Chapter 5

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1．Assuming that all routers and hosts are working properly and that all software in both is free of all errors, is there any chance, however small, that a packet will be delivered to the wrong destination?

答：有可能，数据在传输过程中可能出现随机误差，导致目标 ip 或者子网掩码发生变化，在中转路由器进行处理分析的时候就可能通过错误的端口转发（比如变化之后没有能够匹配的 cidr，从而被转发到了 0.0.0.0/0 的默认路由段）

2．Consider the subnet of Fig 5-13(a). Distance vector routing is used, and the following vectors have just come in to router C: from B:(5,0,8,12,6,2); from D:(16,12,6,0,9,10); and from E:(7,6,3,9,0,4). The measured delays to B, D and E, are 6, 3, and 5, respectively. What is C’ s new routing table? Give both the outgoing line to use and the expected delay.

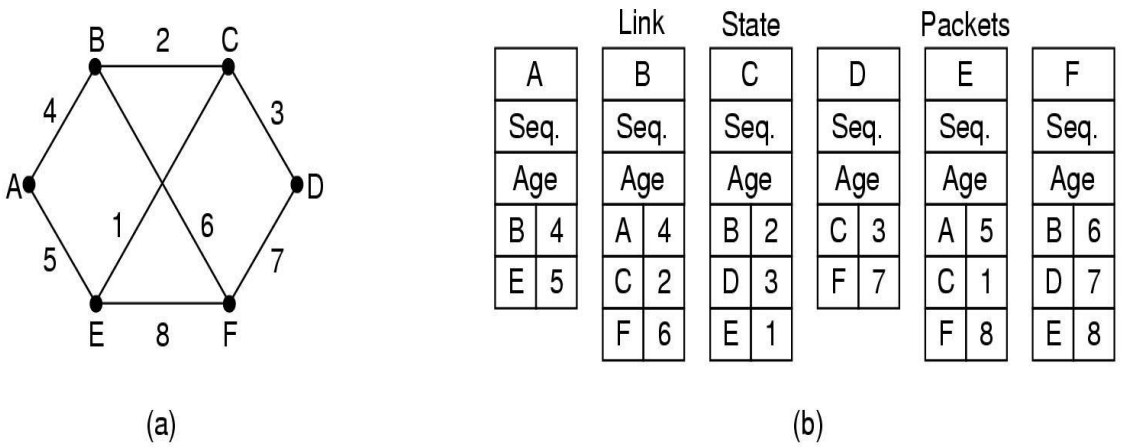

Fig. 5-13. (a) A subnet. (b) The link state packets for this subnet.

答:

从B出发的路径是(11,6,14,18,12,8)

从D出发的路径是(19,15,9,3,12,13)

从E出发的路径是(12,11,8,14,5,9)

可以知道C的新路由表是(11,6,0,3,5,8)，outgoing表是(B,B,-,D,E,B)

3. Suppose that both host A is connected to a router R1, R1 is connected to another router R2, and R2 is connected to host B. Suppose that a TCP message that contains 900 bytes of data and 20 bytes of TCP header is passed to the IP code at host A for delivery to B. Show the Total length, Identification, DF, MF, and Fragment offset fields of the IP header in each packet transmitted over the three links. Assume that link A-R1 can support a maximum frame size of 1024 bytes including a 14-byte frame header, link R1-R2 can support a maximum frame size of 512 bytes, including an 8-byte frame header, and link R2-B can support a maximum frame size of 512 bytes including a 12-byte frame header.

答:

由题意知A-R1链路的MTU = 1024 - 14 = 1010byte，去掉20byte的ip头之后，剩下的990byte能够装入最多984byte的数据，那么A发出的数据只有900byte，加上20byte的tcp头之后，可以只装在一个数据帧中，所以A-R1链路上的数据包只有一个，记为P1。

P1的totalLength为940，DF = 0, MF = 0, Fragment offset = 0。

对R1-R2链路，MTU = 512 - 8 = 504byte，去掉20byte的ip头之后，剩下的484byte最多能够运输480byte的数据，所以上述运输的数据包会被分为2个，分别是P2，和P3，结构如下。

P2的totalLength = 500，DF = 0，MF = 1，Fragment offset = 0

P3的totalLength = 460，DF = 0， MF = 0，Fragment offset = 60

对R2-B链路，MTU = 512 - 12 = 500byte，去掉20byte的ip头之后，剩下的480byte最多能够运输480byte的数据，容易知道上述P2，P3在这里不会发生再次分片，所以在R2-B链路上运输的只有两个数据帧，记为P4,P5,结构如下

P4的totalLength = 500，DF = 0，MF = 1，Fragment offset = 0

P5的totalLength = 460，DF = 0， MF = 0，Fragment offset =60

4. Convert the IP address whose hexadecimal representation is C22F1582 to dotted decimal notation.

答：结果是 194.47.21.130

5. A router has the following (CIDR) entries in its routing table:

Address/mask	Next hop
135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1
192.53.40.0/23	Router 1
Default	Router 2

For each of the following IP address, what does the router do if a packet with that address arrives?

a) 135.46.63.10

b) 135.46.57.14

c) 135.46.52.2

d) 192.53.40.7

e) 192.53.56.7

答:

a 会被转发给 R2 端口 1

b 会被转发给端口 0

c 会被转发给路由器 2

d 会被转发给路由器 1

e 会被转发给路由器 2

6. The client host A, IP address 10.128.254.19, connects to the Internet via fast Ethernet interface. The server B has IP address 130.33.49.26. Following packets are captured at host A by sequence:

Seq.	The 40 bytes header of IP packet (HEX)
1#	45 00 00 3c 02 aa 00 00 40 01 04 38 0a 80 fe 01 0a 80 fe 13 00 00 55 14 00 01 00 47 61 62 63 64 65 66 67 68 69 6a 6b 6c
2#	45 00 00 30 01 9b 40 00 80 06 1d e8 0a 80 fe 13 82 21 31 1a 0b d9 13 88 84 6b 41 c5 00 00 00 00 70 02 43 80 5d b0 00 00
3#	45 00 00 30 68 10 40 00 31 06 6e 83 82 21 31 1a 0a 80 fe 13 13 88 0b d9 e0 59 9f ef 84 6b 41 c6 70 12 16 d0 37 e1 00 00
4#	45 00 00 28 01 9c 40 00 80 06 1d ef 0a 80 fe 13 82 21 31 1a 0b d9 13 88 84 6b 41 c6 e0 59 9f f0 50 10 43 80 2b 32 00 00
5#	45 00 00 4c 01 9d 40 00 80 06 1d de 0a 80 fe 13 82 21 31 1a 0b d9 13 88 84 6b 41 c6 e0 59 9f f0 50 18 43 80 16 b2 00 00
6#	45 00 00 34 68 11 40 00 31 06 06 7a 82 21 31 1a 0a 80 fe 13 13 88 0b d9 e0 59 9f f0 84 6b 41 ea 50 10 16 d0 46 4a 00 00

Please select the best choice and fill it into table below. (以表格答案为准)

Question	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Best choice	B	B	D	C	B	C	A

(1). How many ICMP packets, and how many TCP packets exist respectively in above 6 packets? Some protocol decimal numbers and their corresponding protocols are defined in RFC-1700 as: 1---ICMP, 2---IGMP, 6---TCP, 17---UDP, 89----OSPF ……

A. 2 ICMP paket,3 TCP packet B. 1 ICMP paket,5 TCP packet

C. 2 ICMP paket,5 TCP packet D. 2 ICMP paket,4 TCP packet

(2). Which packets are sent by the host A?

A. 1#,4#,5# B. 2#,4#,5# C. 4#,5#,6# D. 2#,3#,4#

(3). Which packets are used for TCP connection establishment?
A. 1#,2#,3# B. 3#,4#,5# C. 4#,5#,6# D. 2#,3#,4#

(4). Which packet(s) need fill the frame to the minimum size at the fast Ethernet MAC layer?
A. 2# B. 3# C. 4# D. 6#

(5). According to acknowledgement number of 6# packet, TCP data size in 5# packet is _____ bytes?
A. 32 B. 36 C. 48 D. 64

(6). According to 5# packet, what is empty receiving buffer size of 5# packet sender?
A. 0x50 B. 0x5018 C. 0x4380 D. 0x9ff0

(7) At the same time, we have captured packets at server B, below is one of those packets:

Sent by server B	45 00 00 34 13 88 a1 08	68 11 40 00 e0 59 9f f0	3d 06 4c 5c 84 6b 41 ea	82 21 31 1a 50 10 16 d0	ca 76 01 06 37 2a 00 00

_____ routers passed before the packet arrived to the host A.

A. 12 B. 15 C. 19 D. 8

7. Node A and node B use the Go-Back-N protocol (3-bit sequence, sending window size=6) for half-duplex frame transmission in data link layer, A sends frame A1,A2,A3,A4,A5 to B, and B sends frame B1,B2 to A, these 7 frames are transmitted in the order of A1,A2,B1,A3,A4,A5,B2, only after all bits of a frame has been sent out, next frame begins to send. In following tables, seq is sequence number of the frame, and ack is the acknowledgement number of the frame. The following table-A and table-B are 2 different cases: no time-out occurs in Table-A, but a time-out occurs in table-B, please fill number in each blank of seq column and ack column, you need not to fill cells marked "not fill" .

Table-A

frame	Direction	Seq	ack	comment
A1	A --→ B	5	3	Arrival
A2	A --→ B	6	3	Arrival
B1	A ←-- B	4	6	Arrival
A3	A --→ B	1	4	Arrival
A4	A --→ B	not-fill	not-fill	Arrival
A5	A --→ B	3	4	Arrival
B2	A ←-- B	5	3	Arrival

Table-B

frame	Direction	Seq	ack	comment
A1	A --→ B	5	3	Arrival
A2	A --→ B	6	3	Get lost
B1	A ←-- B	4	5	Arrival
After timeout of A2				
retransmitted A2	A ---> B	6	4	Arrival
A3	A --→ B	not-fill	not-fill	Arrival
A4	A --→ B	not-fill	not-fill	Arrival
A5	A --→ B	not-fill	not-fill	Arrival
B2	A ←-- B	5	3	Arrival