

2 IS-IS 路由协议

2.1 项目背景

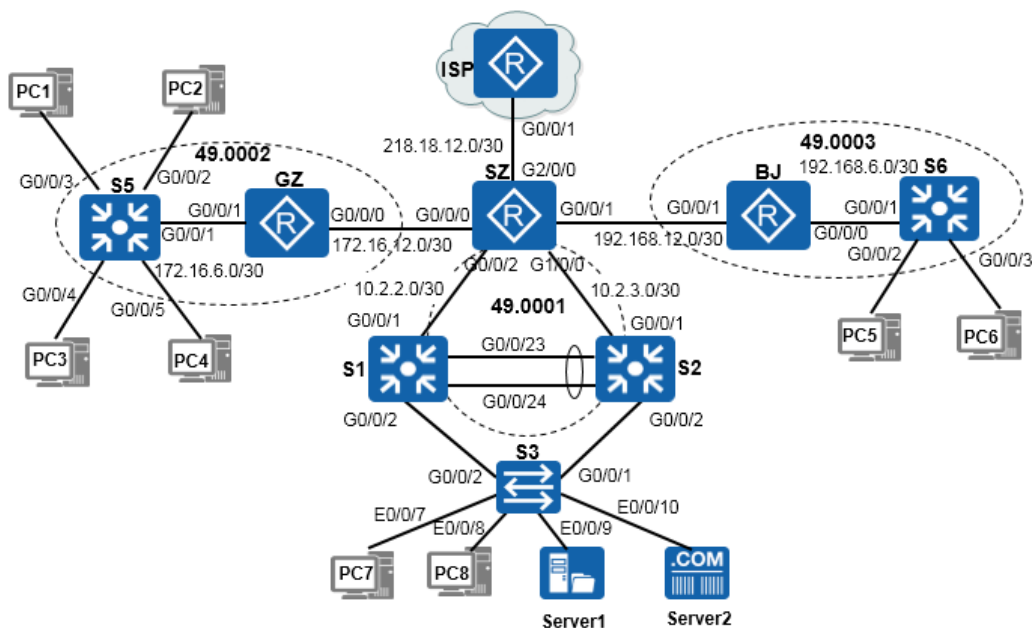
为了确保资源共享、办公自动化和节省人力成本，公司 E 申请两条专线将深圳总部和广州、北京两家分公司网络连接起来。公司原来运行 OSPF 路由协议，现打算迁移到 IS-IS 路由协议，张同学正在该公司实习，为了提高实际工作的准确性和工作效率，项目经理安排他在实验室环境下完成测试，为设备上线运行奠定坚实的基础。张同学用 1 台路由器模拟 ISP 的网络，总部通过静态默认路由实现到 ISP 的连接。分公司和总部内部网络通过三层交换机实现 VLAN 间路由，总部和分公司运行 IS-IS 路由协议实现网络互联。

2.2 项目目的

通过本项目可以掌握如下知识点和技能点，同时积累项目经验。

- 启动 IS-IS 路由进程的方法及启用参与 IS-IS 路由协议接口的方法。
- 修改 IS-IS 路由器类型和链路上 IS-IS 电路类型的方法。
- 配置 IS-IS 计时器参数和修改 IS-IS 度量类型的方法。
- 修改 IS-IS 接口优先级控制 DIS 选举的方法。
- IS-IS 接口验证和区域验证的配置方法。
- IS-IS 路由聚合配置以及向 IS-IS 网络注入默认路由的方法。
- IS-IS LSP、PSNP 和 CSNP 的特征。
- IS-IS L1 和 L2 路由器的功能以及 L1 和 L2 路由类型的区别。
- IS-IS 链路状态数据库的同步过程、特征和含义。
- 查看和调试 IS-IS 路由协议相关信息。

2.3 项目拓扑



2.4 项目规划

本项目的核心任务是完成 IS-IS 部署，为保持项目的完整性，需完成前期准备工作。

2.4.1 项目前期准备工作

- 步骤 1 VLAN 部署：在总部和分公司相应交换机上完成 VLAN 相关配置，包括 VLAN 创建和端口划分、Trunk 配置等。在交换机 S1 和 S2 之间链路配置链路聚合。
- 步骤 2 MSTP 部署：在交换机 S1、S2 和 S3 上配置 MSTP，通过实例 1（VLAN12 和 VLAN13）和实例 2（VLAN14 和 VLAN15）选举不同的根桥实现负载分担。交换机 S1 是实例 1 的根桥（优先级为 4096），是实例 2 的次根桥（优先级为 8192）；交换机 S2 是实例 1 的次根桥（优先级为 8192），是实例 2 的根桥（优先级为 4096）。
- 步骤 3 IP 地址部署：在总部和分公司设备上完成 IP 地址配置，包括配置路由器接口的 IP 地址、三层交换机创建 VLANIF 并配置 IP 地址以及配置计算机和服务器的 IP 地址、子网掩码和网关。
- 步骤 4 VRRP 部署：总部核心交换机 S1 和 S2 配置 VRRP，为各个 VLAN 主机提供冗余网关。通过配置使得交换机 S1 作为 VLAN12 和 VLAN13 的 Master，交换机 S2 作为 VLAN14 和 VLAN15 的 Master。确保每个 VLAN 的 VRRP 的 Master 和 MSTP 的根一致。
- 步骤 5 NAT 部署：配置 NAT，使得总部和分公司的主机可以通过路由器 SZ 访问 Internet。

2.4.2 项目核心任务

- 步骤 1 配置 IS-IS 基本功能：创建 IS-IS 进程，配置开销类型、配置 NET、动态主机名、激活运行 IS-IS 的路由器接口等。广州网络划分到 IS-IS 区域 49.0002，北京网络划分到 IS-IS 区域 49.0003，深圳总部网络划分到 IS-IS 区域 49.0001。修改 S1、S2、S5、S6 的 IS-IS 路由器类型为 Level-1。在深圳总部到分公司的两条链路上修改 IS-IS 电路类型为 Level-2。为了减少向局域网发送不必要的 IS-IS 更新，将分公司交换机适当接口配置为静默接口。
- 步骤 2 配置 IS-IS 验证：为了提高网络安全性，在深圳总部到分公司的两条链路上，配置 IS-IS 接口 MD5 验证。在深圳总部的 IS-IS 区域 49.0001 配置区域 MD5 验证。
- 步骤 3 配置 IS-IS 路由聚合：在三地边界路由器上分别配置路由聚合，以便减少路由表大小，提高路由查找效率。
- 步骤 4 配置 IS-IS 默认路由注入：在深圳总部路由器上配置指向 ISP 的静态默认路由，并向 IS-IS 网络注入默认路由。
- 步骤 5 控制 DIS 选举：控制路由器 SZ 成为连接三层交换机 S1 和 S2 的相应网段的 DIS。
- 步骤 6 调整 IS-IS 计时器：在深圳和北京连接的链路上，将接口发送 Hello 报文周期改为 5 秒，邻居保持时间为 Hello 报文的发送间隔时间的 4 倍。

交换机 VLAN 规划表、设备接口连接规划表和设备接口 IP 地址规划表如下。

表2-1 交换机 VLAN 规划和接口地址表

设备	VLAN ID	IP 地址段	VLAN 接口地址
S1	VLAN2	10. 2. 2. 0/30	10. 2. 2. 2/30
	VLAN12	10. 1. 12. 0/24	10. 1. 12. 252/24
	VLAN13	10. 1. 13. 0/24	10. 1. 13. 252/24
	VLAN14	10. 1. 14. 0/24	10. 1. 14. 252/24
	VLAN15	10. 1. 15. 0/24	10. 1. 15. 252/24
S2	VLAN3	10. 2. 3. 0/30	10. 2. 3. 2/30
	VLAN12	10. 1. 12. 0/24	10. 1. 12. 253/24
	VLAN13	10. 1. 13. 0/24	10. 1. 13. 253/24
	VLAN14	10. 1. 14. 0/24	10. 1. 14. 253/24
	VLAN15	10. 1. 15. 0/24	10. 1. 15. 253/24
S3	VLAN12	10. 1. 12. 0/24	172. 16. 8. 254/24
	VLAN13	10. 1. 13. 0/24	172. 16. 9. 254/24
	VLAN14	10. 1. 14. 0/24	172. 16. 10. 254/24
	VLAN15	10. 1. 15. 0/24	172. 16. 11. 254/24
S5	VLAN22	172. 16. 8. 0/24	172. 16. 6. 1/30
	VLAN33	172. 16. 9. 0/24	192. 168. 2. 254/24
	VLAN44	172. 16. 10. 0/24	192. 168. 3. 254/24
	VLAN55	172. 16. 11. 0/24	192. 168. 6. 2/30

	VLAN66	172. 16. 6. 0/30	10. 2. 2. 2/30
S6	VLAN222	192. 168. 2. 0/24	10. 1. 12. 252/24
	VLAN333	192. 168. 3. 0/24	10. 1. 13. 252/24
	VLAN666	192. 168. 6. 0/30	10. 1. 14. 252/24

表2-2 设备接口连接规划表

设备	接口	接口类型	VLAN	链路聚合	对端设备及接口
S1	G0/0/1	Access	VLAN 2		SZ G0/0/2
	G0/0/2	Trunk			S3 G0/0/2
	G0/0/23	Trunk		是	S2 G0/0/23
	G0/0/24	Trunk		是	S2 G0/0/24
S2	G0/0/1	Access	VLAN 3		SZ G1/0/0
	G0/0/2	Trunk			S3 G0/0/1
	G0/0/23	Trunk		是	S2 G0/0/23
	G0/0/24	Trunk		是	S2 G0/0/24
S3	Ethernet0/0/7	Access	VLAN 12		PC7
	Ethernet0/0/8	Access	VLAN 13		PC8
	Ethernet0/0/9	Access	VLAN 14		Server1
	Ethernet0/0/10	Access	VLAN 15		Server2
	G0/0/1	Trunk			S2 G0/0/2
	G0/0/2	Trunk			S1 G0/0/2
S5	G0/0/1	Access	VLAN 66		GZ G0/0/1
	G0/0/2	Access	VLAN 22		PC1
	G0/0/3	Access	VLAN 33		PC2
	G0/0/4	Access	VLAN 44		PC3
	G0/0/5	Access	VLAN 55		PC4
S6	G0/0/1	Access	VLAN 666		BJ G0/0/0
	G0/0/2	Access	VLAN 222		PC5
	G0/0/3	Access	VLAN 333		PC6
SZ	G0/0/0				GZ G0/0/0
	G0/0/1				BJ G0/0/1
	G0/0/2				S1 G0/0/1
	G1/0/0				S2 G0/0/1
	G2/0/0				ISP G0/0/0
GZ	G0/0/0				SZ G0/0/0
	G0/0/1				S5 G0/0/1
BJ	G0/0/0				S6 G0/0/1
	G0/0/1				SZ G0/0/1
ISP	G0/0/0				SZ G2/0/0
	LoopBack0				

表2-3 设备接口 IP 地址规划表

设备	接口	IP 地址	备注
SZ	G0/0/0	172.16.12.2/30	
	G0/0/1	192.168.12.1/30	
	G0/0/2	10.2.2.1/30	
	G1/0/0	10.2.3.1/30	
	G2/0/0	218.18.12.1/30	
GZ	G0/0/0	172.16.12.1/30	
	G0/0/1	172.16.6.2/30	
BJ	G0/0/0	192.168.6.1/30	
	G0/0/1	192.168.12.2/30	
ISP	G0/0/0	218.18.12.2/30	
	LoopBack0	8.8.8.8/24	模拟 Internet 上主机
PC1		172.16.8.100/24	网关：172.16.8.254
PC2		172.16.9.100/24	网关：172.16.9.254
PC3		172.16.10.100/24	网关：172.16.10.254
PC4		172.16.11.100/24	网关：172.16.11.254
PC5		192.168.2.100/24	网关：192.168.2.254
PC6		192.168.3.100/24	网关：192.168.3.254
PC7		10.1.12.100/24	网关：10.1.12.254
PC8		10.1.13.100/24	网关：10.1.13.254
Server1		10.1.14.100/24	网关：10.1.14.254
Server2		10.1.15.100/24	网关：10.1.15.254

2.5 项目实施

2.5.1 项目准备工作

步骤 1 配置 VLAN

在总部和分公司相应交换机上完成 VLAN 相关配置，包括 VLAN 创建和端口划分、Trunk 配置。在交换机 S1 和 S2 之间链路配置链路聚合。

● 配置交换机 S1

```
[S1]vlan batch 2 12 to 15
[S1]interface Eth-Trunk1
[S1-Eth-Trunk1]port link-type trunk
[S1-Eth-Trunk1]port trunk allow-pass vlan 2 to 4094
[S1-Eth-Trunk1]load-balance src-dst-mac
[S1-Eth-Trunk1]quit
[S1]interface GigabitEthernet0/0/1
[S1-GigabitEthernet0/0/1]port link-type access
[S1-GigabitEthernet0/0/1]port default vlan 2
[S1-GigabitEthernet0/0/1]quit
[S1]interface GigabitEthernet0/0/2
```

```
[S1-GigabitEthernet0/0/2]port link-type trunk
[S1-GigabitEthernet0/0/2]port trunk allow-pass vlan 2 to 4094
[S1-GigabitEthernet0/0/2]quit
[S1]interface GigabitEthernet0/0/23
[S1-GigabitEthernet0/0/23]eth-trunk 1
[S1-GigabitEthernet0/0/23]quit
[S1]interface GigabitEthernet0/0/24
[S1-GigabitEthernet0/0/24]eth-trunk 1
[S1-GigabitEthernet0/0/24]quit
```

● 配置交换机 S2

```
[S2]vlan batch 2 to 3 12 to 15
[S2]interface Eth-Trunk1
[S2-Eth-Trunk1]port link-type trunk
[S2-Eth-Trunk1]port trunk allow-pass vlan 2 to 4094
[S2-Eth-Trunk1]load-balance src-dst-mac
[S2-Eth-Trunk1]quit
[S2]interface GigabitEthernet0/0/1
[S2-GigabitEthernet0/0/1]port link-type access
[S2-GigabitEthernet0/0/1]port default vlan 3
[S2-GigabitEthernet0/0/1]quit
[S2]interface GigabitEthernet0/0/2
[S2-GigabitEthernet0/0/2]port link-type trunk
[S2-GigabitEthernet0/0/2]port trunk allow-pass vlan 2 to 4094
[S2-GigabitEthernet0/0/2]quit
[S2]interface GigabitEthernet0/0/23
[S2-GigabitEthernet0/0/23]eth-trunk 1
[S2-GigabitEthernet0/0/23]quit
[S2]interface GigabitEthernet0/0/24
[S2-GigabitEthernet0/0/24]eth-trunk 1
[S2-GigabitEthernet0/0/24]quit
```

● 配置交换机 S3

```
[S3]vlan batch 12 to 15
[S3]interface Ethernet0/0/7
[S3-Ethernet0/0/7]port link-type access
[S3-Ethernet0/0/7]port default vlan 12
[S3-Ethernet0/0/7]quit
[S3]interface Ethernet0/0/8
[S3-Ethernet0/0/8]port link-type access
[S3-Ethernet0/0/8]port default vlan 13
[S3-Ethernet0/0/8]quit
[S3]interface Ethernet0/0/9
[S3-Ethernet0/0/9]port link-type access
[S3-Ethernet0/0/9]port default vlan 14
[S3-Ethernet0/0/9]quit
[S3]interface Ethernet0/0/10
[S3-Ethernet0/0/10]port link-type access
[S3-Ethernet0/0/10]port default vlan 15
[S3-Ethernet0/0/10]interface GigabitEthernet0/0/1
[S3-GigabitEthernet0/0/1]port link-type trunk
[S3-GigabitEthernet0/0/1]port trunk allow-pass vlan 2 to 4094
[S3-GigabitEthernet0/0/1]quit
[S3]interface GigabitEthernet0/0/2
[S3-GigabitEthernet0/0/2]port link-type trunk
[S3-GigabitEthernet0/0/2]port trunk allow-pass vlan 2 to 4094
[S3-GigabitEthernet0/0/2]quit
```

● 配置交换机 S5

```
[S5]vlan batch 22 33 44 55 66
[S5]interface GigabitEthernet0/0/1
[S5-GigabitEthernet0/0/1]port link-type access
[S5-GigabitEthernet0/0/1]port default vlan 66
[S5-GigabitEthernet0/0/1]quit
[S5]interface GigabitEthernet0/0/2
[S5-GigabitEthernet0/0/2]port link-type access
[S5-GigabitEthernet0/0/2]port default vlan 22
[S5-GigabitEthernet0/0/2]quit
[S5]interface GigabitEthernet0/0/3
[S5-GigabitEthernet0/0/3]port link-type access
[S5-GigabitEthernet0/0/3]port default vlan 32
[S5-GigabitEthernet0/0/3]quit
[S5]interface GigabitEthernet0/0/4
[S5-GigabitEthernet0/0/4]port link-type access
[S5-GigabitEthernet0/0/4]port default vlan 44
[S5-GigabitEthernet0/0/4]quit
[S5]interface GigabitEthernet0/0/5
[S5-GigabitEthernet0/0/5]port link-type access
[S5-GigabitEthernet0/0/5]port default vlan 55
[S5-GigabitEthernet0/0/5]quit
```

● 配置交换机 S6

```
[S6]vlan batch 222 333 666
[S6]interface GigabitEthernet0/0/1
[S6-GigabitEthernet0/0/1]port link-type access
[S6-GigabitEthernet0/0/1]port default vlan 666
[S6-GigabitEthernet0/0/1]quit
[S6]interface GigabitEthernet0/0/2
[S6-GigabitEthernet0/0/2]port link-type access
[S6-GigabitEthernet0/0/2]port default vlan 222
[S6-GigabitEthernet0/0/2]quit
[S6]interface GigabitEthernet0/0/3
[S6-GigabitEthernet0/0/3]port link-type access
[S6-GigabitEthernet0/0/3]port default vlan 333
[S6-GigabitEthernet0/0/3]quit
```

验证以上配置任务。

● 验证 VLAN 配置

```
[S1]display vlan
```

The total number of vlans is : 6

U: Up; D: Down; TG: Tagged; UT: Untagged;
MP: Vlan-mapping; ST: Vlan-stacking;
#: ProtocolTransparent-vlan; *: Management-vlan;

VID	Type	Ports
1	common	UT:GE0/0/2(U) GE0/0/3(D) GE0/0/4(D) GE0/0/5(D) GE0/0/6(D) GE0/0/7(D) GE0/0/8(D) GE0/0/9(D) GE0/0/10(D) GE0/0/11(D) GE0/0/12(D) GE0/0/13(D) GE0/0/14(D) GE0/0/15(D) GE0/0/16(D) GE0/0/17(D) GE0/0/18(D) GE0/0/19(D) GE0/0/20(D) GE0/0/21(D) GE0/0/22(D) Eth-Trunk1(U)
2	common	UT:GE0/0/1(U)

		TG:GE0/0/2(U)	Eth-Trunk1(U)
12	common	TG:GE0/0/2(U)	Eth-Trunk1(U)
13	common	TG:GE0/0/2(U)	Eth-Trunk1(U)
14	common	TG:GE0/0/2(U)	Eth-Trunk1(U)
15	common	TG:GE0/0/2(U)	Eth-Trunk1(U)
VID	Status	Property	MAC-LRN Statistics Description
1	enable	default	enable disable VLAN 0001
2	enable	default	enable disable VLAN 0002
12	enable	default	enable disable VLAN 0012
13	enable	default	enable disable VLAN 0013
14	enable	default	enable disable VLAN 0014
15	enable	default	enable disable VLAN 0015

其他交换机验证命令相同，这里不再一一列出。

● 验证 Eth-Trunk 配置

[S1]display eth-trunk 1

Eth-Trunk1's state information is:

WorkingMode: NORMAL

Hash arithmetic: According to SA-XOR-DA

Least Active-linknumber: 1

Max Bandwidth-affected-linknumber: 8

Operate status: up

Number Of Up Port In Trunk: 2

PortName

Status

Weight

GigabitEthernet0/0/23

Up

1

GigabitEthernet0/0/24

Up

1

[S2]display eth-trunk 1

Eth-Trunk1's state information is:

WorkingMode: NORMAL

Hash arithmetic: According to SA-XOR-DA

Least Active-linknumber: 1

Max Bandwidth-affected-linknumber: 8

Operate status: up

Number Of Up Port In Trunk: 2

PortName

Status

Weight

GigabitEthernet0/0/23

Up

1

GigabitEthernet0/0/24

Up

1

● 验证 Trunk 配置

[S1]display port vlan			
Port	Link Type	PVID	Trunk VLAN List

Eth-Trunk1	trunk	1	1-4094
GigabitEthernet0/0/1	access	2	-
GigabitEthernet0/0/2	trunk	1	1-4094
省略部分输出			

其他交换机验证命令相同，这里不再一一列出。

步骤 2 配置 MSTP

在交换机 S1、S2 和 S3 上配置 MSTP，通过实例 1（VLAN12 和 VLAN13）和实例 2（VLAN14 和 VLAN15）选举不同的根桥实现负载分担。交换机 S1 是实例 1 的根桥（优先级为 4096），是实例 2 的次根桥（优先级为 8192）；交换机 S2 是实例 1 的次根桥（优先级为 8192），是实例 2 的根桥（优先级为 4096）。

● 配置交换机 S1

[S1]stp instance 1 priority 4096

```
[S1]stp instance 2 priority 8192
[S1]stp region-configuration
[S1-mst-region]region-name HQ
[S1-mst-region]instance 1 vlan 12 to 13
[S1-mst-region]instance 2 vlan 14 to 15
[S1-mst-region]active region-configuration
[S1-mst-region]quit
```

● 配置交换机 S2

```
[S2]stp instance 1 priority 8192
[S2]stp instance 2 priority 4096
[S2]stp region-configuration
[S2-mst-region]region-name HQ
[S2-mst-region]instance 1 vlan 12 to 13
[S2-mst-region]instance 2 vlan 14 to 15
[S2-mst-region]active region-configuration
[S2-mst-region]quit
```

● 配置交换机 S3

```
[S3]stp region-configuration
[S3-mst-region]region-name HQ
[S3-mst-region]instance 1 vlan 12 to 13
[S3-mst-region]instance 2 vlan 14 to 15
[S3-mst-region]active region-configuration
[S3-mst-region]
```

验证以上配置任务

```
[S1]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/1	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/2	DESI	FORWARDING	NONE
0	Eth-Trunk1	ROOT	FORWARDING	NONE
1	GigabitEthernet0/0/2	DESI	FORWARDING	NONE
1	Eth-Trunk1	DESI	FORWARDING	NONE
2	GigabitEthernet0/0/2	DESI	FORWARDING	NONE
2	Eth-Trunk1	ROOT	FORWARDING	NONE

```
[S2]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/1	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/2	DESI	FORWARDING	NONE
0	Eth-Trunk1	DESI	FORWARDING	NONE
1	GigabitEthernet0/0/2	DESI	FORWARDING	NONE
1	Eth-Trunk1	ROOT	FORWARDING	NONE
2	GigabitEthernet0/0/2	DESI	FORWARDING	NONE
2	Eth-Trunk1	DESI	FORWARDING	NONE

```
[S3]display stp brief | include GigabitEthernet
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/1	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/2	ALTE	DISCARDING	NONE
1	GigabitEthernet0/0/1	ALTE	DISCARDING	NONE
1	GigabitEthernet0/0/2	ROOT	FORWARDING	NONE
2	GigabitEthernet0/0/1	ROOT	FORWARDING	NONE
2	GigabitEthernet0/0/2	ALTE	DISCARDING	NONE

步骤 3 配置 IP 地址

在总部和分公司设备上完成 IP 地址配置，包括配置路由器接口的 IP 地址、三层交换机创建 VLANIF 并配置 IP 地址以及配置计算机和服务器的 IP 地址、子网掩码和网关。

- 配置路由器 SZ

```
[SZ]interface GigabitEthernet0/0/0
[SZ-GigabitEthernet0/0/0]ip address 172.16.12.2 255.255.255.252
[SZ-GigabitEthernet0/0/0]quit
[SZ]interface GigabitEthernet0/0/1
[SZ-GigabitEthernet0/0/1]ip address 192.168.12.1 255.255.255.252
[SZ-GigabitEthernet0/0/1]quit
[SZ]interface GigabitEthernet0/0/2
[SZ-GigabitEthernet0/0/2]ip address 10.2.2.1 255.255.255.252
[SZ-GigabitEthernet0/0/2]quit
[SZ]interface GigabitEthernet1/0/0
[SZ-GigabitEthernet1/0/0]ip address 10.2.3.1 255.255.255.252
[SZ-GigabitEthernet1/0/0]quit
[SZ]interface GigabitEthernet2/0/0
[SZ-GigabitEthernet2/0/0]ip address 218.18.12.1 255.255.255.252
[SZ-GigabitEthernet2/0/0]quit
```

- 配置路由器 GZ

```
[GZ]interface GigabitEthernet0/0/0
[GZ-GigabitEthernet0/0/0]ip address 172.16.12.1 255.255.255.252
[GZ-GigabitEthernet0/0/0]quit
[GZ]interface GigabitEthernet0/0/1
[GZ-GigabitEthernet0/0/1]ip address 172.16.6.2 255.255.255.252
[GZ-GigabitEthernet0/0/1]quit
```

- 配置路由器 BJ

```
[BJ]interface GigabitEthernet0/0/1
[BJ-GigabitEthernet0/0/0]ip address 192.168.6.1 255.255.255.252
[BJ-GigabitEthernet0/0/0]quit
[BJ]interface GigabitEthernet0/0/1
[BJ-GigabitEthernet0/0/1]ip address 192.168.12.2 255.255.255.252
[BJ-GigabitEthernet0/0/1]quit
```

- 配置路由器 ISP

```
[ISP]interface GigabitEthernet0/0/0
[ISP-GigabitEthernet0/0/0]ip address 218.18.12.2 255.255.255.252
[ISP-GigabitEthernet0/0/0]quit
[ISP]interface LoopBack0
[ISP-LoopBack0]ip address 8.8.8.8 255.255.255.0
[ISP-LoopBack0]quit
```

- 配置交换机 S1

```
[S1]interface Vlanif2
[S1-Vlanif2]ip address 10.2.2.2 255.255.255.252
[S1-Vlanif2]quit
[S1]interface Vlanif12
[S1-Vlanif12]ip address 10.1.12.252 255.255.255.0
[S1-Vlanif12]quit
[S1]interface Vlanif13
[S1-Vlanif13]ip address 10.1.13.252 255.255.255.0
[S1-Vlanif13]quit
[S1]interface Vlanif14
[S1-Vlanif14]ip address 10.1.14.252 255.255.255.0
[S1-Vlanif14]quit
```

```
[S1]interface Vlanif15
[S1-Vlanif15]ip address 10.1.15.252 255.255.255.0
[S1-Vlanif15]quit
```

- 配置交换机 S2

```
[S2]interface Vlanif3
[S2-Vlanif3]ip address 10.2.3.2 255.255.255.252
[S2-Vlanif3]quit
[S2]interface Vlanif12
[S2-Vlanif12]ip address 10.1.12.253 255.255.255.0
[S2-Vlanif12]quit
[S2]interface Vlanif13
[S2-Vlanif13]ip address 10.1.13.253 255.255.255.0
[S2-Vlanif13]quit
[S2]interface Vlanif14
[S2-Vlanif14]ip address 10.1.14.253 255.255.255.0
[S2-Vlanif14]quit
[S2]interface Vlanif15
[S2-Vlanif15]ip address 10.1.15.253 255.255.255.0
[S2-Vlanif15]quit
```

- 配置交换机 S5

```
[S5]interface Vlanif22
[S5-Vlanif22]ip address 172.16.8.254 255.255.255.0
[S5-Vlanif22]quit
[S5]interface Vlanif33
[S5-Vlanif33]ip address 172.16.9.254 255.255.255.0
[S5-Vlanif33]quit
[S5]interface Vlanif44
[S5-Vlanif44]ip address 172.16.10.254 255.255.255.0
[S5-Vlanif44]quit
[S5]interface Vlanif55
[S5-Vlanif55]ip address 172.16.11.254 255.255.255.0
[S5-Vlanif55]quit
[S5]interface Vlanif66
[S5-Vlanif66]ip address 172.16.6.1 255.255.255.252
[S5-Vlanif66]quit
```

- 配置交换机 S6

```
[S6]interface Vlanif222
[S6-Vlanif222]ip address 192.168.2.254 255.255.255.0
[S6-Vlanif222]quit
[S6]interface Vlanif333
[S6-Vlanif333]ip address 192.168.3.254 255.255.255.0
[S6-Vlanif333]quit
[S6]interface Vlanif666
[S6-Vlanif666]ip address 192.168.6.2 255.255.255.252
[S6-Vlanif666]quit
```

- 以主机 PC7 和服务器 Sever1 为例配置主机和服务器 IP 地址、掩码和网关。其他主机配置相同。

PC7

基础配置

命令行

组播

UDP发包工具

串口

主机名:

MAC 地址:

54-89-98-87-67-3E

IPv4 配置

静态

DHCP

自动获取 DNS 服务器地址

IP 地址:

10 . 1 . 12 . 100

DNS1:

0 . 0 . 0 . 0

子网掩码:

255 . 255 . 255 . 0

DNS2:

0 . 0 . 0 . 0

网关:

10 . 1 . 12 . 254

IPv6 配置

静态

DHCPv6

IPv6 地址:

::

前缀长度:

128

IPv6 网关:

::

应用

Server1

基础配置

服务器信息

日志信息

Mac地址:

54-89-98-E9-50-A1

(格式:00-01-02-03-04-05)

IPv4 配置

本机地址:

10 . 1 . 14 . 100

子网掩码:

255 . 255 . 255 . 0

网关:

10 . 1 . 14 . 254

域名服务器:

0 . 0 . 0 . 0

PING测试

目的IPv4:

0 . 0 . 0 . 0

次数:

发送

本机状态:

设备启动

ping 成功: 0 失败: 0

保存

验证以上配置任务。

[SZ]display ip interface brief | exclude unassigned

*down: administratively down

^down: standby

(l): loopback

(s): spoofing

The number of interface that is UP in Physical is 6

The number of interface that is DOWN in Physical is 0

The number of interface that is UP in Protocol is 6

The number of interface that is DOWN in Protocol is 0

Interface	IP Address/Mask	Physical	Protocol
GigabitEthernet0/0/0	172.16.12.2/30	up	up
GigabitEthernet0/0/1	192.168.12.1/30	up	up
GigabitEthernet0/0/2	10.2.2.1/30	up	up
GigabitEthernet1/0/0	10.2.3.1/30	up	up

```
GigabitEthernet2/0/0          218.18.12.1/30          up          up

[S1]display ip interface brief | exclude unassigned
*down: administratively down
^down: standby
(l): loopback
(s): spoofing
The number of interface that is UP in Physical is 7
The number of interface that is DOWN in Physical is 1
The number of interface that is UP in Protocol is 6
The number of interface that is DOWN in Protocol is 2
Interface                    IP Address/Mask          Physical    Protocol
Vlanif2                     10.2.2.2/30              up          up
Vlanif12                    10.1.12.252/24           up          up
Vlanif13                    10.1.13.252/24           up          up
Vlanif14                    10.1.14.252/24           up          up
Vlanif15                    10.1.15.252/24           up          up
```

其他设备验证命令相同，这里不再一一列出。

步骤 4 配置 VRRP

总部核心交换机 S1 和 S2 配置 VRRP，为各个 VLAN 主机提供冗余网关。通过配置使得交换机 S1 作为 VLAN12 和 VLAN13 的 Master，交换机 S2 作为 VLAN14 和 VLAN15 的 Master。确保每个 VLAN 的 VRRP 的 Master 和 MSTP 的根一致。

● 配置交换机 S1

```
[S1]interface Vlanif12
[S1-Vlanif12]vrrp vrid 12 virtual-ip 10.1.12.254
[S1-Vlanif12]vrrp vrid 12 priority 120
[S1-Vlanif12]quit
[S1]interface Vlanif13
[S1-Vlanif13]vrrp vrid 13 virtual-ip 10.1.13.254
[S1-Vlanif13]vrrp vrid 13 priority 120
[S1-Vlanif13]quit
[S1]interface Vlanif14
[S1-Vlanif14]vrrp vrid 14 virtual-ip 10.1.14.254
[S1-Vlanif14]quit
[S1]interface Vlanif15
[S1-Vlanif15]vrrp vrid 15 virtual-ip 10.1.15.254
[S1-Vlanif15]quit
```

● 配置交换机 S2

```
[S2]interface Vlanif12
[S2-Vlanif12]vrrp vrid 12 virtual-ip 10.1.12.254
[S2-Vlanif12]quit
[S2]interface Vlanif13
[S2-Vlanif13]vrrp vrid 13 virtual-ip 10.1.13.254
[S2-Vlanif13]quit
[S2]interface Vlanif14
[S2-Vlanif14]vrrp vrid 14 virtual-ip 10.1.14.254
[S2-Vlanif14]vrrp vrid 14 priority 120
[S2-Vlanif14]quit
[S2]interface Vlanif15
[S2-Vlanif15]vrrp vrid 15 virtual-ip 10.1.15.254
[S2-Vlanif15]vrrp vrid 15 priority 120
[S2-Vlanif15]quit
```

验证以上配置任务。

[S1]display vrrp brief

VRID	State	Interface	Type	Virtual IP
12	Master	Vlanif12	Normal	10.1.12.254
13	Master	Vlanif13	Normal	10.1.13.254
14	Backup	Vlanif14	Normal	10.1.14.254
15	Backup	Vlanif15	Normal	10.1.15.254

Total:4	Master:2	Backup:2	Non-active:0	

[S2]display vrrp brief

VRID	State	Interface	Type	Virtual IP
12	Backup	Vlanif12	Normal	10.1.12.254
13	Backup	Vlanif13	Normal	10.1.13.254
14	Master	Vlanif14	Normal	10.1.14.254
15	Master	Vlanif15	Normal	10.1.15.254

Total:4	Master:2	Backup:2	Non-active:0	

步骤 5 配置 NAT

配置 NAT 使得总部和分公司的主机可以通过路由器 SZ 访问 Internet。

[SZ]acl number 2000

[SZ-acl-basic-2000]rule 10 permit source 192.168.2.0 0.0.1.255

[SZ-acl-basic-2000]rule 20 permit source 172.16.8.0 0.0.3.255

[SZ-acl-basic-2000]rule 30 permit source 10.1.12.0 0.0.3.255

[SZ-acl-basic-2000]quit

[SZ]interface GigabitEthernet2/0/0

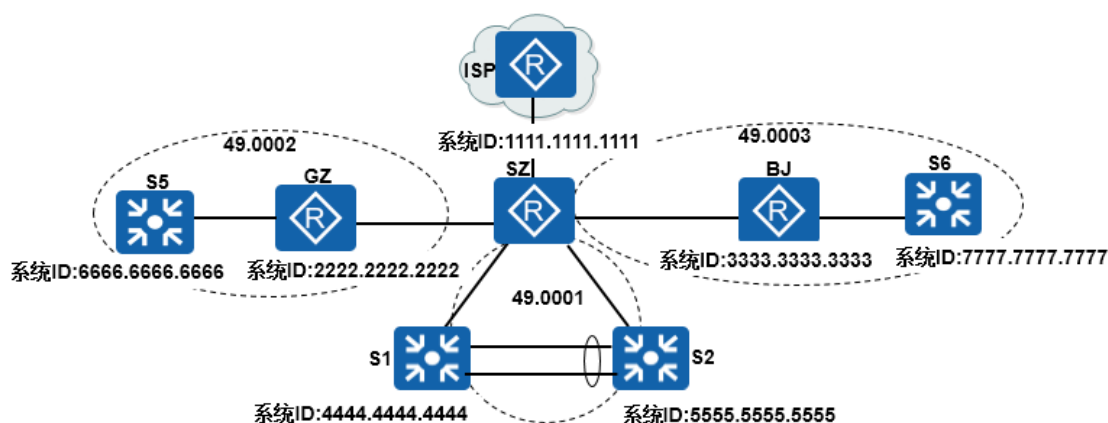
[SZ-GigabitEthernet2/0/0]nat outbound 2000

[SZ-GigabitEthernet2/0/0]quit

2.5.2 项目核心任务

步骤 1 配置 IS-IS 基本功能

项目核心任务是完成 IS-IS 部署，针对 IS-IS 部署任务对项目整体拓扑进行简化，只保留运行 IS-IS 的设备，如下图。



3 台路由器和 4 台交换机配置基本 IS-IS，包括创建 IS-IS 进程，配置开销类型、配置 NET、动态主机名、激活运行 IS-IS 的路由器接口等。修改 S1、S2、S5、S6 的 IS-IS 路由器类型为

Level-1。在深圳总部到分公司的两条链路上修改 IS-IS 电路类型为 Level-2。将分公司交换机适当接口配置为静默接口。

- 配置路由器 SZ

```
[SZ]isis 1
[SZ-isis-1]cost-style wide
[SZ-isis-1]network-entity 49.0001.1111.1111.1111.00
[SZ-isis-1]is-name SZ
[SZ]interface GigabitEthernet0/0/0
[SZ-GigabitEthernet0/0/0]isis enable 1
[SZ-GigabitEthernet0/0/0]isis circuit-level level-2
[SZ]interface GigabitEthernet0/0/1
[SZ-GigabitEthernet0/0/1]isis enable 1
[SZ-GigabitEthernet0/0/1]isis circuit-level level-2
[SZ]interface GigabitEthernet0/0/2
[SZ-GigabitEthernet0/0/2]isis enable 1
[SZ-GigabitEthernet0/0/2]isis circuit-level level-1
[SZ]interface GigabitEthernet1/0/0
[SZ-GigabitEthernet1/0/0]isis enable 1
[SZ-GigabitEthernet1/0/0]isis circuit-level level-1
```

- 配置路由器 GZ

```
[GZ]isis 1
[GZ-isis-1]cost-style wide
[GZ-isis-1]network-entity 49.0002.2222.2222.2222.00
[GZ-isis-1]is-name GZ
[GZ]interface GigabitEthernet0/0/0
[GZ-GigabitEthernet0/0/0]isis enable 1
[GZ-GigabitEthernet0/0/0]isis circuit-level level-2
[GZ]interface GigabitEthernet0/0/1
[GZ-GigabitEthernet0/0/1]isis enable 1
[GZ-GigabitEthernet0/0/1]isis circuit-level level-1
```

- 配置路由器 BJ

```
[BJ]isis 1
[BJ-isis-1]cost-style wide
[BJ-isis-1]network-entity 49.0003.3333.3333.3333.00
[BJ-isis-1]is-name BJ
[BJ]interface GigabitEthernet0/0/0
[BJ-GigabitEthernet0/0/0]isis enable 1
[BJ-GigabitEthernet0/0/0]isis circuit-level level-1
[BJ]interface GigabitEthernet0/0/1
[BJ-GigabitEthernet0/0/1]isis enable 1
[BJ-GigabitEthernet0/0/1]isis circuit-level level-2
```

- 配置交换机 S1

```
[S1]isis 1
[S1-isis-1]is-level level-1
[S1-isis-1]cost-style wide
[S1-isis-1]network-entity 49.0001.4444.4444.4444.00
[S1-isis-1]is-name S1
[S1-isis-1]quit
[S1]interface Vlanif2
[S1-Vlanif2]isis enable 1
[S1-Vlanif2]quit
[S1]interface Vlanif12
[S1-Vlanif12]isis enable 1
```

```
[S1-Vlanif12]quit
[S1]interface Vlanif13
[S1-Vlanif13]isis enable 1
[S1-Vlanif13]quit
[S1]interface Vlanif14
[S1-Vlanif14]isis enable 1
[S1-Vlanif14]quit
[S1]interface Vlanif15
[S1-Vlanif15]isis enable 1
[S1-Vlanif15]quit
```

● 配置交换机 S2

```
[S2]isis 1
[S2-isis-1]is-level level-1
[S2-isis-1]cost-style wide
[S2-isis-1]network-entity 49.0001.5555.5555.5555.00
[S2-isis-1]is-name S2
[S2-isis-1]quit
[S2]interface Vlanif3
[S2-Vlanif3]isis enable 1
[S2-Vlanif3]quit
[S2]interface Vlanif12
[S2-Vlanif12]isis enable 1
[S2-Vlanif12]quit
[S2]interface Vlanif13
[S2-Vlanif13]isis enable 1
[S2-Vlanif13]quit
[S2]interface Vlanif14
[S2-Vlanif14]isis enable 1
[S2-Vlanif14]quit
[S2]interface Vlanif15
[S2-Vlanif15]isis enable 1
[S2-Vlanif15]quit
```

● 配置交换机 S5

```
[S5]isis 1
[S5-isis-1]is-level level-1
[S5-isis-1]cost-style wide
[S5-isis-1]network-entity 49.0002.6666.6666.6666.00
[S5-isis-1]is-name S5
[S5-isis-1]quit
[S5]interface Vlanif22
[S5-Vlanif22]isis enable 1
[S5-Vlanif22]isis silent
[S5-Vlanif22]quit
[S5]interface Vlanif33
[S5-Vlanif33]isis enable 1
[S5-Vlanif33]isis silent
[S5-Vlanif33]quit
[S5]interface Vlanif44
[S5-Vlanif44]isis enable 1
[S5-Vlanif44]isis silent
[S5-Vlanif44]quit
[S5]interface Vlanif55
[S5-Vlanif55]isis enable 1
[S5-Vlanif55]isis silent
[S5-Vlanif55]quit
[S5]interface Vlanif66
```



```
[S5-Vlanif6]isis enable 1
[S5-Vlanif6]quit
```

- 配置交换机 S6

```
[S6]isis 1
[S6-isis-1]is-level level-1
[S6-isis-1]cost-style wide
[S6-isis-1]network-entity 49.0003.7777.7777.7777.00
[S6-isis-1]is-name S6
[S6-isis-1]quit
[S6]interface Vlanif222
[S6-Vlanif2]isis enable 1
[S6-Vlanif2]isis silent
[S6-Vlanif2]quit
[S6]interface Vlanif333
[S6-Vlanif3]isis enable 1
[S6-Vlanif3]isis silent
[S6-Vlanif3]quit
[S6]interface Vlanif666
[S6-Vlanif6]isis enable 1
[S6-Vlanif6]quit
```

步骤 2 配置 IS-IS 验证

为了提高网络安全性，在深圳总部到分公司的两条链路上，配置 IS-IS 接口 MD5 验证。在深圳总部的 IS-IS 区域 49.0001 配置区域 MD5 验证。

- 在深圳总部到分公司的两条链路上，配置 IS-IS 接口 MD5 验证。

```
[SZ]interface GigabitEthernet0/0/0
[SZ-GigabitEthernet0/0/0]isis authentication-mode md5 cipher 123456
[SZ]interface GigabitEthernet0/0/1
[SZ-GigabitEthernet0/0/1]isis authentication-mode md5 cipher 123456
```

```
[GZ]interface GigabitEthernet0/0/0
[GZ-GigabitEthernet0/0/0]isis authentication-mode md5 cipher 123456
```

```
[BJ]interface GigabitEthernet0/0/1
[BJ-GigabitEthernet0/0/1]isis authentication-mode md5 cipher 123456
```

- 在深圳总部的 IS-IS 区域 49.0001 配置区域 MD5 验证。

```
[SZ]isis 1
[SZ-isis-1]area-authentication-mode md5 cipher 123456
```

```
[S1]isis 1
[S1-isis-1]area-authentication-mode md5 cipher 123456
```

```
[S2]isis 1
[S2-isis-1]area-authentication-mode md5 cipher 123456
```

步骤 3 配置 IS-IS 路由聚合

配置 IS-IS 路由聚合，在深圳、广州和北京三地边界路由器上分别配置路由聚合，减少路由表大小。

```
[SZ]isis 1
[SZ-isis-1]summary10.1.12.0 255.255.252.0 avoid-feedback generate_null0_route
```

```
[GZ]isis 1
```

```
[GZ-isis-1]summary 172.16.8.0 255.255.252.0 avoid-feedback generate_null0_route
```

```
[BJ]isis 1
```

```
[BJ-isis-1]summary 192.168.2.0 255.255.254.0 avoid-feedback generate_null0_route
```

步骤 4 配置 IS-IS 默认路由注入

在深圳路由器上配置指向 ISP 的静态默认路由，并向 IS-IS 网络注入默认路由。

```
[SZ]ip route-static 0.0.0.0 0.0.0.0 218.18.12.2
```

```
[SZ]isis 1
```

```
[SZ-isis-1]default-route-advertise always cost 20 tag 1111
```

步骤 5 控制 IS-IS DIS 选举

控制路由器 SZ 成为连接三层交换机 S1 和 S2 的相应网段的 DIS。交换机 S1 和 S2 为 Level-1 路由器，只需要更改 Level-1 的优先级即可。

```
[SZ]interface GigabitEthernet0/0/2
```

```
[SZ-GigabitEthernet0/0/2]isis dis-priority 96 level-1
```

```
[SZ]interface GigabitEthernet1/0/0
```

```
[SZ-GigabitEthernet1/0/0]isis dis-priority 96 level-1
```

步骤 6 调整 IS-IS 接口计时器

在路由器 SZ 和 BJ 之间链路上调整 IS-IS 计时器参数，将接口发送 Hello 报文周期改为 5 秒，邻居保持时间为 Hello 报文的发送间隔时间的 4 倍。

```
[SZ]interface GigabitEthernet0/0/1
```

```
[SZ-GigabitEthernet0/0/1]isis timer hello 5 level-2
```

```
[SZ-GigabitEthernet0/0/1]isis timer holding-multiplier 4 level-2
```

```
[BJ]interface GigabitEthernet0/0/1
```

```
[BJ-GigabitEthernet0/0/1]isis timer hello 5 level-2
```

```
[BJ-GigabitEthernet0/0/1]isis timer holding-multiplier 4 level-2
```

2.6 项目验证

2.6.1 查看 IS-IS 邻居信息

● 查看 IS-IS 邻居的摘要信息

```
[SZ]display isis peer
```

Peer information for ISIS(1)

System Id	Interface	Circuit Id	State	HoldTime	Type	PRI
GZ	GE0/0/0	SZ.01	Up	25s	L2	64
BJ	GE0/0/1	BJ.02	Up	6s	L2	64
S1	GE0/0/2	SZ.03	Up	28s	L1	64
S2	GE1/0/0	SZ.04	Up	24s	L1	64

Total Peer(s): 4

```
[GZ]display isis peer
```

Peer information for ISIS(1)						
System Id	Interface	Circuit Id	State	HoldTime	Type	PRI
SZ	GE0/0/0	SZ.01	Up	8s	L2	64
S5	GE0/0/1	S5.05	Up	7s	L1	64
Total Peer(s): 2						
[BJ]display isis peer						
Peer information for ISIS(1)						
System Id	Interface	Circuit Id	State	HoldTime	Type	PRI
S6	GE0/0/0	S6.03	Up	7s	L1	64
SZ	GE0/0/1	BJ.02	Up	17s	L2	64
Total Peer(s): 2						
[S1]display isis peer						
Peer information for ISIS(1)						
System Id	Interface	Circuit Id	State	HoldTime	Type	PRI
SZ	Vlanif2	SZ.03	Up	7s	L1	96
S2	Vlanif12	S1.02	Up	23s	L1	64
S2	Vlanif13	S1.03	Up	21s	L1	64
S2	Vlanif14	S1.04	Up	26s	L1	64
S2	Vlanif15	S1.05	Up	26s	L1	64

● 查看 IS-IS 邻居的详细信息

[SZ]display isis peer interface GigabitEthernet 0/0/2 verbose						
Peer information for ISIS(1)						
System Id	Interface	Circuit Id	State	HoldTime	Type	PRI
S1	GE0/0/2	SZ.03	Up	28s	L1	64
MT IDs supported : 0(UP)						
Local MT IDs : 0						
Area Address(es) : 49.0001						
Peer IP Address(es) : 10.2.2.2						
Uptime : 01:28:57						
Adj Protocol : IPV4						
Restart Capable : YES						
Suppressed Adj : NO						
Peer System Id : 4444.4444.4444						
Total Peer(s): 1						
[SZ]display isis peer interface GigabitEthernet 0/0/1 verbose						
Peer information for ISIS(1)						
System Id	Interface	Circuit Id	State	HoldTime	Type	PRI

BJ	GE0/0/1	BJ.02	Up	5s	L2	64

MT IDs supported		: 0(UP)				
Local MT IDs		: 0				
Area Address(es)		: 49.0003				
Peer IP Address(es)		: 192.168.12.2				
Uptime		: 01:29:53				
Adj Protocol		: IPV4				
Restart Capable		: YES				
Suppressed Adj		: NO				
Peer System Id		: 3333.3333.3333				
Total Peer(s): 1						

2.6.2 查看 IS-IS 接口信息

● 查看 IS-IS 接口的摘要信息

[SZ]dis isis interface						
Interface information for ISIS(1)						

Interface	Id	IPV4.State	IPV6.State	MTU	Type	DIS
GE0/0/0	001	Up	Down	1497	L2	Yes
GE0/0/1	002	Up	Down	1497	L2	No
GE0/0/2	003	Up	Down	1497	L1	Yes
GE1/0/0	004	Up	Down	1497	L1	Yes
[S1]display isis interface						
Interface information for ISIS(1)						

Interface	Id	IPV4.State	IPV6.State	MTU	Type	DIS
Vlanif2	001	Up	Down	1497	L1/L2	No/No
Vlanif12	002	Up	Down	1497	L1/L2	Yes/No
Vlanif13	003	Up	Down	1497	L1/L2	Yes/No
Vlanif14	004	Up	Down	1497	L1/L2	Yes/No
Vlanif15	005	Up	Down	1497	L1/L2	Yes/No

● 查看 IS-IS 接口的摘要信息

[SZ]display isis interface GigabitEthernet 0/0/1 verbose						
Interface information for ISIS(1)						

Interface	Id	IPV4.State	IPV6.State	MTU	Type	DIS
GE0/0/1	002	Up	Down	1497	L2	No
Circuit MT State	: Standard					
Description	: HUAWEI, AR Series, GigabitEthernet0/0/1 Interface					
SNPA Address	: 00e0-fccd-1eba					
IP Address	: 192.168.12.1					
IPV6 Link Local Address	:					
IPV6 Global Address(es)	:					
Csnp Timer Value	:	L1	10	L2	10	
Hello Timer Value	:	L1	10	L2	5	
DIS Hello Timer Value	:	L1	3	L2	1	
Hello Multiplier Value	:	L1	3	L2	4	

LSP-Throttle Timer	:	L12	50		
Cost	:	L1	10	L2	10
Ipv6 Cost	:	L1	10	L2	10
Priority	:	L1	64	L2	64
Retransmit Timer Value	:	L12	5		
Bandwidth-Value	:	Low	1000000000	High	0
Static Bfd	:	NO			
Dynamic Bfd	:	NO			
Fast-Sense Rpr	:	NO			

2.6.3 查看 IS-IS LSDB 信息

[SZ]display isis lsdb					
Database information for ISIS(1)					

Level-1 Link State Database					
LSPID	Seq Num	Checksum	Holdtime	Length	ATT/P/OL

SZ.00-00*	0x0000000a	0xf58a	590	121	1/0/0
SZ.03-00*	0x00000004	0x9071	590	73	0/0/0
SZ.04-00*	0x00000004	0xa19c	590	73	0/0/0
S1.00-00	0x0000000d	0xf617	511	199	0/0/0
S1.02-00	0x00000004	0x9ec6	511	73	0/0/0
S1.03-00	0x00000004	0x3f3d	511	73	0/0/0
S1.04-00	0x00000004	0xbf5c	511	73	0/0/0
S1.05-00	0x00000004	0xf26	511	73	0/0/0
S2.00-00	0x0000000e	0x9640	549	199	0/0/0
Total LSP(s): 9					
*(In TLV)-Leaking Route, *(By LSPID)-Self LSP, +-Self LSP(Extended),					
ATT-Attached, P-Partition, OL-Overload					
Level-2 Link State Database					
LSPID	Seq Num	Checksum	Holdtime	Length	ATT/P/OL

SZ.00-00*	0x0000000d	0xce1d	590	128	0/0/0
SZ.00-01*	0x00000004	0x46fc	590	41	0/0/0
SZ.01-00*	0x00000004	0x20c2	590	54	0/0/0
GZ.00-00	0x0000000a	0x1d1f	536	91	0/0/0
BJ.00-00	0x00000010	0x4a71	457	91	0/0/0
BJ.02-00	0x00000004	0x1995	457	54	0/0/0
Total LSP(s): 6					
*(In TLV)-Leaking Route, *(By LSPID)-Self LSP, +-Self LSP(Extended),					
ATT-Attached, P-Partition, OL-Overload					

2.6.4 查看 IS-IS LSDB LSP 信息

[SZ]display isis lsdb 3333.3333.3333.00-00 verbose					
Database information for ISIS(1)					

Level-2 Link State Database					

LSPID	Seq Num	Checksum	Holdtime	Length	ATT/P/OL
3333.3333.3333.00-00	0x0000000e	0xa01d	383	91	0/0/0
SOURCE	BJ.00				
HOST NAME	BJ				
NLPID	IPV4				
AREA ADDR	49.0003				
INTF ADDR	192.168.6.1				
INTF ADDR	192.168.12.2				
+NBR ID	BJ.02	COST: 10			
+IP-Extended	192.168.6.0	255.255.255.252	COST: 10		
+IP-Extended	192.168.12.0	255.255.255.252	COST: 10		
+IP-Extended	192.168.2.0	255.255.254.0	COST: 20		
Total LSP(s): 1					
*(In TLV)-Leaking Route, *(By LSPID)-Self LSP, +-Self LSP(Extended), ATT-Attached, P-Partition, OL-Overload					
[S5]display isis lsdb 2222.2222.2222.00-00 verbose					
Database information for ISIS(1)					
Level-1 Link State Database					
LSPID	Seq Num	Checksum	Holdtime	Length	ATT/P/OL
2222.2222.2222.00-00	0x0000000c	0x58c6	1137	74	1/0/0
SOURCE	GZ.00				
HOST NAME	GZ				
NLPID	IPV4				
AREA ADDR	49.0002				
INTF ADDR	172.16.12.1				
INTF ADDR	172.16.6.2				
+NBR ID	S5.05	COST: 10			
+IP-Extended	172.16.6.0	255.255.255.252	COST: 10		
Total LSP(s): 1					
*(In TLV)-Leaking Route, *(By LSPID)-Self LSP, +-Self LSP(Extended), ATT-Attached, P-Partition, OL-Overload					

2.6.5 查看 IS-IS 概要信息

[SZ]display isis brief					
ISIS Protocol Information for ISIS(1)					

SystemId: 1111.1111.1111 System Level: L12					
Area-Authentication-mode: MD5					
Domain-Authentication-mode: NULL					
Ipv6 is not enabled					
ISIS is in invalid restart status					
ISIS is in protocol hot standby state: Real-Time Backup					
Interface: 172.16.12.2(GE0/0/0)					
Cost: L1 10	L2 10	Ipv6 Cost: L1 10 L2 10			
State: IPV4 Up		IPV6 Down			

```

Type: BROADCAST                               MTU: 1497
Priority: L1 64   L2 64
Timers:      Csnp: L1 10   L2 10   ,Retransmit: L12 5   , Hello: L1 10 L2 10   ,

Hello Multiplier: L1 3   L2 3   , LSP-Throttle Timer: L12 50

Interface: 192.168.12.1(GE0/0/1)
Cost: L1 10   L2 10   Ipv6 Cost: L1 10   L2 10
State: IPV4 Up   IPV6 Down
Type: BROADCAST                               MTU: 1497
Priority: L1 64   L2 64
Timers:      Csnp: L1 10   L2 10   ,Retransmit: L12 5   , Hello: L1 10 L2 5   ,

Hello Multiplier: L1 3   L2 4   , LSP-Throttle Timer: L12 50

Interface: 10.2.2.1(GE0/0/2)
Cost: L1 10   L2 10   Ipv6 Cost: L1 10   L2 10
State: IPV4 Up   IPV6 Down
Type: BROADCAST                               MTU: 1497
Priority: L1 96   L2 64
Timers:      Csnp: L1 10   L2 10   ,Retransmit: L12 5   , Hello: L1 10 L2 10   ,

Hello Multiplier: L1 3   L2 3   , LSP-Throttle Timer: L12 50

Interface: 10.2.3.1(GE1/0/0)
Cost: L1 10   L2 10   Ipv6 Cost: L1 10   L2 10
State: IPV4 Up   IPV6 Down
Type: BROADCAST                               MTU: 1497
Priority: L1 96   L2 64
Timers:      Csnp: L1 10   L2 10   ,Retransmit: L12 5   , Hello: L1 10 L2 10   ,

Hello Multiplier: L1 3   L2 3   , LSP-Throttle Timer: L12 50

```

2.6.6 查看 IS-IS 路由表

- 查看路由器 SZ IS-IS 路由表

[SZ]display isis route					
Route information for ISIS(1)					

ISIS(1) Level-1 Forwarding Table					

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags
10.1.14.0/24	20	NULL	GE0/0/2	10.2.2.2	A/-/L/-
			GE1/0/0	10.2.3.2	
10.1.13.254/32	20	NULL	GE0/0/2	10.2.2.2	A/-/L/-
10.1.13.0/24	20	NULL	GE0/0/2	10.2.2.2	A/-/L/-
			GE1/0/0	10.2.3.2	
10.1.12.254/32	20	NULL	GE0/0/2	10.2.2.2	A/-/L/-
10.2.3.0/30	10	NULL	GE1/0/0	Direct	D/-/L/-
10.1.12.0/24	20	NULL	GE0/0/2	10.2.2.2	A/-/L/-
			GE1/0/0	10.2.3.2	
10.2.2.0/30	10	NULL	GE0/0/2	Direct	D/-/L/-
10.1.15.254/32	20	NULL	GE1/0/0	10.2.3.2	A/-/L/-
10.1.15.0/24	20	NULL	GE0/0/2	10.2.2.2	A/-/L/-

10.1.14.254/32	20	NULL	GE1/0/0	10.2.3.2	A/-/L/-
Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut, U-Up/Down Bit Set					
ISIS(1) Level-2 Forwarding Table					

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags
192.168.2.0/23	30	NULL	GE0/0/1	192.168.12.2	A/-/-/
172.16.8.0/22	30	NULL	GE0/0/0	172.16.12.1	A/-/-/
192.168.6.0/30	20	NULL	GE0/0/1	192.168.12.2	A/-/-/
172.16.12.0/30	10	NULL	GE0/0/0	Direct	D/-/L/-
10.2.3.0/30	10	NULL	GE1/0/0	Direct	D/-/L/-
172.16.6.0/30	20	NULL	GE0/0/0	172.16.12.1	A/-/-/
10.2.2.0/30	10	NULL	GE0/0/2	Direct	D/-/L/-
192.168.12.0/30	10	NULL	GE0/0/1	Direct	D/-/L/-
Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut, U-Up/Down Bit Set					

● 查看路由器 GZ IS-IS 路由表

[GZ]display isis route					
Route information for ISIS(1)					

ISIS(1) Level-1 Forwarding Table					

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags
172.16.8.0/24	20	NULL	GE0/0/1	172.16.6.1	A/-/L/-
172.16.11.0/24	20	NULL	GE0/0/1	172.16.6.1	A/-/L/-
172.16.6.0/30	10	NULL	GE0/0/1	Direct	D/-/L/-
172.16.10.0/24	20	NULL	GE0/0/1	172.16.6.1	A/-/L/-
172.16.9.0/24	20	NULL	GE0/0/1	172.16.6.1	A/-/L/-
Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut, U-Up/Down Bit Set					
ISIS(1) Level-2 Forwarding Table					

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags
0.0.0.0/0	30	NULL	GE0/0/0	172.16.12.2	A/-/-/
192.168.2.0/23	40	NULL	GE0/0/0	172.16.12.2	A/-/-/
192.168.6.0/30	30	NULL	GE0/0/0	172.16.12.2	A/-/-/
172.16.12.0/30	10	NULL	GE0/0/0	Direct	D/-/L/-
10.2.3.0/30	20	NULL	GE0/0/0	172.16.12.2	A/-/-/
10.1.12.0/22	30	NULL	GE0/0/0	172.16.12.2	A/-/-/
172.16.6.0/30	10	NULL	GE0/0/1	Direct	D/-/L/-
10.2.2.0/30	20	NULL	GE0/0/0	172.16.12.2	A/-/-/
192.168.12.0/30	20	NULL	GE0/0/0	172.16.12.2	A/-/-/
Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut, U-Up/Down Bit Set					

- 查看路由器 BJ IS-IS 路由表

[BJ]display isis route

Route information for ISIS(1)

ISIS(1) Level-1 Forwarding Table

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags
192.168.2.0/24	20	NULL	GE0/0/0	192.168.6.2	A/-/L/-
192.168.6.0/30	10	NULL	GE0/0/0	Direct	D/-/L/-
192.168.3.0/24	20	NULL	GE0/0/0	192.168.6.2	A/-/L/-

Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut,
U-Up/Down Bit Set

ISIS(1) Level-2 Forwarding Table

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags
0.0.0.0/0	30	NULL	GE0/0/1	192.168.12.1	A/-/-/-
172.16.8.0/22	40	NULL	GE0/0/1	192.168.12.1	A/-/-/-
192.168.6.0/30	10	NULL	GE0/0/0	Direct	D/-/L/-
172.16.12.0/30	20	NULL	GE0/0/1	192.168.12.1	A/-/-/-
10.2.3.0/30	20	NULL	GE0/0/1	192.168.12.1	A/-/-/-
10.1.12.0/22	30	NULL	GE0/0/1	192.168.12.1	A/-/-/-
172.16.6.0/30	30	NULL	GE0/0/1	192.168.12.1	A/-/-/-
10.2.2.0/30	20	NULL	GE0/0/1	192.168.12.1	A/-/-/-
192.168.12.0/30	10	NULL	GE0/0/1	Direct	D/-/L/-

Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut,
U-Up/Down Bit Set

- 查看交换机 S1 IS-IS 路由表

[S1]display isis route

Route information for ISIS(1)

ISIS(1) Level-1 Forwarding Table

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags
0.0.0.0/0	10	NULL	Vlanif2	10.2.2.1	A/-/-/-
10.1.14.0/24	10	NULL	Vlanif14	Direct	D/-/L/-
10.1.13.254/32	10	NULL	Vlanif13	Direct	D/-/L/-
10.1.13.0/24	10	NULL	Vlanif13	Direct	D/-/L/-
10.1.12.254/32	10	NULL	Vlanif12	Direct	D/-/L/-
10.2.3.0/30	20	NULL	Vlanif12	10.1.12.253	A/-/-/-
			Vlanif13	10.1.13.253	
			Vlanif14	10.1.14.253	
			Vlanif15	10.1.15.253	
			Vlanif2	10.2.2.1	
10.1.12.0/24	10	NULL	Vlanif12	Direct	D/-/L/-

10.2.2.0/30	10	NULL	Vlanif2	Direct	D/-/L/-
10.1.15.254/32	20	NULL	Vlanif12	10.1.12.253	A/-/-/-
			Vlanif13	10.1.13.253	
			Vlanif14	10.1.14.253	
			Vlanif15	10.1.15.253	
10.1.15.0/24	10	NULL	Vlanif15	Direct	D/-/L/-
10.1.14.254/32	20	NULL	Vlanif12	10.1.12.253	A/-/-/-
			Vlanif13	10.1.13.253	
			Vlanif14	10.1.14.253	
			Vlanif15	10.1.15.253	
Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut, U-Up/Down Bit Set					

● 查看交换机 S2 IS-IS 路由表

[S2]display isis route					
Route information for ISIS(1)					

ISIS(1) Level-1 Forwarding Table					

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags

0.0.0.0/0	10	NULL	Vlanif3	10.2.3.1	A/-/-/-
10.1.14.0/24	10	NULL	Vlanif14	Direct	D/-/L/-
10.1.13.254/32	20	NULL	Vlanif12	10.1.12.252	A/-/-/-
			Vlanif13	10.1.13.252	
			Vlanif14	10.1.14.252	
			Vlanif15	10.1.15.252	
10.1.13.0/24	10	NULL	Vlanif13	Direct	D/-/L/-
10.1.12.254/32	20	NULL	Vlanif12	10.1.12.252	A/-/-/-
			Vlanif13	10.1.13.252	
			Vlanif14	10.1.14.252	
			Vlanif15	10.1.15.252	
10.2.3.0/30	10	NULL	Vlanif3	Direct	D/-/L/-
10.1.12.0/24	10	NULL	Vlanif12	Direct	D/-/L/-
10.2.2.0/30	20	NULL	Vlanif12	10.1.12.252	A/-/-/-
			Vlanif13	10.1.13.252	
			Vlanif14	10.1.14.252	
			Vlanif15	10.1.15.252	
			Vlanif3	10.2.3.1	
10.1.15.254/32	10	NULL	Vlanif15	Direct	D/-/L/-
10.1.15.0/24	10	NULL	Vlanif15	Direct	D/-/L/-
10.1.14.254/32	10	NULL	Vlanif14	Direct	D/-/L/-
Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut, U-Up/Down Bit Set					

● 查看交换机 S5 IS-IS 路由表

[S5]display isis route					
Route information for ISIS(1)					

ISIS(1) Level-1 Forwarding Table					

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags

0.0.0.0/0	10	NULL	Vlanif66	172.16.6.2	A/-/-/-
172.16.8.0/24	10	NULL	Vlanif22	Direct	D/-/L/-
172.16.11.0/24	10	NULL	Vlanif55	Direct	D/-/L/-
172.16.6.0/30	10	NULL	Vlanif66	Direct	D/-/L/-
172.16.10.0/24	10	NULL	Vlanif44	Direct	D/-/L/-
172.16.9.0/24	10	NULL	Vlanif33	Direct	D/-/L/-

Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut,
U-Up/Down Bit Set

● 查看交换机 S6 IS-IS 路由表

[S6]display isis route					
Route information for ISIS(1)					

ISIS(1) Level-1 Forwarding Table					

IPv4 Destination	IntCost	ExtCost	ExitInterface	NextHop	Flags

0.0.0.0/0	10	NULL	Vlanif666	192.168.6.1	A/-/-/-
192.168.2.0/24	10	NULL	Vlanif222	Direct	D/-/L/-
192.168.6.0/30	10	NULL	Vlanif666	Direct	D/-/L/-
192.168.3.0/24	10	NULL	Vlanif333	Direct	D/-/L/-

Flags: D-Direct, A-Added to URT, L-Advertised in LSPs, S-IGP Shortcut,
U-Up/Down Bit Set

2.6.7 查看 IP 路由表

● 查看路由器 SZ IP 路由表中 IS-IS 路由信息

[SZ]display ip routing-table protocol isis

Route Flags: R - relay, D - download to fib

Public routing table : ISIS

Destinations : 13

Routes : 17

ISIS routing table status : <Active>

Destinations : 13

Routes : 17

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
10.1.12.0/22	ISIS-L2	255	0	D	0.0.0.0	NULL0
10.1.12.0/24	ISIS-L1	15	20	D	10.2.2.2	GigabitEthernet0/0/2
	ISIS-L1	15	20	D	10.2.3.2	GigabitEthernet1/0/0
10.1.12.254/32	ISIS-L1	15	20	D	10.2.2.2	GigabitEthernet0/0/2
10.1.13.0/24	ISIS-L1	15	20	D	10.2.2.2	GigabitEthernet0/0/2
	ISIS-L1	15	20	D	10.2.3.2	GigabitEthernet1/0/0
10.1.13.254/32	ISIS-L1	15	20	D	10.2.2.2	GigabitEthernet0/0/2
10.1.14.0/24	ISIS-L1	15	20	D	10.2.2.2	GigabitEthernet0/0/2
	ISIS-L1	15	20	D	10.2.3.2	GigabitEthernet1/0/0
10.1.14.254/32	ISIS-L1	15	20	D	10.2.3.2	GigabitEthernet1/0/0
10.1.15.0/24	ISIS-L1	15	20	D	10.2.2.2	GigabitEthernet0/0/2
	ISIS-L1	15	20	D	10.2.3.2	GigabitEthernet1/0/0
10.1.15.254/32	ISIS-L1	15	20	D	10.2.3.2	GigabitEthernet1/0/0
172.16.6.0/30	ISIS-L2	15	20	D	172.16.12.1	GigabitEthernet0/0/0
172.16.8.0/22	ISIS-L2	15	30	D	172.16.12.1	GigabitEthernet0/0/0

192.168.2.0/23	ISIS-L2	15	30	D	192.168.12.2	GigabitEthernet0/0/1
192.168.6.0/30	ISIS-L2	15	20	D	192.168.12.2	GigabitEthernet0/0/1

ISIS routing table status : <Inactive>
Destinations : 0 Routes : 0

● 查看路由器 GZ IP 路由表中 IS-IS 路由信息

[GZ]display ip routing-table protocol isis						
Route Flags: R - relay, D - download to fib						

Public routing table : ISIS						
Destinations : 12 Routes : 12						
ISIS routing table status : <Active>						
Destinations : 12 Routes : 12						
Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	ISIS-L2	15	30	D	172.16.12.2	GigabitEthernet0/0/0
10.1.12.0/22	ISIS-L2	15	30	D	172.16.12.2	GigabitEthernet0/0/0
10.2.2.0/30	ISIS-L2	15	20	D	172.16.12.2	GigabitEthernet0/0/0
10.2.3.0/30	ISIS-L2	15	20	D	172.16.12.2	GigabitEthernet0/0/0
172.16.8.0/22	ISIS-L2	255	0	D	0.0.0.0	NULL0
172.16.8.0/24	ISIS-L1	15	20	D	172.16.6.1	GigabitEthernet0/0/1
172.16.9.0/24	ISIS-L1	15	20	D	172.16.6.1	GigabitEthernet0/0/1
172.16.10.0/24	ISIS-L1	15	20	D	172.16.6.1	GigabitEthernet0/0/1
172.16.11.0/24	ISIS-L1	15	20	D	172.16.6.1	GigabitEthernet0/0/1
192.168.2.0/23	ISIS-L2	15	40	D	172.16.12.2	GigabitEthernet0/0/0
192.168.6.0/30	ISIS-L2	15	30	D	172.16.12.2	GigabitEthernet0/0/0
192.168.12.0/30	ISIS-L2	15	20	D	172.16.12.2	GigabitEthernet0/0/0

ISIS routing table status : <Inactive>
Destinations : 0 Routes : 0

● 查看路由器 BJ IP 路由表中 IS-IS 路由信息

[BJ]display ip routing-table protocol isis						
Route Flags: R - relay, D - download to fib						

Public routing table : ISIS						
Destinations : 10 Routes : 10						
ISIS routing table status : <Active>						
Destinations : 10 Routes : 10						
Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	ISIS-L2	15	30	D	192.168.12.1	GigabitEthernet0/0/1
10.1.12.0/22	ISIS-L2	15	30	D	192.168.12.1	GigabitEthernet0/0/1
10.2.2.0/30	ISIS-L2	15	20	D	192.168.12.1	GigabitEthernet0/0/1
10.2.3.0/30	ISIS-L2	15	20	D	192.168.12.1	GigabitEthernet0/0/1
172.16.6.0/30	ISIS-L2	15	30	D	192.168.12.1	GigabitEthernet0/0/1
172.16.8.0/22	ISIS-L2	15	40	D	192.168.12.1	GigabitEthernet0/0/1
172.16.12.0/30	ISIS-L2	15	20	D	192.168.12.1	GigabitEthernet0/0/1
192.168.2.0/23	ISIS-L2	255	0	D	0.0.0.0	NULL0
192.168.2.0/24	ISIS-L1	15	20	D	192.168.6.2	GigabitEthernet0/0/0
192.168.3.0/24	ISIS-L1	15	20	D	192.168.6.2	GigabitEthernet0/0/0

ISIS routing table status : <Inactive>

Destinations : 0 Routes : 0

● 查看交换机 S1 IP 路由表中 IS-IS 路由信息

[S1]display ip routing-table protocol isis

Route Flags: R - relay, D - download to fib

Public routing table : ISIS

Destinations : 4 Routes : 14

ISIS routing table status : <Active>

Destinations : 4 Routes : 14

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	ISIS-L1	15	10	D	10.2.2.1	Vlanif2
10.1.14.254/32	ISIS-L1	15	20	D	10.1.13.253	Vlanif13
	ISIS-L1	15	20	D	10.1.14.253	Vlanif14
	ISIS-L1	15	20	D	10.1.12.253	Vlanif12
	ISIS-L1	15	20	D	10.1.15.253	Vlanif15
10.1.15.254/32	ISIS-L1	15	20	D	10.1.13.253	Vlanif13
	ISIS-L1	15	20	D	10.1.14.253	Vlanif14
	ISIS-L1	15	20	D	10.1.12.253	Vlanif12
	ISIS-L1	15	20	D	10.1.15.253	Vlanif15
10.2.3.0/30	ISIS-L1	15	20	D	10.1.13.253	Vlanif13
	ISIS-L1	15	20	D	10.1.14.253	Vlanif14
	ISIS-L1	15	20	D	10.1.12.253	Vlanif12
	ISIS-L1	15	20	D	10.1.15.253	Vlanif15
	ISIS-L1	15	20	D	10.2.2.1	Vlanif2

ISIS routing table status : <Inactive>

Destinations : 0 Routes : 0

● 查看交换机 S2 IP 路由表中 IS-IS 路由信息

[S2]display ip routing-table protocol isis

Route Flags: R - relay, D - download to fib

Public routing table : ISIS

Destinations : 4 Routes : 14

ISIS routing table status : <Active>

Destinations : 4 Routes : 14

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	ISIS-L1	15	10	D	10.2.3.1	Vlanif3
10.1.12.254/32	ISIS-L1	15	20	D	10.1.13.252	Vlanif13
	ISIS-L1	15	20	D	10.1.14.252	Vlanif14
	ISIS-L1	15	20	D	10.1.12.252	Vlanif12
	ISIS-L1	15	20	D	10.1.15.252	Vlanif15
10.1.13.254/32	ISIS-L1	15	20	D	10.1.13.252	Vlanif13
	ISIS-L1	15	20	D	10.1.14.252	Vlanif14
	ISIS-L1	15	20	D	10.1.12.252	Vlanif12
	ISIS-L1	15	20	D	10.1.15.252	Vlanif15
10.2.2.0/30	ISIS-L1	15	20	D	10.1.13.252	Vlanif13
	ISIS-L1	15	20	D	10.1.14.252	Vlanif14
	ISIS-L1	15	20	D	10.1.12.252	Vlanif12
	ISIS-L1	15	20	D	10.1.15.252	Vlanif15
	ISIS-L1	15	20	D	10.2.3.1	Vlanif3

```
ISIS routing table status : <Inactive>
Destinations : 0          Routes : 0
```

- 查看交换机 S5 IP 路由表中 IS-IS 路由信息

```
[S5]display ip routing-table protocol isis
```

```
Route Flags: R - relay, D - download to fib
```

```
-----
Public routing table : ISIS
```

```
Destinations : 1          Routes : 1
```

```
ISIS routing table status : <Active>
```

```
Destinations : 1          Routes : 1
```

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	ISIS-L1	15	10	D	172.16.6.2	Vlanif66

```
ISIS routing table status : <Inactive>
```

```
Destinations : 0          Routes : 0
```

- 查看交换机 S6 IP 路由表中 IS-IS 路由信息

```
[S6]display ip routing-table protocol isis
```

```
Route Flags: R - relay, D - download to fib
```

```
-----
Public routing table : ISIS
```

```
Destinations : 1          Routes : 1
```

```
ISIS routing table status : <Active>
```

```
Destinations : 1          Routes : 1
```

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	ISIS-L1	15	10	D	192.168.6.1	Vlanif666

```
ISIS routing table status : <Inactive>
```

```
Destinations : 0          Routes : 0
```

2.6.8 测试连通性

- 从 PC1 测试内网连通性

```
PC>ping 10.1.12.100
```

```
Ping 10.1.12.100: 32 data bytes, Press Ctrl_C to break
From 10.1.12.100: bytes=32 seq=1 ttl=124 time=188 ms
From 10.1.12.100: bytes=32 seq=2 ttl=124 time=109 ms
From 10.1.12.100: bytes=32 seq=3 ttl=124 time=124 ms
From 10.1.12.100: bytes=32 seq=4 ttl=124 time=93 ms
From 10.1.12.100: bytes=32 seq=5 ttl=124 time=93 ms
```

```
--- 10.1.12.100 ping statistics ---
```

```
5 packet(s) transmitted
```

```
5 packet(s) received
```

```
0.00% packet loss
```

```
round-trip min/avg/max = 93/121/188 ms
```

```
PC>ping 10.1.13.100
```

```
Ping 10.1.13.100: 32 data bytes, Press Ctrl_C to break
From 10.1.13.100: bytes=32 seq=1 ttl=124 time=156 ms
From 10.1.13.100: bytes=32 seq=2 ttl=124 time=109 ms
From 10.1.13.100: bytes=32 seq=3 ttl=124 time=94 ms
From 10.1.13.100: bytes=32 seq=4 ttl=124 time=110 ms
From 10.1.13.100: bytes=32 seq=5 ttl=124 time=94 ms
```

```
--- 10.1.13.100 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 94/112/156 ms
```

PC>ping 10.1.14.100

```
Ping 10.1.14.100: 32 data bytes, Press Ctrl_C to break
From 10.1.14.100: bytes=32 seq=1 ttl=251 time=156 ms
From 10.1.14.100: bytes=32 seq=2 ttl=251 time=63 ms
From 10.1.14.100: bytes=32 seq=3 ttl=251 time=94 ms
From 10.1.14.100: bytes=32 seq=4 ttl=251 time=78 ms
From 10.1.14.100: bytes=32 seq=5 ttl=251 time=47 ms
```

```
--- 10.1.14.100 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 47/87/156 ms
```

PC>ping 10.1.15.100

```
Ping 10.1.15.100: 32 data bytes, Press Ctrl_C to break
From 10.1.15.100: bytes=32 seq=1 ttl=251 time=141 ms
From 10.1.15.100: bytes=32 seq=2 ttl=251 time=109 ms
From 10.1.15.100: bytes=32 seq=3 ttl=251 time=63 ms
From 10.1.15.100: bytes=32 seq=4 ttl=251 time=78 ms
From 10.1.15.100: bytes=32 seq=5 ttl=251 time=93 ms
```

```
--- 10.1.15.100 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 63/96/141 ms
```

PC>ping 192.168.2.100

```
Ping 192.168.2.100: 32 data bytes, Press Ctrl_C to break
From 192.168.2.100: bytes=32 seq=1 ttl=123 time=109 ms
From 192.168.2.100: bytes=32 seq=2 ttl=123 time=109 ms
From 192.168.2.100: bytes=32 seq=3 ttl=123 time=63 ms
From 192.168.2.100: bytes=32 seq=4 ttl=123 time=62 ms
From 192.168.2.100: bytes=32 seq=5 ttl=123 time=78 ms
```

```
--- 192.168.2.100 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 62/84/109 ms
```

PC>**ping 192.168.3.100**

Ping 192.168.3.100: 32 data bytes, Press Ctrl_C to break
From 192.168.3.100: bytes=32 seq=1 ttl=123 time=109 ms
From 192.168.3.100: bytes=32 seq=2 ttl=123 time=94 ms
From 192.168.3.100: bytes=32 seq=3 ttl=123 time=63 ms
From 192.168.3.100: bytes=32 seq=4 ttl=123 time=78 ms
From 192.168.3.100: bytes=32 seq=5 ttl=123 time=78 ms

--- 192.168.3.100 ping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 63/84/109 ms

● 从 PC7 测试内网连通性

PC>**ping 172.16.8.100**

Ping 172.16.8.100: 32 data bytes, Press Ctrl_C to break
Request timeout!
From 172.16.8.100: bytes=32 seq=2 ttl=124 time=109 ms
From 172.16.8.100: bytes=32 seq=3 ttl=124 time=110 ms
From 172.16.8.100: bytes=32 seq=4 ttl=124 time=109 ms
From 172.16.8.100: bytes=32 seq=5 ttl=124 time=109 ms

--- 172.16.8.100 ping statistics ---
5 packet(s) transmitted
4 packet(s) received
20.00% packet loss
round-trip min/avg/max = 0/109/110 ms

PC>**ping 172.16.9.100**

Ping 172.16.9.100: 32 data bytes, Press Ctrl_C to break
From 172.16.9.100: bytes=32 seq=1 ttl=124 time=140 ms
From 172.16.9.100: bytes=32 seq=2 ttl=124 time=94 ms
From 172.16.9.100: bytes=32 seq=3 ttl=124 time=63 ms
From 172.16.9.100: bytes=32 seq=4 ttl=124 time=94 ms
From 172.16.9.100: bytes=32 seq=5 ttl=124 time=94 ms

--- 172.16.9.100 ping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 63/97/140 ms

PC>**ping 172.16.10.100**

Ping 172.16.10.100: 32 data bytes, Press Ctrl_C to break
From 172.16.10.100: bytes=32 seq=1 ttl=124 time=125 ms
From 172.16.10.100: bytes=32 seq=2 ttl=124 time=78 ms
From 172.16.10.100: bytes=32 seq=3 ttl=124 time=125 ms
From 172.16.10.100: bytes=32 seq=4 ttl=124 time=93 ms
From 172.16.10.100: bytes=32 seq=5 ttl=124 time=109 ms

--- 172.16.10.100 ping statistics ---
5 packet(s) transmitted


```
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 78/106/125 ms
```

PC>ping 172.16.11.100

```
Ping 172.16.11.100: 32 data bytes, Press Ctrl_C to break
From 172.16.11.100: bytes=32 seq=1 ttl=124 time=124 ms
From 172.16.11.100: bytes=32 seq=2 ttl=124 time=93 ms
From 172.16.11.100: bytes=32 seq=3 ttl=124 time=93 ms
From 172.16.11.100: bytes=32 seq=4 ttl=124 time=78 ms
From 172.16.11.100: bytes=32 seq=5 ttl=124 time=109 ms
```

```
--- 172.16.11.100 ping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 78/99/124 ms
```

PC>ping 192.168.2.100

```
Ping 192.168.2.100: 32 data bytes, Press Ctrl_C to break
Request timeout!
From 192.168.2.100: bytes=32 seq=2 ttl=124 time=94 ms
From 192.168.2.100: bytes=32 seq=3 ttl=124 time=94 ms
From 192.168.2.100: bytes=32 seq=4 ttl=124 time=94 ms
From 192.168.2.100: bytes=32 seq=5 ttl=124 time=94 ms
```

```
--- 192.168.2.100 ping statistics ---
5 packet(s) transmitted
4 packet(s) received
20.00% packet loss
round-trip min/avg/max = 0/94/94 ms
```

PC>ping 192.168.3.100

```
Ping 192.168.3.100: 32 data bytes, Press Ctrl_C to break
Request timeout!
From 192.168.3.100: bytes=32 seq=2 ttl=124 time=110 ms
From 192.168.3.100: bytes=32 seq=3 ttl=124 time=109 ms
From 192.168.3.100: bytes=32 seq=4 ttl=124 time=78 ms
From 192.168.3.100: bytes=32 seq=5 ttl=124 time=78 ms
```

```
--- 192.168.3.100 ping statistics ---
5 packet(s) transmitted
4 packet(s) received
20.00% packet loss
round-trip min/avg/max = 0/93/110 ms
```

- 所有主机从内网测试外网 ISP 路由器环回接口地址 8.8.8.8，均出现如下结果。

PC>ping 8.8.8.8

```
Ping 8.8.8.8: 32 data bytes, Press Ctrl_C to break
From 8.8.8.8: bytes=32 seq=1 ttl=252 time=47 ms
From 8.8.8.8: bytes=32 seq=2 ttl=252 time=31 ms
From 8.8.8.8: bytes=32 seq=3 ttl=252 time=47 ms
From 8.8.8.8: bytes=32 seq=4 ttl=252 time=32 ms
From 8.8.8.8: bytes=32 seq=5 ttl=252 time=62 ms
```

--- 8.8.8.8 ping statistics ---

5 packet(s) transmitted

5 packet(s) received

0.00% packet loss

round-trip min/avg/max = 31/43/62 ms