

IPv6

1 Topology

Set up the switch, routers and hosts as shown in Figure 1.

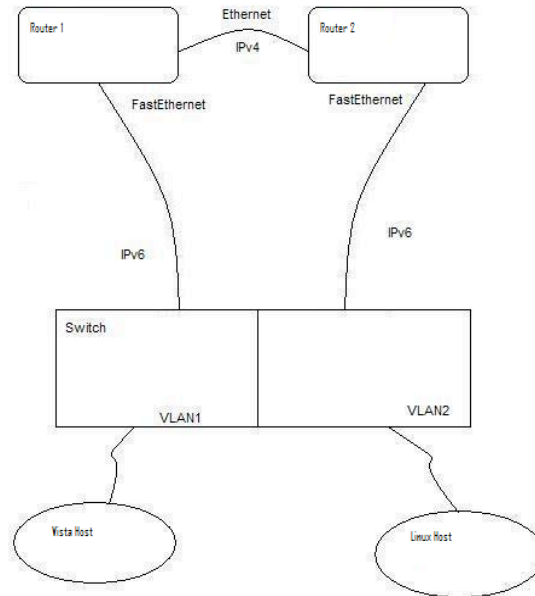


Figure 1

1.1 Addressing

Remove the IPv4 addresses from the Vista Host, Linux Host and Routers 1 and 2 FE0 interfaces

In the same manner as you would modify the IPv4 address for the Local Area Connection of the Vista host, modify the IPv6 address as follows:

IPv6 Address: 2002:c0a8:6301:1::2

Subnet Prefix Length: 64

Default Gateway: 2002:c0a8:6301:1::1/64 (shouldn't need to enter the /64 into the wizard)

Setup a unicast IPv6 address and IPv6 default gateway on the Linux host using the following commands:

```

sudo /sbin/ifconfig eth0 inet6 down
sudo /sbin/ifconfig eth0 inet6 up
sudo /sbin/route del default gw netlab1 (May Fail if doesn't exist)
sudo /sbin/ifconfig eth0 inet6 add 2002:c0a8:6302:2::2/64
sudo /sbin/route -A inet6 add default gw 2002:c0a8:6302:2::1
  
```

1.2 Routing

Make sure no routing protocols (RIP, OSPF, and BGP) are configured on the routers. Verify that both the Linux Host and Vista Host are not running RIP, and that no IPv4 default gateway is configured. IPv4 PING's between the Host and Server, also Host and Router should fail.

2 IPv6

2.1 Router1

Configure Router1 (Sharing VLAN with Vista host) with a unicast IPv6 address on the FastEthernet0/0 interface:

```
Router1(Config)# ipv6 unicast-routing
Router1(Config)# interface FastEthernet0/0
Router1(Config-Int)# no ip address
Router1(Config-Int)# ipv6 address 2002:c0a8:6301:1::1/64
```

The Ethernet0/0 interface should remain with only an IPv4 address. You should be able to run the command “show ipv6 int” to get the full 128-bit unicast address for the Router FE0 interface.

2.2 Router2

Configure Router2 (Sharing VLAN with Linux host) with a unicast IPv6 address on the FastEthernet0/0 interface:

```
Router2(Config)# ipv6 unicast-routing
Router2(Config)# interface FastEthernet0/0
Router2(Config-Int)# no ip address
Router2(Config-Int)# ipv6 address 2002:c0a8:6302:2::1/64
```

2.3 Experiment

Use the **Ping -6** and **Tracert -6** commands from the Vista Host to Router1, using IPv6 addresses. Test if the Linux Host can connect to Router2 using IPv6 addresses and vice-versa. (Linux uses the **ping6** command for IPv6, and **traceroute -6** for tracing packets) If you can not ping everywhere, verify your default gateways are still on your Vista and Linux hosts. **netstat -A inet6 -nr** can show the routing table on the Linux system.

3 IPv6 Automatic Tunnel

3.1 Router Tunnel

Configure a simple IPv6 tunnel over the IPv4 interface between the routers. This should allow end systems (Host and Server) at both ends to run IPv6 locally, yet still communicate with IPv6 over an intermediate IPv4 network. The tunnel will have to be configured on both RouterA and RouterB.

3.2 Configuring 6to4 Tunnels

The following example configures a 6to4 tunnel on a border router in an isolated IPv6 network. The IPv4 address is 192.168.99.1, which translates to the IPv6 prefix of 2002:c0a8:6301::/48. The IPv6 prefix is subnetted into 2002:c0a8:6301::/64 for the tunnel interface: 2002:c0a8:6301:1::/64 for the first IPv6 network, and 2002:c0a8:6301:2::/64 for the second IPv6 network. The static route ensures that any other traffic for the IPv6 prefix 2002::/16 is directed to tunnel interface 0 for automatic tunneling.

```
interface Ethernet0/0
 ip address 192.168.99.1 255.255.255.0
 no shutdown
!
interface FastEthernet0/0
 ipv6 address 2002:c0a8:6301:1::1/64
!
interface Tunnel0
 no ip address
 ipv6 address 2002:c0a8:6301::1/64
 tunnel source Ethernet 0/0
```

```
tunnel mode ipv6ip 6to4
!  
ipv6 route 2002::/16 tunnel 0
```

For Router2:

```
interface Ethernet0/0  
 ip address 192.168.99.2 255.255.255.0  
 no shutdown  
!  
interface FastEthernet0/0  
 ipv6 address 2002:c0a8:6302:2::1/64  
!  
interface Tunnel0  
 no ip address  
 ipv6 address 2002:c0a8:6302::1/64  
 tunnel source Ethernet 0/0  
 tunnel mode ipv6ip 6to4  
!  
ipv6 route 2002::/16 tunnel 0
```

3.3 Experiment

Verify that the Ethernet0/0 interfaces between the Routers can communicate, verify that Router1 can reach the IPv6 address of Router2, and finally that the Vista Host can reach the IPv6 addresses of both Router1 and Router2 and the Linux Host, but not the addresses of either Ethernet0/0 interface. The “Show IPv6 Interface” on the routers will give automatic address information. When successful, you should be able to Telnet to the IPv6 address of Router2.

For your report, include your IPv6 IOS configurations from Router1 and 2.

4 IPv6 Manual Tunnel

4.1 Router Tunnel

Configure a simple IPv6 tunnel over the IPv4 interface between the routers. This should allow end systems (Vista Host and Linux Host) at both ends to run IPv6 locally, yet still communicate with IPv6 over an intermediate IPv4 network. The tunnel will have to be configured on both Router1 and Router2.

4.2 Configuring Manual 6to4 Tunnels

The following *example* configures a manual 6to4 tunnel on a pair of routers in an isolated IPv6 network.

Router 1 Configuration

```
ip routing  
!  
interface ethernet0/0  
 ip address 10.0.3.31 255.255.255.0  
!  
interface tunnel0  
 ipv6 address 3ffe:b00:c18:1::3/127  
 tunnel source ethernet0/0  
 tunnel destination 10.0.3.32  
 tunnel mode ipv6ip
```

```
!  
interface FastEthernet0/0  
description IPv6 local network 1  
ipv6 address 3ffe:b00:c18:3::3/64  
!  
ipv6 unicast-routing  
ipv6 route 3ffe::/16 tunnel0
```

Router B Configuration

```
ip routing  
!  
interface ethernet0/0  
ip address 10.0.3.32 255.255.255.0  
!  
interface tunnel0  
ipv6 address 3ffe:b00:c18:1::2/127  
tunnel source ethernet0/0  
tunnel destination 10.0.3.31  
tunnel mode ipv6ip  
!  
interface FastEthernet0/0  
description IPv6 local network 1  
ipv6 address 3ffe:b00:c18:2::2/64  
!  
ipv6 unicast-routing  
ipv6 route 3ffe::/16 tunnel0
```

4.3 Experiment

Configure IPv6 unicast addresses on both the Vista Host and the Linux Host (Section 1.1), that are on the same IPv6 subnets as the FE0 interfaces of their local router.

Use Wireshark to verify your experiments. Verify that the Ethernet0/0 interfaces between the Routers can communicate, verify that Router1 can reach the IPv6 address of Router2, and finally that the Host can reach the IPv6 addresses of both Router1 and Router2, but not the addresses of either Ethernet0/0 interface. The “Show IPv6 Interface” on the routers will give automatic address information. When successful, you should be able to Telnet to the IPv6 address of Router2 and ping the Linux Host. Test if the Linux Host (/usr/sbin/ping6, /usr/sbin/traceroute6) can route to Router2 using IPv6 addresses and vice-versa.

For your report, include your IPv6 IOS configurations from Router1 and 2.