

# RIP协议基础实验

# 关于RIP协议

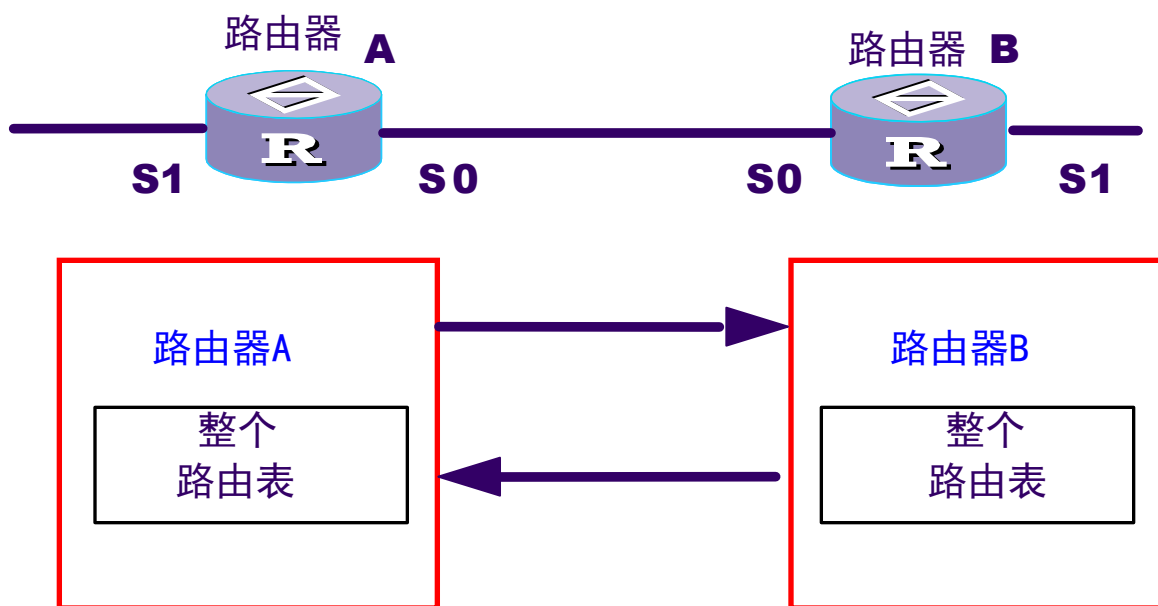
---

- 内部网关协议
- 距离矢量算法
- 交换整个路由表
- 定期更新(30s)路由表
- 最大跳数15

◆ 适用范围：小型网络

# RIP如何交换路由信息？

◆ 定期发送路由表获得距离信息:30S



# RIP启动和运行的过程

## ■ RIP协议启动的Debug信息显示

```
[r 1-rip]
*0.904772 r 1 RM/7/RTDBG:
RIP: send from 192.168.2.2(Ethernet0/0) to 255.255.255.255
  Packet:vers 1, cmd Response, length 24
  dest 192.168.3.0, metric 1, tag 0
*0.904772 r 1 RM/7/RTDBG:
RIP: send from 192.168.3.1(Ethernet0/1) to 255.255.255.255
  Packet:vers 1, cmd Response, length 44
  dest 192.168.1.0, metric 2, tag 0
  dest 192.168.2.0, metric 1, tag 0
*0.934772 r 1 RM/7/RTDBG:
RIP: send from 192.168.2.2(Ethernet0/0) to 255.255.255.255
  Packet:vers 1, cmd Response, length 24
  dest 192.168.3.0, metric 1, tag 0
*0.934773 r 1 RM/7/RTDBG:
RIP: send from 192.168.3.1(Ethernet0/1) to 255.255.255.255
  Packet:vers 1, cmd Response, length 44
  dest 192.168.1.0, metric 2, tag 0
  dest 192.168.2.0, metric 1, tag 0
```

<r1>debugging rip packet

<r1>terminal debugging

# RIP管理的路由数据库

## ■ 显示路由数据库信息

```
[r 1]display rip
RIP is running
public net VPN-Instance
  Checkzero is on      Default cost : 1
  Summary is on       Preference : 100
  Validate-source-address is on
  Traffic-share-across-interface is off
  Period update timer : 30
  Timeout timer : 180
  Garbage-collection timer : 120
  No peer router
  Network :
    192.168.2.0          192.168.3.0
```

# RIP管理的路由数据库

## ■ Display rip router

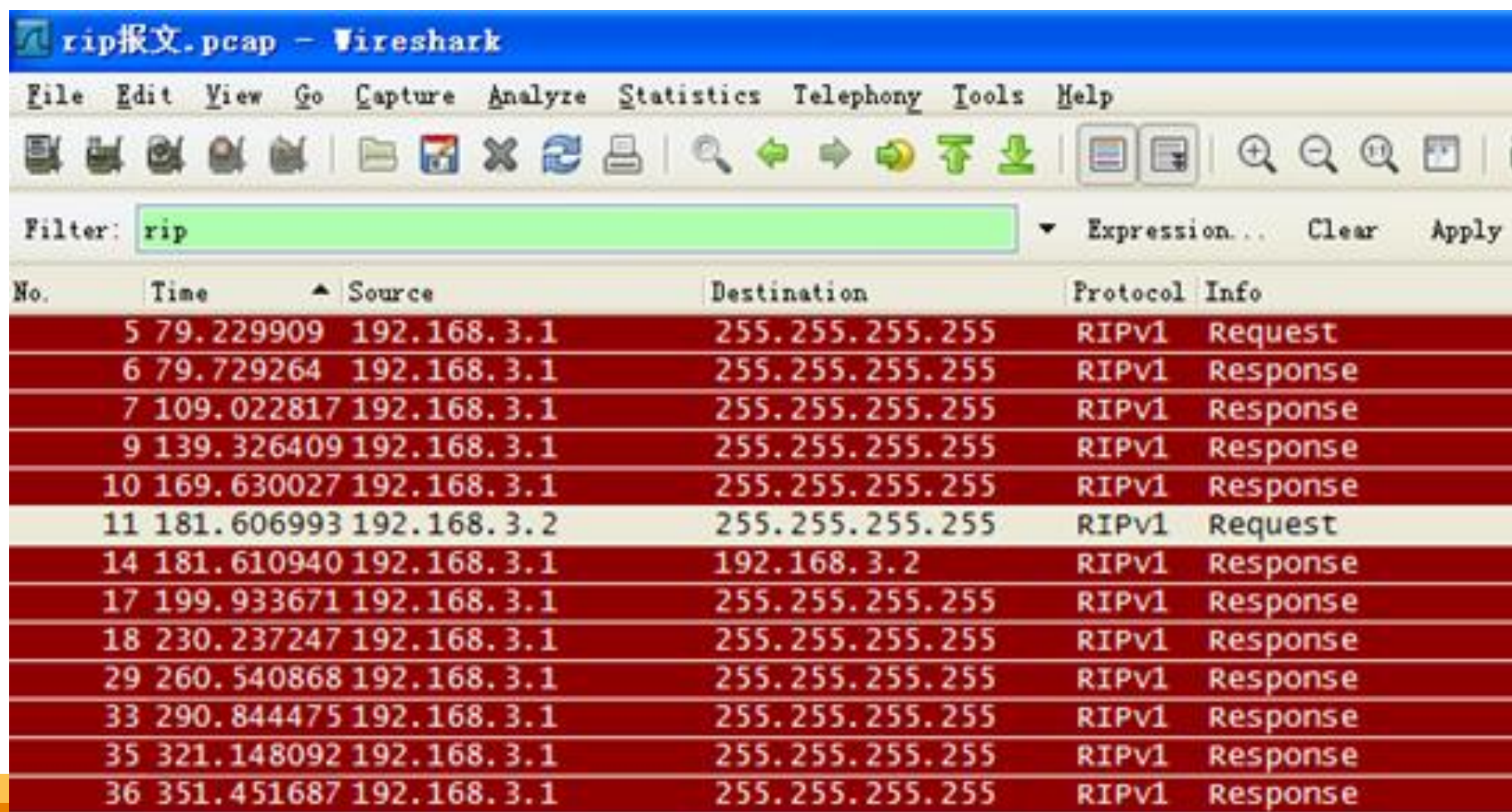
```
[r 1]display rip routing-table
```

RIP routing table: public net

Destination/Mask SourceGateway	Cost	NextHop	Age	
192.168.1.0/24	1	192.168.2.1	21s	192.168.2.1
192.168.5.0/24	1	192.168.3.2	18s	192.168.3.2

# RIP1协议报文

- Request报文
- Response报文



The image shows a Wireshark packet capture window titled "rip报文.pcap - Wireshark". The filter bar shows "rip". The packet list table below displays 14 captured packets, all of which are RIPv1. Packet 11 is highlighted in yellow, indicating it is the selected packet. The table columns are No., Time, Source, Destination, Protocol, and Info.

No.	Time	Source	Destination	Protocol	Info
5	79.229909	192.168.3.1	255.255.255.255	RIPv1	Request
6	79.729264	192.168.3.1	255.255.255.255	RIPv1	Response
7	109.022817	192.168.3.1	255.255.255.255	RIPv1	Response
9	139.326409	192.168.3.1	255.255.255.255	RIPv1	Response
10	169.630027	192.168.3.1	255.255.255.255	RIPv1	Response
11	181.606993	192.168.3.2	255.255.255.255	RIPv1	Request
14	181.610940	192.168.3.1	192.168.3.2	RIPv1	Response
17	199.933671	192.168.3.1	255.255.255.255	RIPv1	Response
18	230.237247	192.168.3.1	255.255.255.255	RIPv1	Response
29	260.540868	192.168.3.1	255.255.255.255	RIPv1	Response
33	290.844475	192.168.3.1	255.255.255.255	RIPv1	Response
35	321.148092	192.168.3.1	255.255.255.255	RIPv1	Response
36	351.451687	192.168.3.1	255.255.255.255	RIPv1	Response

# RIP1报文结构

报  
文  
首  
部

命令（1-5）	版本1	必须为0
网络i的协议族	必须为0	
网络i的IP地址		
必须为0		
必须为0		
到网络i的跳数(metric)		

报  
文  
数  
据  
部  
分

一个RIP报文=一个报文首部+n个数据部分， $n \geq 1$



# 报文分析

- 交换机刚启动RIP时，发送request请求报文；
- 此后，没有request报文，只有response应答报文
- 每隔30s发送一次response报文。
- 以广播方式发送报文

rip报文.pcap - Wireshark

File Edit View Go Capture Analyze Statistics Telephony Tools Help

Filter: rip Expression... Clear Apply

No.	Time	Source	Destination	Protocol	Info
5	79.229909	192.168.3.1	255.255.255.255	RIPv1	Request
6	79.729264	192.168.3.1	255.255.255.255	RIPv1	Response
7	109.022817	192.168.3.1	255.255.255.255	RIPv1	Response
9	139.326409	192.168.3.1	255.255.255.255	RIPv1	Response
10	169.630027	192.168.3.1	255.255.255.255	RIPv1	Response
11	181.606993	192.168.3.2	255.255.255.255	RIPv1	Request
14	181.610940	192.168.3.1	192.168.3.2	RIPv1	Response
17	199.933671	192.168.3.1	255.255.255.255	RIPv1	Response
18	230.237247	192.168.3.1	255.255.255.255	RIPv1	Response
29	260.540868	192.168.3.1	255.255.255.255	RIPv1	Response
33	290.844475	192.168.3.1	255.255.255.255	RIPv1	Response
35	321.148092	192.168.3.1	255.255.255.255	RIPv1	Response
36	351.451687	192.168.3.1	255.255.255.255	RIPv1	Response

Frame 11: 66 bytes on wire (528 bits), 66 bytes captured (528 bits)

Ethernet II, Src: HuaweiTe\_08:38:c0 (00:e0:fc:08:38:c0), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Internet Protocol, Src: 192.168.3.2 (192.168.3.2), Dst: 255.255.255.255 (255.255.255.255)

User Datagram Protocol, Src Port: router (520), Dst Port: router (520)

Routing Information Protocol

Command: Request (1)

Version: RIPv1 (1)

Address not specified, Metric: 16

Address Family: Unspecified (0)

Metric: 16

0000 ff ff ff ff ff ff 00 e0 fc 08 38 c0 08 00 45 c0 .....8...E.

0010 00 34 00 07 00 00 01 11 f5 48 c0 a8 03 02 ff ff .4.....H.....

0020 ff ff 02 08 02 08 00 20 36 e3 01 01 00 00 00 00 .....6.....

0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ..... ..

0040 00 10 .....

File: "G:\mooc-网络实验(本科)\rip... Packets: 37 Displayed: 13 Marked: 0 Load time: 0:00.000

开始 CNA Capturing from R... Tel控制台测试程... mooc-网络实验(本科) rip报文.pcap

# Request报文分析

- 命令字段为1，表示是请求选路信息的报文
- 版本号为1
- 地址簇字段是0
- Metric值是16
- 其余字段为0。

rip报文.pcap - Wireshark

Filter: `rip` Expression... Clear Apply

No.	Time	Source	Destination	Protocol	Info
5	79.229909	192.168.3.1	255.255.255.255	RIPv1	Request
6	79.729264	192.168.3.1	255.255.255.255	RIPv1	Response
7	109.022817	192.168.3.1	255.255.255.255	RIPv1	Response
9	139.326409	192.168.3.1	255.255.255.255	RIPv1	Response
10	169.630027	192.168.3.1	255.255.255.255	RIPv1	Response
11	181.606993	192.168.3.2	255.255.255.255	RIPv1	Request
14	181.610940	192.168.3.1	192.168.3.2	RIPv1	Response
17	199.933671	192.168.3.1	255.255.255.255	RIPv1	Response
18	230.237247	192.168.3.1	255.255.255.255	RIPv1	Response
29	260.540868	192.168.3.1	255.255.255.255	RIPv1	Response
33	290.844475	192.168.3.1	255.255.255.255	RIPv1	Response
35	321.148092	192.168.3.1	255.255.255.255	RIPv1	Response
36	351.451687	192.168.3.1	255.255.255.255	RIPv1	Response

Frame 11: 66 bytes on wire (528 bits), 66 bytes captured (528 bits)

Ethernet II, Src: HuaweiTe\_08:38:c0 (00:e0:fc:08:38:c0), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Internet Protocol, Src: 192.168.3.2 (192.168.3.2), Dst: 255.255.255.255 (255.255.255.255)

User Datagram Protocol, Src Port: router (520), Dst Port: router (520)

Routing Information Protocol

Command: Request (1)

Version: RIPv1 (1)

Address not specified, Metric: 16

Address Family: Unspecified (0)

Metric: 16

```

0000  ff ff ff ff ff ff 00 e0 fc 08 38 c0 08 00 45 c0  .....8...E.
0010  00 34 00 07 00 00 01 11 f5 48 c0 a8 03 02 ff ff  .4.....H....
0020  ff ff 02 08 02 08 00 20 36 e3 01 01 00 00 00 00  .....6.....
0030  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ..
0040  00 10
    
```

File: "G:\mooc-网络实验(本科)\rip..." Packets: 37 Displayed: 13 Marked: 0 Load time: 0:00.000

# Response报文分析

- 命令字段是2
- 版本号是1
- 后面紧跟地址簇字段、
- IP地址字段和Metric字段

rip报文.pcap - Wireshark

Filter: rip

No.	Time	Source	Destination	Protocol	Info
5	79.229909	192.168.3.1	255.255.255.255	RIPv1	Request
6	79.729264	192.168.3.1	255.255.255.255	RIPv1	Response
7	109.022817	192.168.3.1	255.255.255.255	RIPv1	Response
9	139.326409	192.168.3.1	255.255.255.255	RIPv1	Response
10	169.630027	192.168.3.1	255.255.255.255	RIPv1	Response
11	181.606993	192.168.3.2	255.255.255.255	RIPv1	Request
14	181.610940	192.168.3.1	192.168.3.2	RIPv1	Response
17	199.933671	192.168.3.1	255.255.255.255	RIPv1	Response
18	230.237247	192.168.3.1	255.255.255.255	RIPv1	Response
29	260.540868	192.168.3.1	255.255.255.255	RIPv1	Response
33	290.844475	192.168.3.1	255.255.255.255	RIPv1	Response
35	321.148092	192.168.3.1	255.255.255.255	RIPv1	Response
36	351.451687	192.168.3.1	255.255.255.255	RIPv1	Response

Frame 6: 86 bytes on wire (688 bits), 86 bytes captured (688 bits)

Ethernet II, Src: HuaweiTe\_59:7c:95 (00:e0:fc:59:7c:95), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Internet Protocol, Src: 192.168.3.1 (192.168.3.1), Dst: 255.255.255.255 (255.255.255.255)

User Datagram Protocol, Src Port: router (520), Dst Port: router (520)

Routing Information Protocol

Command: Response (2)

Version: RIPv1 (1)

- IP Address: 192.168.1.0, Metric: 2
  - Address Family: IP (2)
  - IP Address: 192.168.1.0 (192.168.1.0)
  - Metric: 2
- IP Address: 192.168.2.0, Metric: 1
  - Address Family: IP (2)
  - IP Address: 192.168.2.0 (192.168.2.0)
  - Metric: 1

0000 ff ff ff ff ff ff 00 e0 fc 59 7c 95 08 00 45 c0 ..... .Y|...E.

0010 00 48 00 35 00 00 01 11 f5 07 c0 a8 03 01 ff ff ..M.5.....

0020 ff ff 02 08 02 08 00 34 b1 73 02 01 00 00 00 02 .....4..S.....

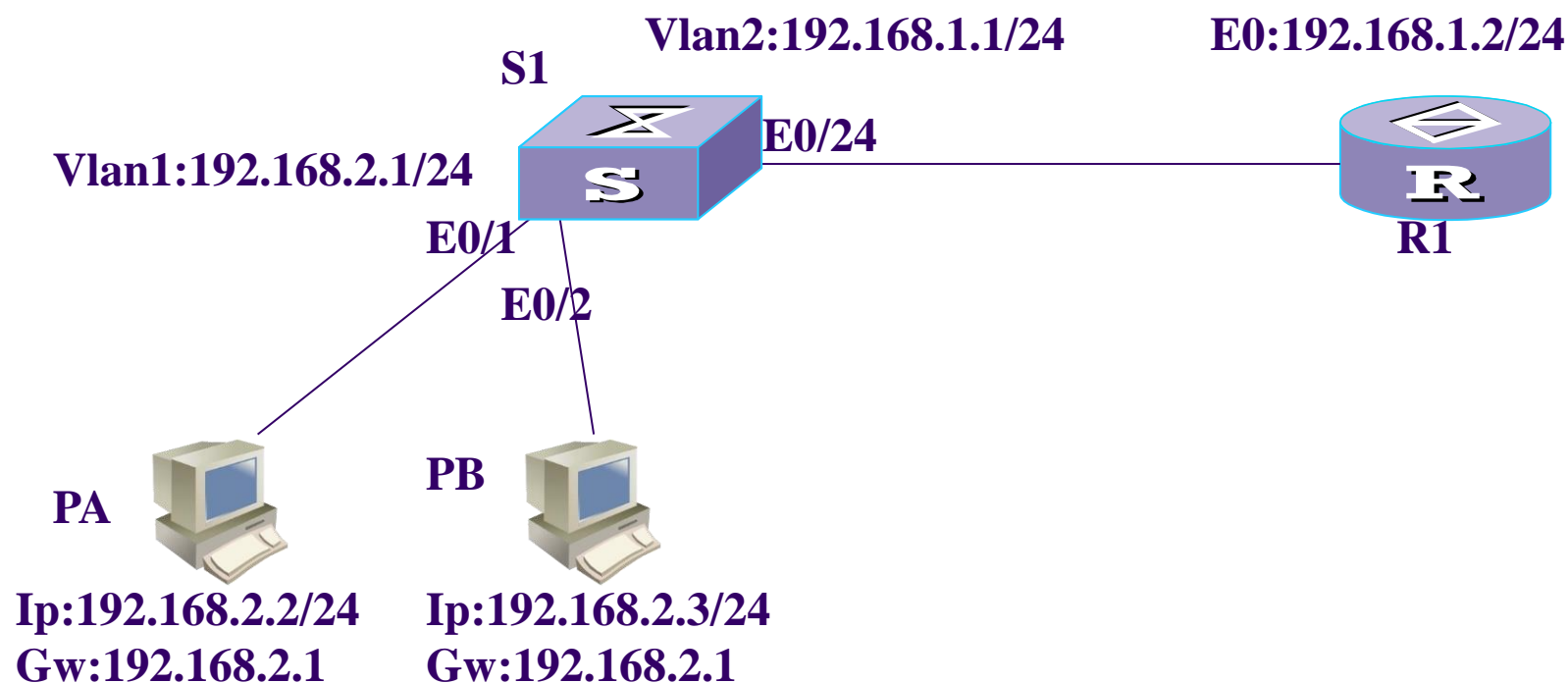
0030 00 00 c0 a8 01 00 00 00 00 00 00 00 00 00 00 ..... ..

0040 00 02 00 02 00 00 c0 a8 02 00 00 00 00 00 00 ..... ..

0050 00 00 00 00 00 00 01 .....

File: "G:\mooc-网络实验(本科)\rip..." Packets: 37 Displayed: 13 Marked: 0 Load time: 0:00.000

# RIP1 协议基础实验组网图



注：vlan1包括端口E0/1到E0/22，vlan2包括端口E0/23到E0/24

# RIP1协议配置关键实验步骤说明

1. 在静态路由配置实验基础上删除配置的缺省路由，对**S1**和**R1** 分别配置**RIP**协议。

```
[R1]rip //启动RIP协议
```

```
[R1-rip]network 192.168.1.0 //指定启动RIP协议的网段地址
```

```
[S1]rip
```

```
[S1-rip]network 192.168.1.0
```

```
[S1-rip]network 192.168.2.0
```

2. 观察**R1**路由表，比较与配置**RIP**协议前的差别。
3. 在**R1**上**ping**各台计算机，测试能否**ping**通。

# RIP1报文结构分析关键实验步骤说明

4. 在**RIP**协议基本配置实验基础上进行，为了观察**RIP**报文的交互过程，先停止**S1**上的**RIP** 协议。

```
[s1] undo rip
```

5. 在各台计算机上运行**Wireshark** ,然后在**S1**上运行**RIP** 协议。
6. 观察**Wireshark**截获的报文，分析**RIP1**报文。
7. 观察报文的交互过程。