

Nguyễn Văn Nhật

B2012122

THỰC HÀNH BUỔI 4

Bài tập 11

Câu 1

Số lượng đường đi trên bảng vạch đường các Router và số đường đi do RIP vạch đường (Metric = 20)

```

root@router1: /
++ ifconfig eth0 100.1.0.13/30 up
++ ifconfig eth1 100.1.0.3/30 up
++ ifconfig eth2 100.1.0.1/30 up
++ ifconfig eth3 100.1.1.1/24 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ripd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log

root@router1: /# route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
100.1.0.0      0.0.0.0         255.255.255.252 U         0      0      0 eth2
100.1.0.4      100.1.0.2       255.255.255.252 UG        20     0      0 eth2
100.1.0.8      0.0.0.0         255.255.255.252 U         0      0      0 eth1
100.1.0.12     0.0.0.0         255.255.255.252 U         0      0      0 eth0
100.1.0.16     100.1.0.14      255.255.255.252 UG        20     0      0 eth0
100.1.1.0      0.0.0.0         255.255.255.0   U         0      0      0 eth3
100.1.2.0      100.1.0.2       255.255.255.0   UG        20     0      0 eth2
100.1.3.0      100.1.0.10      255.255.255.0   UG        20     0      0 eth1
100.1.4.0      100.1.0.14      255.255.255.0   UG        20     0      0 eth0
root@router1: /#

root@router2: /
--- Startup Commands Log
++ ifconfig eth0 100.1.0.2/30 up
++ ifconfig eth1 100.1.0.5/30 up
++ ifconfig eth2 100.1.2.1/24 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ripd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log

root@router2: /# route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
100.1.0.0      0.0.0.0         255.255.255.252 U         0      0      0 eth0
100.1.0.4      0.0.0.0         255.255.255.252 U         0      0      0 eth1
100.1.0.8      100.1.0.1       255.255.255.252 UG        20     0      0 eth0
100.1.0.12     100.1.0.1       255.255.255.252 UG        20     0      0 eth0
100.1.0.16     100.1.0.6       255.255.255.252 UG        20     0      0 eth1
100.1.1.0      100.1.0.1       255.255.255.0   UG        20     0      0 eth0
100.1.2.0      0.0.0.0         255.255.255.0   U         0      0      0 eth2
100.1.3.0      100.1.0.6       255.255.255.0   UG        20     0      0 eth1
100.1.4.0      100.1.0.1       255.255.255.0   UG        20     0      0 eth0
root@router2: /#

root@router3: /
++ ifconfig eth0 100.1.0.6/30 up
++ ifconfig eth1 100.1.0.10/30 up
++ ifconfig eth2 100.1.0.17/30 up
++ ifconfig eth3 100.1.3.1/24 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ripd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log

root@router3: /# route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
100.1.0.0      100.1.0.5       255.255.255.252 UG        20     0      0 eth0
100.1.0.4      0.0.0.0         255.255.255.252 U         0      0      0 eth0
100.1.0.8      0.0.0.0         255.255.255.252 U         0      0      0 eth1
100.1.0.12     100.1.0.9       255.255.255.252 UG        20     0      0 eth1
100.1.0.16     0.0.0.0         255.255.255.252 U         0      0      0 eth2
100.1.1.0      100.1.0.9       255.255.255.0   UG        20     0      0 eth1
100.1.2.0      100.1.0.5       255.255.255.0   UG        20     0      0 eth0
100.1.3.0      0.0.0.0         255.255.255.0   U         0      0      0 eth3
100.1.4.0      100.1.0.18      255.255.255.0   UG        20     0      0 eth2
root@router3: /#

root@router4: /
--- Startup Commands Log
++ ifconfig eth0 100.1.4.1/24 up
++ ifconfig eth1 100.1.0.18/30 up
++ ifconfig eth2 100.1.0.14/30 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ripd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log

root@router4: /# route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
100.1.0.0      100.1.0.13      255.255.255.252 UG        20     0      0 eth2
100.1.0.4      100.1.0.17      255.255.255.252 UG        20     0      0 eth1
100.1.0.8      100.1.0.13      255.255.255.252 UG        20     0      0 eth2
100.1.0.12     0.0.0.0         255.255.255.252 U         0      0      0 eth2
100.1.0.16     0.0.0.0         255.255.255.252 U         0      0      0 eth1
100.1.1.0      100.1.0.13      255.255.255.0   UG        20     0      0 eth2
100.1.2.0      100.1.0.13      255.255.255.0   UG        20     0      0 eth2
100.1.3.0      100.1.0.17      255.255.255.0   UG        20     0      0 eth1
100.1.4.0      0.0.0.0         255.255.255.0   U         0      0      0 eth0
root@router4: /#

```

Câu 2

Router 1 nhận được câu trả lời khi ping tới khác Router còn lại, do Router1 có đường đi đến các Router còn lại thông qua việc vạch đường động, nên khi ping ta sẽ nhận được trả lời của các Router còn lại

Câu 3

```

root@router2: /
--- Startup Commands Log
++ ifconfig eth0 100.1.0.2/30 up
++ ifconfig eth1 100.1.0.5/30 up
++ ifconfig eth2 100.1.2.1/24 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ripd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log

root@router2:/# route
Kernel IP routing table

```

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
100.1.0.0	0.0.0.0	255.255.255.252	U	0	0	0	eth0
100.1.0.4	0.0.0.0	255.255.255.252	U	0	0	0	eth1
100.1.0.8	100.1.0.1	255.255.255.252	UG	20	0	0	eth0
100.1.0.12	100.1.0.1	255.255.255.252	UG	20	0	0	eth0
100.1.0.16	100.1.0.6	255.255.255.252	UG	20	0	0	eth1
100.1.1.0	100.1.0.1	255.255.255.0	UG	20	0	0	eth0
100.1.2.0	0.0.0.0	255.255.255.0	U	0	0	0	eth2
100.1.3.0	100.1.0.6	255.255.255.0	UG	20	0	0	eth1
100.1.4.0	100.1.0.1	255.255.255.0	UG	20	0	0	eth0

```

root@router2:/#

```

```

root@router2: /
Hello, this is Quagga (version 1.2.4).
Copyright 1996-2005 Kunihiro Ishiguro, et al.

User Access Verification

Password:
ripd> show ip rip
Codes: R - RIP, C - connected, S - Static, O - OSPF, B - BGP
Sub-codes:
      (n) - normal, (s) - static, (d) - default, (r) - redistribute,
      (i) - interface

```

	Network	Next Hop	Metric	From	Tag	Time
C(i)	100.1.0.0/30	0.0.0.0	1	self	0	
C(i)	100.1.0.4/30	0.0.0.0	1	self	0	
R(n)	100.1.0.8/30	100.1.0.1	2	100.1.0.1	0	02:57
R(n)	100.1.0.12/30	100.1.0.1	2	100.1.0.1	0	02:57
R(n)	100.1.0.16/30	100.1.0.6	2	100.1.0.6	0	02:50
R(n)	100.1.1.0/24	100.1.0.1	2	100.1.0.1	0	02:57
C(i)	100.1.2.0/24	0.0.0.0	1	self	0	
R(n)	100.1.3.0/24	100.1.0.6	2	100.1.0.6	0	02:50
R(n)	100.1.4.0/24	100.1.0.1	3	100.1.0.1	0	02:57

```

ripd>

```

Codes: Mã loại giao thức vạch đường

Next Hop: Hop tiếp theo mà gói tin sẽ đi qua mạng đó (Cổng)

Metric: Chi phí, 1: Kết nối trực tiếp

From: Các địa chỉ IP Next Hop mạng

Câu 4

- Địa chỉ IP nhận dữ liệu của khung này

The image shows a Wireshark packet capture window titled "BaiTap11_Router1.pcap". The packet list pane displays 22 packets. Packets 11-15 are ICMPv6 Router Solicitations from various source addresses to ff02::2. Packets 16-22 are RIPv2 Responses from 100.1.0.10 to 224.0.0.9. The packet details pane for packet 16 shows the structure: Linux cooked capture v1, Internet Protocol Version 4 (Src: 100.1.0.10, Dst: 224.0.0.9), User Datagram Protocol (Src Port: 520, Dst Port: 520), and Routing Information Protocol. The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
11	14.336163	fe80::a832:ddff:fe5...	ff02::2	ICMPv6	72	Router Solicitation
12	14.336164	fe80::8063:7bff:fe8...	ff02::2	ICMPv6	72	Router Solicitation
13	16.384194	fe80::9ca1:b1ff:fe4...	ff02::2	ICMPv6	72	Router Solicitation
14	18.432165	fe80::dce1:baff:fe0...	ff02::2	ICMPv6	72	Router Solicitation
15	18.432194	fe80::fc55:deff:fe9...	ff02::2	ICMPv6	72	Router Solicitation
16	21.334228	100.1.0.10	224.0.0.9	RIPv2	168	Response
17	25.316231	100.1.0.13	224.0.0.9	RIPv2	168	Response
18	25.316399	100.1.0.9	224.0.0.9	RIPv2	188	Response
19	25.316526	100.1.0.1	224.0.0.9	RIPv2	168	Response
20	25.316649	100.1.1.1	224.0.0.9	RIPv2	208	Response
21	25.751509	100.1.0.2	224.0.0.9	RIPv2	128	Response
22	32.944631	100.1.0.14	224.0.0.9	RIPv2	128	Response

Frame 16: 168 bytes on wire (1344 bits), 168 bytes captured (1344 bits)
 Linux cooked capture v1
 Internet Protocol Version 4, Src: 100.1.0.10, Dst: 224.0.0.9
 User Datagram Protocol, Src Port: 520, Dst Port: 520
 Routing Information Protocol

Offset	Hex	ASCII
0000	00 02 00 01 00 06 8e 68 63 4a 65 4a 00 00 08 00h cJeJ....
0010	45 c0 00 98 65 dc 40 00 01 11 ce a4 64 01 00 0a	E...e-@...d...
0020	e0 00 00 09 02 08 02 08 00 84 44 aa 02 02 00 00D.....
0030	00 02 00 00 64 01 00 00 ff ff ff fc 00 00 00 00d.....
0040	00 00 00 02 00 02 00 00 64 01 00 04 ff ff ff fcd.....

BaiTap11_Router1.pcap Packets: 22 · Displayed: 22 (100.0%) Profile: Default

Đây là địa chỉ IP BroadCast

Giao thức sử dụng ở tầng vận chuyển

BaiTap11_Router1.pcap

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
11	14.336163	fe80::a832:ddff:fe5...	ff02::2	ICMPv6	72	Router Solicitation
12	14.336164	fe80::8063:7bff:fe8...	ff02::2	ICMPv6	72	Router Solicitation
13	16.384194	fe80::9ca1:b1ff:fe4...	ff02::2	ICMPv6	72	Router Solicitation
14	18.432165	fe80::dce1:baff:fe0...	ff02::2	ICMPv6	72	Router Solicitation
15	18.432194	fe80::fc55:deff:fe9...	ff02::2	ICMPv6	72	Router Solicitation
16	21.334228	100.1.0.10	224.0.0.9	RIPv2	168	Response
17	25.316231	100.1.0.13	224.0.0.9	RIPv2	168	Response
18	25.316399	100.1.0.9	224.0.0.9	RIPv2	188	Response
19	25.316526	100.1.0.1	224.0.0.9	RIPv2	168	Response
20	25.316649	100.1.1.1	224.0.0.9	RIPv2	208	Response
21	25.751509	100.1.0.2	224.0.0.9	RIPv2	128	Response
22	32.944631	100.1.0.14	224.0.0.9	RIPv2	128	Response

Frame 16: 168 bytes on wire (1344 bits), 168 bytes captured (1344 bits)

Linux cooked capture v1

Internet Protocol Version 4, Src: 100.1.0.10, Dst: 224.0.0.9

User Datagram Protocol, Src Port: 520, Dst Port: 520

Source Port: 520
Destination Port: 520
Length: 132
Checksum: 0x44aa [unverified]
[Checksum Status: Unverified]
[Stream index: 8]
[Timestamps]
UDP payload (124 bytes)

Routing Information Protocol

```

0010 45 c0 00 98 65 dc 40 00 01 11 ce a4 64 01 00 0a E...e.@. ...d...
0020 e0 00 00 09 02 08 02 08 00 84 44 aa 02 02 00 00 .....D.....
0030 00 02 00 00 64 01 00 00 ff ff ff fc 00 00 00 00 .....d.....
0040 00 00 00 02 00 02 00 00 64 01 00 04 ff ff ff fc .....d.....
0050 00 00 00 00 00 00 00 01 00 02 00 00 64 01 00 10 .....d...

```

Internet Protocol Version 4 (ip), 20 bytes Packets: 22 · Displayed: 22 (100.0%) Profile: Default

Port :520

- Ngoài gói Tin RIPv2 đến từ địa chỉ của Router3 thì Router1 còn nhận được dữ liệu từ Router 2 và Router4
- Router1 có gửi đi các gói tin RIPv2 như:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	100.1.0.13	224.0.0.9	RIPv2	188	Response
2	0.000142	100.1.0.9	224.0.0.9	RIPv2	168	Response
3	0.000218	100.1.0.1	224.0.0.9	RIPv2	168	Response
4	0.000289	100.1.1.1	224.0.0.9	RIPv2	208	Response
5	2.883587	100.1.0.14	224.0.0.9	RIPv2	148	Response

Câu 5

Khi tắt đi giao diện eth1 trên Router 1 thì ping đến Router3 không thành công do không có đường đi từ Router1 đến Router3

```

root@router1: /
^C14 packets captured
14 packets received by filter
0 packets dropped by kernel
root@router1:/#
root@router1:/# ifconfig eth1 down
root@router1:/# ping 100.1.0.10
PING 100.1.0.10 (100.1.0.10) 56(84) bytes of data.
^C
--- 100.1.0.10 ping statistics ---
11 packets transmitted, 0 received, 100% packet loss, time 10233ms

root@router1:/# route
Kernel IP routing table

```

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
100.1.0.0	0.0.0.0	255.255.255.252	U	0	0	0	eth2
100.1.0.4	100.1.0.2	255.255.255.252	UG	20	0	0	eth2
100.1.0.8	100.1.0.14	255.255.255.252	UG	20	0	0	eth0
100.1.0.12	0.0.0.0	255.255.255.252	U	0	0	0	eth0
100.1.0.16	100.1.0.14	255.255.255.252	UG	20	0	0	eth0
100.1.1.0	0.0.0.0	255.255.255.0	U	0	0	0	eth3
100.1.2.0	100.1.0.2	255.255.255.0	UG	20	0	0	eth2
100.1.3.0	100.1.0.14	255.255.255.0	UG	20	0	0	eth0
100.1.4.0	100.1.0.14	255.255.255.0	UG	20	0	0	eth0

```

root@router1:/#

```

Từ bảng vạch đường mới ta thấy Router1 không còn đường đi qua eth1 nữa, do đó không còn đường đi trực tiếp đến Router3 nên khi ping đến Router3 thì Router3 sẽ không trả lời lại

Câu 6

Khi đợi khoảng 1 phút, ping từ Router1 đến Router3 thì Router3 sẽ trả lời lại, do lúc này bảng vạch đường đã cập nhật lại đường đi đến Router3 thông qua các giao diện eth còn lại của Router1

```

root@router1: /
64 bytes from 100.1.0.10: icmp_seq=5 ttl=63 time=0.109 ms
64 bytes from 100.1.0.10: icmp_seq=6 ttl=63 time=0.111 ms
64 bytes from 100.1.0.10: icmp_seq=7 ttl=63 time=0.104 ms
64 bytes from 100.1.0.10: icmp_seq=8 ttl=63 time=0.097 ms
64 bytes from 100.1.0.10: icmp_seq=9 ttl=63 time=0.105 ms
64 bytes from 100.1.0.10: icmp_seq=10 ttl=63 time=0.111 ms
^C
--- 100.1.0.10 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9221ms
rtt min/avg/max/mdev = 0.097/0.107/0.113/0.006 ms
root@router1:/#
root@router1:/# route
Kernel IP routing table

```

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
100.1.0.0	0.0.0.0	255.255.255.252	U	0	0	0	eth2
100.1.0.4	100.1.0.2	255.255.255.252	UG	20	0	0	eth2
100.1.0.8	100.1.0.14	255.255.255.252	UG	20	0	0	eth0
100.1.0.12	0.0.0.0	255.255.255.252	U	0	0	0	eth0
100.1.0.16	100.1.0.14	255.255.255.252	UG	20	0	0	eth0
100.1.1.0	0.0.0.0	255.255.255.0	U	0	0	0	eth3
100.1.2.0	100.1.0.2	255.255.255.0	UG	20	0	0	eth2
100.1.3.0	100.1.0.14	255.255.255.0	UG	20	0	0	eth0
100.1.4.0	100.1.0.14	255.255.255.0	UG	20	0	0	eth0

```

root@router1:/#

```

Lúc này trong bảng vạch đường có đường đi đến các Router2, Router4 nên gói tin muốn chuyển đến Router3 phải qua các con đường gián tiếp này

Khi gửi gói tin đến Router3 thì gói tin sẽ qua các mạng trung gian có kết nối với Router3 thông qua các giao diện eth0 và eth2 thay thế cho eth1 đã bị tắt trên Router1

Câu 7

Kết luận:

- Khi hình trạng mạng có sự thay đổi, bảng vạch đường gói tin RIPv2 sẽ cần khoảng 30s-1p để cập nhật lại đường đi qua các mạng

Bài tập 12

Câu 8

Số lượng đường đi trên bảng chỉ đường của các Router và số đường đi do OSPF vạch đường và cập nhật vào bảng chỉ đường của các Router (Metric = 20)

```

root@router1:/ #
++ ifconfig eth0 100.1.0.13/30 up
++ ifconfig eth1 100.1.0.9/30 up
++ ifconfig eth2 100.1.0.1/30 up
++ ifconfig eth3 100.1.1.1/24 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.

--- End Startup Commands Log

root@router1:/# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
100.1.0.0 0.0.0.0 255.255.255.252 U 0 0 0 eth2
100.1.0.4 100.1.0.2 255.255.255.252 UG 20 0 0 eth2
100.1.0.8 0.0.0.0 255.255.255.252 U 0 0 0 eth1
100.1.0.12 0.0.0.0 255.255.255.252 U 0 0 0 eth0
100.1.0.16 100.1.0.2 255.255.255.252 UG 20 0 0 eth2
100.1.1.0 0.0.0.0 255.255.255.0 U 0 0 0 eth3
100.1.2.0 100.1.0.2 255.255.255.0 UG 20 0 0 eth2
100.1.3.0 100.1.0.2 255.255.255.0 UG 20 0 0 eth2
100.1.4.0 100.1.0.14 255.255.255.0 UG 20 0 0 eth0

root@router2:/#
--- Startup Commands Log
++ ifconfig eth0 100.1.0.2/30 up
++ ifconfig eth1 100.1.0.5/30 up
++ ifconfig eth2 100.1.2.1/24 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.

--- End Startup Commands Log

root@router2:/# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
100.1.0.0 0.0.0.0 255.255.255.252 U 0 0 0 eth0
100.1.0.4 0.0.0.0 255.255.255.252 U 0 0 0 eth1
100.1.0.8 100.1.0.6 255.255.255.252 UG 20 0 0 eth1
100.1.0.12 100.1.0.6 255.255.255.252 UG 20 0 0 eth1
100.1.0.16 100.1.0.6 255.255.255.252 UG 20 0 0 eth1
100.1.1.0 100.1.0.1 255.255.255.0 UG 20 0 0 eth0
100.1.2.0 0.0.0.0 255.255.255.0 U 0 0 0 eth2
100.1.3.0 100.1.0.6 255.255.255.0 UG 20 0 0 eth1
100.1.4.0 100.1.0.6 255.255.255.0 UG 20 0 0 eth1

root@router3:/#
++ ifconfig eth0 100.1.0.6/30 up
++ ifconfig eth1 100.1.0.10/30 up
++ ifconfig eth2 100.1.0.17/30 up
++ ifconfig eth3 100.1.3.1/24 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.

--- End Startup Commands Log

root@router3:/# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
100.1.0.0 100.1.0.5 255.255.255.252 UG 20 0 0 eth0
100.1.0.4 0.0.0.0 255.255.255.252 U 0 0 0 eth0
100.1.0.8 0.0.0.0 255.255.255.252 U 0 0 0 eth1
100.1.0.12 100.1.0.18 255.255.255.252 UG 20 0 0 eth2
100.1.0.16 0.0.0.0 255.255.255.252 U 0 0 0 eth2
100.1.1.0 100.1.0.9 255.255.255.0 UG 20 0 0 eth1
100.1.2.0 100.1.0.5 255.255.255.0 UG 20 0 0 eth0
100.1.3.0 0.0.0.0 255.255.255.0 U 0 0 0 eth3
100.1.4.0 100.1.0.18 255.255.255.0 UG 20 0 0 eth2

root@router4:/#
--- Startup Commands Log
++ ifconfig eth0 100.1.4.1/24 up
++ ifconfig eth1 100.1.0.18/30 up
++ ifconfig eth2 100.1.0.14/30 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.

--- End Startup Commands Log

root@router4:/# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
100.1.0.0 100.1.0.13 255.255.255.252 UG 20 0 0 eth2
100.1.0.4 100.1.0.13 255.255.255.252 UG 20 0 0 eth2
100.1.0.8 100.1.0.17 255.255.255.252 UG 20 0 0 eth1
100.1.0.12 0.0.0.0 255.255.255.252 U 0 0 0 eth2
100.1.0.16 0.0.0.0 255.255.255.252 U 0 0 0 eth1
100.1.1.0 100.1.0.13 255.255.255.0 UG 20 0 0 eth2
100.1.2.0 100.1.0.13 255.255.255.0 UG 20 0 0 eth2
100.1.3.0 100.1.0.17 255.255.255.0 UG 20 0 0 eth1
100.1.4.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0
  
```

Câu 9

Router 1 nhận được câu trả lời khi ping tới khác Router còn lại, do Router1 có đường đi đến các Router còn lại thông qua việc vạch đường động, nên khi ping ta sẽ nhận được trả lời của các Router còn lại

Câu 10

Đường đi của dữ liệu từ Router1 đến các địa chỉ đã cho phụ thuộc vào chi phí (Metric) của đường đi, lệnh Traceroute cho thấy dữ liệu sẽ được gửi đến máy đích qua đường có chi phí thấp nhất có thể đi trong mạng

Câu 11

```

root@router2: /

User Access Verification

Password:
ospfd> show ip ospf route
===== OSPF network routing table =====
N   100.1.0.0/30      [25] area: 0.0.0.0
                        directly attached to eth0
N   100.1.0.4/30      [15] area: 0.0.0.0
                        directly attached to eth1
N   100.1.0.8/30      [45] area: 0.0.0.0
                        via 100.1.0.6, eth1
N   100.1.0.12/30     [50] area: 0.0.0.0
                        via 100.1.0.6, eth1
N   100.1.0.16/30     [35] area: 0.0.0.0
                        via 100.1.0.6, eth1
N   100.1.1.0/24      [35] area: 0.0.0.0
                        via 100.1.0.1, eth0
N   100.1.2.0/24      [10] area: 0.0.0.0
                        directly attached to eth2
N   100.1.3.0/24      [25] area: 0.0.0.0
                        via 100.1.0.6, eth1
N   100.1.4.0/24      [45] area: 0.0.0.0
                        via 100.1.0.6, eth1

===== OSPF router routing table =====

===== OSPF external routing table =====

ospfd> show ip ospf database

        OSPF Router with ID (100.1.2.1)

                Router Link States (Area 0.0.0.0)

Link ID      ADV Router    Age Seq#       CkSum Link count
100.1.1.1    100.1.1.1      334 0x8000000c 0xd1f5 4
100.1.2.1    100.1.2.1      333 0x80000009 0x61bc 3
100.1.3.1    100.1.3.1      336 0x8000000c 0x5d8e 4
100.1.4.1    100.1.4.1      339 0x80000008 0x5f79 3

                Net Link States (Area 0.0.0.0)

Link ID      ADV Router    Age Seq#       CkSum
100.1.0.2    100.1.2.1      333 0x80000001 0xf0cc
100.1.0.6    100.1.3.1      343 0x80000001 0xd7de
100.1.0.10   100.1.3.1      334 0x80000001 0xa60d
100.1.0.14   100.1.4.1      340 0x80000001 0x8429
100.1.0.18   100.1.4.1      340 0x80000001 0x6e39

ospfd>

```



```

root@router2:/# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
100.1.0.0 0.0.0.0 255.255.255.252 U 0 0 0 eth0
100.1.0.4 0.0.0.0 255.255.255.252 U 0 0 0 eth1
100.1.0.8 100.1.0.6 255.255.255.252 UG 20 0 0 eth1
100.1.0.12 100.1.0.6 255.255.255.252 UG 20 0 0 eth1
100.1.0.16 100.1.0.6 255.255.255.252 UG 20 0 0 eth1
100.1.1.0 100.1.0.1 255.255.255.0 UG 20 0 0 eth0
100.1.2.0 0.0.0.0 255.255.255.0 U 0 0 0 eth2
100.1.3.0 100.1.0.6 255.255.255.0 UG 20 0 0 eth1
100.1.4.0 100.1.0.6 255.255.255.0 UG 20 0 0 eth1

```

Lệnh này khác biệt so với route là nó có thể cho ta biết được các Metric cụ thể của các đường đi trong mạng và các thông tin khác như: age, seq#, CkSum của các địa chỉ IP

1 số thông tin có ích

- Metric: chi phí đường đi trong mạng
- Age: Là thời khoảng thời gian kể từ lần cuối cùng update bảng routing trên router và được tính bằng đơn vị giây(second)
- ADV Router :là OSPF router ID được router quảng bá
- Seq :Dãy số thể hiện để bảo đảm rằng LSA chính xác trong quá trình update
- Checksum: Dùng để kiểm tra tính toàn vẹn của quá trình LSA update.
- Link Count: Số kết nối mà Router đã cấu hình cho OSPF
- Net Link States: Hiện thị các thông tin lấy từ network LSA mà router đã nhận được
- Link States: Trạng thái kết nối

Câu 12

Địa chỉ Multicast nhận dữ liệu của khung này

Wireshark packet capture interface showing OSPF Hello packets. The packet list table shows 10 packets from 100.1.0.2 to 224.0.0.5. Packet 8 is selected, showing details for Frame 8: 84 bytes on wire (672 bits), 84 bytes captured (672 bits). The packet bytes panel shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	100.1.0.2	224.0.0.5	OSPF	84	Hello Packet
2	0.163987	100.1.0.13	224.0.0.5	OSPF	84	Hello Packet
3	0.164072	100.1.0.9	224.0.0.5	OSPF	84	Hello Packet
4	0.164134	100.1.0.1	224.0.0.5	OSPF	84	Hello Packet
5	0.164174	100.1.1.1	224.0.0.5	OSPF	80	Hello Packet
6	2.565729	100.1.0.14	224.0.0.5	OSPF	84	Hello Packet
7	2.565880	100.1.0.10	224.0.0.5	OSPF	84	Hello Packet
8	10.000329	100.1.0.2	224.0.0.5	OSPF	84	Hello Packet
9	10.164333	100.1.0.13	224.0.0.5	OSPF	84	Hello Packet
10	10.164380	100.1.0.9	224.0.0.5	OSPF	84	Hello Packet

Frame 8: 84 bytes on wire (672 bits), 84 bytes captured (672 bits)
 Linux cooked capture v1
 Internet Protocol Version 4, Src: 100.1.0.2, Dst: 224.0.0.5
 Open Shortest Path First

0000 00 02 00 01 00 06 22 d8 46 b0 13 1b 00 00 08 00". F.....
 0010 45 c0 00 44 e3 e7 00 00 01 59 90 b1 64 01 00 02 E..D....Y..d...
 0020 e0 00 00 05 02 01 00 30 64 01 02 01 00 00 00 000 d.....
 0030 68 94 00 00 00 00 00 00 00 00 00 00 ff ff ff fc h.....
 0040 00 0a 02 01 00 00 00 28 64 01 00 02 64 01 00 01(d...d...
 0050 64 01 01 01 d...

BT12_Router1.pcap Packets: 65 · Displayed: 65 (100.0%) Profile: Default

Địa chỉ IP này được gọi là Multicast

- Gói tin OSPFv2 này không sử dụng giao thức của tần vận chuyển

- Nội dung thông điệp:

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	100.1.0.2	224.0.0.5	OSPF	84	Hello Packet
2	0.163987	100.1.0.13	224.0.0.5	OSPF	84	Hello Packet
3	0.164072	100.1.0.9	224.0.0.5	OSPF	84	Hello Packet
4	0.164134	100.1.0.1	224.0.0.5	OSPF	84	Hello Packet
5	0.164174	100.1.1.1	224.0.0.5	OSPF	80	Hello Packet
6	2.565729	100.1.0.14	224.0.0.5	OSPF	84	Hello Packet
7	2.565880	100.1.0.10	224.0.0.5	OSPF	84	Hello Packet
8	10.000329	100.1.0.2	224.0.0.5	OSPF	84	Hello Packet
9	10.164333	100.1.0.13	224.0.0.5	OSPF	84	Hello Packet
10	10.164380	100.1.0.9	224.0.0.5	OSPF	84	Hello Packet

Frame 8: 84 bytes on wire (672 bits), 84 bytes captured (672 bits)

- Linux cooked capture v1
- Internet Protocol Version 4, Src: 100.1.0.2, Dst: 224.0.0.5
- Open Shortest Path First
 - OSPF Header
 - Version: 2
 - Message Type: Hello Packet (1)
 - Packet Length: 48
 - Source OSPF Router: 100.1.2.1
 - Area ID: 0.0.0.0 (Backbone)
 - Checksum: 0x6894 [correct]
 - Auth Type: Null (0)
 - Auth Data (none): 0000000000000000
 - OSPF Hello Packet
 - Network Mask: 255.255.255.252
 - Hello Interval [sec]: 10

0000 00 02 00 01 00 06 22 d8 46 b0 13 1b 00 00 08 00". F.....
 0010 45 c0 00 44 e3 e7 00 00 01 59 90 b1 64 01 00 02 E..D....Y..d..
 0020 e0 00 00 05 02 01 00 30 64 01 02 01 00 00 000 d.....
 0030 68 94 00 00 00 00 00 00 00 00 00 00 ff ff ff fc h.....
 0040 00 0a 02 01 00 00 00 28 64 01 00 02 64 01 00 01(d...d..
 0050 64 01 01 01 d...

Frame (frame), 84 bytes Packets: 65 · Displayed: 65 (100.0%) Profile: Default

- Các Active Neighbor:

Message Type: Hello Packet (1)

Packet Length: 48

Source OSPF Router: 100.1.2.1

Area ID: 0.0.0.0 (Backbone)

Checksum: 0x6894 [correct]

Auth Type: Null (0)

Auth Data (none): 0000000000000000

- OSPF Hello Packet
 - Network Mask: 255.255.255.252
 - Hello Interval [sec]: 10
 - Options: 0x02, (E) External Routing
 - Router Priority: 1
 - Router Dead Interval [sec]: 40
 - Designated Router: 100.1.0.2
 - Backup Designated Router: 100.1.0.1
 - Active Neighbor: 100.1.1.1

0000 00 02 00 01 00 06 22 d8 46 b0 13 1b 00 00 08 00". F.....
 0010 45 c0 00 44 e3 e7 00 00 01 59 90 b1 64 01 00 02 E..D....Y..d..
 0020 e0 00 00 05 02 01 00 30 64 01 02 01 00 00 000 d.....
 0030 68 94 00 00 00 00 00 00 00 00 00 00 ff ff ff fc h.....
 0040 00 0a 02 01 00 00 00 28 64 01 00 02 64 01 00 01(d...d..
 0050 64 01 01 01 d...

Active Neighbor (ospf.hello.active_neighbor), 4 bytes Packets: 65 · Displayed: 65 (100.0%) Profile: Default

Câu 13

The image shows two terminal windows from a Linux environment, likely a virtual machine, running Quagga OSPFv2. The left window shows the initial configuration of interfaces eth0, eth1, eth2, and eth3, and the start of the OSPF daemon. The right window shows the OSPF daemon running, a topdump command being executed, and the OSPFv2 routing table being updated after interface eth0 is shut down.

```

root@router1: /
++ ifconfig eth0 100.1.0.13/30 up
++ ifconfig eth1 100.1.0.9/30 up
++ ifconfig eth2 100.1.0.1/30 up
++ ifconfig eth3 100.1.1.1/24 up
++ /etc/init.d/zebra start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.

--- End Startup Commands Log

root@router1:/* route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
100.1.0.0      0.0.0.0         255.255.255.252 U         0    0    0 eth2
100.1.0.4      100.1.0.2       255.255.255.252 UG        20    0    0 eth2
100.1.0.8      0.0.0.0         255.255.255.252 U         0    0    0 eth1
100.1.0.12     0.0.0.0         255.255.255.252 U         0    0    0 eth0
100.1.0.16     100.1.0.2       255.255.255.252 UG        20    0    0 eth2
100.1.1.0      0.0.0.0         255.255.255.0   U         0    0    0 eth3
100.1.2.0      100.1.0.2       255.255.255.0   UG        20    0    0 eth2
100.1.3.0      100.1.0.2       255.255.255.0   UG        20    0    0 eth2
100.1.4.0      100.1.0.14      255.255.255.0   UG        20    0    0 eth0

root@router1:/*

ospfd>
Why connection is timed out.
Connection closed by foreign host.
root@router1:/* topdump -i any -w /shared/RT12.Router1.pcap
topdump: listening on any, link-type LINUX_SLL (Linux cooked), capture size 2621
44 bytes
^C65 packets captured
65 packets received by filter
0 packets dropped by kernel
root@router1:/* ifconfig eth0 down
root@router1:/* route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
100.1.0.0      0.0.0.0         255.255.255.252 U         0    0    0 eth2
100.1.0.4      100.1.0.2       255.255.255.252 UG        20    0    0 eth2
100.1.0.8      0.0.0.0         255.255.255.252 U         0    0    0 eth1
100.1.0.12     100.1.0.2       255.255.255.252 UG        20    0    0 eth2
100.1.0.16     100.1.0.2       255.255.255.252 UG        20    0    0 eth2
100.1.1.0      0.0.0.0         255.255.255.0   U         0    0    0 eth3
100.1.2.0      100.1.0.2       255.255.255.0   UG        20    0    0 eth2
100.1.3.0      100.1.0.2       255.255.255.0   UG        20    0    0 eth2
100.1.4.0      100.1.0.2       255.255.255.0   UG        20    0    0 eth2

```

Khi tắt eth0 của Router1, có thể thấy Router1 không còn đường đi qua eth0 nữa, do đó muốn đi đến các địa chỉ có kết nối trực tiếp đến eth0, bảng vạch đường OSPFv2 sẽ cập nhật lại các đường đi gián tiếp đến các địa chỉ đó thông qua các giao diện mạng còn lại của Router1

Bài tập 13

Câu 14

Các lệnh ping nhận được câu trả lời từ máy nhận

```

root@routerisp: /
--- Startup Commands Log
do
++ ifconfig eth0 200.117.68.2/30 up
++ route add default gw 200.117.68.1
ud
--- End Startup Commands Log
root@routerisp: /# ping 192.168.2.1
PING 192.168.2.1 (192.168.2.1) 56(84) bytes of data.
64 bytes from 192.168.2.1: icmp_seq=1 ttl=63 time=0.274 ms
64 bytes from 192.168.2.1: icmp_seq=2 ttl=63 time=0.155 ms
64 bytes from 192.168.2.1: icmp_seq=3 ttl=63 time=0.114 ms
^C
--- 192.168.2.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2045ms
rtt min/avg/max/ndev = 0.114/0.181/0.274/0.067 ms
root@routerisp: /# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=63 time=0.148 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=63 time=0.327 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=63 time=0.141 ms
^C
--- 192.168.1.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2032ms
rtt min/avg/max/ndev = 0.117/0.253/0.327/0.092 ms

root@pc2: /
--- Startup Commands Log
++ ifconfig eth0 192.168.1.200/24 up
++ route add default gw 192.168.1.1
++ /etc/init.d/zebra start
Starting Quagga daemons (prio:10);
--- End Startup Commands Log
root@pc2: /# ping 192.168.2.111
PING 192.168.2.111 (192.168.2.111) 56(84) bytes of data.
64 bytes from 192.168.2.111: icmp_seq=1 ttl=62 time=0.171 ms
64 bytes from 192.168.2.111: icmp_seq=2 ttl=62 time=0.729 ms
64 bytes from 192.168.2.111: icmp_seq=3 ttl=62 time=0.155 ms
64 bytes from 192.168.2.111: icmp_seq=4 ttl=62 time=0.117 ms
^C
--- 192.168.2.111 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3064ms
rtt min/avg/max/ndev = 0.117/0.253/0.729/0.292 ms
root@pc2: /# ping 200.117.68.2
PING 200.117.68.2 (200.117.68.2) 56(84) bytes of data.
64 bytes from 200.117.68.2: icmp_seq=1 ttl=62 time=0.253 ms
64 bytes from 200.117.68.2: icmp_seq=2 ttl=62 time=0.154 ms
64 bytes from 200.117.68.2: icmp_seq=3 ttl=62 time=0.124 ms
^C
--- 200.117.68.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2031ms
rtt min/avg/max/ndev = 0.077/0.220/0.465/0.174 ms
root@routerisp: /# ping 192.168.1.200
PING 192.168.1.200 (192.168.1.200) 56(84) bytes of data.
64 bytes from 192.168.1.200: icmp_seq=1 ttl=62 time=0.138 ms
64 bytes from 192.168.1.200: icmp_seq=2 ttl=62 time=0.138 ms
64 bytes from 192.168.1.200: icmp_seq=3 ttl=62 time=0.123 ms
64 bytes from 192.168.1.200: icmp_seq=4 ttl=62 time=0.153 ms
64 bytes from 192.168.1.200: icmp_seq=5 ttl=62 time=0.110 ms
^C
--- 192.168.1.200 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4087ms
rtt min/avg/max/ndev = 0.110/0.132/0.153/0.014 ms
root@routerisp: /# ping 192.168.2.111
PING 192.168.2.111 (192.168.2.111) 56(84) bytes of data.
64 bytes from 192.168.2.111: icmp_seq=1 ttl=62 time=0.171 ms
64 bytes from 192.168.2.111: icmp_seq=2 ttl=62 time=0.729 ms
64 bytes from 192.168.2.111: icmp_seq=3 ttl=62 time=0.155 ms
64 bytes from 192.168.2.111: icmp_seq=4 ttl=62 time=0.117 ms
^C
--- 192.168.2.111 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3064ms
rtt min/avg/max/ndev = 0.117/0.253/0.729/0.292 ms
root@pc2: /# ping 200.117.68.2
PING 200.117.68.2 (200.117.68.2) 56(84) bytes of data.
64 bytes from 200.117.68.2: icmp_seq=1 ttl=62 time=0.253 ms
64 bytes from 200.117.68.2: icmp_seq=2 ttl=62 time=0.154 ms
64 bytes from 200.117.68.2: icmp_seq=3 ttl=62 time=0.124 ms
^C
--- 200.117.68.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2031ms
rtt min/avg/max/ndev = 0.124/0.177/0.253/0.055 ms
root@pc2: /#

root@router2: /
--- Startup Commands Log
++ ifconfig eth0 200.117.68.1/24
++ ifconfig eth1 10.0.1.2/30 up
++ ifconfig eth2 10.0.1.1/30 up
++ /etc/init.d/zebra start
Starting Quagga daemons (prio:10); zebra ripd,
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log
root@router2: /# ping 200.117.68.1
PING 200.117.68.1 (200.117.68.1) 56(84) bytes of data.
64 bytes from 200.117.68.1: icmp_seq=1 ttl=64 time=0.114 ms
64 bytes from 200.117.68.1: icmp_seq=2 ttl=64 time=0.150 ms
64 bytes from 200.117.68.1: icmp_seq=3 ttl=64 time=0.169 ms
64 bytes from 200.117.68.1: icmp_seq=4 ttl=64 time=0.171 ms
64 bytes from 200.117.68.1: icmp_seq=5 ttl=64 time=0.088 ms
64 bytes from 200.117.68.1: icmp_seq=6 ttl=64 time=0.120 ms
64 bytes from 200.117.68.1: icmp_seq=7 ttl=64 time=0.113 ms
^C
--- 200.117.68.1 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6125ms
rtt min/avg/max/ndev = 0.088/0.132/0.171/0.029 ms

root@router3: /
--- Startup Commands Log
++ ifconfig eth0 192.168.2.1/24 up
++ ifconfig eth1 10.0.1.5/30 up
++ ifconfig eth2 10.0.1.10/30 up
++ /etc/init.d/zebra start
Starting Quagga daemons (prio:10); zebra ripd,
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log
root@router3: /# ping 200.117.68.2
PING 200.117.68.2 (200.117.68.2) 56(84) bytes of data.
64 bytes from 200.117.68.2: icmp_seq=1 ttl=63 time=0.157 ms
64 bytes from 200.117.68.2: icmp_seq=2 ttl=63 time=0.106 ms
64 bytes from 200.117.68.2: icmp_seq=3 ttl=63 time=0.113 ms
^C
--- 200.117.68.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2053ms
rtt min/avg/max/ndev = 0.105/0.138/0.157/0.042 ms
root@router3: /# ping 200.117.68.1
PING 200.117.68.1 (200.117.68.1) 56(84) bytes of data.
64 bytes from 200.117.68.1: icmp_seq=1 ttl=64 time=0.117 ms
64 bytes from 200.117.68.1: icmp_seq=2 ttl=64 time=0.091 ms
64 bytes from 200.117.68.1: icmp_seq=3 ttl=64 time=0.134 ms
64 bytes from 200.117.68.1: icmp_seq=4 ttl=64 time=0.110 ms
64 bytes from 200.117.68.1: icmp_seq=5 ttl=64 time=0.159 ms
64 bytes from 200.117.68.1: icmp_seq=6 ttl=64 time=0.155 ms
64 bytes from 200.117.68.1: icmp_seq=7 ttl=64 time=0.113 ms
^C
--- 200.117.68.1 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8173ms
rtt min/avg/max/ndev = 0.082/0.115/0.155/0.027 ms
root@router3: /# ping 200.117.68.2
PING 200.117.68.2 (200.117.68.2) 56(84) bytes of data.
64 bytes from 200.117.68.2: icmp_seq=1 ttl=63 time=0.274 ms
64 bytes from 200.117.68.2: icmp_seq=2 ttl=63 time=0.236 ms
64 bytes from 200.117.68.2: icmp_seq=3 ttl=63 time=0.224 ms
64 bytes from 200.117.68.2: icmp_seq=4 ttl=63 time=0.171 ms
64 bytes from 200.117.68.2: icmp_seq=5 ttl=63 time=0.110 ms
^C
--- 200.117.68.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4074ms
rtt min/avg/max/ndev = 0.110/0.203/0.274/0.057 ms
root@router3: /#

root@pc3: /
--- Startup Commands Log
++ ifconfig eth0 192.168.1.200/24 up
++ route add default gw 192.168.1.1
++ /etc/init.d/zebra start
Starting Quagga daemons (prio:10);
--- End Startup Commands Log
root@pc3: /# ping 192.168.1.200
PING 192.168.1.200 (192.168.1.200) 56(84) bytes of data.
64 bytes from 192.168.1.200: icmp_seq=1 ttl=62 time=0.249 ms
64 bytes from 192.168.1.200: icmp_seq=2 ttl=62 time=0.138 ms
64 bytes from 192.168.1.200: icmp_seq=3 ttl=62 time=0.120 ms
64 bytes from 192.168.1.200: icmp_seq=4 ttl=62 time=0.310 ms
^C
--- 192.168.1.200 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3068ms
rtt min/avg/max/ndev = 0.120/0.203/0.310/0.080 ms
root@pc3: /# ping 200.117.68.2
PING 200.117.68.2 (200.117.68.2) 56(84) bytes of data.
64 bytes from 200.117.68.2: icmp_seq=1 ttl=62 time=0.184 ms
64 bytes from 200.117.68.2: icmp_seq=2 ttl=62 time=0.315 ms
64 bytes from 200.117.68.2: icmp_seq=3 ttl=62 time=0.344 ms
^C
--- 200.117.68.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2034ms
rtt min/avg/max/ndev = 0.184/0.281/0.344/0.089 ms
root@pc3: /#

```