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Introduction

This document provides IPv6 over IPv4 tunneling with OSPFv3 configuration examples.

Prerequisites

The configuration examples in this document were created and verified in a lab environment, and all the devices were started with the factory default configuration. When you are working on a live network, make sure you understand the potential impact of every command on your network.

This document assumes that you have basic knowledge of HP IPv6 over IPv4 tunneling and OSPFv3.

Example: Configuring IPv6 over IPv4 tunneling with OSPFv3

Network configuration

As shown in [Figure 1](#), in IPv6 networks, Device A, Device B, and Device C act as the gateways of the headquarters, Branch 1, and Branch 2, respectively.

Configure IPv6 over IPv4 tunnels to ensure that the headquarters can communicate with the two branches over IPv4 networks.

Configure OSPFv3 on the gateways to ensure the following:

- The gateways have routes to destination IPv6 addresses through tunnel interfaces.
- Branch 1 and Branch 2 can communicate with each other through the headquarters.

Figure 1 Network diagram

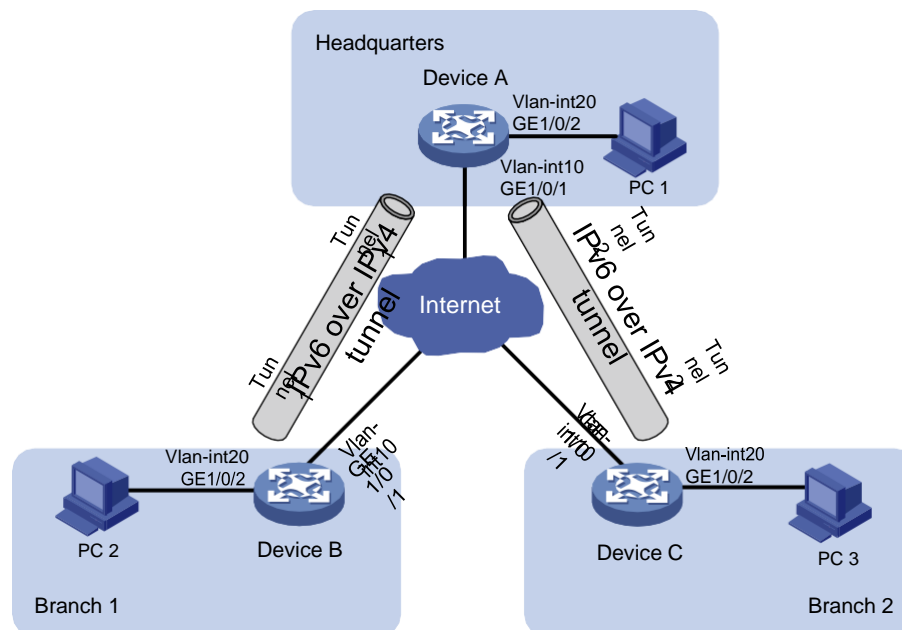


Table 1 Interface and IP address assignment

Device	Interface	IP address
Device A	Vlan-int10	20.1.1.1/24
	Vlan-int20	2001::1/64
	Tunnel1	3001::1/64
	Tunnel2	4001::1/64
Device B	Vlan-int10	30.1.1.1/24
	Vlan-int20	5001::1/64
	Tunnel1	3001::2/64
Device C	Vlan-int10	40.1.1.1/24
	Vlan-int20	6001::1/64
	Tunnel2	4001::2/64

Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3170 switch series	Not supported
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3570 switch series	Not supported
SC 3130 switch series	Not supported

Procedures

Make sure the gateways can reach each other at IPv4.

Configuring IPv6 over IPv4 tunnels

- **Configure Device A:**
 - # Configure an IP address for VLAN-interface 10.**

```
<DeviceA> system-view
[DeviceA] vlan 10
[DeviceA-vlan10] port GigabitEthernet 1/0/1
[DeviceA-vlan10] quit
[DeviceA] interface vlan-interface 10
[DeviceA-Vlan-interface10] ip address 20.1.1.1 24
[DeviceA-Vlan-interface10] quit
```
 - # Configure IP addresses for other interfaces, as shown in [Figure 1](#). (Details not shown.)**
 - # Create service loopback group 1 and specify tunnel services for the group, and then add GigabitEthernet 1/0/3 to the group.**

```
[DeviceA] service-loopback group 1 type tunnel
[DeviceA] interface gigabitethernet 1/0/3
[DeviceA-GigabitEthernet1/0/3] port service-loopback group 1
[DeviceA-GigabitEthernet1/0/3] quit
```
 - # Configure an IPv6 over IPv4 tunnel interface Tunnel 1.**

```
[DeviceA] interface tunnel 1 mode ipv6-ipv4
```
 - # Configure an IPv6 address for Tunnel 1.**

```
[DeviceA-Tunnel1] ipv6 address 3001::1/64
```
 - # Specify VLAN-interface 10 as the source interface of Tunnel 1.**

```
[DeviceA-Tunnel1] source vlan-interface 10
```
 - # Specify the destination address for Tunnel 1.**

```
[DeviceA-Tunnel1] destination 30.1.1.1
[DeviceA-Tunnel1] quit
```

- # Configure an IPv6 over IPv4 tunnel interface Tunnel 2.**

```
[DeviceA] interface tunnel 2 mode ipv6-ipv4
```

Configure an IPv6 address for Tunnel 2.

```
[DeviceA-Tunnel2] ipv6 address 4001::1/64
```

Specify VLAN-interface 10 as the source interface of Tunnel 2.

```
[DeviceA-Tunnel2] source Vlan-interface 10
```

Specify the destination address for Tunnel 2.

```
[DeviceA-Tunnel2] destination 40.1.1.1
[DeviceA-Tunnel2] quit
```
- Configure Device B:**

Configure an IP address for VLAN-interface 10.

```
<DeviceB> system-view
[DeviceB] vlan 10
[DeviceB-vlan10] port GigabitEthernet 1/0/1
[DeviceB-vlan10] quit
[DeviceB] interface vlan-interface 10
[DeviceB-Vlan-interface10] ip address 30.1.1.1 24
[DeviceB-Vlan-interface10] quit
```

Configure IP addresses for other interfaces, as shown in [Figure 1](#). (Details not shown.)

Create service loopback group 1 and specify tunnel services for the group, and then add GigabitEthernet 1/0/3 to the group.

```
[DeviceB] service-loopback group 1 type tunnel
[DeviceB] interface gigabitethernet 1/0/3
[DeviceB-GigabitEthernet1/0/3] port service-loopback group 1
[DeviceB-GigabitEthernet1/0/3] quit
```

Configure an IPv6 over IPv4 tunnel interface Tunnel 1.

```
[DeviceB] interface tunnel 1 mode ipv6-ipv4
```

Configure an IPv6 address for Tunnel 1.

```
[DeviceB-Tunnel1] ipv6 address 3001::2/64
```

Specify VLAN-interface 10 as the source interface of Tunnel 1.

```
[DeviceB-Tunnel1] source vlan-interface 10
```

Specify the destination address for Tunnel 1.

```
[DeviceB-Tunnel1] destination 20.1.1.1
[DeviceB-Tunnel1] quit
```
- Configure Device C:**

Configure an IP address for VLAN-interface 10.

```
<DeviceC> system-view
[DeviceC] vlan 10
[DeviceC-vlan10] port GigabitEthernet 1/0/1
[DeviceC-vlan10] quit
[DeviceC] interface vlan-interface 10
[DeviceC-Vlan-interface10] ip address 40.1.1.1 24
[DeviceC-Vlan-interface10] quit
```

Configure IP addresses for other interfaces, as shown in [Figure 1](#). (Details not shown.)

Create service loopback group 1 and specify tunnel services for the group, and then add GigabitEthernet 1/0/3 to the group.

```
[DeviceC] service-loopback group 1 type tunnel
[DeviceC] interface gigabitethernet 1/0/3
[DeviceC-GigabitEthernet1/0/3] port service-loopback group 1
[DeviceC-GigabitEthernet1/0/3] quit
```

Configure an IPv6 over IPv4 tunnel interface Tunnel 2.

```
[DeviceC] interface tunnel 2 mode ipv6-ipv4
```

Configure an IPv6 address for Tunnel 2.

```
[DeviceC-Tunnel2] ipv6 address 4001::2/64
```

Specify VLAN-interface 10 as the source interface of Tunnel 2.

```
[DeviceC-Tunnel2] source vlan-interface 10
```

Specify the destination address for Tunnel 2.

```
[DeviceC-Tunnel2] destination 20.1.1.1
[DeviceC-Tunnel2] quit
```

Configuring OSPFv3

- **Configure Device A:**

Specify the router ID as 1.1.1.1.

```
[DeviceA] ospfv3
[DeviceA-ospfv3-1] router-id 1.1.1.1
[DeviceA-ospfv3-1] quit
```

Enable OSPFv3 on Tunnel 1.

```
[DeviceA] interface Tunnel 1
[DeviceA-Tunnel1] ospfv3 1 area 0
[DeviceA-Tunnel1] quit
```

Enable OSPFv3 on Tunnel 2.

```
[DeviceA] interface Tunnel 2
[DeviceA-Tunnel2] ospfv3 1 area 0
[DeviceA-Tunnel2] quit
```

Enable OSPFv3 on VLAN-interface 20.

```
[DeviceA] interface vlan-interface 20
[DeviceA-Vlan-interface20] ospfv3 1 area 0
[DeviceA-Vlan-interface20] quit
```

- **Configure Device B:**

Specify the router ID as 2.2.2.2.

```
[DeviceB] ospfv3
[DeviceB-ospfv3-1] router-id 2.2.2.2
[DeviceB-ospfv3-1] quit
```

Enable OSPFv3 on Tunnel 1.

```
[DeviceB] interface Tunnel 1
[DeviceB-Tunnel1] ospfv3 1 area 0
[DeviceB-Tunnel1] quit
```

Enable OSPFv3 on VLAN-interface 20.

```
[DeviceB] interface vlan-interface 20
```

- ```
[DeviceB-Vlan-interface20] ospfv3 1 area 0
[DeviceB-Vlan-interface20] quit
```
- **Configure Device C:**
    - # Specify the router ID as 3.3.3.3.**

```
[DeviceC] ospfv3
[DeviceC-ospfv3-1] router-id 3.3.3.3
[DeviceC-ospfv3-1] quit
```
    - # Enable OSPFv3 on Tunnel 2.**

```
[DeviceC] interface Tunnel 2
[DeviceC-Tunnel2] ospfv3 1 area 0
[DeviceC-Tunnel2] quit
```
    - # Enable OSPFv3 on VLAN-interface 20.**

```
[DeviceC] interface vlan-interface 20
[DeviceC-Vlan-interface20] ospfv3 1 area 0
[DeviceC-Vlan-interface20] quit
```

## Verifying the configuration

### # Ping PC 1 from PC 2.

```
D:\>ping6 -s 5001::3 2001::3
```

```
Pinging 2001::3
```

```
from 5001::3 with 32 bytes of data:
```

```
Reply from 2001::3: bytes=32 time=13ms
```

```
Reply from 2001::3: bytes=32 time=1ms
```

```
Reply from 2001::3: bytes=32 time=1ms
```

```
Reply from 2001::3: bytes=32 time<1ms
```

```
Ping statistics for 2001::3:
```

```
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
```

```
Minimum = 0ms, Maximum = 13ms, Average = 3ms
```

The output shows that the ping operation succeeds.

### # Ping PC 3 from PC 2.

```
D:\>ping6 -s 5001::3 6001::3
```

```
Pinging 6001::3
```

```
from 6001::3 with 32 bytes of data:
```

```
Reply from 6001::3: bytes=32 time=13ms
```

```
Reply from 6001::3: bytes=32 time=1ms
```

```
Reply from 6001::3: bytes=32 time=1ms
```

```
Reply from 6001::3: bytes=32 time<1ms
```

```
Ping statistics for 6001::3:
```

```
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 13ms, Average = 3ms

The output shows that the ping operation succeeds.

## Configuration files

### ⚠ IMPORTANT:

Support for the **port link-mode bridge** command depends on the device model.

- Device A:

```
#
service-loopback group 1 type tunnel
#
ospfv3 1
router-id 1.1.1.1
area 0.0.0.0
#
vlan 10
#
vlan 20
#
interface Vlan-interface10
ip address 20.1.1.1 255.255.255.0
#
interface Vlan-interface20
ospfv3 1 area 0.0.0.0
ipv6 address 2001::1/64
#
interface GigabitEthernet1/0/1
port link-mode bridge
port access vlan 10
#
interface GigabitEthernet1/0/2
port link-mode bridge
port access vlan 20
#
interface GigabitEthernet1/0/3
port link-mode bridge
port service-loopback group 1
#
interface Tunnel1 mode ipv6-ipv4
ospfv3 1 area 0.0.0.0
source Vlan-interface10
destination 30.1.1.1
ipv6 address 3001::1/64
#
interface Tunnel2 mode ipv6-ipv4
ospfv3 1 area 0.0.0.0
```



```

source Vlan-interface10
destination 40.1.1.1
ipv6 address 4001::1/64
#

```

- **Device B:**

```

#
service-loopback group 1 type tunnel
#
ospfv3 1
router-id 2.2.2.2
area 0.0.0.0
#
vlan 10
#
vlan 20
#
interface Vlan-interface10
ip address 30.1.1.1 255.255.255.0
#
interface Vlan-interface20
ospfv3 1 area 0.0.0.0
ipv6 address 5001::1/64
#
interface GigabitEthernet1/0/1
port link-mode bridge
port access vlan 10
#
interface GigabitEthernet1/0/2
port link-mode bridge
port access vlan 20
#
interface GigabitEthernet1/0/3
port link-mode bridge
port service-loopback group 1
#
interface Tunnel1 mode ipv6-ipv4
ospfv3 1 area 0.0.0.0
source Vlan-interface10
destination 20.1.1.1
ipv6 address 3001::2/64
#

```

- **Device C:**

```

#
service-loopback group 1 type tunnel
#
ospfv3 1
router-id 3.3.3.3
area 0.0.0.0

```

```

#
vlan 10
#
vlan 20
#
interface Vlan-interface10
 ip address 40.1.1.1 255.255.255.0
#
interface Vlan-interface20
 ospfv3 1 area 0.0.0.0
 ipv6 address 6001::1/64
#
interface GigabitEthernet1/0/1
 port link-mode bridge
 port access vlan 10
#
interface GigabitEthernet1/0/2
 port link-mode bridge
 port access vlan 20
#
interface GigabitEthernet1/0/3
 port link-mode bridge
 port service-loopback group 1
#
interface Tunnel2 mode ipv6-ipv4
 ospfv3 1 area 0.0.0.0
 source Vlan-interface10
 destination 20.1.1.1
 ipv6 address 4001::2/64
#

```