



Virtual Services Platform

9000

Engineering

> IPv6 for VSP 9000 Technical Configuration Guide

Avaya Data Solutions

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Abstract

This document provides examples on configuring IPv6 and OSPFv3 on the VPS 9000 and assumes you have a good working knowledge of IPv6 and OSPFv3.

Acronym Key

Throughout this guide the following acronyms will be used:

- 6to4: IPv6 to IPv4 automatic tunneling by appending IPv4 address to 2002::/16
- ARP: Address Resolution Protocol
- DHCPv6: Dynamic Host Configuration Protocol version 6
- EUI-64: 64-bit Extended Unique Identifier
- ICMPv6: Internet Control Message version 6
- IPv6: Internet Protocol version 6
- ISATAP: Intra-Site Automatic Tunneling Addressing Protocol
- MLD: Multicast Listener Discovery
- MTU: Maximum Transmission Unit
- NA: Neighbor Advertisement
- NAT64: Network Address Translation IPv6 to IPv4
- NS: Neighbor Solicitation
- ND: Neighbor Discovery and uses ICMPv6 messages RS, RA, NS, NA, and redirect
- NUD: Neighbor Unreachability Detection
- OSPFv3: Open Shortest Path First version 3
- RA: Router Advertisement
- RS: Router Solicitation
- RDISC: Router Discovery

Revision Control

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1		1.0	John Vant Erve	Initial Release

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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 covers how to provision the Virtual Services Platform 9000 (VSP 9000) to support dual stack and IPv6 tunneling over IPv4. It is assumed the reader has a good knowledge of IPv4 and IPv6 including OSPFv2 and OSPFv3. Two configuration examples are providing on each of these topics.



Please note, all reference to VSP refers to the Virtual Services Platform 9000 switch.

2. Configuration Examples

2.1 IPv6 Dual Stack Configuration Example

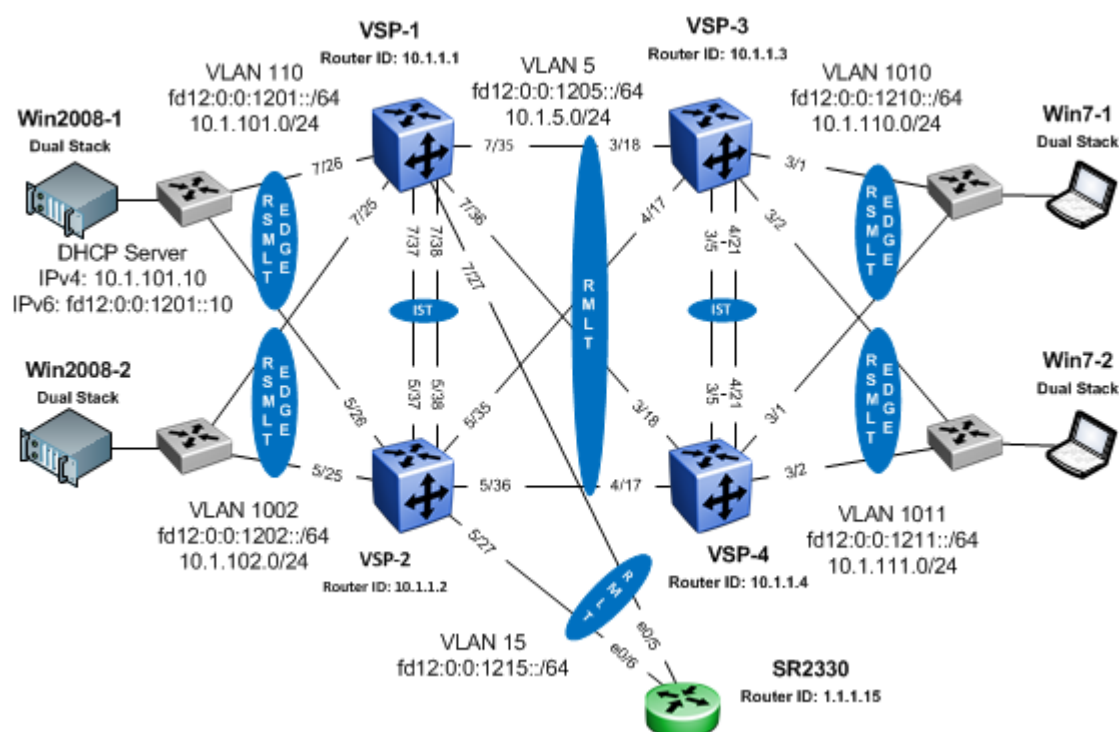


Figure 1 – IPv6 Dual Stack Configuration Example

Overall, this configuration example will consist of the following:

- Two SMLT clusters consisting
 - VSP 9000 switches: VSP-1 & VSP-2 and VSP-3 & VSP-4 with software level 3.2
- Secure Router model 2330 connected to the VSP 9000 cluster VSP-1 and VSP-2
- All edge switches connected to either of the VSP 9000 clusters are Avaya stackable switches running L2 with an MLT uplink
- RSMLT is configured for all L3 routing instances between the two VSP 9000 cluster switches and also provisioned on the VSP 9000 cluster (VSP-1 & VSP-2) cluster to the SR2330
- RSMLT Edge is configured on both of the VSP 9000 cluster switches to the Avaya L2 edge stackable switches
- IPv6 dual stack is provisioned on all VLANs with the exception of the interface from the VSP 9000 cluster VSP-1 & VSP-2 to the SR2330 which is provisioned for IPv6 only
- The Windows 2008 servers and Windows 7 clients are running IPv6 dual stack
 - IPv6 must be disabled on the Windows 7 clients to test IPv4 in this setup
- Both IPv4 and IPv6 DHCP Relay is enabled on the VSP-9000 cluster switches VSP-3 & VSP-4

2.1.1 IPv6 Dual Stack Configuration:

1 IST Configuration:

Switch	Feature	Parameter	Value
VSP-1, VSP-2, VSP-3, VSP-4	IST	MLT ID	1
		VLAN	2
	VLACP (IST port members)	Timers	Long (slow)
		Time-out Scale	5
		VLACP MAC	01:80:c2:00:00:0f
		Slow periodic time	10000
VSP-1	IST VLAN	IP address	10.1.2.1/30
		Ports	7/37, 7/38
VSP-2	IST VLAN	IP address	10.1.2.2/30
		Ports	5/37, 5/38
VSP-3	IST VLAN	IP address	10.1.2.6/30
		Ports	3/5, 4/21
VSP-4	IST VLAN	IP address	10.1.2.5/30
		Ports	3/5, 4/21

VSP-1

```
#
# LACP CONFIGURATION
#

vlacp enable

#
# PORT CONFIGURATION - PHASE I
#

interface GigabitEthernet 7/37
loop-detect action mac-discard
exit
interface GigabitEthernet 7/38
loop-detect action mac-discard
exit

#
# MLT CONFIGURATION
#

mlt 1 enable name "IST"
mlt 1 member 7/37-7/38
mlt 1 encapsulation dot1q

#
# VLAN CONFIGURATION
#

vlan create 2 name "IST" type port-
mstprstp 1
vlan mlt 2 1
vlan members 2 7/37-7/38 portmember
interface Vlan 2
ip address 10.1.2.1 255.255.255.252
exit
```

VSP-2

```
#
# LACP CONFIGURATION
#

vlacp enable

#
# PORT CONFIGURATION - PHASE I
#

interface GigabitEthernet 5/37
loop-detect action mac-discard
exit
interface GigabitEthernet 5/38
loop-detect action mac-discard
exit

#
# MLT CONFIGURATION
#

mlt 1 enable name "IST"
mlt 1 member 5/37-5/38
mlt 1 encapsulation dot1q

#
# VLAN CONFIGURATION
#

vlan create 2 name "IST" type port-
mstprstp 1
vlan mlt 2 1
vlan members 2 5/37-5/38 portmember
interface Vlan 2
ip address 10.1.2.2 255.255.255.252
exit
```

```
#
# MLT INTERFACE CONFIGURATION
#
```

```
interface mlt 1
ist peer-ip 10.1.2.2 vlan 2
ist enable
exit
```

```
#
# PORT CONFIGURATION - PHASE II
#
```

```
interface GigabitEthernet 7/37
default-vlan-id 2
no shutdown

vlacp slow-periodic-time 10000 funcmac-
addr 01:80:c2:00:00:0f
vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit

interface GigabitEthernet 7/38
default-vlan-id 2
no shutdown

vlacp slow-periodic-time 10000 funcmac-
addr 01:80:c2:00:00:0f
vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

```
#
# MLT INTERFACE CONFIGURATION
#
```

```
interface mlt 1
ist peer-ip 10.1.2.1 vlan 2
ist enable
exit
```

```
#
# PORT CONFIGURATION - PHASE II
#
```

```
interface GigabitEthernet 5/37
default-vlan-id 2
no shutdown

vlacp slow-periodic-time 10000 timeout-
scale 5 funcmac-addr 01:80:c2:00:00:0f
vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit

interface GigabitEthernet 5/38
default-vlan-id 2
no shutdown

vlacp slow-periodic-time 10000 timeout-
scale 5 funcmac-addr 01:80:c2:00:00:0f
vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

VSP-3

```
#
# LACP CONFIGURATION
#

vlacp enable

#
# PORT CONFIGURATION - PHASE I
#

interface GigabitEthernet 3/5
loop-detect action mac-discard
exit
interface GigabitEthernet 4/21
loop-detect action mac-discard
exit

#
# MLT CONFIGURATION
#

mlt 1 enable name "IST"
mlt 1 member 3/5,4/21
mlt 1 encapsulation dot1q

#
# VLAN CONFIGURATION
#

vlan create 2 name "IST" type port-
mstprstp 1
vlan members 2 3/5,4/21 portmember
interface Vlan 2
ip address 10.1.2.6 255.255.255.252
exit

#
```

VSP-4

```
#
# LACP CONFIGURATION
#

vlacp enable

#
# PORT CONFIGURATION - PHASE I
#

interface GigabitEthernet 3/5
loop-detect action mac-discard
exit
interface GigabitEthernet 4/21
loop-detect action mac-discard
exit

#
# MLT CONFIGURATION
#

mlt 1 enable name "IST"
mlt 1 member 3/5,4/21
mlt 1 encapsulation dot1q

#
# VLAN CONFIGURATION
#

vlan create 2 name "IST" type port-
mstprstp 1
vlan members 2 3/5,4/21 portmember
interface Vlan 2
ip address 10.1.2.5 255.255.255.252
exit

#
```

```
# MLT INTERFACE CONFIGURATION
```

```
#
```

```
interface mlt 1
```

```
ist peer-ip 10.1.2.5 vlan 2
```

```
ist enable
```

```
exit
```

```
#
```

```
# PORT CONFIGURATION - PHASE II
```

```
#
```

```
interface GigabitEthernet 3/5
```

```
default-vlan-id 2
```

```
no shutdown
```

```
vlacp slow-periodic-time 10000 funcmac-  
addr 01:80:c2:00:00:0f
```

```
vlacp enable
```

```
no spanning-tree mstp force-port-state  
enable
```

```
no spanning-tree mstp msti 1 force-port-  
state enable
```

```
exit
```

```
interface GigabitEthernet 4/21
```

```
default-vlan-id 2
```

```
no shutdown
```

```
vlacp slow-periodic-time 10000 funcmac-  
addr 01:80:c2:00:00:0f
```

```
vlacp enable
```

```
no spanning-tree mstp force-port-state  
enable
```

```
no spanning-tree mstp msti 1 force-port-  
state enable
```

```
exit
```

```
# MLT INTERFACE CONFIGURATION
```

```
#
```

```
interface mlt 1
```

```
ist peer-ip 10.1.2.6 vlan 2
```

```
ist enable
```

```
exit
```

```
#
```

```
# PORT CONFIGURATION - PHASE II
```

```
#
```

```
interface GigabitEthernet 3/5
```

```
default-vlan-id 2
```

```
no shutdown
```

```
vlacp slow-periodic-time 10000 funcmac-  
addr 01:80:c2:00:00:0f
```

```
vlacp enable
```

```
no spanning-tree mstp force-port-state  
enable
```

```
no spanning-tree mstp msti 1 force-port-  
state enable
```

```
exit
```

```
interface GigabitEthernet 4/21
```

```
default-vlan-id 2
```

```
no shutdown
```

```
vlacp slow-periodic-time 10000 funcmac-  
addr 01:80:c2:00:00:0f
```

```
vlacp enable
```

```
no spanning-tree mstp force-port-state  
enable
```

```
no spanning-tree mstp msti 1 force-port-  
state enable
```

```
exit
```

2 Core Configuration: OSPFv2 and OSPFv3 with RSMILT – VSP9000 Clusters

Switch	Feature	Parameter	Value
VSP-1, VSP-2, VSP-3 VSP-4	VLAN and MLT	VLAN	5
		MLT ID	7
		RSMILT	Enable
		OSPFv2	Enable
		OSPFv3	Enable
VSP-1, VSP-2, VSP-3 VSP-4	VLACP – for VLAN 5 port members	Timer	Short
		Timeout Scale	5
		VLACP MAC	01:80:c2:00:00:0f
		Fast periodic time	500
VSP-1	VLAN 5	IPv4 address	10.1.5.1/24
		IPv6 address	fd12:0:0:1205::1/64
		Ports	7/35, 7/36
VSP-2	VLAN 5	IPv4 address	10.1.5.2/24
		IPv6 address	fd12:0:0:1205::2/64
		Ports	5/35, 5/36
VSP-3	VLAN 5	IPv4 address	10.1.5.3/24
		IPv6 address	fd12:0:0:1205::3/64
		Ports	3/18, 4/17
VSP-4	VLAN 5	IPv4 address	10.1.5.4/24
		IPv6 address	fd12:0:0:1205::4/64
		Ports	3/18, 4/17

VSP-1

```
#
# MLT CONFIGURATION
#

mlt 7 enable name "SMLT_to_8800"
mlt 7 member 7/35-7/36
mlt 7 encapsulation dot1q

#
# VLAN CONFIGURATION - PHASE I
#

vlan create 5 type port-mstprstp 1
vlan mlt 5 1
vlan mlt 5 7
vlan members 5 7/35-7/38 portmember
interface Vlan 5
ip address 10.1.5.1 255.255.255.0
ip ospf enable
ipv6 interface enable
ipv6 interface address
fd12:0:0:1205:0:0:0:1/64
ip rsmlt
exit

#
# MLT INTERFACE CONFIGURATION
#

interface mlt 7
smlt
exit

#
# PORT CONFIGURATION - PHASE II
#
```

VSP-2

```
#
# MLT CONFIGURATION
#

mlt 7 enable name "SMLT_to_8800"
mlt 7 member 5/35-5/36
mlt 7 encapsulation dot1q

#
# VLAN CONFIGURATION - PHASE I
#

vlan create 5 type port-mstprstp 1
vlan mlt 5 1
vlan mlt 5 7
vlan members 5 5/35-5/38 portmember
interface Vlan 5
ip address 10.1.5.2 255.255.255.0
ip ospf enable
ipv6 interface enable
ipv6 interface address
fd12:0:0:1205:0:0:0:2/64
ip rsmlt
exit

#
# MLT INTERFACE CONFIGURATION
#

interface mlt 7
smlt
exit

#
# PORT CONFIGURATION - PHASE II
#
```



```
interface GigabitEthernet 7/35
default-vlan-id 5
no shutdown

vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f

vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

```
interface GigabitEthernet 7/36
default-vlan-id 5
no shutdown

vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f

vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#
```

```
interface vlan 5
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
```

```
interface GigabitEthernet 5/35
default-vlan-id 5
no shutdown

vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f

vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

```
interface GigabitEthernet 5/36
default-vlan-id 5
no shutdown

vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f

vlacp enable

no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#
```

```
interface vlan 5
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
```

VSP-3

```
#
# MLT CONFIGURATION
#

mlt 7 enable
mlt 7 member 3/18,4/17
mlt 7 encapsulation dot1q

#
# VLAN CONFIGURATION - PHASE I
#

vlan create 5 type port-mstprstp 1
vlan mlt 5 1
vlan mlt 5 7
vlan members 5 3/5,3/18,4/17,4/21
portmember
interface Vlan 5
ip address 10.1.5.3 255.255.255.0 1
ip ospf enable
ipv6 interface enable
ipv6 interface address
fd12:0:0:1205:0:0:0:3/64
ip rsmlt
exit

#
# MLT INTERFACE CONFIGURATION
#

interface mlt 7
smlt
exit

#
# PORT CONFIGURATION - PHASE II
#
```

VSP-4

```
#
# MLT CONFIGURATION
#

mlt 7 enable
mlt 7 member 3/18,4/17
mlt 7 encapsulation dot1q

#
# VLAN CONFIGURATION - PHASE I
#

vlan create 5 type port-mstprstp 1
vlan mlt 5 1
vlan mlt 5 7
vlan members 5 3/5,3/18,4/17,4/21
portmember
interface Vlan 5
ip address 10.1.5.4 255.255.255.0 1
ip ospf enable
ipv6 interface enable
ipv6 interface address
fd12:0:0:1205:0:0:0:4/64
ip rsmlt
exit

#
# MLT INTERFACE CONFIGURATION
#

interface mlt 7
smlt
exit

#
# PORT CONFIGURATION - PHASE II
#
```

```
interface GigabitEthernet 3/18
default-vlan-id 5
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state
exit
```

```
interface GigabitEthernet 4/17
default-vlan-id 5
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state
exit
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#
```

```
interface vlan 5
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
```

```
interface GigabitEthernet 3/18
default-vlan-id 5
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state
exit
```

```
interface GigabitEthernet 4/17
default-vlan-id 5
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state
exit
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#
```

```
interface vlan 5
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
```

3 Core Configuration: OSPFv3 with RSMLT – VSP9000 to SR2330

Switch	Feature	Parameter	Value
VSP-1, VSP-2	VLAN and MLT	VLAN	15
		MLT ID	8
		RSMLT	Enable
		OSPFv3	Enable
SR2330	VLAN and Channel Group	VLAN	15
		OSPFv3	Enable
		Channel-group	1
		Channel-group type	static
VSP-1	VLAN 15	IPv6 address	fd12:0:0:1215::1/64
		Ports	7/27
VSP-2	VLAN 15	IPv6 address	fd12:0:0:1215::2/64
		Ports	5/27
SE2330	VLAN 15	IPv6 address	fd12:0:0:1215::10/64
		Ports	e0/6, e0/6

VSP-1

```
#
# MLT CONFIGURATION
#

mlt 8 enable
mlt 8 member 7/27
mlt 8 encapsulation dot1q

#
# VLAN CONFIGURATION - PHASE I
#

vlan create 15 type port-mstprstp 1
vlan mlt 15 1
vlan mlt 15 8
vlan members 15 7/27,7/37-7/38 portmember
interface vlan 15
ipv6 interface mac-offset 6
ipv6 interface enable
ipv6 interface address
fd12:0:0:2015:0:0:0:1/64
ip rsm1t
exit

#
# MLT INTERFACE CONFIGURATION
#

interface mlt 8
smlt
exit

#
# PORT CONFIGURATION - PHASE II
#

interface GigabitEthernet 7/27
```

VSP-2

```
#
# MLT CONFIGURATION
#

mlt 8 enable
mlt 8 member 5/27
mlt 8 encapsulation dot1q

#
# VLAN CONFIGURATION - PHASE I
#

vlan create 15 name "WAN_VLAN" type port-
mstprstp 1
vlan mlt 15 1
vlan mlt 15 8
vlan members 15 5/27,5/37-5/38 portmember
interface vlan 15
ipv6 interface mac-offset 5
ipv6 interface enable
ipv6 interface address
fd12:0:0:2015:0:0:0:2/64
ip rsm1t
exit

#
# MLT INTERFACE CONFIGURATION
#

interface mlt 8
smlt
exit

#
# PORT CONFIGURATION - PHASE II
#
```

```
default-vlan-id 15
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#
```

```
interface vlan 15
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
```

```
interface GigabitEthernet 5/27
default-vlan-id 15
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#
```

```
interface vlan 15
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
```

SR2330

```
vlan database
vlan 15 name core
exit database
```

```
interface loopback lo1
ipv6 enable
ipv6 address fd12:0:0:2099::1/128
exit loopback
```

```
interface ethernet 0/5
aaa
exit aaa
lacp
channel-group 1 static
exit lacp
```

```
interface ethernet 0/6
aaa
exit aaa
lacp
channel-group 1 static
exit lacp
```

```
interface vlan vlan15
```

```
ipv6 enable
ipv6 address fd12:0:0:2015::10/64
    ipv6 ospf network broadcast
    ipv6 router ospf area 0
exit vlan

interface lag lag1
    switchport
    switchport mode trunk
    switchport trunk allowed vlan 15
    switchport trunk remove default-vlan
exit lag

router ipv6 ospf
    redistribute connected
    log-adjacency-changes
exit ospf
```

4 Edge Configuration: OSPFv2 and OSPFv3 with RSMLT Edge

For this configuration step the following VLAN and IP parameters will be enabled:

Switch	Feature	Parameter	Value
VSP-1, VSP-2	VLAN and MLT	ID	110
		MLT ID	6
		RSMLT Edge	Holdup timer 9999
		OSPFv2	Enable
		OSPFv3	Enable
	VLAN and MLT	ID	1002
		MLT ID	5
		RSMLT Edge	Holdup timer 9999
		OSPFv2	Enable
		OSPFv3	Enable
	VLACP – VLAN 110 and VLAN 1002 port members	Timer	Short
		Timeout Scale	5
		VLACP MAC	01:80:c2:00:00:0f
		Fast periodic time	500
VSP-1	VLAN 110	IPv4 address	10.1.101.1/24
		IPv6 address	Fd12:0:0:1201::1/64
		Ports	7/26
	VLAN 1002	IPv4 address	10.1.102.1/24
		IPv6 address	Fd12:0:0:1202::1/64
		Ports	7/25

VSP-2	VLAN 110	IPv4 address	10.1.101.2/24
		IPv6 address	Fd12:0:0:1201::2//64
		Ports	5/26
	VLAN 1002	IPv4 address	10.1.102.2/24
		IPv6 address	Fd12:0:0:1202::1//64
		Ports	5/25
VSP-3, VSP-4	VLAN 1010	ID	1010
		MLT ID	2
		SMLT ID	2
		RSMLT Edge	Holdup timer 9999
		OSPFv2	Enable
		OSPFv3	Enable
		IPv4 DHCP Relay	Enable
		IPv6 DHCP Relay	Enable
	VLAN 1011	ID	1011
		MLT ID	3
		SMLT ID	3
		RSMLT Edge	Holdup timer 9999
		OSPFv2	Enable
		OSPFv3	Enable
		IPv4 DHCP Relay	Enable
		IPv6 DHCP Relay	Enable
	VLACP	Timer	Short
		Timeout Scale	5
		VLACP MAC	01:80:c2:00:00:0f
		Fast periodic time	500

VSP-3	VLAN 1010	IPv4 address	10.1.110.1/24
		IPv6 address	fd12:0:0:1210::1/64
		Ports	3/1
	VLAN 1011	IPv4 address	10.1.111.1/24
		IPv6 address	fd12:0:0:1211::1/64
		Ports	3/2
	DHCP Relay – IPv4/IPv6	Agent – VLAN 1010	10.1.110.1 fd12:0:0:1210::1
		Agent – VLAN 1011	10.1.111.1 fd12:0:0:1211::1
		Server	10.1.101.10 fd12:0:0:1201::1
VSP-4	VLAN 1010	IPv4 address	10.1.110.2/24
		IPv6 address	fd12:0:0:1210::2/64
		Ports	3/1
	VLAN 1011	IPv4 address	10.1.111.2/24
		IPv6 address	fd12:0:0:1211::2/64
		Ports	3/2
	DHCP Relay – IPv4/IPv6	Agent – VLAN 1010	10.1.110.2 fd12:0:0:1211::2
		Agent – VLAN 1011	10.1.111.2 fd12:0:0:1211::2
		Server	10.1.101.10 fd12:0:0:1201::1

VSP-1

```
#
# MLT CONFIGURATION
#

mlt 5 enable name "smlt5"
mlt 5 member 7/25
mlt 5 encapsulation dot1q
mlt 6 enable name "smlt6"
mlt 6 member 7/26
mlt 6 encapsulation dot1q

#
# VLAN CONFIGURATION
#

vlan create 110 type port-mstprstp 1
vlan mlt 110 1
vlan mlt 110 6
vlan members 110 7/26,7/37-7/38 portmember
interface Vlan 110
ip address 10.1.101.1 255.255.255.0 5
ip ospf enable
ipv6 interface enable
ipv6 interface address
fd12:0:0:1201:0:0:0:1/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit
vlan create 1002 type port-mstprstp 1
vlan mlt 1002 1
vlan mlt 1002 5
vlan members 1002 7/25,7/37-7/38
portmember
interface Vlan 1002
ip address 10.1.102.1 255.255.255.0
ip ospf enable
ip dhcp-relay
```

VSP-2

```
#
# MLT CONFIGURATION
#

mlt 5 enable name "smlt5"
mlt 5 member 5/25
mlt 5 encapsulation dot1q
mlt 6 enable name "smlt6"
mlt 6 member 5/26
mlt 6 encapsulation dot1q

#
# VLAN CONFIGURATION
#

vlan create 110 type port-mstprstp 1
vlan mlt 110 1
vlan mlt 110 6
vlan members 110 5/26,5/37-5/38 portmember
interface Vlan 110
ip address 10.1.101.2 255.255.255.0 1
ip ospf enable
ipv6 interface enable
ipv6 interface address
fd12:0:0:1201:0:0:0:2/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit
vlan create 1002 type port-mstprstp 1
vlan mlt 1002 1
vlan mlt 1002 5
vlan members 1002 5/25,5/37-5/38
portmember
interface Vlan 1002
ip address 10.1.102.2 255.255.255.0
ip ospf enable
ip dhcp-relay
```

```

ipv6 interface enable
ipv6 interface address
fd12:0:0:1202:0:0:0:1/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit

```

```

#
# MLT INTERFACE CONFIGURATION
#

```

```

interface mlt 5
smlt
exit
interface mlt 6
smlt
exit

```

```

#
# PORT CONFIGURATION - PHASE II
#

```

```

interface GigabitEthernet 7/25
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
interface GigabitEthernet 7/26
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable

```

```

ipv6 interface enable
ipv6 interface address
fd12:0:0:1202:0:0:0:2/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit

```

```

#
# MLT INTERFACE CONFIGURATION
#

```

```

interface mlt 5
smlt
exit
interface mlt 6
smlt
exit

```

```

#
# PORT CONFIGURATION - PHASE II
#

```

```

interface GigabitEthernet 5/25
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
interface GigabitEthernet 5/26
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable

```

```
no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

```
#

# IPV6 OSPF VLAN CONFIGURATION

#
```

```
interface vlan 110
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit

interface vlan 1002
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit
```

```
no spanning-tree mstp force-port-state
enable

no spanning-tree mstp msti 1 force-port-
state enable

exit
```

```
#

# IPV6 OSPF VLAN CONFIGURATION

#
```

```
interface vlan 110
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit

interface vlan 1002
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit
```

VSP-3

```
#

# MLT CONFIGURATION

#

mlt 2 enable name "smlt2"
mlt 2 member 3/1
mlt 2 encapsulation dot1q
mlt 3 enable name "smlt3"
mlt 3 member 3/2
mlt 3 encapsulation dot1q
```

```
#

# VLAN CONFIGURATION

#
```

```
vlan create 1010 type port-mstprstp 1
vlan mlt 1010 1
vlan mlt 1010 2
```

VSP-4

```
#

# MLT CONFIGURATION

#

mlt 2 enable name "smlt2"
mlt 2 member 3/1
mlt 2 encapsulation dot1q
mlt 3 enable name "smlt3"
mlt 3 member 3/2
mlt 3 encapsulation dot1q
```

```
#

# VLAN CONFIGURATION

#
```

```
vlan create 1010 type port-mstprstp 1
vlan mlt 1010 1
vlan mlt 1010 2
```

```
vlan members 1010 3/1,3/5,4/21 portmember
interface Vlan 1010
ip address 10.1.110.1 255.255.255.0 2
ip ospf enable
ip dhcp-relay
ipv6 interface enable
ipv6 interface address
fd12:0:0:1210:0:0:0:1/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit
vlan create 1011 type port 1
vlan mlt 1011 1
vlan mlt 1011 3
vlan members 1011 3/2,3/5,4/21 portmember
interface Vlan 1011
ip address 10.1.111.1 255.255.255.0
ip ospf enable
ip dhcp-relay
ipv6 interface enable
ipv6 interface address
fd12:0:0:1211:0:0:0:1/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit
```

```
#
# MLT INTERFACE CONFIGURATION
#
```

```
interface mlt 2
smlt
exit
interface mlt 3
smlt
exit
```

```
#
# PORT CONFIGURATION - PHASE II
```

```
vlan members 1010 3/1,3/5,4/21 portmember
interface Vlan 1010
ip address 10.1.110.2 255.255.255.0 2
ip ospf enable
ip dhcp-relay
ipv6 interface enable
ipv6 interface address
fd12:0:0:1210:0:0:0:2/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit
vlan create 1011 type port 1
vlan mlt 1011 1
vlan mlt 1011 3
vlan members 1011 3/2,3/5,4/21 portmember
interface Vlan 1011
ip address 10.1.111.2 255.255.255.0
ip ospf enable
ip dhcp-relay
ipv6 interface enable
ipv6 interface address
fd12:0:0:1211:0:0:0:2/64
ip rsmlt
ip rsmlt holdup-timer 9999
exit
```

```
#
# MLT INTERFACE CONFIGURATION
#
```

```
interface mlt 2
smlt
exit
interface mlt 3
smlt
exit
```

```
#
# PORT CONFIGURATION - PHASE II
```

```
#
interface GigabitEthernet 3/1
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
interface GigabitEthernet 3/2
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit

#
# DHCP CONFIGURATION - GlobalRouter
#

ip dhcp-relay fwd-path 10.1.110.1
10.1.101.10
ip dhcp-relay fwd-path 10.1.110.1
10.1.101.10 enable
ip dhcp-relay fwd-path 10.1.110.1
10.1.101.10 mode dhcp
ip dhcp-relay fwd-path 10.1.111.1
10.1.101.10
ip dhcp-relay fwd-path 10.1.111.1
10.1.101.10 enable
ip dhcp-relay fwd-path 10.1.111.1
10.1.101.10 mode dhcp

#
interface GigabitEthernet 3/1
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
interface GigabitEthernet 3/2
default-vlan-id 0
no shutdown
vlacp fast-periodic-time 500 timeout short
timeout-scale 5 funcmac-addr
01:80:c2:00:00:0f
vlacp enable
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit

#
# DHCP CONFIGURATION - GlobalRouter
#

ip dhcp-relay fwd-path 10.1.110.2
10.1.101.10
ip dhcp-relay fwd-path 10.1.110.2
10.1.101.10 enable
ip dhcp-relay fwd-path 10.1.110.2
10.1.101.10 mode dhcp
ip dhcp-relay fwd-path 10.1.111.2
10.1.101.10
ip dhcp-relay fwd-path 10.1.111.2
10.1.101.10 enable
ip dhcp-relay fwd-path 10.1.111.2
10.1.101.10 mode dhcp
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#

interface vlan 1010
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit
interface vlan 1011
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit

#
# DHCP CONFIGURATION
#

ipv6 dhcp-relay fwd-path
fd12:0:0:1211:0:0:0:1
fd12:0:0:1202:0:0:0:10

ipv6 dhcp-relay fwd-path
fd12:0:0:1211:0:0:0:1
fd12:0:0:1202:0:0:0:10 enable
```

```
#
# IPV6 OSPF VLAN CONFIGURATION
#

interface vlan 1010
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit
interface vlan 1011
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit

#
# DHCP CONFIGURATION
#

ipv6 dhcp-relay fwd-path
fd12:0:0:1211:0:0:0:2
fd12:0:0:1202:0:0:0:10

ipv6 dhcp-relay fwd-path
fd12:0:0:1211:0:0:0:2
fd12:0:0:1202:0:0:0:10 enable
```


5 Global Settings: Loopback Interface, VLACP, RSMLT, OSPFv2, and OSPFv3

For this configuration step the following VLAN and IP parameters will be enabled:

Switch	Feature	Parameter	Value
VSP-1, VSP-2, VSP-3, VSP-4	VLACP	Global	Enable
	RSMLT	RSMLT edge-support	Enable
	IPv6	Forwarding	Enable
	OSPFv2	Global OSPF	Enable
	OSPFv3	Global OSPFv3	Enable
VSP-1	Loopback	1	10.1.1.1/32
		OSPF	Enable
	OSPFv2	Router-ID	10.1.1.1
	OSPFv3	Router-ID	10.1.1.1
VSP-2	Loopback	1	10.1.1.2/32
		OSPF	Enable
	OSPFv2	Router-ID	10.1.1.2
	OSPFv3	Router-ID	10.1.1.2
VSP-3	Loopback	1	10.1.1.3/32
		OSPF	Enable
	OSPFv2	Router-ID	10.1.1.3
	OSPFv3	Router-ID	10.1.1.3
VSP-4	Loopback	1	10.1.1.4/32
		OSPF	Enable
	OSPFv2	Router-ID	10.1.1.4
	OSPFv3	Router-ID	10.1.1.4

VSP-1	VSP-2
#	#
# LACP CONFIGURATION	# LACP CONFIGURATION
#	#
vlacp enable	vlacp enable
#	#
# CIRCUITLESS IP INTERFACE CONFIGURATION - GlobalRouter	# CIRCUITLESS IP INTERFACE CONFIGURATION - GlobalRouter
#	#
interface loopback 1	interface loopback 1
ip address 1 10.1.1.1/255.255.255.255	ip address 1 10.1.1.2/255.255.255.255
ip ospf 1	ip ospf 1
exit	exit
#	#
# OSPF CONFIGURATION - GlobalRouter	# OSPF CONFIGURATION - GlobalRouter
#	#
router ospf enable	router ospf enable
router ospf	router ospf
router-id 10.1.1.1	router-id 10.1.1.2
exit	exit
#	#
# RSMLT CONFIGURATION	# RSMLT CONFIGURATION
#	#
ip rsm1t edge-support	ip rsm1t edge-support
#	#
# IPV6 CONFIGURATION	# IPV6 CONFIGURATION
#	#
ipv6 forwarding	ipv6 forwarding

```
#  
# IPV6 OSPFV3 CONFIGURATION  
#  
  
router ospf ipv6-enable  
router ospf  
ipv6 router-id 10.1.1.1  
exit
```

```
#  
# IPV6 OSPFV3 CONFIGURATION  
#  
  
router ospf ipv6-enable  
router ospf  
ipv6 router-id 10.1.1.2  
exit
```

VSP-3

```
#
# LACP CONFIGURATION
#

vlacp enable

#
# CIRCUITLESS IP INTERFACE CONFIGURATION -
GlobalRouter
#

interface loopback 1
ip address 1 10.1.1.3/255.255.255.255
ip ospf 1
exit

#
# OSPF CONFIGURATION - GlobalRouter
#

router ospf enable
router ospf
router-id 10.1.1.3
exit

#
# RSMILT CONFIGURATION
#

ip rsmilt edge-support

#
# IPV6 CONFIGURATION
#

ipv6 forwarding
```

VSP-4

```
#
# LACP CONFIGURATION
#

vlacp enable

#
# CIRCUITLESS IP INTERFACE CONFIGURATION -
GlobalRouter
#

interface loopback 1
ip address 1 10.1.1.4/255.255.255.255
ip ospf 1
exit

#
# OSPF CONFIGURATION - GlobalRouter
#

router ospf enable
router ospf
router-id 10.1.1.4
exit

#
# RSMILT CONFIGURATION
#

ip rsmilt edge-support

#
# IPV6 CONFIGURATION
#

ipv6 forwarding
```

```
#  
# IPV6 OSPFV3 CONFIGURATION  
#  
  
router ospf ipv6-enable  
router ospf  
ipv6 router-id 10.1.1.3  
exit
```

```
#  
# IPV6 OSPFV3 CONFIGURATION  
#  
  
router ospf ipv6-enable  
router ospf  
ipv6 router-id 10.1.1.4  
exit
```

2.1.2 IPv6 Dual Stack Verification

2.1.2.1 RSMLT

1 Verify RSMLT Operations:

ACLI

show ip rsmlt

Results: Admin should display *Enable* while Operation should display *Up*. All RSMLT Edge interfaces should display holdup timer of *infinity*.

Response from 9000-1:

```
=====
                        Ip Rsmlt Local Info - GlobalRouter
=====
```

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
5	10.1.5.1	00:1b:4f:60:fa:04	Enable	Up	60	180
110	10.1.101.1	00:1b:4f:60:fa:05	Enable	Up	60	infinity
1002	10.1.102.1	00:1b:4f:60:fa:03	Enable	Up	60	infinity

Local IPv4 interfaces displayed here

VID	SMLT ID
5	7
110	6
1002	5

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
5	fd12:0:0:1205:0:0:0:0/64	00:1b:4f:60:fa:04	Enable	Up	60	180
	fd12:0:0:1205:0:0:0:1/64					
	fe80:0:0:0:21b:4fff:fe60:fa04/128					
15	fd12:0:0:2015:0:0:0:0/64	00:1b:4f:60:fa:06	Enable	Up	60	180
	fe80:0:0:0:21b:4fff:fe60:fa06/128					
110	fd12:0:0:1201:0:0:0:0/64	00:1b:4f:60:fa:05	Enable	Up	60	infinity
	fe80:0:0:0:21b:4fff:fe60:fa05/128					
1002	fd12:0:0:1202:0:0:0:0/64	00:1b:4f:60:fa:03	Enable	Up	60	infinity
	fe80:0:0:0:21b:4fff:fe60:fa03/128					

Local IPv6 interfaces displayed here

VID	SMLT ID
5	7
15	8
110	6
1002	5

VLAN and SMLT ID mappings displayed here

Ip Rsmlt Peer Info - GlobalRouter

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
-----	----	-----	-------	------	-------	-------

5	10.1.5.2	00:1b:4f:5f:fa:03	Enable	Up	60	180
110	10.1.101.2	00:1b:4f:5f:fa:01	Enable	Up	60	infinity
1002	10.1.102.2	00:1b:4f:5f:fa:02	Enable	Up	60	infinity

Remote IPv4
interfaces displayed

VID	HDT REMAIN	HUT REMAIN	SMLT ID
-----	------------	------------	---------

5	60	180	7
110	60	infinity	6
1002	60	infinity	5

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
-----	------	-----	-------	------	-------	-------

5	00:1b:4f:5f:fa:03	Enable	Up	60	180
	fd12:0:0:1205:0:0:0:0/64				
	fd12:0:0:1205:0:0:0:2/64				
	fe80:0:0:0:21b:4fff:fe5f:fa03/128				
15	00:1b:4f:5f:fa:05	Enable	Up	60	180
	fd12:0:0:2015:0:0:0:0/64				
	fe80:0:0:0:21b:4fff:fe5f:fa05/128				
110	00:1b:4f:5f:fa:01	Enable	Up	60	infinity
	fd12:0:0:1201:0:0:0:0/64				
	fe80:0:0:0:21b:4fff:fe5f:fa01/128				
1002	00:1b:4f:5f:fa:02	Enable	Up	60	infinity
	fd12:0:0:1202:0:0:0:0/64				
	fe80:0:0:0:21b:4fff:fe5f:fa02/128				

Remote IPv6
interfaces displayed

VID	HDT REMAIN	HUT REMAIN	SMLT ID
-----	------------	------------	---------

5	60	180	7
15	60	180	8
110	60	infinity	6
1002	60	infinity	5

VLAN and SMLT ID
mappings displayed
here

Response from 9000-2:

```
=====
Ip Rsmлт Local Info - GlobalRouter
=====
```

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
5	10.1.5.2	00:1b:4f:5f:fa:03	Enable	Up	60	180
110	10.1.101.2	00:1b:4f:5f:fa:01	Enable	Up	60	infinity
1002	10.1.102.2	00:1b:4f:5f:fa:02	Enable	Up	60	infinity

VID	SMLT	ID
5	7	
110	6	
1002	5	

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
5		00:1b:4f:5f:fa:03	Enable	Up	60	180
	fd12:0:0:1205:0:0:0:0/64					
	fd12:0:0:1205:0:0:0:2/64					
	fe80:0:0:0:21b:4fff:fe5f:fa03/128					
15		00:1b:4f:5f:fa:05	Enable	Up	60	180
	fd12:0:0:2015:0:0:0:0/64					
	fe80:0:0:0:21b:4fff:fe5f:fa05/128					
110		00:1b:4f:5f:fa:01	Enable	Up	60	infinity
	fd12:0:0:1201:0:0:0:0/64					
	fe80:0:0:0:21b:4fff:fe5f:fa01/128					
1002		00:1b:4f:5f:fa:02	Enable	Up	60	infinity
	fd12:0:0:1202:0:0:0:0/64					
	fe80:0:0:0:21b:4fff:fe5f:fa02/128					

VID	SMLT	ID
5	7	
15	8	
110	6	
1002	5	

```
=====
Ip Rsmлт Peer Info - GlobalRouter
=====
```

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
5	10.1.5.1	00:1b:4f:60:fa:04	Enable	Up	60	180
110	10.1.101.1	00:1b:4f:60:fa:05	Enable	Up	60	infinity
1002	10.1.102.1	00:1b:4f:60:fa:03	Enable	Up	60	infinity

VID	HDT	REMAIN	HUT	REMAIN	SMLT	ID
5	60		180		7	
110	60		infinity		6	
1002	60		infinity		5	

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
5	fd12:0:0:1205:0:0:0:0/64 fd12:0:0:1205:0:0:0:1/64 fe80:0:0:0:21b:4fff:fe60:fa04/128	00:1b:4f:60:fa:04	Enable	Up	60	180
15	fd12:0:0:2015:0:0:0:0/64 fe80:0:0:0:21b:4fff:fe60:fa06/128	00:1b:4f:60:fa:06	Enable	Up	60	180
110	fd12:0:0:1201:0:0:0:0/64 fe80:0:0:0:21b:4fff:fe60:fa05/128	00:1b:4f:60:fa:05	Enable	Up	60	infinity
1002	fd12:0:0:1202:0:0:0:0/64 fe80:0:0:0:21b:4fff:fe60:fa03/128	00:1b:4f:60:fa:03	Enable	Up	60	infinity
VID	HDT REMAIN	HUT REMAIN	SMLT ID			
5	60	180	7			
15	60	180	8			
110	60	infinity	6			
1002	60	infinity	5			

Response from VSP-3:

Ip Rsmлт Local Info - GlobalRouter						
VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
5	10.1.5.3	00:0e:62:df:02:01	Enable	Up	60	180
1010	10.1.110.1	00:0e:62:df:02:02	Enable	Up	60	infinity
1011	10.1.111.1	00:0e:62:df:02:03	Enable	Up	60	infinity
VID	SMLT ID	SLT ID				
5	7					
1010	2					
1011	3					
VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
5	fd12:0:0:1205:0:0:0:3/64 fe80:0:0:0:20e:62ff:fedf:201/0	00:0e:62:df:02:01	Enable	Up	60	180
1010	fd12:0:0:1210:0:0:0:1/64	00:0e:62:df:02:02	Enable	Up	60	infinity
1011	fe80:0:0:0:20e:62ff:fedf:202/0 fd12:0:0:1211:0:0:0:1/64 fe80:0:0:0:20e:62ff:fedf:203/0	00:0e:62:df:02:03	Enable	Up	60	infinity
VID	SMLT ID	SLT ID				
5	7					
1010	2					

1011 3

```
=====
Ip RsmIt Peer Info - GlobalRouter
=====
```

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
5	10.1.5.4	00:09:97:fa:f2:01	Enable	Up	60	180
1010	10.1.110.2	00:09:97:fa:f2:02	Enable	Up	60	infinity
1011	10.1.111.2	00:09:97:fa:f2:03	Enable	Up	60	infinity

VID	HDT REMAIN	HUT REMAIN	SMLT ID	SLT ID
5	60	infinity	7	
1010	60	infinity	2, 3	
1011	60	infinity	2, 3	

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
5		00:09:97:fa:f2:01	Enable	Up	60	180
	fd12:0:0:1205:0:0:0:4/64					
	fe80:0:0:0:209:97ff:feff:f201/0					
1010		00:09:97:fa:f2:02	Enable	Up	60	infinity
	fd12:0:0:1210:0:0:0:2/64					
	fe80:0:0:0:209:97ff:feff:f202/0					
1011		00:09:97:fa:f2:03	Enable	Up	60	infinity
	fd12:0:0:1211:0:0:0:2/64					
	fe80:0:0:0:209:97ff:feff:f203/0					

VID	HDT REMAIN	HUT REMAIN	SMLT ID	SLT ID
5	60	infinity	7	
1010	60	infinity	2	
1011	60	infinity	3	

Response from VSP-4:

```
=====
Ip RsmIt Local Info - GlobalRouter
=====
```

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
5	10.1.5.4	00:09:97:fa:f2:01	Enable	Up	60	180
1010	10.1.110.2	00:09:97:fa:f2:02	Enable	Up	60	infinity
1011	10.1.111.2	00:09:97:fa:f2:03	Enable	Up	60	infinity

VID	SMLT ID	SLT ID
5	7	
1010	2	
1011	3	

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
5		00:09:97:fa:f2:01	Enable	Up	60	180

```

fd12:0:0:1205:0:0:0:4/64
fe80:0:0:0:209:97ff:feffa:f201/0
1010      00:09:97:fa:f2:02  Enable  Up    60    infinity
fd12:0:0:1210:0:0:0:2/64

```

```

fe80:0:0:0:209:97ff:feffa:f202/0
1011      00:09:97:fa:f2:03  Enable  Up    60    infinity
fd12:0:0:1211:0:0:0:2/64
fe80:0:0:0:209:97ff:feffa:f203/0

```

VID	SMLT ID	SLT ID
-----	---------	--------

5	7	
1010	2	
1011	3	

Ip Rsmlt Peer Info - GlobalRouter

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
5	10.1.5.3	00:0e:62:df:02:01	Enable	Up	60	180
1010	10.1.110.1	00:0e:62:df:02:02	Enable	Up	60	infinity
1011	10.1.111.1	00:0e:62:df:02:03	Enable	Up	60	infinity

VID	HDT REMAIN	HUT REMAIN	SMLT ID	SLT ID
5	60	180	7	
1010	60	infinity	2	
1011	60	infinity	3	

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
5		00:0e:62:df:02:01	Enable	Up	60	180
	fd12:0:0:1205:0:0:0:3/64					
	fe80:0:0:0:20e:62ff:fedf:201/0					
1010		00:0e:62:df:02:02	Enable	Up	60	infinity
	fd12:0:0:1210:0:0:0:1/64					
	fe80:0:0:0:20e:62ff:fedf:202/0					
1011		00:0e:62:df:02:03	Enable	Up	60	infinity
	fd12:0:0:1211:0:0:0:1/64					
	fe80:0:0:0:20e:62ff:fedf:203/0					

VID	HDT REMAIN	HUT REMAIN	SMLT ID	SLT ID
5	60	180	7	
1010	60	infinity	2	
1011	60	infinity	3	

2.1.2.2 IPv4 and OSPFv2

1 Verify IPv4 Interfaces:

ACLI

show ip interface

Results:

Response from 9000-1:

```
=====
                                IP Interface - GlobalRouter
=====
```

INTERFACE	IP ADDRESS	NET MASK	BCASTADDR FORMAT	REASM MAXSIZE	VLAN ID	BROUTER PORT
Clip1	10.1.1.1	255.255.255.255	ones	1500	--	false
Vlan2	10.1.2.1	255.255.255.252	ones	1500	2	false
Vlan5	10.1.5.1	255.255.255.0	ones	1500	5	false
Vlan110	10.1.101.1	255.255.255.0	ones	1500	110	false
Vlan1002	10.1.102.1	255.255.255.0	ones	1500	1002	false

Response from 9000-2:

```
=====
                                IP Interface - GlobalRouter
=====
```

INTERFACE	IP ADDRESS	NET MASK	BCASTADDR FORMAT	REASM MAXSIZE	VLAN ID	BROUTER PORT
Clip1	10.1.1.2	255.255.255.255	ones	1500	--	false
Vlan2	10.1.2.2	255.255.255.252	ones	1500	2	false
Vlan5	10.1.5.2	255.255.255.0	ones	1500	5	false
Vlan110	10.1.101.2	255.255.255.0	ones	1500	110	false
Vlan1002	10.1.102.2	255.255.255.0	ones	1500	1002	false

Response from VSP-3:

```
=====
                                IP Interface - GlobalRouter
=====
```

INTERFACE	IP ADDRESS	NET MASK	BCASTADDR FORMAT	REASM MAXSIZE	VLAN ID	BROUTER PORT
Clip1	10.1.1.3	255.255.255.255	ones	1500	--	false
Vlan2	10.1.2.5	255.255.255.252	ones	1500	2	false
Vlan5	10.1.5.3	255.255.255.0	ones	1500	5	false
Vlan1010	10.1.110.1	255.255.255.0	ones	1500	1010	false
Vlan1011	10.1.111.1	255.255.255.0	ones	1500	1011	false

Response from VSP-4:

```
=====
IP Interface - GlobalRouter
=====
INTERFACE      IP          NET          BCASTADDR  REASM      VLAN  BROUTER
ADDRESS        MASK        FORMAT      MAXSIZE    ID      PORT
-----
Clip1          10.1.1.4    255.255.255.255 ones        1500     --    false
Vlan2          10.1.2.6    255.255.255.252 ones        1500     2     false
Vlan5          10.1.5.4    255.255.255.0  ones        1500     5     false
Vlan1010       10.1.110.2  255.255.255.0  ones        1500    1010  false
Vlan1011       10.1.111.2  255.255.255.0  ones        1500    1011  false
```

2 Verify OSPFv2 Interfaces:

ACLI

show ip ospf interface

Results:

Response from 9000-1:

```
=====
                        OSPF Interface - GlobalRouter
=====
```

INTERFACE	AREA ID	ADM	IFST	MET	PRI	DR/ BDR	TYPE	AUTH TYPE	MTU IGNO
10.1.102.1	0.0.0.0	en	BDR	10	1	10.1.102.2 10.1.102.1	brdc	none	dis
10.1.101.1	0.0.0.0	en	BDR	10	1	10.1.101.2 10.1.101.1	brdc	none	dis
10.1.1.1	0.0.0.0	en	DR	10	1	10.1.1.1 0.0.0.0	pass	none	dis
10.1.5.1	0.0.0.0	en	DR	10	1	10.1.5.1 10.1.5.2	brdc	none	dis

Response from 9000-2:

```
=====
                        OSPF Interface - GlobalRouter
=====
```

INTERFACE	AREA ID	ADM	IFST	MET	PRI	DR/ BDR	TYPE	AUTH TYPE	MTU IGNO
10.1.102.2	0.0.0.0	en	DR	10	1	10.1.102.2 10.1.102.1	brdc	none	dis
10.1.101.2	0.0.0.0	en	DR	10	1	10.1.101.2 10.1.101.1	brdc	none	dis
10.1.1.2	0.0.0.0	en	DR	10	1	10.1.1.2 0.0.0.0	pass	none	dis
10.1.5.2	0.0.0.0	en	BDR	10	1	10.1.5.1 10.1.5.2	brdc	none	dis

Response from VSP-3:

```
=====
                        OSPF Interface - GlobalRouter
=====
```

INTERFACE	AREA ID	ADM	IFST	MET	PRI	DR/ BDR	TYPE	AUTH TYPE	MTU IGNO
10.1.1.3	0.0.0.0	en	DR	10	1	10.1.1.3 0.0.0.0	pass	none	dis
10.1.111.1	0.0.0.0	en	BDR	10	1	10.1.111.2 10.1.111.1	brdc	none	dis
10.1.110.1	0.0.0.0	en	BDR	10	1	10.1.110.2 10.1.110.1	brdc	none	dis

```
10.1.5.3      0.0.0.0      en  DR_O 10  1  10.1.5.1      brdc none      dis
               10.1.5.2
```

Response from VSP-4:

```
=====
                        OSPF Interface - GlobalRouter
=====
INTERFACE      AREA      ADM IFST MET PRI DR/      TYPE AUTH      MTU
              ID              BDR              TYPE      IGNO
-----
10.1.1.4        0.0.0.0      en  DR   10  1  10.1.1.4      pass none      dis
               0.0.0.0
10.1.111.2      0.0.0.0      en  DR   10  1  10.1.111.2    brdc none      dis
               10.1.111.1
10.1.110.2      0.0.0.0      en  DR   10  1  10.1.110.2    brdc none      dis
               10.1.110.1
10.1.5.4        0.0.0.0      en  DR_O 10  1  10.1.5.1      brdc none      dis
               10.1.5.2
```

3 Verify IPv4 Routes:

ACLI

show ip route

Results:

Response from 9000-1:

```
=====
                        IP Route - GlobalRouter
=====
```

DST	MASK	NEXT	NH VRF	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.1.1	255.255.255.255	10.1.1.1	-	1	0	LOC	0	DB	0
10.1.1.2	255.255.255.255	10.1.102.2	Glob~	1	1002	OSPF	0	IB	20
10.1.1.3	255.255.255.255	10.1.5.3	Glob~	20	5	OSPF	0	IB	20
10.1.1.4	255.255.255.255	10.1.5.4	Glob~	20	5	OSPF	0	IB	20
10.1.2.0	255.255.255.252	10.1.2.1	-	1	2	LOC	0	DB	0
10.1.5.0	255.255.255.0	10.1.5.1	-	1	5	LOC	0	DB	0
10.1.101.0	255.255.255.0	10.1.101.1	-	1	110	LOC	0	DB	0
10.1.102.0	255.255.255.0	10.1.102.1	-	1	1002	LOC	0	DB	0
10.1.110.0	255.255.255.0	10.1.5.3	Glob~	20	5	OSPF	0	IB	20
10.1.111.0	255.255.255.0	10.1.5.3	Glob~	20	5	OSPF	0	IB	20

TYPE Legend:

I=Indirect Route, D=Direct Route, A=Alternative Route, B=Best Route, E=Ecmp Route,
U=Unresolved Route, N=Not in HW, F=Replaced by FTN, V=IPVPN Route

PROTOCOL Legend:

v=Inter-VRF route redistributed

Response from 9000-2:

```
=====
                        IP Route - GlobalRouter
=====
```

DST	MASK	NEXT	NH VRF	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.1.1	255.255.255.255	10.1.102.1	Glob~	20	1002	OSPF	0	IB	20
10.1.1.2	255.255.255.255	10.1.1.2	-	1	0	LOC	0	DB	0
10.1.1.3	255.255.255.255	10.1.5.3	Glob~	20	5	OSPF	0	IB	20
10.1.1.4	255.255.255.255	10.1.5.4	Glob~	20	5	OSPF	0	IB	20
10.1.2.0	255.255.255.252	10.1.2.2	-	1	2	LOC	0	DB	0
10.1.5.0	255.255.255.0	10.1.5.2	-	1	5	LOC	0	DB	0
10.1.101.0	255.255.255.0	10.1.101.2	-	1	110	LOC	0	DB	0
10.1.102.0	255.255.255.0	10.1.102.2	-	1	1002	LOC	0	DB	0
10.1.110.0	255.255.255.0	10.1.5.3	Glob~	20	5	OSPF	0	IB	20
10.1.111.0	255.255.255.0	10.1.5.3	Glob~	20	5	OSPF	0	IB	20

TYPE Legend:

I=Indirect Route, D=Direct Route, A=Alternative Route, B=Best Route, E=Ecmp Route,
U=Unresolved Route, N=Not in HW, F=Replaced by FTN, V=IPVPN Route

PROTOCOL Legend:
v=Inter-VRF route redistributed

Response from VSP-3:

IP Route - GlobalRouter									
DST	MASK	NEXT	NH VRF	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.1.1	255.255.255.255	10.1.5.1	Glob~	20	5	OSPF	0	IB	20
10.1.1.2	255.255.255.255	10.1.5.2	Glob~	20	5	OSPF	0	IB	20
10.1.1.3	255.255.255.255	10.1.1.3	-	1	0	LOC	0	DB	0
10.1.1.4	255.255.255.255	10.1.110.2	Glob~	20	1010	OSPF	0	IB	20
10.1.2.4	255.255.255.252	10.1.2.5	-	1	2	LOC	0	DB	0
10.1.5.0	255.255.255.0	10.1.5.3	-	1	5	LOC	0	DB	0
10.1.101.0	255.255.255.0	10.1.5.1	Glob~	20	5	OSPF	0	IB	20
10.1.102.0	255.255.255.0	10.1.5.1	Glob~	20	5	OSPF	0	IB	20
10.1.110.0	255.255.255.0	10.1.110.1	-	1	1010	LOC	0	DB	0
10.1.111.0	255.255.255.0	10.1.111.1	-	1	1011	LOC	0	DB	0

Response from VSP-4:

IP Route - GlobalRouter									
DST	MASK	NEXT	NH VRF	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.1.1	255.255.255.255	10.1.5.1	Glob~	20	5	OSPF	0	IB	20
10.1.1.2	255.255.255.255	10.1.5.2	Glob~	20	5	OSPF	0	IB	20
10.1.1.3	255.255.255.255	10.1.110.1	Glob~	20	1010	OSPF	0	IB	20
10.1.1.4	255.255.255.255	10.1.1.4	-	1	0	LOC	0	DB	0
10.1.2.4	255.255.255.252	10.1.2.6	-	1	2	LOC	0	DB	0
10.1.5.0	255.255.255.0	10.1.5.4	-	1	5	LOC	0	DB	0
10.1.101.0	255.255.255.0	10.1.5.1	Glob~	20	5	OSPF	0	IB	20
10.1.102.0	255.255.255.0	10.1.5.1	Glob~	20	5	OSPF	0	IB	20
10.1.110.0	255.255.255.0	10.1.110.2	-	1	1010	LOC	0	DB	0
10.1.111.0	255.255.255.0	10.1.111.2	-	1	1011	LOC	0	DB	0

2.1.2.3 IPv6 and OSPFv3

1 Verify IPv6 Forwarding:

ACLI

show ipv6 forwarding

Results: Should be displayed as *enable*.

Response from 9000-1:

forwarding : enable

Response from 9000-2:

forwarding : enable

Response from VSP-3:

forwarding : enable

Response from VSP-4:

forwarding : enable

2 Verify IPv6 Interface:

ACLI

show ipv6 address interface

Secure Router

show ipv6 interface brief

Results: Should display IPv6 configred and link local addresses

Response from 9000-1:

```
=====
                        Address Information
=====
```

IPV6 ADDRESS	VID/BID/TID	TYPE	ORIGIN	STATUS
-----	-----	-----	-----	-----
fd12:0:0:1205:0:0:0:1	V-5	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe60:fa04	V-5	UNICAST	LINKLAYER	PREFERRED
fd12:0:0:2015:0:0:0:1	V-15	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe60:fa06	V-15	UNICAST	LINKLAYER	PREFERRED
fd12:0:0:1201:0:0:0:1	V-110	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe60:fa05	V-110	UNICAST	LINKLAYER	PREFERRED
fd12:0:0:1202:0:0:0:1	V-1002	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe60:fa03	V-1002	UNICAST	LINKLAYER	PREFERRED

Response from 9000-2:

```
=====
                        Address Information
=====
```

IPV6 ADDRESS	VID/BID/TID	TYPE	ORIGIN	STATUS
-----	-----	-----	-----	-----
fd12:0:0:1205:0:0:0:2	V-5	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe5f:fa03	V-5	UNICAST	LINKLAYER	PREFERRED
fd12:0:0:2015:0:0:0:2	V-15	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe5f:fa05	V-15	UNICAST	LINKLAYER	PREFERRED
fd12:0:0:1201:0:0:0:2	V-110	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe5f:fa01	V-110	UNICAST	LINKLAYER	PREFERRED
fd12:0:0:1202:0:0:0:2	V-1002	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:21b:4fff:fe5f:fa02	V-1002	UNICAST	LINKLAYER	PREFERRED

Response from VSP-4:

```
=====
                        Address Information
=====
```

IPV6 ADDRESS	VID/BID/TID	TYPE	ORIGIN	STATUS
-----	-----	-----	-----	-----
fd12:0:0:1205:0:0:0:3	V-5	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:20e:62ff:fedf:201	V-5	UNICAST	RANDOM	PREFERRED
fd12:0:0:1210:0:0:0:1	V-1010	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:20e:62ff:fedf:202	V-1010	UNICAST	RANDOM	PREFERRED
fd12:0:0:1211:0:0:0:1	V-1011	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:20e:62ff:fedf:203	V-1011	UNICAST	RANDOM	PREFERRED

Response from VSP-4:

Address Information				
IPV6 ADDRESS	VID/BID/TID	TYPE	ORIGIN	STATUS
fd12:0:0:1205:0:0:0:4	V-5	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:209:97ff:fefa:f201	V-5	UNICAST	RANDOM	PREFERRED
fd12:0:0:1210:0:0:0:2	V-1010	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:209:97ff:fefa:f202	V-1010	UNICAST	RANDOM	PREFERRED
fd12:0:0:1211:0:0:0:2	V-1011	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:209:97ff:fefa:f203	V-1011	UNICAST	RANDOM	PREFERRED

Response from SR2330:

```

vlan15 (unit number 103)
  Interface Index : 104
  Type: VLAN INTERFACE
  Flags: (0x20f8243) UP, RUNNING, MULTICAST-ROUTE
  IPv6 is enabled
  link-local address is fe80::92fb:5bff:fe7f:8b00 [OK] from Stack
  Global Unicast address(es):
    fd12::2015:0:0:0:0010 prefixlen 64 [OK] from CLI
  ICMP redirects will be sent
  ICMP unreachable will be sent
  Directed broadcasts will be forwarded
  Interface RED is disabled
  Maximum Transfer Unit: 1500 bytes
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 milliseconds
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent between 200 seconds and 600 seconds
  ND router advertisements live for 1800 seconds
  Mac Address: 90:fb:5b:7f:8b:00
lol (unit number 104)
  Interface Index : 105
  Type: S/W LOOPBACK
  Flags: (0x20f0243) UP, RUNNING, MULTICAST-ROUTE
  IPv6 is enabled
  link-local address is fe80::92fb:5bff:fe7f:8a00 [OK] from Stack
  Global Unicast address(es):
    fd12::2099:0:0:0:0001 prefixlen 128 [OK] from CLI
  ICMP redirects will be sent
  ICMP unreachable will be sent
  Directed broadcasts will be forwarded
  Interface RED is disabled
  Maximum Transfer Unit: 1500 bytes
  ND DAD is disabled
  ND reachable time is 30000 milliseconds
  Mac Address: 00:00:00:00:00:00

```

3 Verify OSPFv3 Interfaces:

ACLI

show ipv6 ospf interface

SR

show ipv6 ospf neighbor interface

Results:

Response from 9000-1:

=====							
OSPF Interface							
=====							
IFINDEX(VID/BRT)	AREAID	ADM	IFSTATE	METRIC	PRI	DR/BDR	IFTYPE

2053	(5)	0.0.0.0	ena DR_OTHER	1	1	10.1.1.2 10.1.1.4	BROADCAST
2098	(15)	0.0.0.0	ena DR	1	1	10.1.1.1 10.1.1.2	BROADCAST
2158	(110)	0.0.0.0	ena DR	1	1	10.1.1.1 10.1.1.2	BROADCAST
3050	(1002)	0.0.0.0	ena DR	1	1	10.1.1.1 10.1.1.2	BROADCAST

Response from 9000-2:

=====							
OSPF Interface							
=====							
IFINDEX(VID/BRT)	AREAID	ADM	IFSTATE	METRIC	PRI	DR/BDR	IFTYPE

2053	(5)	0.0.0.0	ena DR	1	1	10.1.1.2 10.1.1.4	BROADCAST
2098	(15)	0.0.0.0	ena BDR	1	1	10.1.1.1 10.1.1.2	BROADCAST
2158	(110)	0.0.0.0	ena BDR	1	1	10.1.1.1 10.1.1.2	BROADCAST
3050	(1002)	0.0.0.0	ena BDR	1	1	10.1.1.1 10.1.1.2	BROADCAST

Response from VSP-3:

=====							
OSPF Interface							
=====							
IFINDEX(VID/BRT)	AREAID	ADM	IFSTATE	METRIC	PRI	DR/BDR	IFTYPE

2053	(5)	0.0.0.0	ena DR_OTHER	1	1	10.1.1.2 10.1.1.4	BROADCAST
3058	(1010)	0.0.0.0	ena BDR	1	1	10.1.1.4 10.1.1.3	BROADCAST
3059	(1011)	0.0.0.0	ena BDR	1	1	10.1.1.4 10.1.1.3	BROADCAST

Response from VSP-4:

```
=====
                        OSPF Interface
=====
```

IFINDEX(VID/BRT)	AREAID	ADM IFSTATE	METRIC	PRI	DR/BDR	IFTYPE
2053 (5)	0.0.0.0	ena BDR	1	1	10.1.1.2 10.1.1.4	BROADCAST
3058 (1010)	0.0.0.0	ena DR	1	1	10.1.1.4 10.1.1.3	BROADCAST
3059 (1011)	0.0.0.0	ena DR	1	1	10.1.1.4 10.1.1.3	BROADCAST

Response from SR2330:

```
vlan15 is up, line protocol is up
Interface ID: 104
IPv6 Prefixes:
    fe80::92fb:5bff:fe7f:8b00/10 (Link-Local Address)
    fd12::2015:0:0:0:10/64
OSPFv3 Process (*null*), Area: 0.0.0.0, Instance ID: 0, MTU: 1500
Router ID 1.1.1.15, Network Type BROADCAST, Cost: 10
Transmit Delay: 1 sec, State DROther, Priority 1
Designated Router: 10.1.1.2, Interface Address: fe80::21b:4fff:fe5f:fa05
Backup Designated Router: 10.1.1.1, Interface Address: fe80::21b:4fff:fe60:fa06
Timer interval in secs, Hello: 10, Dead: 40, Wait: 40, Retransmit: 5
    Hello due: 00:00:06
Neighbor Count: 2, Adjacent neighbor count: 2
Hello received: 847, sent: 533
DD received: 13, sent: 27
LS-Req received: 2, sent: 2
LS-Upd received: 90, sent: 11
LS-Ack received: 19, sent: 20
Discarded: 0
```

4 Verify OSPFv3 Neighbors

ACLI

show ipv6 ospf neighbor

Results: Should display as *Full* using the IPv6 link local interface. In our example, the IPv6 Router ID is the IPv4 Loopback (circuitless IP address)

Response from 9000-1:

INTERFACE	NBRROUTERID	NBRIPADDR	STATE	TTL
2053	10.1.1.2	fe80:0:0:0:21b:4fff:fe5f:fa03	Full	32
2053	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:201	Full	33
2053	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f201	Full	38
2063	1.1.1.15	fe80:0:0:0:92fb:5bff:fe7f:8b00	Full	36
2063	10.1.1.2	fe80:0:0:0:21b:4fff:fe5f:fa05	Full	30
2098	10.1.1.2	fe80:0:0:0:21b:4fff:fe5f:fa04	Full	33
2158	10.1.1.2	fe80:0:0:0:21b:4fff:fe5f:fa01	Full	32
3050	10.1.1.2	fe80:0:0:0:21b:4fff:fe5f:fa02	Full	33

Response from 9000-2:

OSPF Neighbor				
INTERFACE	NBRROUTERID	NBRIPADDR	STATE	TTL
2053	10.1.1.1	fe80:0:0:0:21b:4fff:fe60:fa04	Full	40
2053	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:201	Full	34
2053	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f201	Full	38
2063	1.1.1.15	fe80:0:0:0:92fb:5bff:fe7f:8b00	Full	37
2063	10.1.1.1	fe80:0:0:0:21b:4fff:fe60:fa06	Full	33
2098	10.1.1.1	fe80:0:0:0:21b:4fff:fe60:fa02	Full	38
2158	10.1.1.1	fe80:0:0:0:21b:4fff:fe60:fa05	Full	38
3050	10.1.1.1	fe80:0:0:0:21b:4fff:fe60:fa03	Full	38

Response from VSP-3:

2053	10.1.1.1	fe80:0:0:0:21b:4fff:fe60:fa04	Full
2053	10.1.1.2	fe80:0:0:0:21b:4fff:fe5f:fa03	Full
2053	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f201	Full
3058	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f202	Full
3059	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f203	Full
3061	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f204	Full
3064	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f205	Full
3068	10.1.1.4	fe80:0:0:0:209:97ff:fefa:f206	Full

Response from VSP-4:

=====			
OSPF Neighbor			
=====			
INTERFACE	NBRROUTERID	NBRIPADDR	PRI0_STATE

2053	10.1.1.1	fe80:0:0:0:21b:4fff:fe60:fa04	Full
2053	10.1.1.2	fe80:0:0:0:21b:4fff:fe5f:fa03	Full
2053	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:201	Full
3058	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:202	Full
3059	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:203	Full
3061	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:204	Full
3064	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:205	Full
3068	10.1.1.3	fe80:0:0:0:20e:62ff:fedf:206	Full

Response from SR2330:

OSPFv3 Process (*null*)					
Neighbor ID	Pri	State	Dead Time	Interface	Instance ID
10.1.1.1	1	Full/BDR	00:00:32	vlan15	0
10.1.1.2	1	Full/DR	00:00:31	vlan15	0

5 Verify OSPFv3 Routes

ACLI

show ipv6 route

Results:

Response from 9000-1:

```
=====
                        IPv6 Routing Table Information
=====
Destination Address/PrefixLen      NEXT HOP      VID/BID/TID
PROTO    COST
-----
fd12:0:0:1201:0:0:0:0/64          0:0:0:0:0:0:0:0      V-110
LOCAL    1
fd12:0:0:1201:0:0:0:1/128         0:0:0:0:0:0:0:0      V-110
LOCAL    1
fd12:0:0:1202:0:0:0:0/64          0:0:0:0:0:0:0:0      V-1002
LOCAL    1
fd12:0:0:1202:0:0:0:1/128         0:0:0:0:0:0:0:0      V-1002
LOCAL    1
fd12:0:0:1205:0:0:0:0/64          0:0:0:0:0:0:0:0      V-5
LOCAL    1
fd12:0:0:1205:0:0:0:1/128         0:0:0:0:0:0:0:0      V-5
LOCAL    1
fd12:0:0:1210:0:0:0:0/64          fe80:0:0:0:20e:62ff:fedf:201      V-5
OSPF      2
fd12:0:0:1211:0:0:0:0/64          fe80:0:0:0:20e:62ff:fedf:201      V-5
OSPF      2
fd12:0:0:2015:0:0:0:0/64          0:0:0:0:0:0:0:0      V-15
LOCAL    1
fd12:0:0:2015:0:0:0:1/128         0:0:0:0:0:0:0:0      V-15
LOCAL    1
fd12:0:0:2099:0:0:0:1/128         fe80:0:0:0:92fb:5bff:fe7f:8b00      V-15
OSPF      1
```

Response from 9000-2:

```
=====
                        IPv6 Routing Table Information
=====
Destination Address/PrefixLen      NEXT HOP      VID/BID/TID
PROTO    COST
-----
fd12:0:0:1201:0:0:0:0/64          0:0:0:0:0:0:0:0      V-110
LOCAL    1
fd12:0:0:1201:0:0:0:2/128         0:0:0:0:0:0:0:0      V-110
LOCAL    1
fd12:0:0:1202:0:0:0:0/64          0:0:0:0:0:0:0:0      V-1002
LOCAL    1
fd12:0:0:1202:0:0:0:2/128         0:0:0:0:0:0:0:0      V-1002
LOCAL    1
fd12:0:0:1205:0:0:0:0/64          0:0:0:0:0:0:0:0      V-5
LOCAL    1
```

```

fd12:0:0:1205:0:0:0:2/128          0:0:0:0:0:0:0:0          V-5
LOCAL      1
fd12:0:0:1210:0:0:0:0/64          fe80:0:0:0:20e:62ff:fedf:201      V-5
OSPF        2
fd12:0:0:1211:0:0:0:0/64          fe80:0:0:0:20e:62ff:fedf:201      V-5
OSPF        2
fd12:0:0:1215:0:0:0:0/64          fe80:0:0:0:20e:62ff:fedf:201      V-5
OSPF        2
fd12:0:0:2015:0:0:0:0/64          0:0:0:0:0:0:0:0          V-15
LOCAL      1
fd12:0:0:2015:0:0:0:2/128          0:0:0:0:0:0:0:0          V-15
LOCAL      1
fd12:0:0:2099:0:0:0:1/128          fe80:0:0:0:92fb:5bff:fe7f:8b00    V-15
OSPF        1

```

Response from VSP-3:

```

=====
                        IPv6 Routing Table Information
=====
Destination Address/PrefixLen      NEXT HOP                      VID/BID/TID
PROTO  COST  MTU
-----
fd12:0:0:1201::/64                fe80::21b:4fff:fe5f:fa03      V-5
OSPF    2
fd12:0:0:1202::/64                fe80::21b:4fff:fe5f:fa03      V-5
OSPF    2
fd12:0:0:1205::/64                ::                             V-5
LOCAL    1
fd12:0:0:1205::3/128              ::                             V-5
LOCAL    1
fd12:0:0:1210::/64                ::                             V-1010
LOCAL    1
fd12:0:0:1210::1/128              ::                             V-1010
LOCAL    1
fd12:0:0:1211::/64                ::                             V-1011
LOCAL    1
fd12:0:0:1211::1/128              ::                             V-1011
LOCAL    1
fd12:0:0:1250::/64                fe80::21b:4fff:fe5f:fa03      V-5
OSPF    2
fd12:0:0:2015::/64                fe80::21b:4fff:fe5f:fa03      V-5
OSPF    2
fd12:0:0:2099::1/128              fe80::21b:4fff:fe5f:fa03      V-5
OSPF    2

```

Response from VSP-4:

```

=====
                        IPv6 Routing Table Information
=====
Destination Address/PrefixLen      NEXT HOP                      VID/BID/TID
PROTO  COST  MTU
-----
fd12:0:0:1201::/64                fe80::21b:4fff:fe5f:fa03      V-5
OSPF    2
fd12:0:0:1202::/64                fe80::21b:4fff:fe5f:fa03      V-5
OSPF    2

```

```

fd12:0:0:1205::/64                ::                V-5
LOCAL    1
fd12:0:0:1205::4/128              ::                V-5
LOCAL    1
fd12:0:0:1210::/64                ::                V-1010
LOCAL    1
fd12:0:0:1210::2/128              ::                V-1010
LOCAL    1
fd12:0:0:1211::/64                ::                V-1011
LOCAL    1
fd12:0:0:1211::2/128              ::                V-1011
LOCAL    1
fd12:0:0:1250::/64                fe80::21b:4fff:fe5f:fa03    V-5
OSPF      2
fd12:0:0:2015::/64                fe80::21b:4fff:fe5f:fa03    V-5
OSPF      2
fd12:0:0:2099::1/128              fe80::21b:4fff:fe5f:fa03    V-5
OSPF      2

```

Response from SR2330:

Codes: C - connected, S - static, R - RIP, B - BGP, O - OSPF,
 IA - OSPF inter area
 E1 - OSPF external type 1, E2 - OSPF external type 2
 Timers: Uptime

```

O      fd12::1201:0:0:0:0/64 [110/11] via fe80::21b:4fff:fe5f:fa05, vlan15, 00:27:55
      [110/11] via fe80::21b:4fff:fe60:fa06, vlan15, 00:27:55
O      fd12::1202:0:0:0:0/64 [110/11] via fe80::21b:4fff:fe5f:fa05, vlan15, 00:27:55
      [110/11] via fe80::21b:4fff:fe60:fa06, vlan15, 00:27:55
O      fd12::1205:0:0:0:0/64 [110/11] via fe80::21b:4fff:fe5f:fa05, vlan15, 00:27:55
      [110/11] via fe80::21b:4fff:fe60:fa06, vlan15, 00:27:55
O      fd12::1210:0:0:0:0/64 [110/12] via fe80::21b:4fff:fe5f:fa05, vlan15, 00:27:07
      [110/12] via fe80::21b:4fff:fe60:fa06, vlan15, 00:27:07
O      fd12::1211:0:0:0:0/64 [110/12] via fe80::21b:4fff:fe5f:fa05, vlan15, 00:27:07
      [110/12] via fe80::21b:4fff:fe60:fa06, vlan15, 00:27:07
O      fd12::1215:0:0:0:0/64 [110/12] via fe80::21b:4fff:fe5f:fa05, vlan15, 00:27:07
      [110/12] via fe80::21b:4fff:fe60:fa06, vlan15, 00:27:07
C      fd12::2015:0:0:0:0/64 via ::, vlan15, 01:28:55
C      fd12::2099:0:0:0:1/128 via ::, lo1, 00:15:43

```

2.1.2.4 DHCP

1 Verify IPv4 DHCP forwarding path

ACLI

show ip dhcp-relay fwd-path

Results:

Response from VSP-3:

```
=====
                        DHCP Fwd-path - GlobalRouter
=====
INTERFACE      SERVER      ENABLE  MODE
-----
10.1.110.1      10.1.101.10  TRUE    DHCP
10.1.111.1      10.1.101.10  TRUE    DHCP
```

Response from VSP-4:

```
=====
                        DHCP Fwd-path - GlobalRouter
=====
INTERFACE      SERVER      ENABLE  MODE
-----
10.1.110.2      10.1.101.10  TRUE    DHCP
10.1.111.2      10.1.101.10  TRUE    DHCP
```

2 Verify IPv6 DHCP forwarding path

ACLI

show ipv6 dhcp-relay fwd-path

Results:

Response from VSP-3:

```
=====
DHCPv6 Fwd-path
=====
INTERFACE                                SERVER                                ENABLE
-----
fd12:0:0:1210:0:0:0:1                    fd12:0:0:1201:0:0:0:10                enable
fd12:0:0:1211:0:0:0:1                    fd12:0:0:1201:0:0:0:10                enable
```

Response from VSP-4:

```
=====
DHCPv6 Fwd-path
=====
INTERFACE                                SERVER                                ENABLE
-----
fd12:0:0:1210:0:0:0:2                    fd12:0:0:1201:0:0:0:10                enable
fd12:0:0:1211:0:0:0:2                    fd12:0:0:1201:0:0:0:10                enable
```

2.2 Manual IPv6 Tunnel Configuration Example

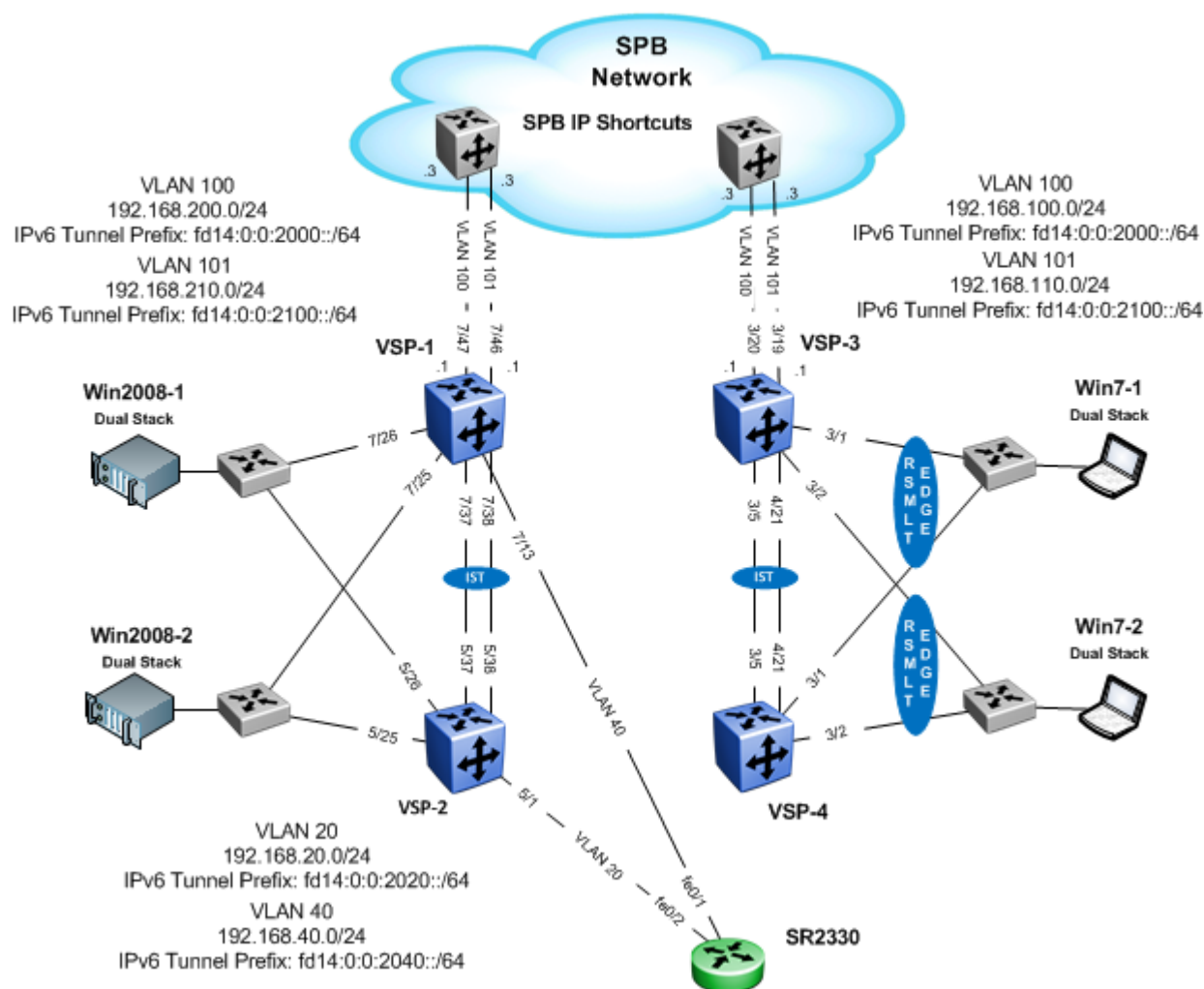


Figure 2 – Manual Tunnel Configuration Example

Overall, this configuration example will consist of the following:

- Basically the same setup as the previous example at the edge, but, in the core, now using manual tunnels to forward IPv6 traffic via IPv4 between VSP-1 to VSP-3 and VSP-1 & VSP-2 to Secure Router
 - Two manual tunnels via an SPB IP Shortcuts core between VSP-1 and VSP-3
 - Using VLANs 100 and 101 to the SPB backbone network
 - The SPB BEB nodes connected to either VSP-1 or VSP-3 has SPB IP Shortcuts enabled to allow IP forwarding over SPB.
 - For the manual tunnel via VLAN 100, we will use an IPv6 subnet of fd14:0:0:1200::/64
 - For the manual tunnel via VLAN 101, we will use an IPv6 subnet of fd14:0:0:1210::/64

- In this example, OSPFv2 is not enabled on the SPB BEB nodes, hence, we will need to create static routes on VSP-1 and VSP-3. The SPB BEB nodes simply just redistributes direct interfaces
- Two manual tunnels between VSP-1 & VSP-2 and the Secure Router 2330
 - One tunnel between VSP-1 and SR2330 via VLAN 40 using an IPv6 subnet of fd14:0:0:1240::/64
 - One tunnel between VSP-2 and SR2330 via VLAN 20 using an IPv6 subnet of fd14:0:0:1220::/64



Please note that one would not normally use a direct connection for either tunnel from VSP-1 or VSP-2 to the Secure Router in a real network. Since this network was setup in a lab environment, we simply used direct connections from VSP-1 and VSP-2 to SR2330 to show how to setup manual tunnels on the Secure Router. Normally a routed IPv4 network would exist between the Secure Router and the VSP 9000 switches.

Overall, IPv6 routing between the VSP 9000 clusters and Secure Router will be via IPv4 using manual tunnels.

Also note that ECMP is not supported via manual tunnels.



Please note, at this time, one must provision the MTU size for the manual tunnel on the Secure Router to a value of 1280. By default, it uses a MTU size of 1480.

2 Core Configuration: Manual Tunnel

Switch	Feature	Parameter	Value
VSP-1	VLAN 40	IPv4 address	192.168.40.1/24
		OSPFv2	Enable
		Ports	7/13
	VLAN 100	IPv4 address	192.168.200.1/24
		OSPFv2	Disable
		Ports	7/47
	VLAN 101	IPv4 address	192.168.210.1/24
		OSPFv2	Disable
		Ports	7/46
	Static Route #1	Dest Network	192.168.100.0/24
		Next Hop	192.168.200.3
	Static Route #2	Dest Network	192.168.110.0/24
		Next Hop	192.168.210.3
	Manual Tunnel to SR2330	Source	192.168.40.1
		IPv6 Address	fd14:0:0:1240::1/64
		Destination	192.168.40.3
	Manual Tunnel to VSP-3 via VLAN 100	Source	192.168.200.1
		IPv6 Address	fd14:0:0:1200::1/64
		Destination	192.168.100.1
	Manual Tunnel to VSP-3 via VLAN 101	Source	192.168.210.1
		IPv6 Address	fd14:0:0:1210::1/64
		Destination	192.168.110.1

VSP-2	VLAN 20	IPv4 address	192.168.20.1/24
		OSPFv2	Enable
		Ports	5/1
	Manual Tunnel to SR2330	Source	192.168.20.1
		IPv6 Address	fd14:0:0:1220::1/64
		Destination	192.168.20.3
VSP-3	VLAN 100	IPv4 address	192.168.100.1/24
		OSPFv2	Disable
		Ports	1/20
	VLAN 101	IPv4 address	192.168.110.1/24
		OSPFv2	Disable
		Ports	1/19
	Static Route #1	Dest Network	192.168.200.0/24
		Next Hop	192.168.100.3
	Static Route #2	Dest Network	192.168.210.0/24
		Next Hop	192.168.110.3
	Manual Tunnel to VSP-1 via VLAN 100	Source	192.168.100.1
		IPv6 Address	fd14:0:0:1200::2/64
		Destination	192.168.200.1
	Manual Tunnel to VSP-1 via VLAN 101	Source	192.168.110.1
		IPv6 Address	fd14:0:0:1210::2/64
		Destination	192.168.210.1

SR2330	fe0/1	IPv4 address	192.168.20.3/24
		OSPFv2	Enable
	fe0/2	IPv4 address	192.168.40.3/24
		OSPFv2	Enable
	Manual Tunnel to VSP-1	Source	192.168.40.3
		IPv6 Address	fd14:0:0:1240::3//64
		Destination	192.168.40.1
		MTU Size	1280
	Manual Tunnel to SR2330	Source	192.168.20.3
		IPv6 Address	fd14:0:0:1220::3//64
		Destination	192.168.20.1
		MTU Size	1280



Please note, at this time, one must provision the MTU size for the manual tunnel on the Secure Router to a value of 1280. By default, it uses a MTU size of 1480.

VSP-1

```
#
# VLAN CONFIGURATION - PHASE I
#

vlan create 40 type port-mstprstp 1
vlan members 40 7/13 portmember
interface Vlan 40
ip address 192.168.40.1 255.255.255.0
ip ospf enable
exit

vlan create 100 type port-mstprstp 1
vlan members 100 7/47 portmember
interface Vlan 100
ip address 192.168.200.1 255.255.255.0
exit

vlan create 101 type port-mstprstp 1
vlan members 101 7/46 portmember
interface Vlan 101
ip address 192.168.210.1 255.255.255.0
exit

#
# PORT CONFIGURATION - PHASE II
#

interface GigabitEthernet 7/13
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit

interface GigabitEthernet 7/46
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state
```

VSP-2

```
#
# VLAN CONFIGURATION - PHASE I
#

vlan create 20 type port-mstprstp 1
vlan members 20 5/1 portmember
interface Vlan 20
ip address 192.168.20.1 255.255.255.0
ip ospf enable
exit

#
# PORT CONFIGURATION - PHASE II
#

interface GigabitEthernet 5/1
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
```

```
exit
interface GigabitEthernet 7/47
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
```

```
#
# IP CONFIGURATION - GlobalRouter
#
```

```
ip route 192.168.100.0 255.255.255.0
192.168.200.3 weight 1
ip route 192.168.110.0 255.255.255.0
192.168.210.3 weight 1
```

```
#
# CIRCUITLESS IP INTERFACE CONFIGURATION -
GlobalRouter
#
```

```
interface loopback 1
ip address 1 10.1.1.1/255.255.255.255
ip ospf 1
```

```
#
# OSPF CONFIGURATION - GlobalRouter
#
```

```
router ospf enable
router ospf
router-id 10.1.1.1
exit
```

```
#
# IPV6 CONFIGURATION
#
```

```
#
# CIRCUITLESS IP INTERFACE CONFIGURATION -
GlobalRouter
#
```

```
interface loopback 1
ip address 1 10.1.1.2/255.255.255.255
ip ospf 1
```

```
#
# OSPF CONFIGURATION - GlobalRouter
#
```

```
router ospf enable
router ospf
router-id 10.1.1.2
exit
```

```
#
# IPV6 CONFIGURATION
#
```

```
ipv6 forwarding
```

```
ipv6 forwarding
```

```
#
# IPV6 TUNNEL CONFIGURATION
#
```

```
ipv6 tunnel 1 source 192.168.40.1 address
fd14:0:0:1240:0:0:0:1/64 destination
192.168.40.3

ipv6 tunnel 2 source 192.168.200.1 address
fd14:0:0:2000:0:0:0:1/64 destination
192.168.100.1

ipv6 tunnel 3 source 192.168.210.1 address
fd14:0:0:2010:0:0:0:1/64 destination
192.168.110.1
```

```
#
# IPV6 OSPFV3 CONFIGURATION
#
```

```
router ospf ipv6-enable
router ospf
ipv6 router-id 10.1.1.1
ipv6 tunnel 1 area 0.0.0.0
ipv6 tunnel 1 metric 10
ipv6 tunnel 1 enable
ipv6 tunnel 2 area 0.0.0.0
ipv6 tunnel 2 enable
ipv6 tunnel 3 area 0.0.0.0
ipv6 tunnel 3 enable
exit
```

```
#
# IPV6 TUNNEL CONFIGURATION
#
```

```
ipv6 tunnel 1 source 192.168.20.1 address
fd14:0:0:1220:0:0:0:1/64 destination
192.168.20.3
```

```
#
# IPV6 OSPFV3 CONFIGURATION
#
```

```
router ospf ipv6-enable
router ospf
ipv6 router-id 10.1.1.2
ipv6 tunnel 1 area 0.0.0.0
ipv6 tunnel 1 metric 10
ipv6 tunnel 1 enable
exit
```

VSP-3

```
#
# VLAN CONFIGURATION - PHASE I
#

vlan create 100 type port-mstprstp 1
vlan members 100 1/20 portmember
interface Vlan 100
ip address 192.168.100.1 255.255.255.0
```

SR2330

```
interface loopback lo1
    ipv6 enable
    ipv6 address fd12:0:0:2099::1/128
    exit loopback

interface ethernet 0/1
    ip address 192.168.20.3 255.255.255.0
    aaa
```

```

exit
vlan create 101 type port-mstprstp 1
vlan members 101 1/19 portmember
interface Vlan 101
ip address 192.168.110.1 255.255.255.0
exit

#
# PORT CONFIGURATION - PHASE II
#

interface GigabitEthernet 3/19
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
interface GigabitEthernet 3/20
no shutdown
no spanning-tree mstp force-port-state
enable
no spanning-tree mstp msti 1 force-port-
state enable
exit
#
# IP CONFIGURATION - GlobalRouter
#

ip route 192.168.200.0 255.255.255.0
192.168.100.3 weight 1
ip route 192.168.210.0 255.255.255.0
192.168.110.3 weight 1

#
# CIRCUITLESS IP INTERFACE CONFIGURATION -
GlobalRouter
#

interface loopback 1
ip address 1 10.1.1.3/255.255.255.255

exit aaa
qos
module
exit module
chassis
exit chassis
exit qos
exit ethernet

interface ethernet 0/2
ip address 192.168.40.3 255.255.255.0
aaa
exit aaa
qos
module
exit module
chassis
exit chassis
exit qos
exit Ethernet

interface tunnel tunnel2
ipv6 address fd14:0:0:1220::3/64
ipv6 router ospf area 0.0.0.0
ipv6 ospf mtu 1280
tunnel source 192.168.20.3
tunnel destination 192.168.20.1
tunnel mode ipv6ip
qos
chassis
exit chassis
exit qos
exit tunnel

interface tunnel tunnel3
ipv6 address fd14:0:0:1240::3/64
ipv6 ospf network point-to-point
ipv6 router ospf area 0.0.0.0
ipv6 ospf mtu 1280
tunnel source 192.168.40.3

```

```

ip ospf 1
exit

#
# OSPF CONFIGURATION - GlobalRouter
#
router ospf enable
router ospf
router-id 10.1.1.3
exit
#
# IPV6 CONFIGURATION
#

ipv6 forwarding

#
# IPV6 TUNNEL CONFIGURATION
#

ipv6 tunnel 2 source 192.168.100.1 address
fd14:0000:0000:2000:0000:0000:0000:0002/64
destination 192.168.200.1

ipv6 tunnel 3 source 192.168.110.1 address
fd14:0000:0000:2010:0000:0000:0000:0002/64
destination 192.168.210.1

#
# IPV6 OSPFV3 CONFIGURATION
#

router ospf ipv6-enable
router ospf
ipv6 router-id 10.1.1.3
ipv6 tunnel 2 area 0.0.0.0
ipv6 tunnel 2 enable
ipv6 tunnel 3 area 0.0.0.0
ipv6 tunnel 3 enable
exit

tunnel destination 192.168.40.1
tunnel mode ipv6ip
qos
chassis
exit chassis
exit qos
exit tunnel

router-id 1.1.1.15

router ospf 1
log-adjacency-changes
network 192.168.20.0 0.0.0.255 area 0
network 192.168.40.0 0.0.0.255 area 0
exit ospf

router ipv6 ospf
redistribute connected
log-adjacency-changes
exit ospf

```

2.2.1 Manual Tunnel Verification

2.2.1.1 IPv6 Tunnels

1 Verify Manual Tunnel:

ACLI

show ipv6 tunnel

SR

show tunnels

show ipv6 ospf interface <tunnel2|tunnel1>

Results:

Response from 9000-1:

```
=====
                        Tunnel If Information
=====
ID          LOCAL ADDRESS  REMOTE ADDRESS  TYPE  TTL
-----
1           192.168.40.1     192.168.40.3   manual 255
2           192.168.200.1         192.168.100.1  manual 255
3           192.168.210.1         192.168.110.1  manual 255
```

Response from 9000-2:

```
=====
                        Tunnel If Information
=====
ID          LOCAL ADDRESS  REMOTE ADDRESS  TYPE  TTL
-----
1           192.168.20.1             192.168.20.3   manual 255
```

Response from VSP-3:

```
=====
                        Tunnel If Information
=====
ID          LOCAL ADDRESS  REMOTE ADDRESS  TYPE  TTL
-----
2           192.168.100.1             192.168.200.1  manual 255
3           192.168.110.1             192.168.210.1  manual 255
```


Response from SR2330:

```
Tunnel: tunnel2 (IfIndex 107),      Status: up
IPv6 Address: fd14:0:0:1220::3/64
Source Address: 192.168.20.3,        Destination Address: 192.168.20.1
MTU: 1480 bytes,                    Protocol: IPv6Ip
TCP MSS: disabled
```

```
Tunnel: tunnel3 (IfIndex 108),      Status: up
IPv6 Address: fd14:0:0:1240::3/64
Source Address: 192.168.40.3,        Destination Address: 192.168.40.1
MTU: 1480 bytes,                    Protocol: IPv6Ip
TCP MSS: disabled
```

```
tunnel2 is up, line protocol is up
Interface ID: 107
IPv6 Prefixes:
  fe80::92fb:5bff:fe7f:8a00/10 (Link-Local Address)
  fd14::1220:0:0:0:3/64
OSPFv3 Process (*null*), Area: 0.0.0.0, Instance ID: 0, MTU: 1280
Router ID 1.1.1.15, Network Type POINTOPOINT, Cost: 10
Transmit Delay: 1 sec, State Point-To-Point, Priority 1
Timer interval in secs, Hello: 10, Dead: 40, Wait: 40, Retransmit: 5
  Hello due: 00:00:04
Neighbor Count: 1, Adjacent neighbor count: 1
Hello received: 506, sent: 500
DD received: 2, sent: 3
LS-Req received: 1, sent: 1
LS-Upd received: 53, sent: 43
LS-Ack received: 22, sent: 17
Discarded: 0
```

```
tunnel3 is up, line protocol is up
Interface ID: 108
IPv6 Prefixes:
  fe80::92fb:5bff:fe7f:8a00/10 (Link-Local Address)
  fd14::1240:0:0:0:3/64
OSPFv3 Process (*null*), Area: 0.0.0.0, Instance ID: 0, MTU: 1280
Router ID 1.1.1.15, Network Type POINTOPOINT, Cost: 10
Transmit Delay: 1 sec, State Point-To-Point, Priority 1
Timer interval in secs, Hello: 10, Dead: 40, Wait: 40, Retransmit: 5
  Hello due: 00:00:04
Neighbor Count: 1, Adjacent neighbor count: 1
Hello received: 500, sent: 494
DD received: 2, sent: 3
LS-Req received: 1, sent: 1
LS-Upd received: 51, sent: 39
LS-Ack received: 15, sent: 19
Discarded: 0
```

2 Verify Manual Tunnel details

ACLI

show ipv6 tunnel detail

Results:

Response from 9000-1:

```
=====
                        Tunnel Interface Information
=====
ID          LOCAL ADDRESS  REMOTE ADDRESS  OPER STATUS TYPE
-----
1           192.168.40.1       192.168.40.3   active   manual
2           192.168.200.1       192.168.100.1  active   manual
3           192.168.210.1       192.168.110.1  active   manual
-----

=====
                        Address Information
=====
IPV6
ADDRESS
-----
fd14:0:0:1240:0:0:0:1      UNICAST MANUAL   PREFERRED
fe80:0:0:0:0:0:c0a8:2801   UNICAST LINKLAYER PREFERRED
fd14:0:0:2000:0:0:0:1      UNICAST MANUAL   PREFERRED
fe80:0:0:0:0:0:c0a8:c801   UNICAST LINKLAYER PREFERRED
fd14:0:0:2010:0:0:0:1      UNICAST MANUAL   PREFERRED
fe80:0:0:0:0:0:c0a8:d201   UNICAST LINKLAYER PREFERRED
-----
```

Response from 9000-2:

```
=====
                        Tunnel Interface Information
=====
ID          LOCAL ADDRESS  REMOTE ADDRESS  OPER STATUS TYPE
-----
1           192.168.20.1          192.168.20.3   active   manual
-----

=====
                        Address Information
=====
IPV6
ADDRESS
-----
fd14:0:0:1220:0:0:0:1      UNICAST MANUAL   PREFERRED
fe80:0:0:0:0:0:c0a8:1401   UNICAST LINKLAYER PREFERRED
-----
```

2 out of 2 Total number of entries displayed.

Response from VSP-3:

```
=====
                        Tunnel Interface Information
=====
```

ID	LOCAL ADDRESS	REMOTE ADDRESS	OPER STATUS	TYPE
2	192.168.100.1	192.168.200.1	active	manual
3	192.168.110.1	192.168.210.1	active	manual

```
=====
                        Address Information
=====
```

IPV6 ADDRESS	TYPE	ORIGIN	STATUS
fd14:0:0:2000:0:0:0:2	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:0:0:c0a8:6401	UNICAST	RANDOM	PREFERRED
fd14:0:0:2010:0:0:0:2	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:0:0:c0a8:6e01	UNICAST	RANDOM	PREFERRED

Response from SR2330:

```
Tunnel: tunnel2 (IfIndex 107),      Status: up
IPv6 Address: fd14:0:0:1220::3/64
Source Address: 192.168.20.3,        Destination Address: 192.168.20.1
MTU: 1480 bytes,                    Protocol: IPv6Ip
TCP MSS: disabled
```

```
Tunnel: tunnel3 (IfIndex 108),      Status: up
IPv6 Address: fd14:0:0:1240::3/64
Source Address: 192.168.40.3,        Destination Address: 192.168.40.1
MTU: 1480 bytes,                    Protocol: IPv6Ip
TCP MSS: disabled
```

```
tunnel2 is up, line protocol is up
Interface ID: 107
IPv6 Prefixes:
  fe80::92fb:5bff:fe7f:8a00/10 (Link-Local Address)
  fd14::1220:0:0:0:3/64
OSPFv3 Process (*null*), Area: 0.0.0.0, Instance ID: 0, MTU: 1280
Router ID 1.1.1.15, Network Type POINTOPOINT, Cost: 10
Transmit Delay: 1 sec, State Point-To-Point, Priority 1
Timer interval in secs, Hello: 10, Dead: 40, Wait: 40, Retransmit: 5
  Hello due: 00:00:04
Neighbor Count: 1, Adjacent neighbor count: 1
Hello received: 506, sent: 500
DD received: 2, sent: 3
LS-Req received: 1, sent: 1
LS-Upd received: 53, sent: 43
LS-Ack received: 22, sent: 17
Discarded: 0
```

```
tunnel3 is up, line protocol is up
Interface ID: 108
IPv6 Prefixes:
  fe80::92fb:5bff:fe7f:8a00/10 (Link-Local Address)
  fd14::1240:0:0:0:3/64
OSPFv3 Process (*null*), Area: 0.0.0.0, Instance ID: 0, MTU: 1280
Router ID 1.1.1.15, Network Type POINTOPOINT, Cost: 10
Transmit Delay: 1 sec, State Point-To-Point, Priority 1
Timer interval in secs, Hello: 10, Dead: 40, Wait: 40, Retransmit: 5
  Hello due: 00:00:04
Neighbor Count: 1, Adjacent neighbor count: 1
Hello received: 500, sent: 494
DD received: 2, sent: 3
LS-Req received: 1, sent: 1
LS-Upd received: 51, sent: 39
LS-Ack received: 15, sent: 19
Discarded: 0
```

3 Verify IPv6 Routes

ACLI

show ipv6 route

Results:

Response from 9000-1:

```
=====
                        IPv6 Routing Table Information
=====
```

Destination Address/PrefixLen	NEXT HOP	VID/BID/TID	PROTO	COST
-----	-----	-----	-----	-----
fd10:0:0:1200:0:0:0:0/64	0:0:0:0:0:0:0:0	T-1	OSPF	10
fd12:0:0:1201:0:0:0:0/64	0:0:0:0:0:0:0:0	V-110	LOCAL	1
fd12:0:0:1201:0:0:0:1/128	0:0:0:0:0:0:0:0	V-110	LOCAL	1
fd12:0:0:1202:0:0:0:0/64	0:0:0:0:0:0:0:0	V-1002	LOCAL	1
fd12:0:0:1202:0:0:0:1/128	0:0:0:0:0:0:0:0	V-1002	LOCAL	1
fd12:0:0:1205:0:0:0:0/64	0:0:0:0:0:0:0:0	V-5	LOCAL	1
fd12:0:0:1205:0:0:0:1/128	0:0:0:0:0:0:0:0	V-5	LOCAL	1
fd12:0:0:1210:0:0:0:0/64	0:0:0:0:0:0:0:0	T-2	OSPF	101
fd12:0:0:1211:0:0:0:0/64	0:0:0:0:0:0:0:0	T-2	OSPF	101
fd12:0:0:1215:0:0:0:0/64	0:0:0:0:0:0:0:0	T-2	OSPF	101
fd12:0:0:1216:0:0:0:0/64	0:0:0:0:0:0:0:0	T-2	OSPF	101
fd12:0:0:1220:0:0:0:0/64	0:0:0:0:0:0:0:0	T-2	OSPF	101
fd12:0:0:1250:0:0:0:0/64	0:0:0:0:0:0:0:0	V-50	LOCAL	1
fd12:0:0:1250:0:0:0:1/128	0:0:0:0:0:0:0:0	V-50	LOCAL	1
fd14:0:0:1220:0:0:0:0/64	0:0:0:0:0:0:0:0	T-1	OSPF	20
fd14:0:0:1240:0:0:0:0/64	0:0:0:0:0:0:0:0	T-1	LOCAL	1
fd14:0:0:1240:0:0:0:1/128	0:0:0:0:0:0:0:0	T-1	LOCAL	1
fd14:0:0:2000:0:0:0:0/64	0:0:0:0:0:0:0:0	T-2	LOCAL	1
fd14:0:0:2000:0:0:0:1/128	0:0:0:0:0:0:0:0	T-2	LOCAL	1
fd14:0:0:2099:0:0:0:3/128	0:0:0:0:0:0:0:0	T-1	OSPF	10

Response from 9000-2:

```
=====
                        IPv6 Routing Table Information
=====
```

Destination Address/PrefixLen	NEXT HOP	VID/BID/TID	PROTO	COST
-----	-----	-----	-----	-----
fd10:0:0:1200:0:0:0:0/64	0:0:0:0:0:0:0:0	T-1	OSPF	10
fd12:0:0:1201:0:0:0:0/64	0:0:0:0:0:0:0:0	V-110	LOCAL	1
fd12:0:0:1201:0:0:0:2/128	0:0:0:0:0:0:0:0	V-110	LOCAL	1
fd12:0:0:1202:0:0:0:0/64	0:0:0:0:0:0:0:0	V-1002	LOCAL	1
fd12:0:0:1202:0:0:0:2/128	0:0:0:0:0:0:0:0	V-1002	LOCAL	1
fd12:0:0:1205:0:0:0:0/64	0:0:0:0:0:0:0:0	V-5	LOCAL	1
fd12:0:0:1205:0:0:0:2/128	0:0:0:0:0:0:0:0	V-5	LOCAL	1
fd12:0:0:1210:0:0:0:0/64	fe80:0:0:0:21b:4fff:fe60:fa04	V-5	OSPF	102
fd12:0:0:1211:0:0:0:0/64	fe80:0:0:0:21b:4fff:fe60:fa04	V-5	OSPF	102
fd12:0:0:1215:0:0:0:0/64	fe80:0:0:0:21b:4fff:fe60:fa04	V-5	OSPF	102
fd12:0:0:1216:0:0:0:0/64	fe80:0:0:0:21b:4fff:fe60:fa04	V-5	OSPF	102
fd12:0:0:1220:0:0:0:0/64	fe80:0:0:0:21b:4fff:fe60:fa04	V-5	OSPF	102
fd12:0:0:1250:0:0:0:0/64	0:0:0:0:0:0:0:0	V-50	LOCAL	1
fd12:0:0:1250:0:0:0:2/128	0:0:0:0:0:0:0:0	V-50	LOCAL	1
fd14:0:0:1220:0:0:0:0/64	0:0:0:0:0:0:0:0	T-1	LOCAL	1

fd14:0:0:1220:0:0:0:1/128	0:0:0:0:0:0:0:0	T-1	LOCAL	1
fd14:0:0:1240:0:0:0:0/64	0:0:0:0:0:0:0:0	T-1	OSPF	20
fd14:0:0:2000:0:0:0:0/64	fe80:0:0:0:21b:4fff:fe60:fa04	V-5	OSPF	101
fd14:0:0:2099:0:0:0:3/128	0:0:0:0:0:0:0:0	T-1	OSPF	10

Response from VSP-3:

IPv6 Routing Table Information				
Destination Address/PrefixLen MTU	NEXT HOP	VID/BID/TID	PROTO	COST
fd10:0:0:1200::/64	fe80::c0a8:c801	T-2	OSPF	11
fd12:0:0:1201::/64	fe80::c0a8:c801	T-2	OSPF	2
fd12:0:0:1202::/64	fe80::c0a8:c801	T-2	OSPF	2
fd12:0:0:1205::/64	::	V-5	LOCAL	1
fd12:0:0:1205::3/128	::	V-5	LOCAL	1
fd12:0:0:1210::/64	::	V-1010	LOCAL	1
fd12:0:0:1210::1/128	::	V-1010	LOCAL	1
fd12:0:0:1211::/64	::	V-1011	LOCAL	1
fd12:0:0:1211::1/128	::	V-1011	LOCAL	1
fd12:0:0:1215::/64	::	V-1013	LOCAL	1
fd12:0:0:1215::1/128	::	V-1013	LOCAL	1
fd12:0:0:1216::/64	::	V-1016	LOCAL	1
fd12:0:0:1216::1/128	::	V-1016	LOCAL	1
fd12:0:0:1220::/64	::	V-1020	LOCAL	1
fd12:0:0:1220::1/128	::	V-1020	LOCAL	1
fd12:0:0:1250::/64	fe80::c0a8:c801	T-2	OSPF	2
fd14:0:0:1220::/64	fe80::c0a8:c801	T-2	OSPF	21
fd14:0:0:1240::/64	fe80::c0a8:c801	T-2	OSPF	21
fd14:0:0:2000::/64	::	T-2	LOCAL	1
fd14:0:0:2000::2/128	::	T-2	LOCAL	1
fd14:0:0:2099::3/128	fe80::c0a8:c801	T-2	OSPF	11

Response from SR2330:

```
Tunnel: tunnel2 (IfIndex 107),      Status: up
IPv6 Address: fd14:0:0:1220::3/64
Source Address: 192.168.20.3,        Destination Address: 192.168.20.1
MTU: 1480 bytes,                    Protocol: IPv6Ip
TCP MSS: disabled
```

```
Tunnel: tunnel3 (IfIndex 108),      Status: up
IPv6 Address: fd14:0:0:1240::3/64
Source Address: 192.168.40.3,        Destination Address: 192.168.40.1
MTU: 1480 bytes,                    Protocol: IPv6Ip
TCP MSS: disabled
```

```
tunnel2 is up, line protocol is up
Interface ID: 107
IPv6 Prefixes:
  fe80::92fb:5bff:fe7f:8a00/10 (Link-Local Address)
  fd14::1220:0:0:0:3/64
OSPFv3 Process (*null*), Area: 0.0.0.0, Instance ID: 0, MTU: 1280
Router ID 1.1.1.15, Network Type POINTOPOINT, Cost: 10
Transmit Delay: 1 sec, State Point-To-Point, Priority 1
Timer interval in secs, Hello: 10, Dead: 40, Wait: 40, Retransmit: 5
  Hello due: 00:00:04
Neighbor Count: 1, Adjacent neighbor count: 1
Hello received: 506, sent: 500
DD received: 2, sent: 3
LS-Req received: 1, sent: 1
LS-Upd received: 53, sent: 43
LS-Ack received: 22, sent: 17
Discarded: 0
```

```
tunnel3 is up, line protocol is up
Interface ID: 108
IPv6 Prefixes:
  fe80::92fb:5bff:fe7f:8a00/10 (Link-Local Address)
  fd14::1240:0:0:0:3/64
OSPFv3 Process (*null*), Area: 0.0.0.0, Instance ID: 0, MTU: 1280
Router ID 1.1.1.15, Network Type POINTOPOINT, Cost: 10
Transmit Delay: 1 sec, State Point-To-Point, Priority 1
Timer interval in secs, Hello: 10, Dead: 40, Wait: 40, Retransmit: 5
  Hello due: 00:00:04
Neighbor Count: 1, Adjacent neighbor count: 1
Hello received: 500, sent: 494
DD received: 2, sent: 3
LS-Req received: 1, sent: 1
LS-Upd received: 51, sent: 39
LS-Ack received: 15, sent: 19
Discarded: 0
```

3. IPv6 Router Advertisements and Windows Platform

3.1 Windows 7 Host: Default Operations

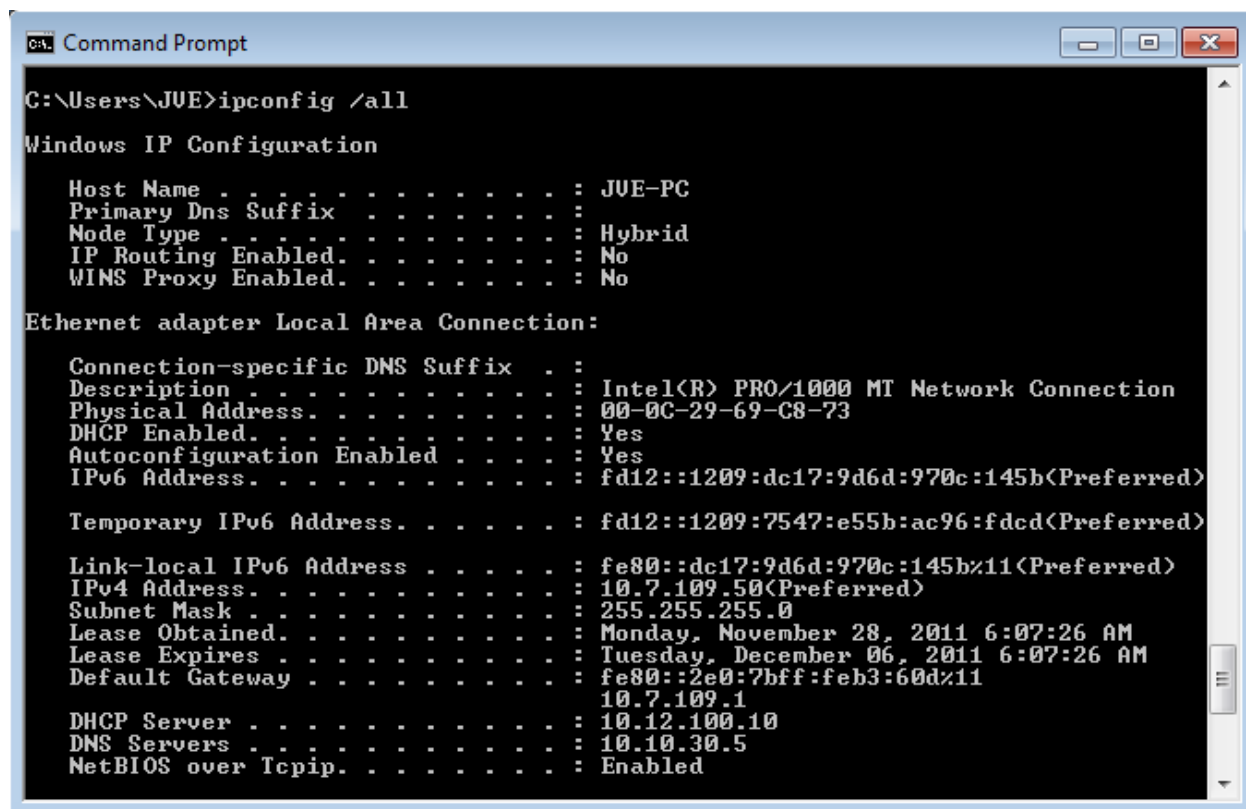
By default, a Windows 7 host has both IPv4 and IPv6 enabled at the same time. An IPv6 host will, by default, automatically configure a link-local address for each IPv6 interface and also use router discovery – an exchange of Router Solicitation and Router Advertisement messages – to get additional addresses and configuration settings. The host will send a Router Solicitation Message and the router should respond with a Router Advertisement message – note that if a host does not receive Router Advertisement messages, the host will then use DHCPv6 to obtain addresses and other configuration parameter.

In summary, through router discovery, a Windows 7 host, when connected to a router, should get the default router address which is the link-local address of the IPv6 interface on the local router – i.e. the link-local interface on the VSP 9000. The router, i.e. VSP 9000, can control the behavior of the Windows 7 host via the Router Advertisement messages as to whether it uses DHCPv6 or not to get additional addresses or configuration parameters. In the Router Advertisement message are the Managed Address Configuration (M) and Other Stateful Configuration (O) flags which are used to indicate to the host whether to use DHCPv6 for additional addresses or configuration settings – please see the next section for more details on the M and O flags. By default, the VSP 9000 sets both the M and O flags with a value of 0 which indicates to the Windows host to not use DHCPv6 to get additional addresses or configuration information. In turn, the default behavior of the Windows host will be to use the router link-local address for the default route. For DNS, a Windows based host will send its DNS queries using the IPv4 address of the DNS server as configured by DHCP. In a IPv6 only environment, a Windows based host can send DNS queries over IPv6 by either manually provisioning the DNS server or using well-known unicast addresses of DNS servers (fec0:0:0:ffff::1, fec0:0:0:ffff::2, and fec0:0:0:ffff::3). The IPv6 DNS server can be manually configured via the properties of the IPv6 component in the Network connections folder or by using the *netsh interface ipv6 add dns* command. As alternative, DHCPv6 can be used providing the router sets the Router Advertisement M and O flags appropriately thus allowing the host to get additional addresses or configuration parameters via DHCPv6 – please see next section.

Windows 7 Host with Dual Stack

The following shows the IP settings from a Window 7 host with both IPv4 and IPv6 enabled. The default setting on the router, i.e. VSP 9000, sets both the M and O flags to 0 in the Router Advertisement message indicating to the host to not use DHCPv6 for additional addresses and configuration parameters. Hence, the Windows host will use the routers link-local address for the default route, get an IPv6 address from the router, and use the IPv4 DNS setting for DNS.

- The temporary IPv6 address of fd12:0:0:1209:7547:e55b:ac96:fdcd is provided by the router
- The default gateway address of fe80:0:0:0:2e0:7bff:feb3:60d is the link-local address of the router
- The DNS address of 10.10.30.5 is the DNS address learn via DHCP



```

C:\Users\JUE>ipconfig /all

Windows IP Configuration

Host Name . . . . . : JUE-PC
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . :
    Description . . . . . : Intel(R) PRO/1000 MT Network Connection
    Physical Address. . . . . : 00-0C-29-69-C8-73
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    IPv6 Address. . . . . : fd12::1209:dc17:9d6d:970c:145b<Preferred>

    Temporary IPv6 Address. . . . . : fd12::1209:7547:e55b:ac96:fdcd<Preferred>

    Link-local IPv6 Address . . . . . : fe80::dc17:9d6d:970c:145b%11<Preferred>
    IPv4 Address. . . . . : 10.7.109.50<Preferred>
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : Monday, November 28, 2011 6:07:26 AM
    Lease Expires . . . . . : Tuesday, December 06, 2011 6:07:26 AM
    Default Gateway . . . . . : fe80::2e0:7bff:feb3:60d%11
                                10.7.109.1
    DHCP Server . . . . . : 10.12.100.10
    DNS Servers . . . . . : 10.10.30.5
    NetBIOS over Tcpip. . . . . : Enabled
  
```

Windows 7 Host with IPv6 only

The following shows the IP settings from a Window 7 host with only IPv6 enabled. The default setting on the router, i.e. VSP 9000, sets both the M and O flags to 0 in the Router Advertisement message indicating to the host to not use DHCPv6 for additional addresses and configuration parameters. Hence, the Windows host will use the routers link-local address for the default route, get an IPv6 address from the router, and use the IPv4 DNS setting for DNS.

- The temporary IPv6 address of fd12:0:0:1209:7547:e55b:ac96:fdcd is provided by the router
- default gateway address of fe80:0:0:0:2e0:7bff:feb3:60d is the link-local address of the router
- The DNS addresses of fec0:0:0:ffff::1, fec0:0:0:ffff::2, and fec0:0:0:ffff::3 are the default well-known unicast addresses of DNS servers; you can also provision the DNS address manually on the host if the well-known addresses are not provisioned on the IPv6 DNS servers.

```

C:\Users\JUE>ipconfig /all

Windows IP Configuration

Host Name . . . . . : JUE-PC
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . :
    Description . . . . . : Intel(R) PRO/1000 MT Network Connection
    Physical Address. . . . . : 00-0C-29-69-C8-73
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    IPv6 Address. . . . . : fd12::1209:dc17:9d6d:970c:145b(Preferred)

    Temporary IPv6 Address. . . . . : fd12::1209:7547:e55b:ac96:fdcd(Preferred)

    Link-local IPv6 Address . . . . . : fe80::dc17:9d6d:970c:145b%11(Preferred)
    Default Gateway . . . . . : fe80::2e0:7bff:feb3:60d%11
    DNS Servers . . . . . : fec0:0:0:ffff::1%1
                           fec0:0:0:ffff::2%1
                           fec0:0:0:ffff::3%1
    NetBIOS over Tcpip. . . . . : Enabled
  
```

3.2 VSP configuration for host addressing options

DHCPv6 can be used to assign additional IPv6 addresses or configuration parameters. By default, as discussed in the previous section, a Window 7 host will use router discover, via exchange of Router Solicitation and Router Advertisement messages to get additional addresses and configuration settings. Included in the Router Advertisement message sent by the router are the Managed Address Configuration (M) and Other Stateful Configuration (O) flags which indicate whether the host should use DHCPv6 for additional addresses or configuration settings.

Overall:

- If the M flag in the Router Advertisement message is set to 1, use DHCPv6 to obtain additional stateful addresses
- If the M flag in the Router Advertisement message is set to 0 and the O flag is set to 1, use DHCPv6 to obtain additional configuration parameters
- If both the M flag and O flag are set to 1, use DHCPv6 to obtain additional stateful addresses and additional configuration parameters

To set the M flag or O flag, i.e. on the VSP 9000, please enter the following ACLI commands. Please note both items are disabled by default.

- VSP-1:1(config)#**interface Vlan 110**
- VSP-1:1(config-if)#**ipv6 nd managed-config-flag**
- VSP-1:1(config-if)#**ipv6 nd other-config-flag**
- VSP-1:1(config-if)#**show ipv6 nd interface <vlan / gigabitethernet>**

In summary, if we set both the M flag and the O flag to 1 on the VSP 9000, the host will use DHCPv6 to get both additional stateful addresses and additional configuration parameters such as DNS addresses while using the routers link-local IPv6 address as the default gateway.

3.3 VSP 9000 – Router Configuration Neighbor Discovery

3.3.1 Enabling Routing Advertisements

A router periodically sends a router advertisement from each of its interfaces announcing its availability. Host will listen to these advertisements for address auto configuration and discovery of link-local address of the neighboring router.

By default, the VSP 9000 will send router advertisement messages when IPv6 is configured either at a port or VLAN level. The VSP 9000 will send out router advertisements for the prefix corresponding to the address configured on the port or VLAN. For example, entering the following commands enables IPv6 and advertises router advertisements:

Configuring IPv6 on Brouter Port

- VSP-9012:1(config)#**interface gigabitEthernet 10/11**
- VSP-9012:1(config-if)#**no shut**
- VSP-9012:1(config-if)#**ipv6 interface vlan 3 address 3000::1/64 enable**

Configuring IPv6 on Vlan

- VSP-9012:1(config)#**interface gigabitEthernet 10/11**
- VSP-9012:1(config-if)#**no shut**
- VSP-9012:1(config-if)#**exit**
- VSP-9012:1(config)#**vlan create 3 type port-mstprstp 0**
- VSP-9012:1(config)#**vlan members add 3 10/11**
- VSP-9012:1(config)#**interface vlan 3**
- VSP-9012:1(config-if)#**ipv6 interface address 3000::1/64**
- VSP-9012:1(config-if)#**ipv6 interface enable**

To disable router advertisements on an IPv6 interface, this can be done by entering the following commands:

Disable Router Advertisement on Brouter Port

- VSP-9012:1(config)#**interface gigabitEthernet 10/11**
- VSP-9012:1(config-if)#**no ipv6 nd send-ra**

Disable Router Advertisement on VLAN

- VSP-9012:1(config)#**interface vlan 3**
- VSP-9012:1(config-if)#**no ipv6 nd send-ra**

Entering the above commands tells the VSP 9000 to advertise all IPv6 prefixes on the interface via Router Advertisements. You can use the ACLI command *ipv6 nd prefix* command to specify what prefixes are advertised and/or what the preferred and valid life is for each prefix:

- VSP-9012:1(config-if)#**ipv6 nd <ipv6address/prefix> <no-advertise | preferred-life | valid-life>**

The *preferred-life* and *valid-life* are values in seconds from 0 to 4294967295 where 4294967295 represent infinity. These values are counted down in real time and when the expiration is reached, the

prefix will no longer be advertised. If you do not provision any prefix, by default, all IPv6 prefixes have a default preferred life of 604800 seconds (7 days) and a default valid life of 2592000 seconds (30 days).

3.4 Router Advertisements and Timing

To configure the IPv6 Router Advertisements transmitted on an interface, use the ACLI command *ipv6 nd rtr-advert-min-interval*.

- VSP-9012:1(config-if)#**ipv6 nd rtr-advert-min-interval <3-1350>**
- VSP-9012:1(config-if)#**ipv6 nd rtr-advert-max-interval <4-1800>**
- VSP-9012:1(config-if)#**ipv6 nd ra-lifetime <0-9000>**

The default interval between transmissions is 200 seconds while the default maximum interval of 600 seconds with a life time of 1800 seconds. This can be verified by using the ACLI command *show ipv6 nd interface <gigabitEthernet | vlan>* command. To prevent synchronization with other IPv6 nodes, randomly adjust the actual value used to within 20 percent of the specified value.

The router lifetime default to a value of 1800 seconds and it included in all IPv6 advertisements send out on each interface. This value is useful when selecting the default router. Setting the lifetime to a value of 0 indicates that the router should not be perceived as a default router on the interface. Please note, if a non-zero value is used, the lifetime should not be less than the router advertisement interval.

3.5 VSP 9000 – Configuring IPv6

3.5.1 Configuration Commands

The following various IPv6 related items with configuration examples.

3.5.1.1 IPv6 Forwarding

```
VSP-9012:1 (config) #ipv6 forwarding
```



"ipv6 forwarding" must be globally enabled in order to terminate IPv6 packets on the CP, install static routes, run routing protocols, etc

3.5.1.2 Configuring IPv6 on Brouter Port

```
VSP-9012:1 (config) #interface gigabitEthernet 10/11
```

```
VSP-9012:1 (config-if) #no shut
```

```
VSP-9012:1 (config-if) #ipv6 interface vlan 3 address 3000::1/64 enable
```

3.5.1.3 Configuring IPv6 on Vlan

```
VSP-9012:1 (config) #interface gigabitEthernet 10/11
```

```
VSP-9012:1 (config-if) #no shut
```

```
VSP-9012:1 (config-if) #exit
```

```
VSP-9012:1 (config) #vlan create 3 type port-mstprstp 0
```

```
VSP-9012:1 (config) #vlan members add 3 10/11
```

```
VSP-9012:1 (config) #interface vlan 3
```

```
VSP-9012:1 (config-if) #ipv6 interface address 3000::1/64
```

```
VSP-9012:1 (config-if) #ipv6 interface enable
```

3.5.1.4 IPv6 Static Route

```
VSP-9012:1 (config) #ipv6 route 4000::/64 cost 1 next-hop 3000::2
```

3.5.1.5 Configuring Ipv6 Static Neighbor

```
VSP-9012:1 (config) #ipv6 neighbor 3000::3 port 10/11 mac 01:02:03:04:05:06
```

3.5.1.6 Configuring Ipv6 Tunneling

a) Example config on Node A

```
VSP-9012:1(config)#vlan create 3 type port-mstprstp 0
VSP-9012:1(config)#vlan members 3 5/33 portmember
VSP-9012:1(config)#interface vlan 3
VSP-9012:1(config-if)#ip address 11.11.11.1 255.255.255.0 1
VSP-9012:1(config)#exit
VSP-9012:1(config)#ipv6 tunnel 2 source 11.11.11.1 address 3000:0:0:0:0:0:1/64
destination 12.12.12.2
```

b) Example config on Node B

```
VSP-9012:1(config)#vlan create 4 type port-mstprstp 0
VSP-9012:1(config)#vlan members 4 3/34 portmember
VSP-9012:1(config)#interface vlan 4
VSP-9012:1(config-if)#ip address 12.12.12.2 255.255.255.0 1
VSP-9012:1(config)#exit
VSP-9012:1(config)#ipv6 tunnel 2 source 12.12.12.2 address 3000:0:0:0:0:0:2/64
destination 11.11.11.1
```

3.5.1.7 Configuring OSPFv3

```
VSP-9012:1(config)#router ospf
VSP-9012:1(config-ospf)#ipv6 router-id 1.1.1.1
VSP-9012:2(config-ospf)#ipv6 area 0.0.0.1
VSP-9012:2(config-ospf)#ipv6 area range 0.0.0.1 3000::0/16 advertise-mode advertise
VSP-9012:2(config-ospf)#ipv6 area virtual-link 0.0.0.1 2.2.2.2
VSP-9012:2(config-ospf)#ipv6 as-boundary-router
VSP-9012:1(config-ospf)#exit
VSP-9012:1(config)#router ospf ipv6-enable
VSP-9012:1(config)#interface gigabitEthernet 6/24
VSP-9012:1(config-if)#ipv6 ospf area 0.0.0.0
VSP-9012:1(config-if)#ipv6 ospf enable
```

3.5.1.8 Configuring OSPFv3 on Ipv6 Configured Tunnels

```
VSP-9012:1(config)#router ospf ipv6-enable
VSP-9012:1(config)#router ospf
VSP-9012:1(config-ospf)#ipv6 router-id 2.2.2.2
VSP-9012:1(config-ospf)#ipv6 area 0.0.0.1
VSP-9012:1(config-ospf)#ipv6 tunnel 2 area 0.0.0.1
VSP-9012:1(config-ospf)#ipv6 tunnel 2 enable
```

3.5.1.9 Configuring IPv6 DHCP Relay

```
VSP-9012:1 (config) #interface gigabitEthernet 6/24
VSP-9012:1 (config-if) #ipv6 dhcp-relay
VSP-9012:1 (config-if) #ipv6 dhcp-relay fwd-path 1234::1234
VSP-9012:1 (config-if) #ipv6 dhcp-relay fwd-path 1234::1234 enable
```

Configure a forwarding path outside the interface

```
VSP-9012:1 (config) #ipv6 dhcp-relay fwd-path 1111::1111 1234::1234
VSP-9012:1 (config) #ipv6 dhcp-relay fwd-path 1111::1111 1234::1234 enable
```



If the forwarding path is configured under interface, the default values will be put as relay address: the smallest IP configured on interface or the first VRRP global address configured, if the relay is VRRP Master.

3.5.1.10 Configure the VRRP Master as Relay (under interface)

```
VSP-9012:1 (config-if) #ipv6 dhcp-relay fwd-path 1234::1234 vrid 12
```



To configure the VRRP Master as Relay outside the interface just put the VRRP address at the Agent Address parameter

3.5.1.11 Configuring IPv6 VRRP

```
VSP-9012:1 (config) #interface gigabitEthernet 6/24
VSP-9012:1 (config-if) #ipv6 vrrp address 12 link-local fe80::1234
VSP-9012:1 (config-if) #ipv6 vrrp address 12 enable
VSP-9012:1 (config-if) #ipv6 vrrp address 12 global 1111:2222/64
```



The configuration is the same for brouter and vlan

3.5.1.12 Configuring IPv6 Route Policies and Route Redistribution

Here is a sample configuration on how the IPv6 route policies and route redistribution are used with BGP and OSPFv3:

- a) Configure IPv6 prefix-lists:

```
VSP-9012:1(config-if)#ipv6 prefix-list "pl_o3" 3ffe:0:0:1::/64 ge 64 le 64
VSP-9012:1(config-if)#ipv6 prefix-list "pl_o3" 3ffe:0:0:2::/64 ge 64 le 64
VSP-9012:1(config-if)#ipv6 prefix-list "b" 3ffe:0:0:4::/64 ge 64 le 64
VSP-9012:1(config-if)#ipv6 prefix-list "pl_st6" 8100::/64 ge 48 le 80
VSP-9012:1(config-if)#ipv6 prefix-list "pl_direct" 4444::/64 ge 64 le 64
```

- b) Create and configure route-maps that use the previous declared prefix-lists:

```
route-map "rm_st6" 50
route-map "rm_st6" 50 deny
enable
match network "pl_st6"
route-map "rm_st6" 51
route-map "rm_st6" 51 permit
enable
route-map "rm_direct" 4
route-map "rm_direct" 4 deny
enable
match network "pl_direct"
route-map "rm_direct" 14
route-map "rm_direct" 14 permit
enable
route-map "rm_o3" 1
route-map "rm_o3" 1 deny
enable
match network "pl_o3"
route-map "rm_o3" 2
route-map "rm_o3" 2 permit
enable
exit
```

c) Create BGP peers and enable BGP redistribution:

```
router bgp 100 enable
router bgp
neighbor "12.1.1.2"
neighbor "7.1.1.2"
neighbor 12.1.1.2 remote-as 300
neighbor 12.1.1.2 address-family ipv6
neighbor 12.1.1.2 enable
neighbor 7.1.1.2 remote-as 200
neighbor 7.1.1.2 address-family ipv6
neighbor 7.1.1.2 enable
exit

router bgp
redistribute ospfv3
redistribute ospfv3 enable
redistribute ospfv3 route-map "rm_o3"
redistribute ipv6-static
redistribute ipv6-static enable
redistribute ipv6-static route-map "rm_st6"
redistribute ipv6-direct
redistribute ipv6-direct enable
redistribute ipv6-direct route-map "rm_direct"
exit
```

d) Add IPv6 in and out policies to BGP:

```
router bgp
neighbor 7.1.1.2 ipv6-in-route-map <in-route-map name>
neighbor 7.1.1.2 ipv6-out-route-map <out-route-map name>
exit
```

- e) Configure and enable redistribution for OSPFv3:

```
router ospf ipv6-enable
router ospf
ipv6 as-boundary-router enable
ipv6 redistribute bgp enable
ipv6 redistribute direct enable
ipv6 redistribute static enable
exit
```

```
interface vlan 23
ipv6 ospf area 0.0.0.0
ipv6 ospf enable
exit
```

3.5.1.13 Configuring IP RSMLT

IPv6 RSMLT using existing IP RSMLT commands

```
VSP-9012:2 (config) #interface vlan 101
VSP-9012:2 (config-if) #ip rsmlt
VSP-9012:2 (config-if) #no ip rsmlt
VSP-9012:2 (config-if) #exit
VSP-9012:2 (config) #ip rsmlt edge-support
VSP-9012:2 (config) #no ip rsmlt edge-support
VSP-9012:2 (config) #no ip rsmlt peer-address 101
```

3.5.1.14 Configure Radius

```
VSP-9012:1 (config) #radius server host 3000:0:0:0:0:0:2 key abc
VSP-9012:1 (config) #radius enable
VSP-9012:1 (config) #radius accounting enable
```

3.5.1.15 Configure Syslog

```
VSP-9012:1 (config) #syslog host 1
VSP-9012:1 (config) #syslog host 1 address 3000:0:0:0:0:0:2
VSP-9012:1 (config) #syslog host 1 enable
```

3.5.1.16 Configure DNS

```
VSP-9012:1(config)#ip name-server primary 3000:0:0:0:0:0:2  
VSP-9012:1(config)#ip name-server secondary 47.17.174.186  
VSP-9012:1(config)#ip name-server tertiary 192.32.99.99
```

3.5.2 Show Commands

3.5.2.1 Show IPv6 Interface

VSP-9012:1 (config) # **show ipv6 interface**

```
=====
```

Interface Information										
=====										
INTER-	SCOPE	Descr	VLAN	MTU	PHYSICAL	ADMIN	OPER	RCHBLE	RETRAN	TYPE
FACE	ID				ADDRESS	STATE	STATE	TIME	TIME	

Vlan3	2051	VLAN-3	3	1500	00:24:7f:9c:da:00	enabl	up	30000	1000	ETHER

Legend: NA - Information not available

1 out of 1 Total Num of Interface Entries displayed.

3.5.2.2 Show IPv6 Neighbor

VSP-9012:1 (config) # **show ipv6 neighbor**

```
=====
```

Neighbor Information				
=====				
NET ADDRESS/ PHYSICAL ADDRESS	PHYS INTF	TYPE	STATE	LAST UPD

3000:0:0:0:0:0:0:1/ 00:24:7f:9c:da:00	cpp	LOCAL	REACHABLE	1770
3000:0:0:0:0:0:0:2/ 00:0c:42:07:35:90	10/11	DYNAMIC	STALE	2197
fe80:0:0:0:20c:42ff:fe07:3590/ 00:0c:42:07:35:90	10/11	DYNAMIC	STALE	2207
fe80:0:0:0:224:7fff:fe9c:da00/ 00:24:7f:9c:da:00	cpp	LOCAL	REACHABLE	1770

4 out of 4 Total Num of Neighbor Entries displayed.

3.5.2.3 Show IPv6 Address Interface

VSP-9012:1 (config) #*show ipv6 address interface*

```
=====
```

Address Information				
=====				
IPV6 ADDRESS	VID/BID/TID	TYPE	ORIGIN	STATUS

3000:0:0:0:0:0:1	V-3	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:224:7fff:fe9c:da00	V-3	UNICAST	RANDOM	PREFERRED

2 out of 2 Total Num of Address Entries displayed.

3.5.2.4 Show IPv6 Nd-prefix

VSP-9012:1 (config) #*show ipv6 nd-prefix*

```
=====
```

Nd-Prefix Address Information					
=====					
INTF	IPV6	VLAN	VALID	PREF	EUI
INDEX	ADDRESS/PREFIX	ID	LIFE	LIFE	

2051	3000:0:0:0:0:0:0/64	3	2592000	604800	1

```
-----
```

Legend: EUI: eui-not-used(1), eui-used-with-ul-complement(2)
 eui-used-without-ul-complement(3)

3.5.2.5 Show IPv6 Nd Interface

VSP-9012:1 (config) #*show ipv6 nd interface vlan*

```
=====
```

Vlan Ipv6 Nd									
=====									
IFID	VLAN	RTR-ADV	MAX-INT	MIN-INT	LIFETIME	HOP-LIM	M-FLAG	OTHER-CONF	DAD-NS

2051	V-3	True	600	200	1800	30	False	False	1

1 out of 1 Total Num of Ipv6 ND Entries displayed.

3.5.2.6 Show IPv6 Route

VSP-9012:1 (config) #*show ipv6 route*

IPv6 Routing Table Information				
Destination Address/PrefixLen				VID/BID/TID
PROTO	COST	MTU	NEXT HOP	

3000::/64			::	V-3
LOCAL	1			
3000::1/128			::	V-3
LOCAL	1			
4000::/64			3000::2	V-3
STATIC	1			

3 out of 3 Total Num of Route Entries displayed.

3.5.2.7 Show IPv6 Route Static

VSP-9012:1 (config) #*show ipv6 route static*

```
=====
                                Static Route Information
=====
DEST-IP                                NET IFINDX(VID/BRT/TUN)  ENABLE   STATUS
NEXT-HOP                                PREFERENCE
-----
4000:0:0:0:0:0:0:0                    64   0      (0      ) enable   ReachableInRtm
3000:0:0:0:0:0:0:2                    5
=====
```

Total Static Routes: 1

3.5.2.8 Show IPv6 DHCP Relay

VSP-9012:1 (config-if) #**show ipv6 dhcp-relay interface gigabitEthernet 5/1**

```
=====
```

Port Dhcpv6				
=====				
PORT NUM	IF INDEX	MAX HOP	DHCP-RELAY	REMOTE ID

5/1	320	32	enable	disable

VSP-9012:1 (config-if) #**show ipv6 dhcp-relay fwd-path**

```
=====
```

DHCPv6 Fwd-path		
=====		
INTERFACE	SERVER	ENABLE

1111:0:0:0:0:0:1111	1234:0:0:0:0:0:1234	enable

VSP-9012:1 (config-if) #**show ipv6 dhcp-relay counters**

```
=====
```

DHCPv6 Counters		
=====		
INTERFACE	REQUESTS	REPLIES

1111:0:0:0:0:0:1111	1	1

3.5.2.9 Show IPv6 VRRP

```
*VSP-9012:1(config)#show ipv6 vrrp *
```

```
=====
VRRP Global Settings - GlobalRouter
=====
```

```
send-trap          : enabled
```

```
*VSP-9012:1(config-if)#show ipv6 vrrp address *
```

```
=====
VRRP Info - GlobalRouter
=====
```

VRID	P/V	IP	MAC	STATE	CONTROL
12	5/1	fe80:0:0:0:0:0:0:1234	00:00:5e:00:02:0c	Init	Disabled

VRID	P/V	MASTER	PRIO	ADV	UP TIME
12	5/1	0:0:0:0:0:0:0:0	100	1	0 day(s), 00:00:00

VRID	P/V	CRITICAL IP	CRITICAL IP ENABLED	ACCEPT MODE
12	5/1	0:0:0:0:0:0:0:0	No	disable

VRID	P/V	BACKUP MASTER	BACKUP-MASTER STATE	FAST (ENABLED) ADV	ACTION	HLD DWN	REM
12	5/1	disable	down	200 (NO)	none	0	0

VRID	P/V	GLOBAL ADDRESS
12	5/1	1111::2222/64

*VSP-9012:1(config)#**show ipv6 vrrp interface vlan 20***

```
=====
                        Vlan Vrrp for Ipv6
=====
VLAN VRRP IPv6          VIRTUAL
ID   ID   ADDRESS        MAC ADDRESS
-----
20   1    fe80:0:0:0:0:0:1 00:00:5e:00:02:01
```

*VSP-9012:1(config-if)#**show ipv6 vrrp interface verbose***

```
=====
                        Vlan Vrrp for IPv6 Extended
=====
VLAN VRRP                                MASTER      ADVERTISE CRITICAL
ID   ID      STATE  CONTROL PRIORITY  IPADDR          INTERVAL  IPADDR
-----
2    2        master enable   100             fe80:0:0:0:224:7fff:fe9d:1a03 3
0:0:0:0:0:0:0
```

All 2 out of 1 Total Num of Vlan Vrrp Extended Entries displayed

```
VLAN VRRP          HOLDDWN ACTION  CRITICAL BACKUP  BACKUP  FAST ADV  FAST ADV
ID   ID              TIME      IP          MASTER  MASTER  INTERVAL  ENABLE
                        ENABLE              STATE
-----
2    2                300      none      disable  disable  down      200      disable
```

All 1 out of 1 Total Num of Vlan Vrrp Extended Entries displayed

```
=====
                        Port Vrrp Extended
=====
PORT VRRP                                MASTER      ADVERTISE CRITICAL
NUM  ID      STATE  CONTROL PRIORITY  IPv6ADDR          INTERVAL  IPv6ADDR
-----
5/1  4        init    disable  100             0:0:0:0:0:0:0:0  1          0:0:0:0:0:0:0:0
```

PORT NUM	VRRP ID	HOLDDWN TIME	ACTION	CRITICAL IPv6 ENABLE	BACKUP MASTER	BACKUP MASTER STATE	FAST ADV INTERVAL	FAST ADV ENABLE
5/1	4	0	none	disable	disable	down	200	disable

*VSP-9012:1(config)#**show ipv6 vrrp statistics vrid 1 ***

=====

VRRP Global Stats - GlobalRouter

=====

CHK_SUM_ERR	VERSION_ERR	VRID_ERR
0	0	0

=====

VRRP Interface Stats - GlobalRouter

=====

VRID	P/V	BECOME_MASTER	ADVERTISE_RCV
1	20	1	0

VRID	P/V	ADVERTISE_INT_ERR	TTL_ERR	PRIO_0_RCV
1	20	0	0	0

VRID	P/V	PRIO_0_SENT	INVALID_TYPE_ERR	ADDRESS_LIST_ERR	UNKNOWN_AUTHTYPE
1	20	0	0	0	0

VRID	P/V	PACKLEN_ERR
1	20	0

3.5.2.10 Show IPv6 Prefix-List

VSP-9012:1 (config) **#show ipv6 prefix-list**

```
=====
                        Prefix List - GlobalRouter
=====

PREFIX                                MASKLEN FROM TO
-----
List 1    pl_o3:
          3ffe:0:0:1::                64      64   64
          3ffe:0:0:2::                64      64   64

List 2    pl_st6:
          8100::                      64      48   80
```

3.5.2.11 Show commands for IPv6 route redistribution

VSP-9012:1 (config) **#show ipv6 ospf redistribute**

```
=====
                        OSPF Redistribute List
=====

direct                : disabled
static                : disabled
bgp                    : enabled
```

VSP-9012:1 (config) **#show bgp ipv6 redistributed-routes**

```
=====
                        BGPv6 Redistribute List - GlobalRouter
=====

SRC-VRF                SRC  MET  ENABLE  RPOLICY
-----
GlobalRouter           OSPF 0   TRUE   rm_o3
GlobalRouter           STAT 0   TRUE   rm_st6
GlobalRouter           LCL 0   TRUE   rm_direct
```

```
VSP-9012:1 (config) #show bgp ipv6 imported-routes
```

```
=====
                        BGPv6 Imported Routes - GlobalRouter
=====
```

ROUTE ORIGIN	METRIC	COMMUNITY	LOCALPREF	NEXTHOP

::ffff:12.1.1.2/128 3	0	0	100	::
23::/64 3	0	0	100	::
1ffe::/64 fe80::200:f2ff:fe2a:2dcd	0 3	0	100	
3ffe::/64 fe80::200:f2ff:fe2a:2dcd	0 3	0	100	
3ffe:0:0:3::/64 fe80::200:f2ff:fe2a:2dcd	0 3	0	100	
5000::/64 3	0	0	100	::

3.5.2.12 Show commands for IPv6 OSPF

VSP-9012:1#**show ipv6 ospf**

```
=====
                        OSPFv3 Global Information
=====
router-id                : 1.1.1.1
admin-state              : ENABLED
version                  : 3
area-bdr-rtr-state      : FALSE
as-bdr-rtr-state        : FALSE
as-scope-lsa-count       : 0
lsa-checksum             : 0
originate-new-lsas      : 10
rx-new-lsas              : 24
ext-lsa-count            : 0
ext-area-lsdb-limit     : 0
multicast-ext            : intraAreaMulticast
exit-over-flow-interval  : 4294967295
demand-extensions        : FALSE
traffic-engineering-support : FALSE
reference-bandwidth      : 1000000
restart-support          : none
restart-interval         : 1800
restart-status           : notRestarting

restart-age              : 1800
restart-exit-reason      : none
```

VSP-9012:1#**show ipv6 ospf neighbor**

```
=====
                        OSPF Neighbor
=====
INTERFACE  NBRROUTERID      NBRIPADDR                      PRIO_STATE
-----
2149       2.2.2.2                fe80:0:0:0:224:7fff:fe9e:ea01   TwoWay
2149       3.3.3.3                fe80:0:0:0:224:7fff:fe9f:a02    Full
2149       4.4.4.4                fe80:0:0:0:3011:7aff:fed6:a02    Full
```

2150	2.2.2.2	fe80:0:0:0:224:7fff:fe9e:ea00	Full
2150	45.197.176.0	fe80:0:0:0:280:2dff:fec5:b200	Full

5 out of 5 Total Num of Neighbor Entries displayed.

OSPF Virtual Neighbor

NBRAREAID	NBRROUTERID	VIRTINTFID	NBRIPV6ADDR	STATE

0 out of 0 Total Num of Virtual Neighbor Entries displayed.

OSPF NBMA Neighbor

INTERFACE	NBRROUTERID	NBRIPADDR	STATE

0 out of 0 Total Num of NBMA Neighbor Entries displayed.

VSP-9012:1#**show ipv6 ospf interface**

OSPF Interface

IFINDEX(VID/BRT)	AREAID	ADM IFSTATE	METRIC	PRI	DR/BDR	IFTYPE
2149 (101)	0.0.0.0	ena DR_OTHER	1	1	4.4.4.4 3.3.3.3	BROADCAST
2150 (102)	0.0.0.0	ena DR_OTHER	1	1	45.197.176.0 2.2.2.2	BROADCAST

OSPF Virtual Interface

AREAID	NBRIPADDR	STATE

VSP-9012:1#*show ipv6 ospf lsdb*

Link Scope LSAs						
VID/BRT/TUN	TYPE	ROUTER ID	LS ID	AGE	CKSUM	Sequence
VID101	link	1.1.1.1	2149	388	892f	80000001
# Prefixes: 1						
1010:0:0:0:0:0:0/64						
VID101	link	2.2.2.2	2149	390	bce7	80000001
# Prefixes: 1						
1010:0:0:0:0:0:0/64						
VID101	link	3.3.3.3	2149	386	5629	80000001
# Prefixes: 1						
1010:0:0:0:0:0:0/64						
VID101	link	4.4.4.4	2149	386	b677	80000001
# Prefixes: 1						
1010:0:0:0:0:0:0/64						
VID102	link	1.1.1.1	2150	388	970f	80000001
# Prefixes: 1						
1020:0:0:0:0:0:0/64						
VID102	link	2.2.2.2	2150	390	9ef5	80000001
# Prefixes: 1						
1020:0:0:0:0:0:0/64						
Area Scope LSAs						
AREA ID	TYPE	Router ID	LS ID	AGE	CKSUM	Sequence
0.0.0.0	router	1.1.1.1	0	341	a3f5	80000004
0.0.0.0	router	2.2.2.2	0	342	8510	80000004
0.0.0.0	router	3.3.3.3	0	342	84fe	80000004
0.0.0.0	router	4.4.4.4	0	342	6619	80000004
0.0.0.0	router	6.6.6.6	1	348	a6a3	8000018f
0.0.0.0	router	45.197.176.0	0	347	20f	800001e9
0.0.0.0	network	4.4.4.4	2149	343	7dfc	80000002
0.0.0.0	network	6.6.6.6	2050	338	7f4d	80000003
0.0.0.0	network	45.197.176.0	2150	343	8bd6	80000002


```

0.0.0.0      intraAreaPrefix 1.1.1.1      1      341  602  80000004
0.0.0.0      intraAreaPrefix 2.2.2.2      1      342  1ae5 80000004
0.0.0.0      intraAreaPrefix 3.3.3.3      1      342  2ec9 80000004
0.0.0.0      intraAreaPrefix 4.4.4.4      1      342  42ad 80000004
0.0.0.0      intraAreaPrefix 4.4.4.4      2      343  d242 80000002

```

Prefixes: 1

1010:0:0:0:0:0:0:0/64

```

0.0.0.0      intraAreaPrefix 6.6.6.6      4      352  321e 8000018f
0.0.0.0      intraAreaPrefix 6.6.6.6      5      342  b7bc 80000003

```

Prefixes: 1

1000:0:0:0:0:0:0:0/64

```

0.0.0.0      intraAreaPrefix 45.197.176.0 1      351  b829 800001e9
0.0.0.0      intraAreaPrefix 45.197.176.0 3      347  5982 80000002

```

Prefixes: 1

1020:0:0:0:0:0:0:0/64

=====

AS Scope LSAs

=====

TYPE	Router ID	LS ID	AGE	CKSUM	Sequence
------	-----------	-------	-----	-------	----------

3.5.2.13 Show commands for IP RSMLT

```
VSP-9012:1#show ip rsmlt
```

```
=====
                        Ip Rsmlt Local Info - GlobalRouter
=====
```

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
101	101.1.1.32	00:24:7f:9e:da:01	Enable	Up	60	180
102	102.1.1.32	00:24:7f:9e:da:02	Enable	Up	60	180

```
-----
```

VID	SMLT ID
101	101
102	102

```
-----
```

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
101		00:24:7f:9e:da:01	Enable	Up	60	180
	1010:0:0:0:0:0:0:0/64					
	1010:0:0:0:0:0:0:32/64					
	fe80:0:0:0:224:7fff:fe9e:da01/128					
102		00:24:7f:9e:da:02	Enable	Up	60	180
	1020:0:0:0:0:0:0:0/64					
	1020:0:0:0:0:0:0:32/64					
	fe80:0:0:0:224:7fff:fe9e:da02/128					

```
-----
```

VID	SMLT ID
101	101
102	102

```
-----
```

```
=====
                        Ip Rsmlt Peer Info - GlobalRouter
=====
```

VID	IP	MAC	ADMIN	OPER	HDTMR	HUTMR
101	101.1.1.33	00:24:7f:9e:ea:01	Enable	Up	60	180
102	102.1.1.33	00:24:7f:9e:ea:00	Enable	Up	60	180

VID	HDT REMAIN	HUT REMAIN	SMLT ID
101	60	180	101
102	60	180	102

VID	IPv6	MAC	ADMIN	OPER	HDTMR	HUTMR
101	1010:0:0:0:0:0:0:0/64 1010:0:0:0:0:0:0:33/64 fe80:0:0:0:224:7fff:fe9e:ea01/128	00:24:7f:9e:ea:01	Enable	Up	60	180
102	1020:0:0:0:0:0:0:0/64 1020:0:0:0:0:0:0:33/64 fe80:0:0:0:224:7fff:fe9e:ea00/128	00:24:7f:9e:ea:00	Enable	Up	60	180

VID	HDT REMAIN	HUT REMAIN	SMLT ID
101	60	180	101
102	60	180	102

3.5.2.14 Show commands for Radius

```
VSP-9012:1(config)#show radius
```

```
acct-attribute-value : 193
acct-enable : true
acct-include-cli-commands : false
access-priority-attribute : 192
auth-info-attr-value : 91
command-access-attribute : 194
cli-commands-attribute : 195
cli-cmd-count : 40
cli-profile-enable : false
enable : true
igap-passwd-attr : standard
igap-timeout-log-fsize : 512
maxserver : 10
mcast-addr-attr-value : 90
sourceip-flag : false
```

```
VSP-9012:1(config)#show radius-server
```

```
create :
```

```
Name Usedby Secret Port Prio Retry Timeout Enabled Acct-port Acct-enabled source-ip
3000:0:0:0:0:0:2cli **** 1812 10 1 3 true 1813 true 0:0:0:0:0:0:0
```

```
delete : N/A
```

```
set : N/A
```

```
VSP-9012:1(config)#show radius-server statistics
```

```
Responses with invalid server address: 0
```

```
Radius Server(UsedBy? ) : 3000:0:0:0:0:0:2(cli)
```

```
-----
Access Requests : 0
```

```
Access Accepts : 0
```

```
Access Rejects : 0
```

```
Bad Responses : 0
```

```
Client Retries : 0
```

```
Pending Requests : 0
Acct On Requests : 1
Acct Off Requests : 0
Acct Start Requests : 0
Acct Stop Requests : 0
Acct Interim Requests : 0
Acct Bad Responses : 1
Acct Pending Requests : 0
Acct Client Retries : 0
Access Challenges : 0
Round-trip Time :
Nas Ip Address : 3000:0:0:0:0:0:1
```

3.5.2.15 Show commands for Syslog

```
VSP-9012:1(config)#show syslog host 1
```

```
Id : 1
IpAddr? : 3000:0:0:0:0:0:2
UdpPort? : 514
Facility : local7
Severity : info|warning|error|fatal
MapInfoSeverity? : info
MapWarningSeverity? : warning
MapErrorSeverity? : error
MapMfgSeverity? : notice
MapFatalSeverity? : emergency
Enable : true
```

```
VSP-9012:1(config)#show syslog
```

```
Enable : true
Max Hosts : 5
OperState? : active
header : default
Total number of configured hosts : 1
Total number of enabled hosts : 1
Configured host : 1
Enabled host : 1
```

3.5.2.16 Show command for DNS

```
VSP-9012:1(config)#show ip dns
DNS Default Domain Name :
Primary DNS server details:
=====
IP address : 3000:0:0:0:0:0:2
Status : Inactive
Total DNS Number of request made to this server : 0
Number of Successful DNS : 0
Secondary DNS server details:
=====
IP address : 47.17.174.186
Status : active
Total DNS Number of request made to this server : 0
Number of Successful DNS : 0
Tertiary DNS server details:
=====
IP address : 192.32.99.99
Status : Inactive
Total DNS Number of request made to this server : 0
Number of Successful DNS : 0
```

3.5.2.17 Show commands for Ipv6 Tunneling

```
VSP-9012:1#show ipv6 tunnel

=====
Tunnel If Information
=====
```

ID	LOCAL ADDRESS	REMOTE ADDRESS	TYPE	TTL
1	10.10.10.1	10.10.10.2	manual	255
2	11.11.11.1	12.12.12.2	manual	255

```

2 out of 2 Total number of entries displayed.
```

VSP-9012:1#**show ipv6 tunnel detail**

Tunnel Interface Information

ID	LOCAL ADDRESS	REMOTE ADDRESS	OPER STATUS	TYPE
1	10.10.10.1	10.10.10.2	active	manual
2	11.11.11.1	12.12.12.2	active	manual

2 out of 2 Total number of entries displayed.

Address Information

IPV6 ADDRESS	TYPE	ORIGIN	STATUS
2000:0:0:0:0:0:0:1	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:0:0:a0a:a01	UNICAST	LINKLAYER	PREFERRED
3000:0:0:0:0:0:0:1	UNICAST	MANUAL	PREFERRED
fe80:0:0:0:0:0:b0b:b01	UNICAST	LINKLAYER	PREFERRED

VSP-9012:1#**show ipv6 interface**

Interface Information

IF	Descr	VLAN	PHYSICAL	ADMIN	OPER	TYPE	MTU	HOP	RCHBLE
RETRAN									
INDX			ADDRESS	STATE	STATE			LMT	TIME
								TIME	
6656	T-1	0	n/a	enable		up	TUN	1280	64
30000	1000								
6657	T-2	0	n/a	enable		up	TUN	1280	64
30000	1000								

Legend: NA - Information not available

2 out of 2 Total Num of Interface Entries displayed.

4. Reference Documentation

Document Title	Publication Number	Description
Configuration — IP Routing Avaya Virtual Services Platform 9000	NN46250-505	

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