lab3 report

PB22111639 马筱雅

实验内容

- **必做**
- **选做1-负载均衡**
- **选做2- `6in4`**

1 必做内容

子网划分

学号后三位： `639` ，将高新区路由与西区路由直接相连，划分方案如下

校区	子网
中区-东区路由	`63.9.1.0/24`
中区-西区路由	`63.9.4.0/24`
南区	`63.9.3.0/24`
北区	`63.9.0.0/24`
东区	`63.9.2.0/24`
西区	`63.9.5.0/24`
西区-高新区路由	`63.9.6.0/24`
高新区	`63.9.7.0/24`

路由器接口连接及IP地址分配

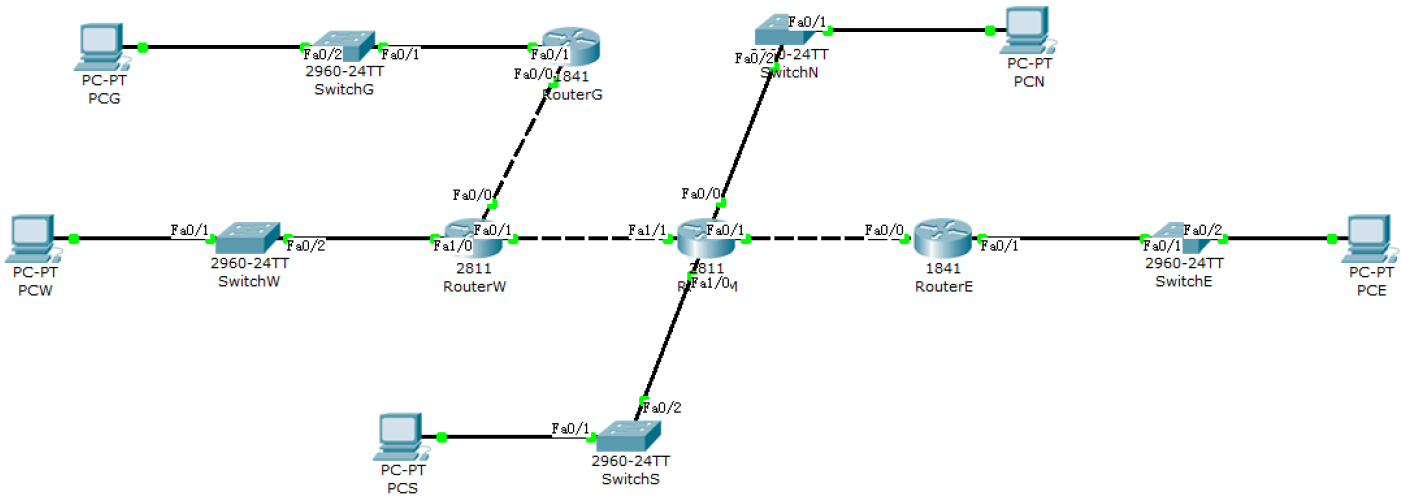
Device	Interface	IP Address	Mask	To Device	To Interface
RouterM Cisco 2811	Fa0/0	63.9.0.1	255.255.255.0	SwitchN	Fa0/2
	Fa0/1	63.9.1.1		RouterE	Fa0/0

(NM-2FE2W module*1)	Fa1/0	63.9.3.1		SwitchS	Fa0/2
	Fa1/1	63.9.4.1		RouterW	Fa0/1
RouterW Cisco 2811 (NM-2FE2W module*1)	Fa0/0	63.9.6.1	255.255.255.0	RouterG	Fa0/0
	Fa0/1	63.9.4.2		RouterM	Fa1/1
	Fa1/0	63.9.5.1		SwitchW	Fa0/2
RouterE Cisco 1841	Fa0/0	63.9.1.2	255.255.255.0	RouterM	Fa0/1
	Fa0/1	63.9.2.1		SwitchE	Fa0/1
RouterG Cisco 1841	Fa0/0	63.9.6.2	255.255.255.0	RouterW	Fa0/0
	Fa0/1	63.9.7.1		SwitchG	Fa0/1

终端设备接口连接及IP地址

Device	IP Address	Mask	Gateway
PCN	63.9.0.2	255.255.255.0	63.9.0.1
PCS	63.9.3.2	255.255.255.0	63.9.3.1
PCW	63.9.5.2	255.255.255.0	63.9.5.1
PCE	63.9.2.2	255.255.255.0	63.9.2.1
PCG	63.9.7.2	255.255.255.0	63.9.7.1

配置结果

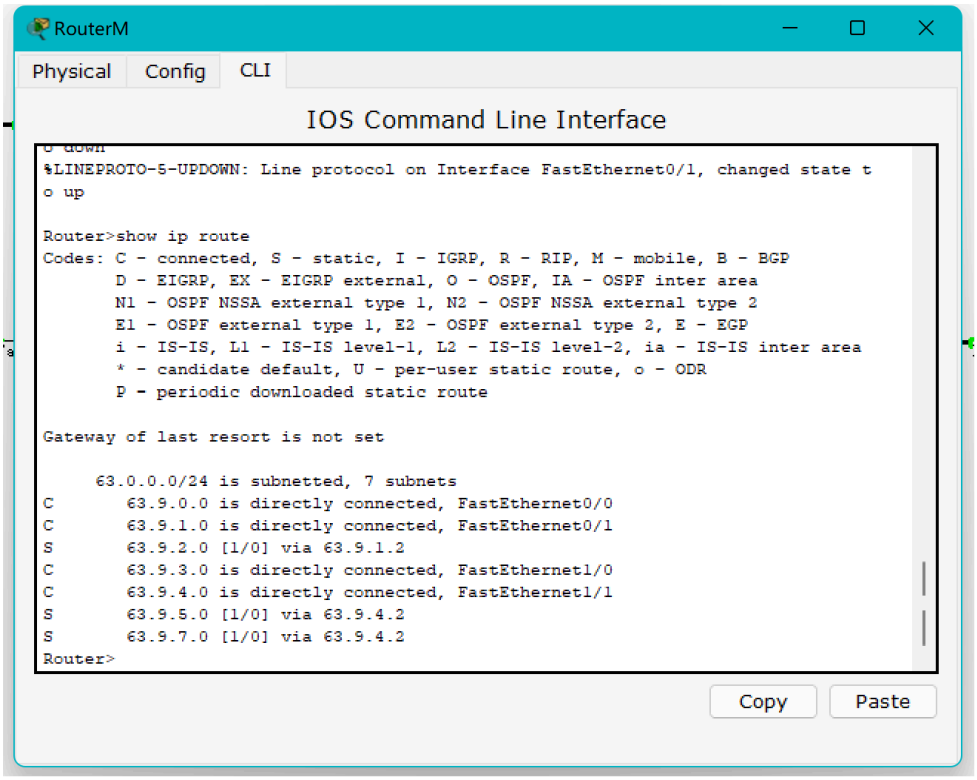


静态路由配置

RouterM，中校区路由

对于目的地东校区、西校区和高新校区，RouterM不能直接到达，故需要配置。

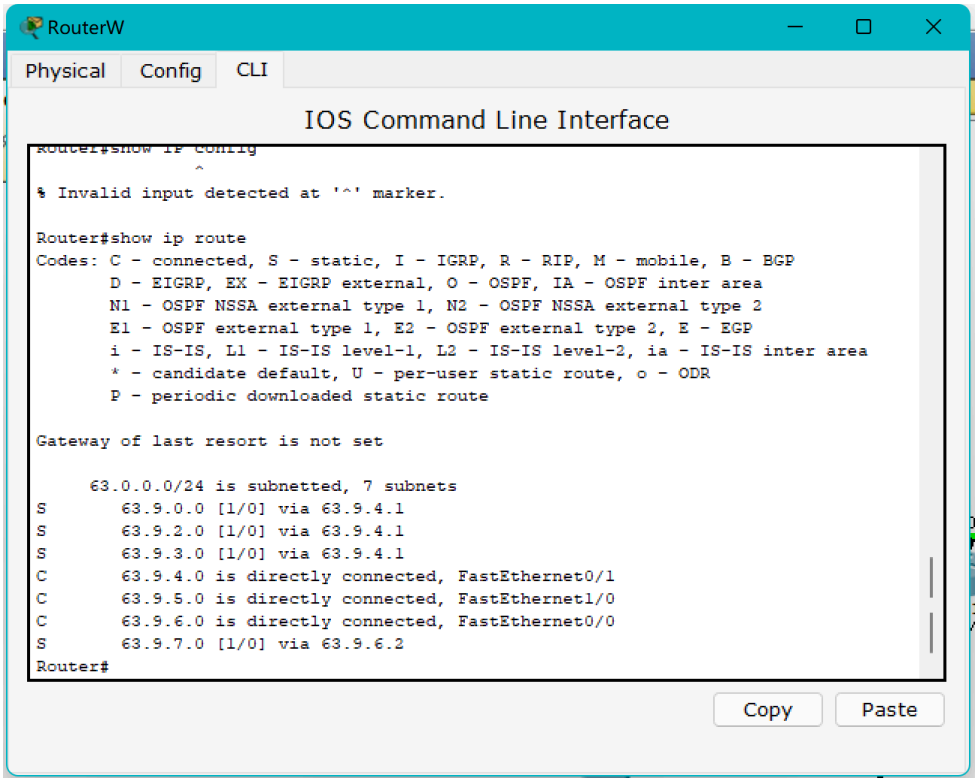
- 目标主机为 PCW 和 PCG ，则下一跳地址为 RouterW Fa0/1 的 IP 地址，即 63.9.4.2 。
- 目标主机为 PCE ，则下一跳地址为 RouterE Fa0/0 的 IP 地址，即 63.9.1.2 。



RouterW，西校区路由

对于目的地东、南、北校区和高新校区，RouterW不能直接到达，故需要配置。

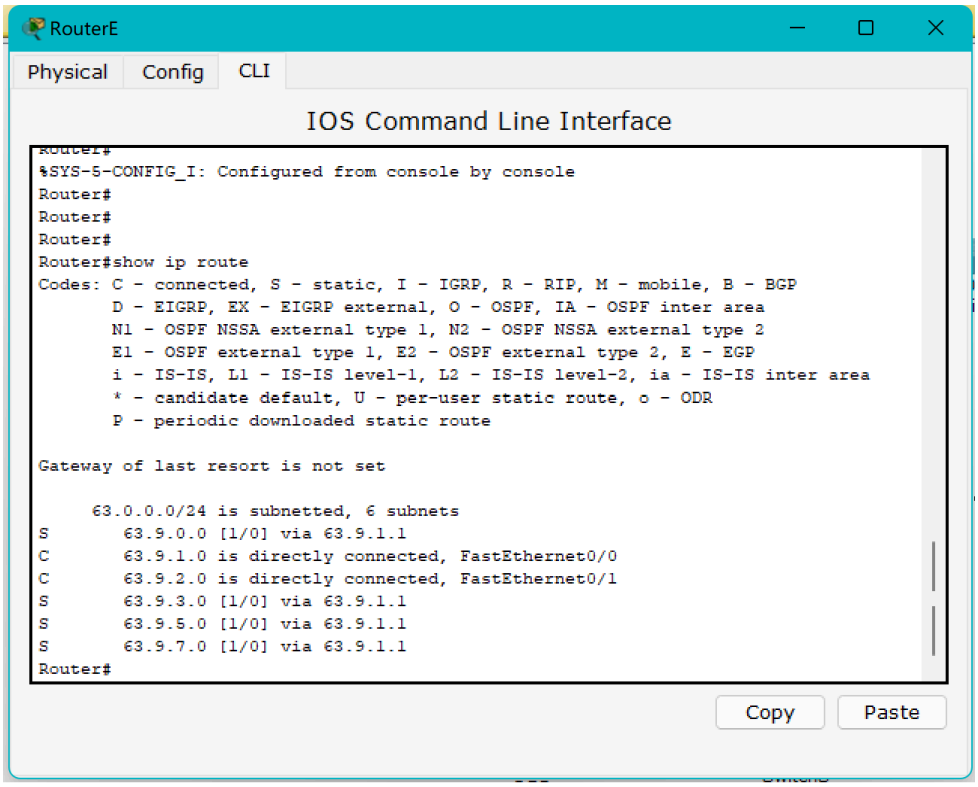
- 目标主机为 PCG ， 则下一跳地址为 RouterG Fa0/1 的 IP 地址，即 63.9.6.2 。
- 目标主机为 PCE，PCN，PCS ,则下一跳地址为 RouterM Fa1/1 的 IP 地址，即 63.9.4.1 。



RouterE，东校区路由

对于目的地西、南、北校区和高新校区，RouterE不能直接到达，故需要配置。

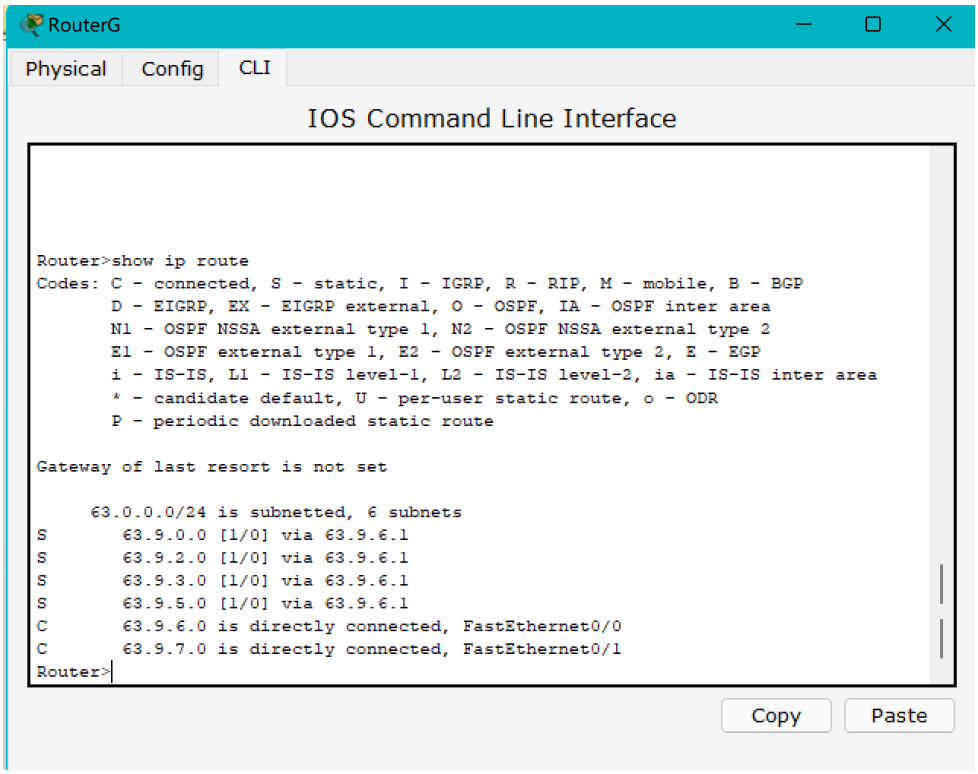
- 目标主机为 PCG，PCN，PCS，PCW ,下一跳地址为 RouterM Fa0/1 的 IP 地址，即 63.9.1.1 。



RouterG

对于目的地西、南、北校区和东校区，RouterG不能直接到达，故需要配置。

- 目标主机为 PCE，PCN，PCS，PCW，下一跳地址为 RouterW Fa0/0 的 IP 地址，即 63.9.6.1 。



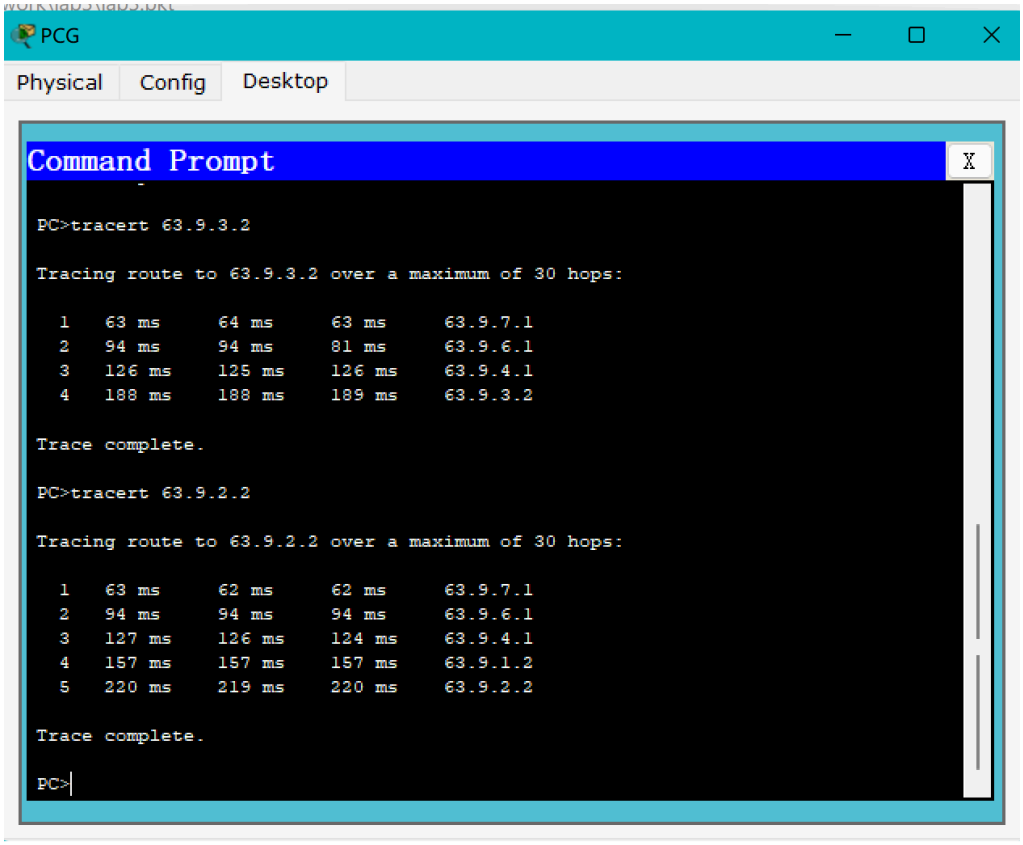
具体配置结果如下

Router	NetWork	Mask	Next Hoop

RouterM	63.9.2.0 E	255.255.255.0	63.9.1.2
	63.9.5.0 W		63.9.4.2
	63.9.7.0 G		63.9.4.2
RouterE	63.9.0.0 N	255.255.255.0	63.9.1.1
	63.9.3.0 S		63.9.1.1
	63.9.5.0 W		63.9.1.1
	63.9.7.0 G		63.9.1.1
RouterG	63.9.0.0 N	255.255.255.0	63.9.6.1
	63.9.2.0 E		63.9.6.1
	63.9.3.0 S		63.9.6.1
	63.9.5.0 W		63.9.6.1
RouterW	63.9.0.0 N	255.255.255.0	63.9.4.1
	63.9.2.0 E		63.9.4.1
	63.9.3.0 S		63.9.4.1
	63.9.7.0 G		63.9.6.2

静态路由高新区连通性测试

通过一下图片可知，当连接 `63.9.3.2` 和 `63.9.2.2` ，即南区主机和东区主机时，均能成功到达。

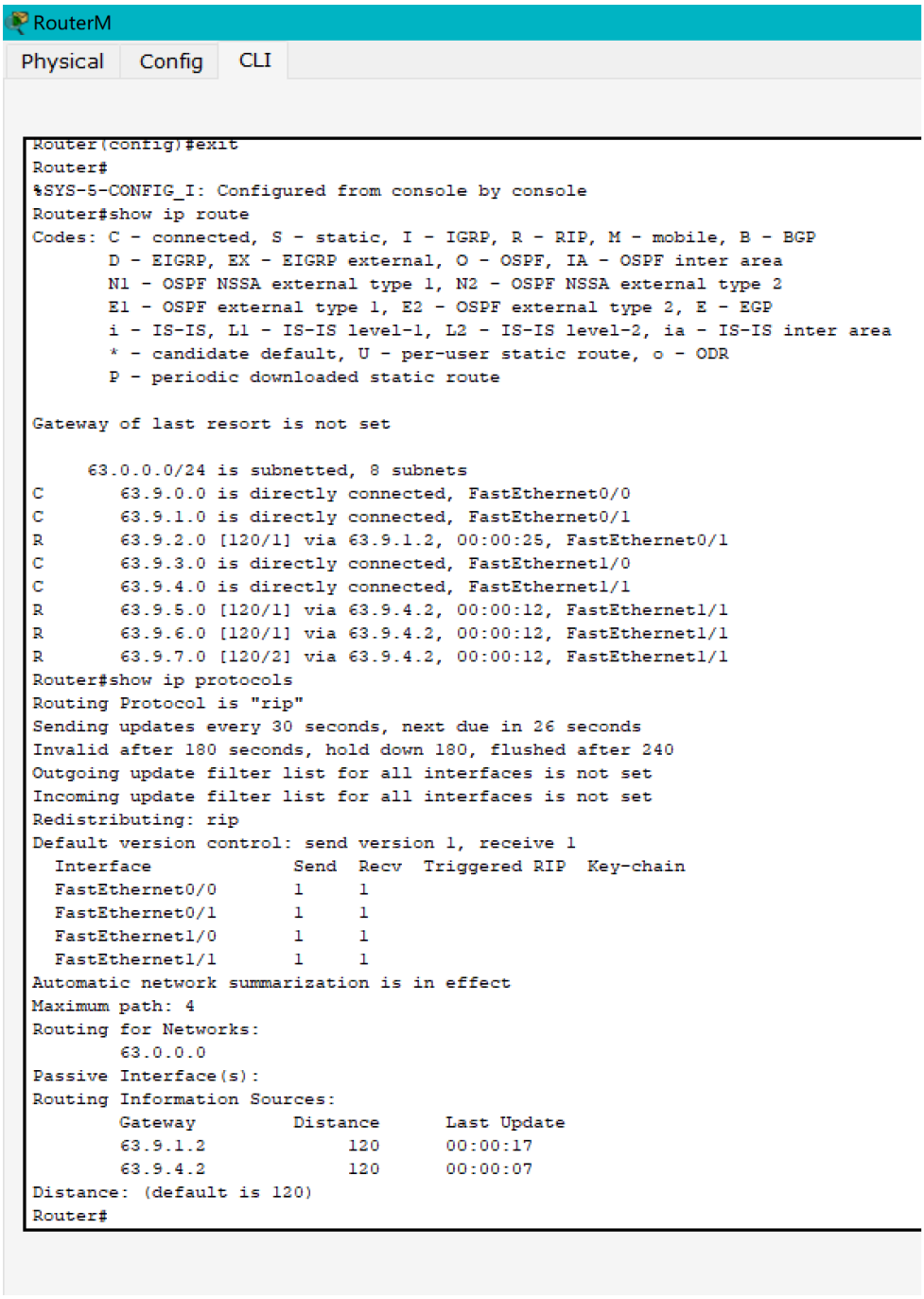


动态配置RIP

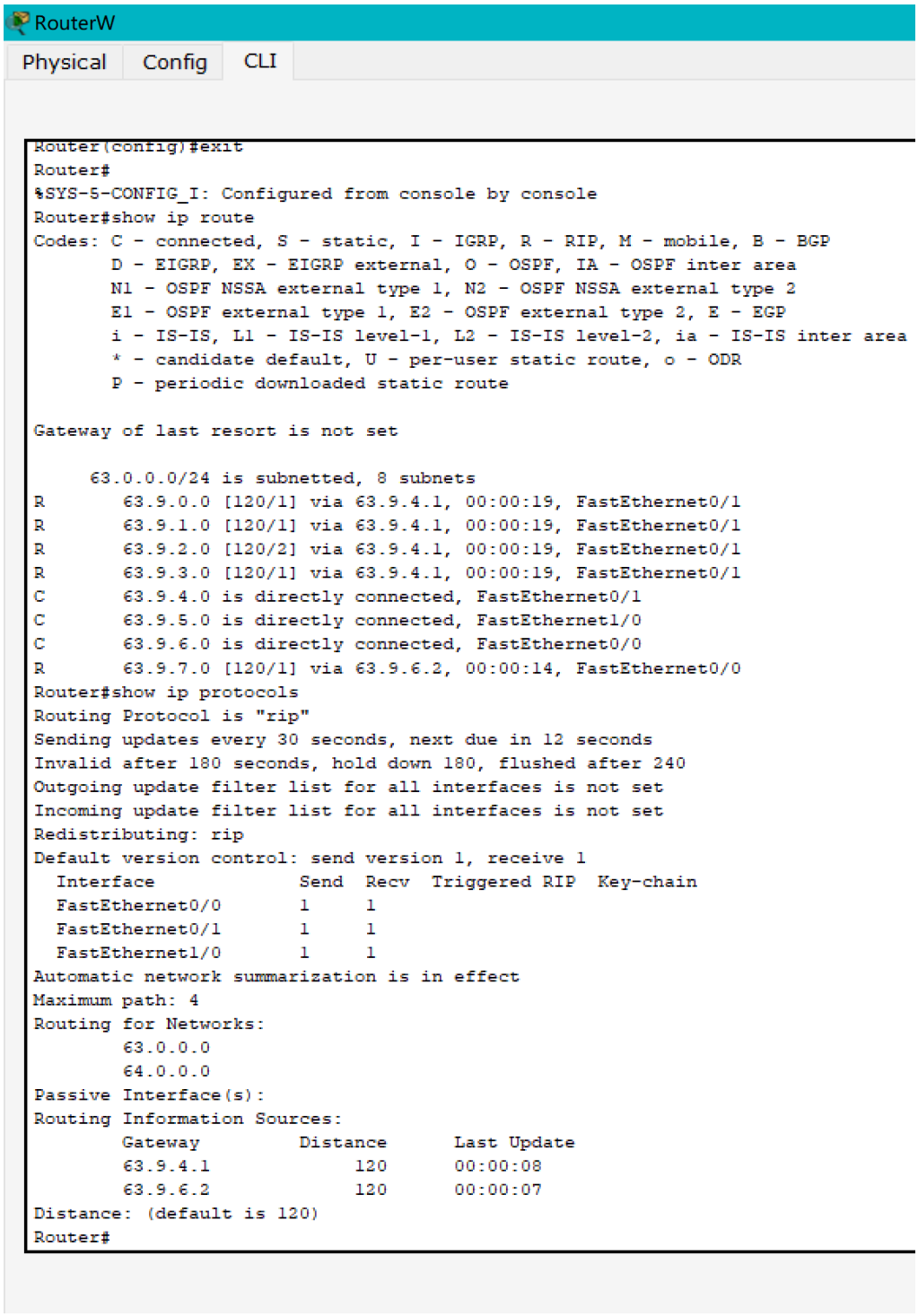
每个图片包含 `show ip route` 和 `show ip protocols` 两条命令

RouterM

- `show ip route` 指令可以看出该路由和所有子网相连，其中表明哪些子网是直接相连，哪些子网通过其他端口和IP地址相连，例如，要到达 `63.9.2.0` 要通过 `63.9.1.2` 。
- `show ip protocols` 指令可以看出动态路由协议为 `RIP` ，包含四个接口，并且正在为 `63.0.0.0` 网络提供接口，从 `63.9.1.2` 和 `63.9.4.2` 两个网关学习到路由。
- 其他路由器信息与此类似。


RouterM
Physical
Config
CLI
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
63.0.0.0/24 is subnetted, 8 subnets
C 63.9.0.0 is directly connected, FastEthernet0/0
C 63.9.1.0 is directly connected, FastEthernet0/1
R 63.9.2.0 [120/1] via 63.9.1.2, 00:00:25, FastEthernet0/1
C 63.9.3.0 is directly connected, FastEthernet1/0
C 63.9.4.0 is directly connected, FastEthernet1/1
R 63.9.5.0 [120/1] via 63.9.4.2, 00:00:12, FastEthernet1/1
R 63.9.6.0 [120/1] via 63.9.4.2, 00:00:12, FastEthernet1/1
R 63.9.7.0 [120/2] via 63.9.4.2, 00:00:12, FastEthernet1/1
Router#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 26 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 1, receive 1
Interface Send Recv Triggered RIP Key-chain
FastEthernet0/0 1 1
FastEthernet0/1 1 1
FastEthernet1/0 1 1
FastEthernet1/1 1 1
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
63.0.0.0
Passive Interface(s):
Routing Information Sources:
Gateway Distance Last Update
63.9.1.2 120 00:00:17
63.9.4.2 120 00:00:07
Distance: (default is 120)
Router#

RouterW


RouterW
Physical
Config
CLI
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
63.0.0.0/24 is subnetted, 8 subnets
R 63.9.0.0 [120/1] via 63.9.4.1, 00:00:19, FastEthernet0/1
R 63.9.1.0 [120/1] via 63.9.4.1, 00:00:19, FastEthernet0/1
R 63.9.2.0 [120/2] via 63.9.4.1, 00:00:19, FastEthernet0/1
R 63.9.3.0 [120/1] via 63.9.4.1, 00:00:19, FastEthernet0/1
C 63.9.4.0 is directly connected, FastEthernet0/1
C 63.9.5.0 is directly connected, FastEthernet1/0
C 63.9.6.0 is directly connected, FastEthernet0/0
R 63.9.7.0 [120/1] via 63.9.6.2, 00:00:14, FastEthernet0/0
Router#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 12 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 1, receive 1
Interface Send Recv Triggered RIP Key-chain
FastEthernet0/0 1 1
FastEthernet0/1 1 1
FastEthernet1/0 1 1
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
63.0.0.0
64.0.0.0
Passive Interface(s):
Routing Information Sources:
Gateway Distance Last Update
63.9.4.1 120 00:00:08
63.9.6.2 120 00:00:07
Distance: (default is 120)
Router#

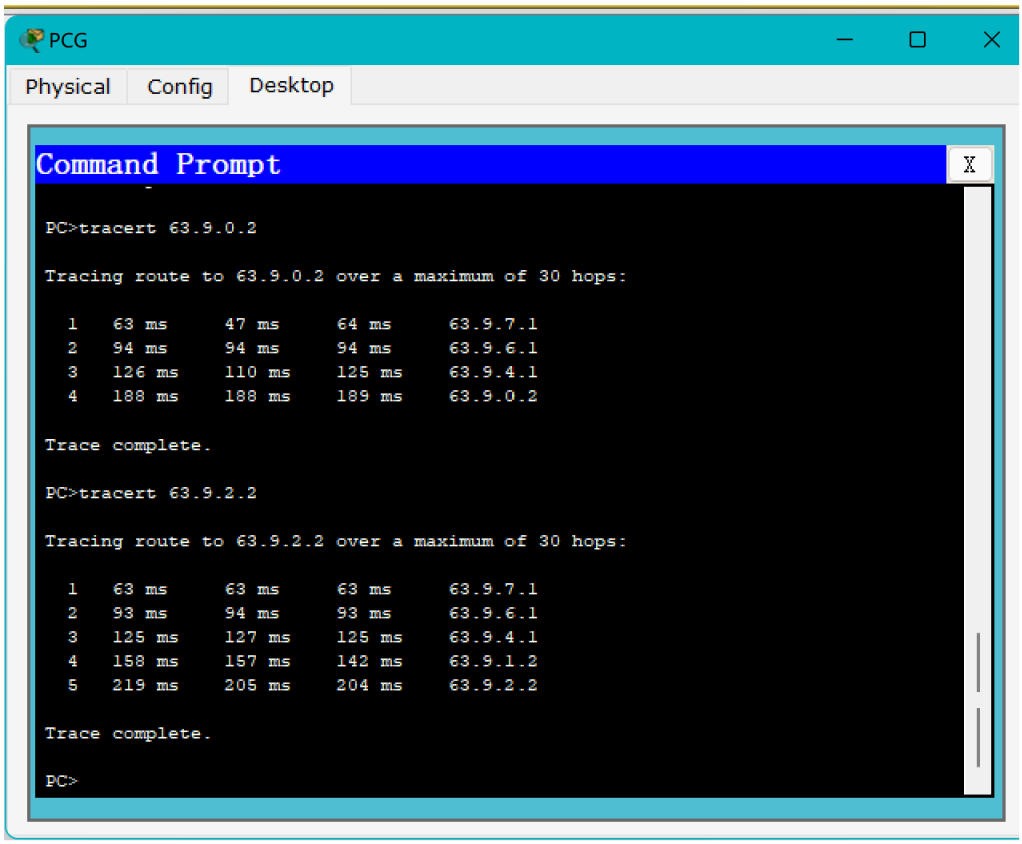
RouterE


RouterE
Physical
Config
CLI
Router>sh
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
63.0.0.0/24 is subnetted, 8 subnets
R 63.9.0.0 [120/1] via 63.9.1.1, 00:00:17, FastEthernet0/0
C 63.9.1.0 is directly connected, FastEthernet0/0
C 63.9.2.0 is directly connected, FastEthernet0/1
R 63.9.3.0 [120/1] via 63.9.1.1, 00:00:17, FastEthernet0/0
R 63.9.4.0 [120/1] via 63.9.1.1, 00:00:17, FastEthernet0/0
R 63.9.5.0 [120/2] via 63.9.1.1, 00:00:17, FastEthernet0/0
R 63.9.6.0 [120/2] via 63.9.1.1, 00:00:17, FastEthernet0/0
R 63.9.7.0 [120/3] via 63.9.1.1, 00:00:17, FastEthernet0/0
Router>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 4 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 1, receive 1
Interface Send Recv Triggered RIP Key-chain
FastEthernet0/0 1 1
FastEthernet0/1 1 1
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
63.0.0.0
Passive Interface(s):
Routing Information Sources:
Gateway Distance Last Update
63.9.1.1 120 00:00:24
Distance: (default is 120)
Router>

RouterG

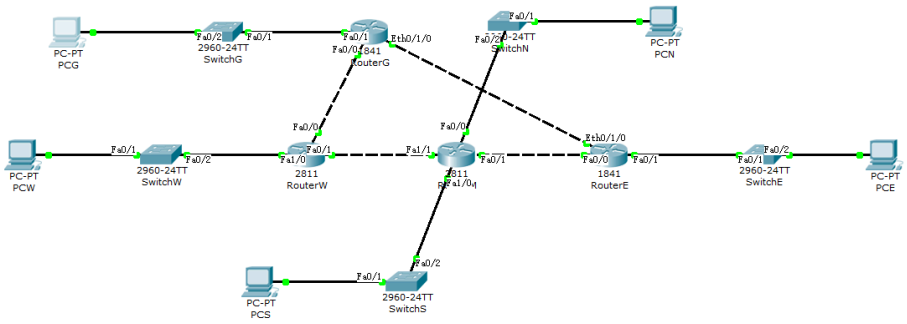

RouterG
Physical
Config
CLI
% Invalid input detected at '^' marker.
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
63.0.0.0/24 is subnetted, 8 subnets
R 63.9.0.0 [120/2] via 63.9.6.1, 00:00:23, FastEthernet0/0
R 63.9.1.0 [120/2] via 63.9.6.1, 00:00:23, FastEthernet0/0
R 63.9.2.0 [120/3] via 63.9.6.1, 00:00:23, FastEthernet0/0
R 63.9.3.0 [120/2] via 63.9.6.1, 00:00:23, FastEthernet0/0
R 63.9.4.0 [120/1] via 63.9.6.1, 00:00:23, FastEthernet0/0
R 63.9.5.0 [120/1] via 63.9.6.1, 00:00:23, FastEthernet0/0
C 63.9.6.0 is directly connected, FastEthernet0/0
C 63.9.7.0 is directly connected, FastEthernet0/1
Router# show
Router#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 17 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 1, receive 1
Interface Send Recv Triggered RIP Key-chain
FastEthernet0/0 1 1
FastEthernet0/1 1 1
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
63.0.0.0
Passive Interface(s):
Routing Information Sources:
Gateway Distance Last Update
63.9.6.1 120 00:00:18
Distance: (default is 120)
Router#

连通性测试

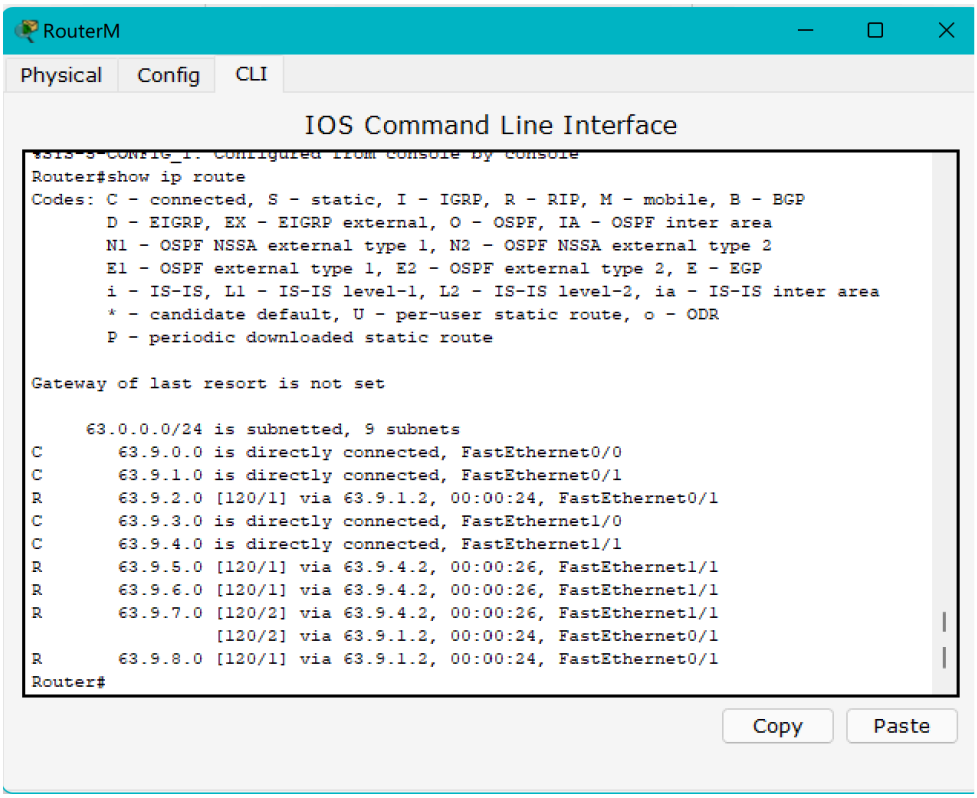


2 选做1-负载均衡

- 建立冗余链路，将高新区路由 RouterG 和东区 RouterE 路由相连。同时为新的端口分配新的 IP 地址，其中 RouterG Eth0/1/0 的 IP 为 63.9.8.1 ，与此相连的 RouterE 的端口 IP 为 63.9.8.2 。



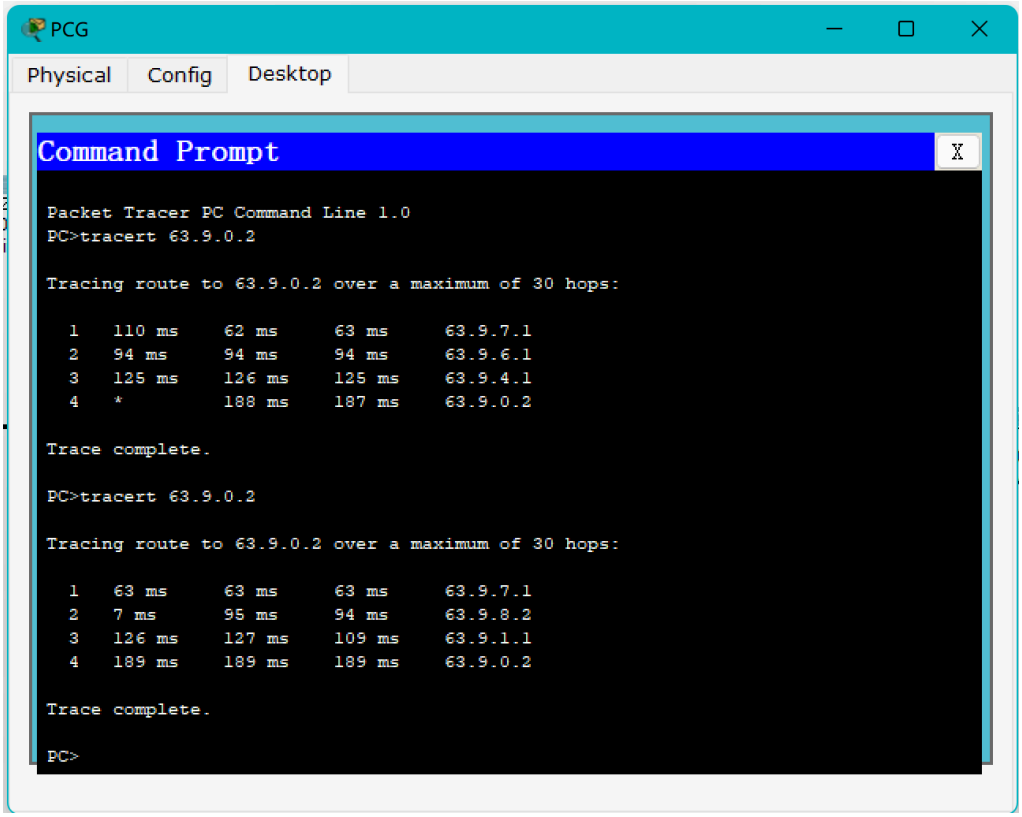
- 可以看出，从高新校区网络到南区网络和北区网络，可以通过 RouterW 和 RouterE 中转，从而实现负载均衡。从下图可看出，从 RouterM 到高新区网络，可以通过 63.9.4.2 和 63.9.1.2 ，从而存在两条路径。



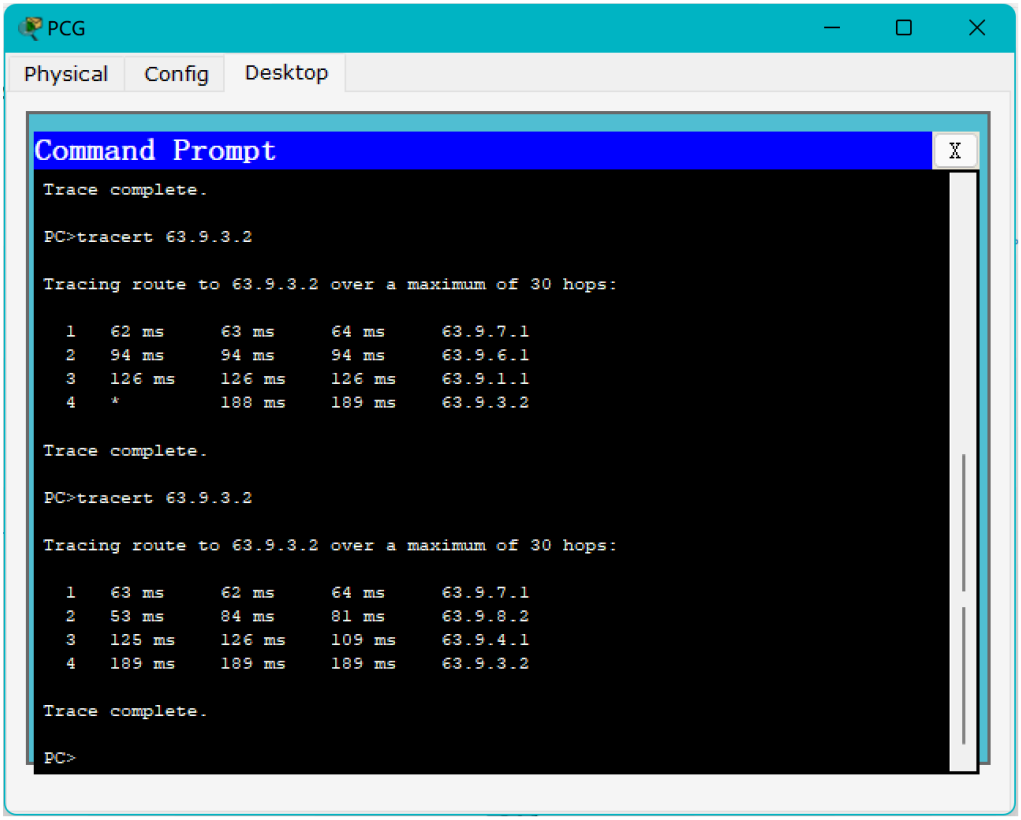
结果

到北校区两条路径

可以看出，从高新区主机 63.9.7.2 到北区主机 63.9.0.2 ， 连续两次 tracert ， 跳转的 IP 地址不同，即存在两条不同的路径。



可以看出，从高新区主机 63.9.7.2 到北区主机 63.9.3.2 ， 连续两次 tracert ， 一次先跳转 63.9.6.1 ，一次先跳转 63.9.8.2 ， 跳转的 IP 地址不同，即存在两条不同的路径。



3 选做2：6in64

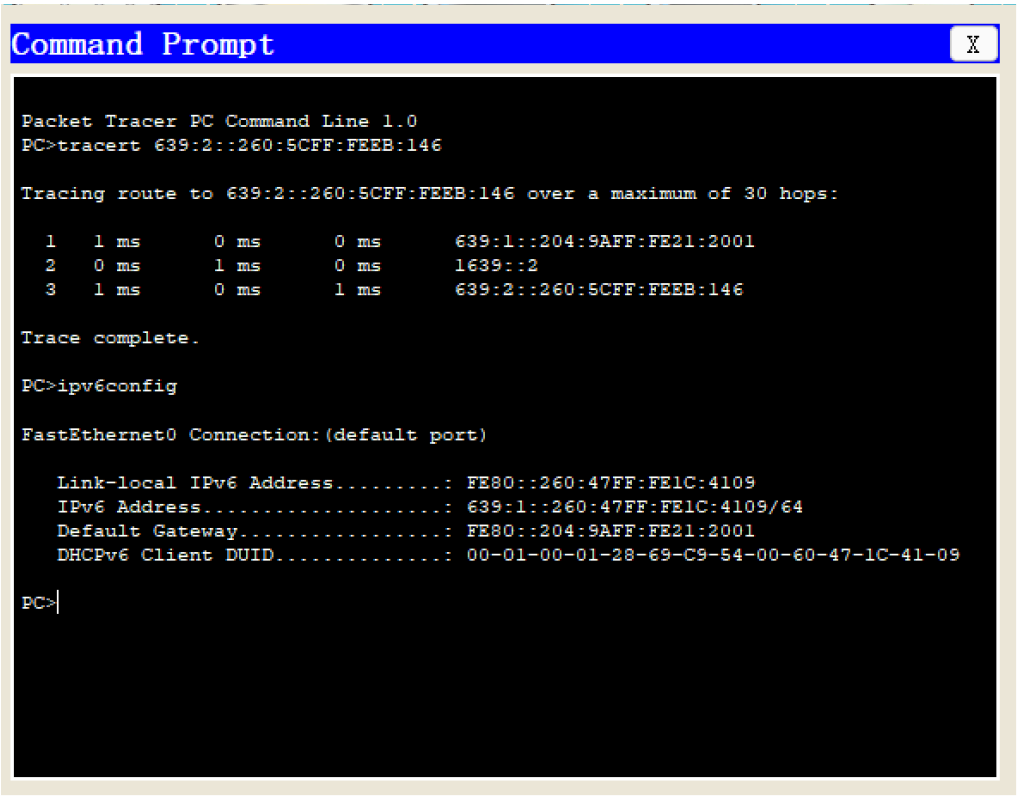
采用**自动分配 ipv6 **的地址

- 为 PCW 的子网分配 ipv6 地址，为 639:1::/64
- 为 PCE 的子网分配 ipv6 地址，为 639:2::/64

连通结果

下图展示了从不同主机连接对方主机的结果及其各自的IP地址

PCW



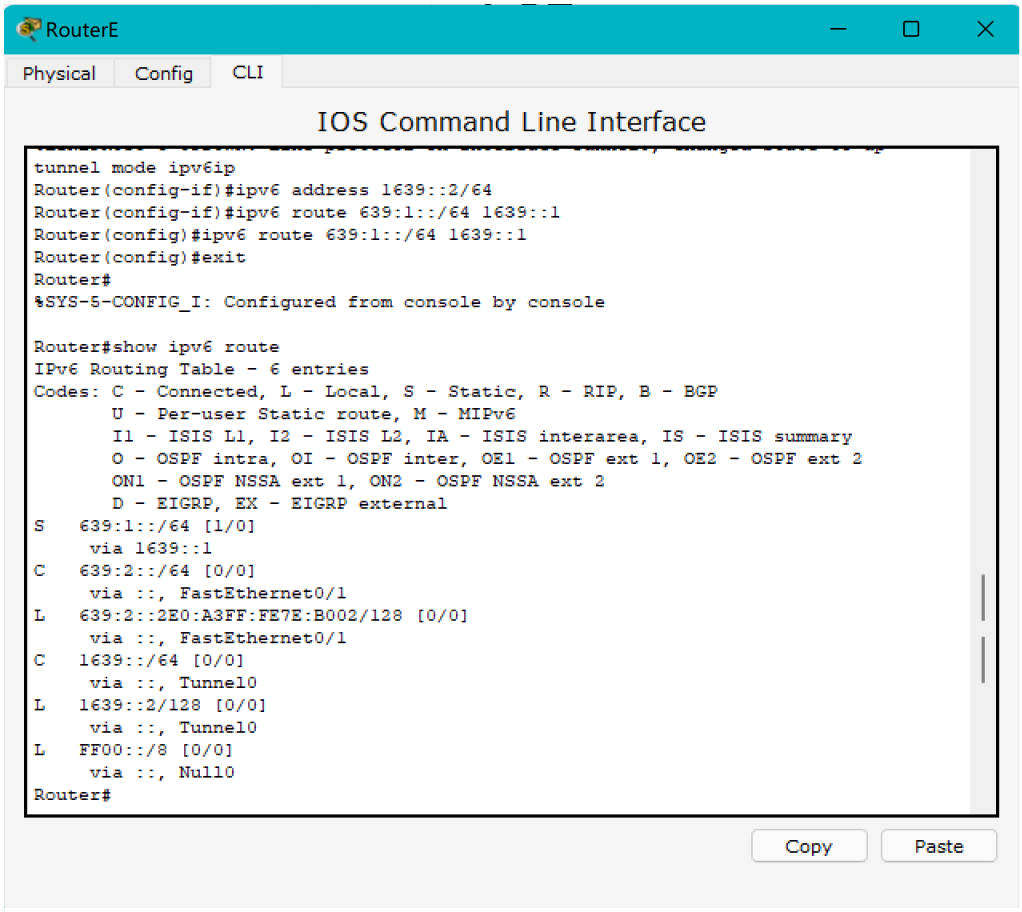
PCE

```
Packet Tracer PC Command Line 1.0
PC>ipv6ip
Invalid Command.

PC>ipv6config

FastEthernet0 Connection:(default port)

   Link-local IPv6 Address.....: FE80::260:5CFF:FEEB:146
   IPv6 Address.....: 639:2::260:5CFF:FEEB:146/64
   Default Gateway.....: FE80::2E0:A3FF:FE7E:B002
   DHCPv6 Client DUID.....: 00-01-00-01-B4-80-8C-24-00-60-5C-EB-01-46

PC>tracert 639:1::260:47FF:FE1C:4109

Tracing route to 639:1::260:47FF:FE1C:4109 over a maximum of 30 hops:

  1    0 ms      0 ms      1 ms      639:2::2E0:A3FF:FE7E:B002
  2    0 ms      0 ms      1 ms      1639::1
  3    0 ms      0 ms      0 ms      639:1::260:47FF:FE1C:4109

Trace complete.

PC>
```

show ipv6 config

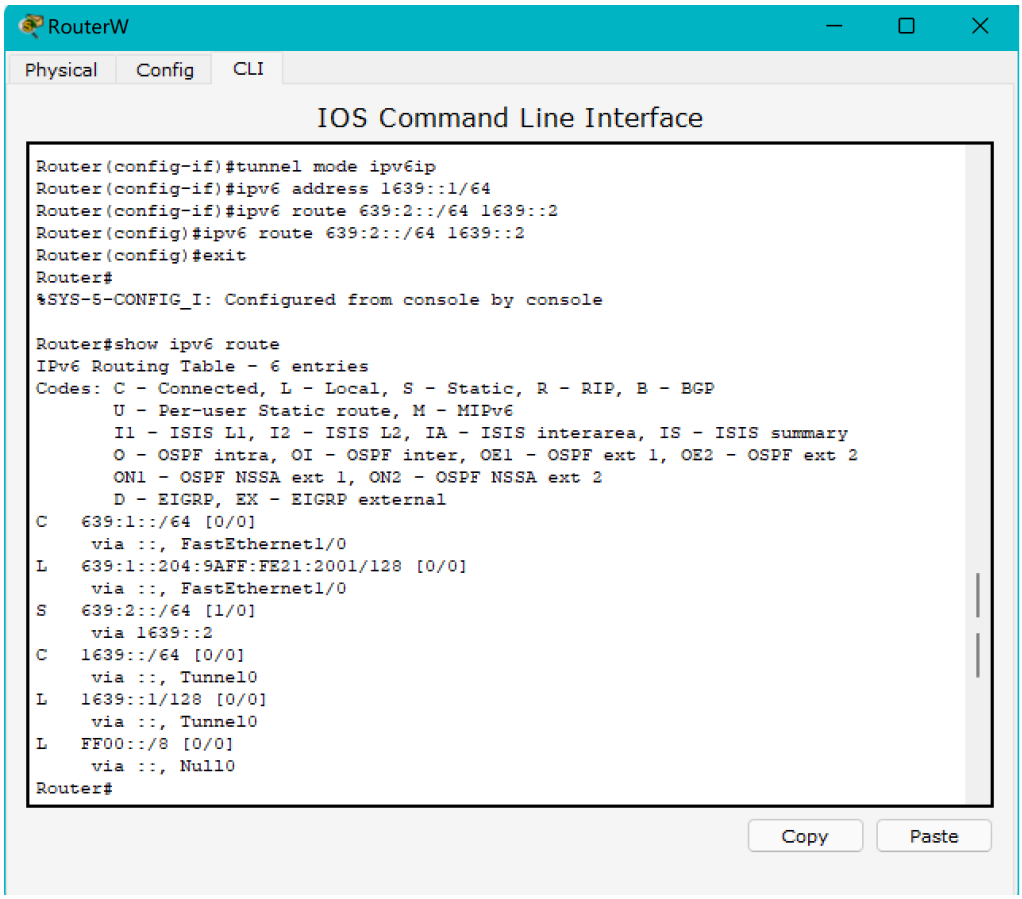
RouterE

可以看出，包含 `Tunnel` 部分的信息为， `C` 连接路由，网络 `1639::/64` 通过 `Tunnel0` 接口连接，目标地址为 `1639::2/128`



RouterW

可以看出，包含 Tunnel 部分的信息为， C 连接路由，网络 1639::/64 通过 Tunnel0 接口连接，目标地址为 1639::1/128 ，表示目标为西校区。



RouterM

RouterM 未配置 ipv6 。

```
Router>show ipv6 route
IPv6 Routing Table - 0 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
Router>
```