

实验八、路由器 RIP-1 配置

一、 实验目的

1. 掌握动态路由的配置方法
2. 理解 RIP 协议的工作过程

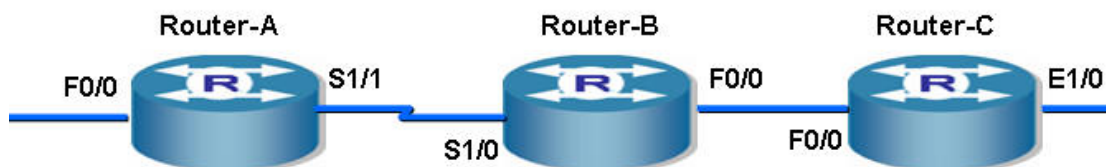
二、 应用环境

1. 在路由器较多的环境里，手工配置静态路由给管理员带来大的工作负担
2. 在不太稳定的网络环境里，手工修改表不现实

三、 实验设备

1. DCR-1751 三台
2. CR-V35FC 一条
3. CR-V35MT 一条

四、 实验拓扑



五、 实验要求

配置表

Router-A		Router-B		Router-C	
S1/1(DCE)	192.168.1.1	S1/0(DTE)	192.168.1.2	F0/0	192.168.2.2
F0/0	192.168.0.1	F0/0	192.168.2.1	E1/0	192.168.3.1

六、 实验步骤

第一步：参照实验三，按照上表配置所有接口的 IP 地址，保证所有接口全部是 up 状态，测试连通性

第二步：查看 ROUTER-A 的路由表

Router-A#show ip route

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected

D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
OE1 - OSPF external type 1, OE2 - OSPF external type 2
DHCP - DHCP type

VRF ID: 0

C 192.168.0.0/24 is directly connected, FastEthernet0/0 ! 直连的路由
C 192.168.1.0/24 is directly connected, Serial1/1 ! 直连的路由

第三步: 查看 ROUTER-B 的路由表

Router-B#show ip route

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected

D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
OE1 - OSPF external type 1, OE2 - OSPF external type 2
DHCP - DHCP type

VRF ID: 0

C 192.168.1.0/24 is directly connected, Serial1/0
C 192.168.2.0/24 is directly connected, FastEthernet0/0

第四步: 查看 ROUTER-C 的路由表

Router-B#show ip route

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected

D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
OE1 - OSPF external type 1, OE2 - OSPF external type 2
DHCP - DHCP type

VRF ID: 0

C 192.168.1.0/24 is directly connected, Serial1/0
C 192.168.2.0/24 is directly connected, FastEthernet0/0

第五步: 在 ROUTER-A 上 PING 路由器 C

Router-A#ping 192.168.2.2

PING 192.168.2.2 (192.168.2.2): 56 data bytes

.....

--- 192.168.2.2 ping statistics ---

5 packets transmitted, 0 packets received, 100% packet loss ! 不通

第六步: 在路由器 A 上配置 RIP 协议并查看路由表

Router-A_config#router rip

! 启动 RIP 协议

```
Router-A_config_rip#network 192.168.0.0          ! 宣告网段
Router-A_config_rip#network 192.168.1.0
Router-A_config_rip#^Z
Router-A#sh ip route
Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected
       D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
       ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
       OE1 - OSPF external type 1, OE2 - OSPF external type 2
       DHCP - DHCP type
```

VRF ID: 0

```
C      192.168.0.0/24      is directly connected, FastEthernet0/0
C      192.168.1.0/24      is directly connected, Serial1/1
```

注意到并没有出现 RIP 学习到的路由。

第七步: 在路由器 B 上配置 RIP 协议并查看路由表

```
Router-B_config#router rip
Router-B_config_rip#network 192.168.1.0
Router-B_config_rip#network 192.168.2.0
Router-B_config_rip#^Z
Router-B#2004-1-1 00:15:58 Configured from console 0 by DEFAULT
Router-B#show ip route
Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected
       D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
       ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
       OE1 - OSPF external type 1, OE2 - OSPF external type 2
       DHCP - DHCP type
```

VRF ID: 0

```
R      192.168.0.0/16      [120,1] via 192.168.1.1(on Serial1/0)  ! 从 A 学习到的路由
C      192.168.1.0/24      is directly connected, Serial1/0
C      192.168.2.0/24      is directly connected, FastEthernet0/0
```

第八步: 在路由器 B 上配置 RIP 协议并查看路由表

```
Router-C_config#router rip
Router-C_config_rip#network 192.168.2.0
Router-C_config_rip#network 192.168.3.0
Router-C_config_rip#^Z
Router-C#show ip route
Codes: C - connected, S - static, R - RIP, B - BGP
       D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
       ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
```

OE1 - OSPF external type 1, OE2 - OSPF external type 2

```
R    192.168.0.0/16    [120,2] via 192.168.2.1(on FastEthernet0/0)
R    192.168.1.0/24    [120,1] via 192.168.2.1(on FastEthernet0/0)
C    192.168.2.0/24    is directly connected, FastEthernet0/0
C    192.168.3.0/24    is directly connected, Ethernet1/0
```

第九步：再次查看 A 和 B 的路由表

Router-B#show ip route

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected

D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area

ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2

OE1 - OSPF external type 1, OE2 - OSPF external type 2

DHCP - DHCP type

VRF ID: 0

```
R    192.168.0.0/16    [120,1] via 192.168.1.1(on Serial1/0)
C    192.168.1.0/24    is directly connected, Serial1/0
C    192.168.2.0/24    is directly connected, FastEthernet0/0
R    192.168.3.0/24    [120,1] via 192.168.2.2(on FastEthernet0/0)
```

Router-A#show ip route

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected

D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area

ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2

OE1 - OSPF external type 1, OE2 - OSPF external type 2

DHCP - DHCP type

VRF ID: 0

```
C    192.168.0.0/24    is directly connected, FastEthernet0/0
C    192.168.1.0/24    is directly connected, Serial1/1
R    192.168.2.0/24    [120,1] via 192.168.1.2(on Serial1/1)
R    192.168.3.0/24    [120,2] via 192.168.1.2(on Serial1/1)
```

！ 注意到所有网段都学习到了路由

第十步：相关的查看命令

Router-A#show ip rip

！ 显示 RIP 状态

RIP protocol: **Enabled**

Global version: default(Decided on the interface version control)

Update: 30, Expire: 180, Holddown: 120

Input-queue: 50

Validate-update-source enable
No neighbor

Router-A#sh ip rip protocol ! 显示协议细节

RIP is Active

Sending updates every 30 seconds, next due in 30 seconds ! 注意定时器的值

Invalid after 180 seconds, holddown 120

update filter list for all interfaces is:

update offset list for all interfaces is:

Redistributing:

Default version control: send version 1, receive version 1 2

Interface	Send	Recv
FastEthernet0/0	1	1 2
Serial1/1	1	1 2

Automatic network summarization is in effect

Routing for Networks:

192.168.1.0/24

192.168.0.0/16

Distance: 120 (default is 120)

! 注意默认的管理距离

Maximum route count: 1024, Route count:6

Router-A#show ip rip database ! 显示 RIP 数据库

192.168.0.0/24 directly connected FastEthernet0/0

192.168.0.0/24 auto-summary

192.168.1.0/24 directly connected Serial1/1

192.168.1.0/24 auto-summary

192.168.2.0/24 [120,1] via 192.168.1.2 (on Serial1/1) 00:00:13 ! 收到 RIP 广播的时间

192.168.3.0/24 [120,2] via 192.168.1.2 (on Serial1/1) 00:00:13

Router-A#sh ip route rip ! 仅显示 RIP 学习到的路由

R 192.168.2.0/24 [120,1] via 192.168.1.2(on Serial1/1)

R 192.168.3.0/24 [120,2] via 192.168.1.2(on Serial1/1)

七、 注意事项和排错

1. 只能宣告直连的网段
2. 宣告时不附加掩码
3. 分配地址时最好是连续的子网，以免 RIP 汇聚出现错误

八、 配置序列

Router-B#show running-config

Building configuration...

Current configuration:

```
!  
!version 1.3.2E  
service timestamps log date  
service timestamps debug date  
no service password-encryption  
!  
hostname Router-B  
!  
!  
!  
!  
!  
!  
!  
interface FastEthernet0/0  
  ip address 192.168.2.1 255.255.255.0  
  no ip directed-broadcast  
!  
interface Serial1/0  
  ip address 192.168.1.2 255.255.255.0  
  no ip directed-broadcast  
!  
interface Async0/0  
  no ip address  
  no ip directed-broadcast  
!  
!  
router rip  
  network 192.168.2.0  
  network 192.168.1.0  
  
!  
!  
!
```

九、 共同思考

1. 为什么 B 没有配置 RIP 协议时，A 没有出现 RIP 路由？
2. 如果不是连续的子网，回出现什么结果？
3. RIP 的广播周期是多少？

十、 课后练习

将地址改为 10.0.0.0/24 这个网段重复以上实验



十一、 相关命令详解

router rip

使用router rip 全局命令来配置RIP路由进程，no router rip 则关闭RIP路由进程。

router rip

no router rip

参数

无

缺省

系统缺省不运行 RIP。

命令模式

全局配置态

使用说明

必须先启动 RIP，才能进入路由配置态，才能配置 RIP 的各种全局性参数，而配置与接口相关的参数则不受是否已经启动 RIP 的限制。

示例

启动 RIP 并进入路由配置态。

