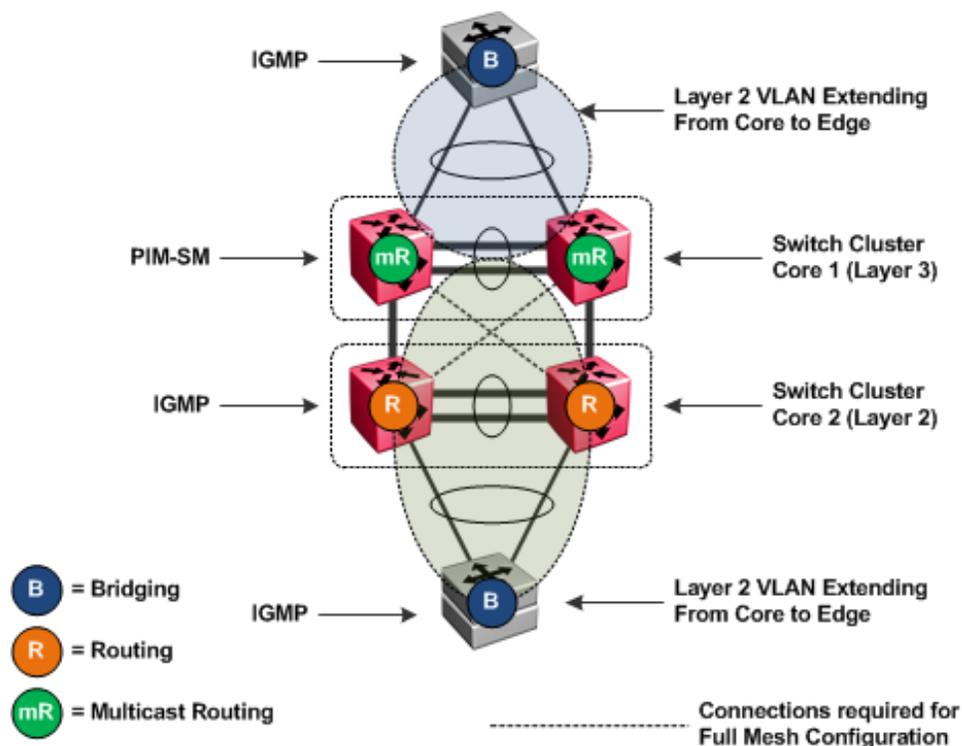


Figure 4.5 – Square / Mesh MSMLT Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP) Scenario 1

Switch Cluster Core 1	Switch Cluster Core 2	Square Topology	Full Mesh Topology	Notes
VSP 9000	VSP 9000	✓	✓	
VSP 9000	ERS 8800/8600	✓	✓	
VSP 9000	ERS 8300	✓	✓	
ERS 8800/8600	ERS 8800/8600	✓	✓	
ERS 8800/8600	ERS 8300	✓	✓	
ERS 8800/8600	ERS 1600	✓		

**Table 4.5 – Square / Mesh MSMLT Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP) Scenario 1**

**Additional Notes:**

- 1) The ERS 5000 does not support IGMP over SMLT/SLT at this time and therefore cannot be used as a Switch Cluster Core in this topology.

## 4.6 MSMLT Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP) Scenario 2

Switch Clustering configuration with two Switch Cluster Cores and dual-connected edge devices. This topology represents different VLANs spanning the edge devices and the Switch Cluster Cores. Both of the Switch Cluster Cores performs Layer 3 multicast routing, while the edge device(s) are Layer 2 IGMP. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Cores.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- Switch Cluster Cores will have PIM-SM enabled per Layer 2 VLAN(s)
- The edge device(s) will have IGMP enabled
- Switch Cluster Cores will have either VRRP/Backup Master or RSMLT Layer 2 Edge enabled per Layer 2 Edge VLAN(s)
- If VRRP used, it will not be enabled on the RSMLT VLAN between Switch Cluster Cores

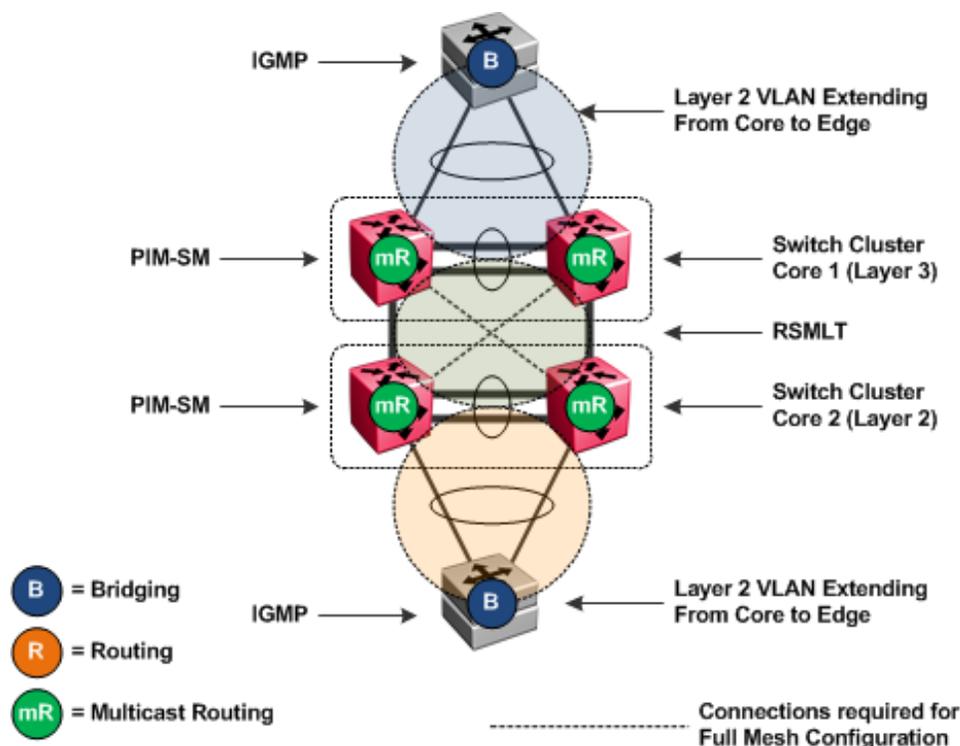


Figure 4.6 – Square / Mesh MSMLT Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP) Scenario 2

Switch Cluster Core 1	Switch Cluster Core 2	Square Topology	Full Mesh Topology	Notes
VSP 9000	VSP 9000	✓	✓	
VSP 9000	ERS 8800/8600	✓	✓	
ERS 8800/8600	VSP 9000	✓	✓	
ERS 8800/8600	ERS 8800/8600	✓	✓	

**Table 4.6 – Square / Mesh MSMLT Layer 3 Core (PIM-SM) & Layer 2 Edge (IGMP) Scenario 2**

**Additional Notes:**

- 1) The ERS 5000 does not support IGMP over SMLT/SLT at this time and therefore cannot be used as a Switch Cluster Core in this topology.

## 4.7 MSMLT Layer 3 Core (PIM-SM) & Edge (PIM-SM)

Switch Clustering configuration with two Switch Cluster cores and dual-connected edge devices. This topology represents different VLANs spanning the edge devices and the Switch Cluster Cores. Both of the Switch Cluster Cores as well as the edge device(s) performs Layer 3 multicast routing. Multiple VLANs can be configured on the edge devices and 802.1Q tagged to the Switch Cluster Cores.

- Any edge device that supports a form of Link Aggregation is supported
- Spanning Tree must be disabled on the edge device(s) link aggregation group
- SLT and SMLT configurations supported
- Switch Cluster Cores and edge device(s) will have PIM-SM enabled per Layer 2 VLAN(s)
- Switch Cluster Cores will have either VRRP/Backup Master or RSMLT Layer 2 Edge enabled per Layer 2 Edge VLAN(s)
  - If VRRP used, it must not be enabled on the RSMLT VLAN between Switch Cluster Cores

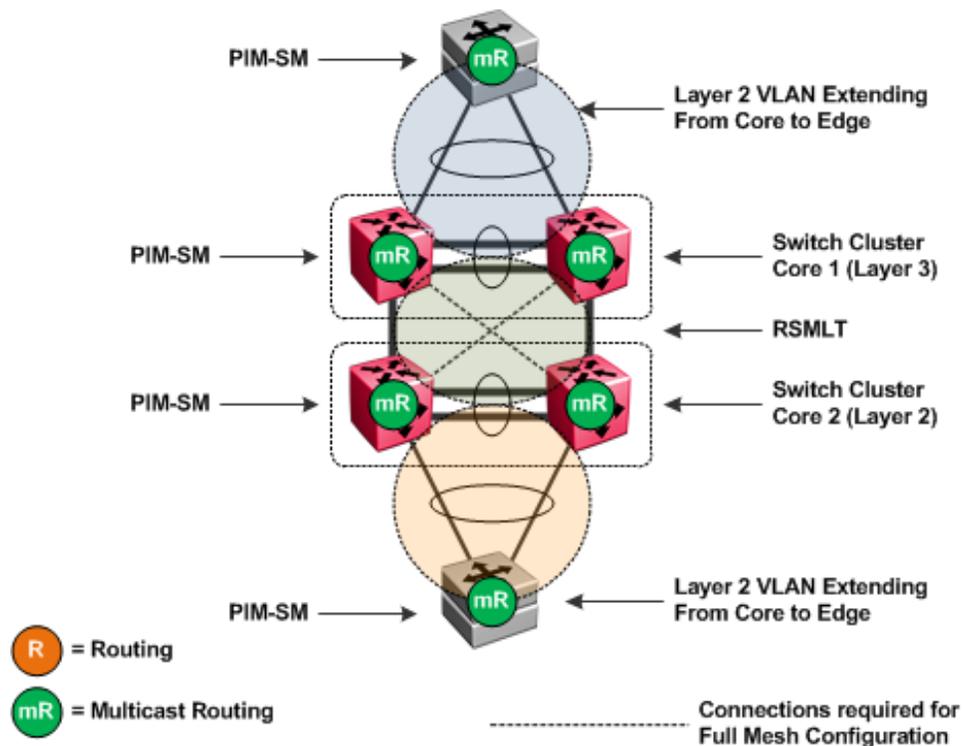


Figure 4.7 – Square / Mesh MSMLT Layer 3 Core (PIM-SM) & Edge (PIM-SM)

Switch Cluster Core 1	Switch Cluster Core 2	Square Topology	Full Mesh Topology	Notes
VSP 9000	VSP 9000	✓	✓	
VSP 9000	ERS 8800/8600	✓	✓	
ERS 8800/8600	VSP 9000	✓	✓	
ERS 8800/8600	ERS 8800/8600	✓	✓	

**Table 4.7 – Square / Mesh MSMLT Layer 3 Core (PIM-SM) & Edge (PIM-SM)**

**Additional Notes:**

- 1) The ERS 5000 does not support IGMP over SMLT/SLT at this time and therefore cannot be used as a Switch Cluster Core in this topology.
- 2) The ERS 8300 is not supported in the core or at the edge in this topology.

## 5. Switch Clustering – Best Practice Feature Support

With the implementation of Switch Clustering, there are several protection features that are recommended for use to ensure a solid and resilient infrastructure. For a detailed discussion on each of these features and their recommended values, please refer to the Small Campus Technical Solutions Guide (NN48500-573), Medium Campus Technical Solutions Guide (NN48500-574), Large Campus Technical Solutions Guide (NN48500-575), Super Large Campus Technical Solutions Guide (NN48500-609) or the Switch Clustering using SMLT Technical Configuration Guide (NN48500-518).

The table below lists the protection features and their support in the Virtual Services Platform 9000 and individual Ethernet Routing Switch platforms:

Hardware Platform	Software Release	cp-limit	ext-cp-limit	VLACP	SLPP
VSP 9000	3.0.0.0	Yes	N/A	Yes	Yes
ERS 8800/8600	3.7.0-3.7.4	Yes	N/A	Yes	N/A
ERS 8800/8600	3.7.5-3.7.x	Yes	Yes <sup>1</sup>	Yes	N/A
ERS 8800/8600	4.0.x	Yes	N/A	Yes	N/A
ERS 8800/8600	4.1.x – 7.0.x	Yes	Yes <sup>2</sup>	Yes	Yes
ERS 8300	3.x	Yes	N/A	N/A	N/A
ERS 8300	4.0.x	Yes	N/A	N/A	Yes
ERS 8300	4.1.x	Yes	N/A	Yes	Yes
ERS 5000	5.0.x – 6.2.x	N/A	N/A	Yes	N/A
ERS 1600	2.1.x	Yes	N/A	N/A	N/A

<sup>1</sup> HardDown

<sup>2</sup> SoftDown

## 6. Reference Documentation

For more detailed information on Switch Clustering, please refer to:

Publication Number	Document Title
(NN48500-573)	Small Campus Technical Solutions Guide
(NN48500-574)	Medium Campus Technical Solutions Guide
(NN48500-575)	Large Campus Technical Solutions Guide
(NN48500-609)	Super Large Campus Technical Solutions Guide
(NN48500-518)	Switch Clustering using SMLT Technical Configuration Guide

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