

LAB5

牛庆源 PB21111733

- 1.

本地计算机ip地址为192.168.1.102

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> Frame 8: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on 0
> Ethernet II, Src: ActiontecEle_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysGroup_da:af:73 (00:06:25:da:af:73)
√ Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        Total Length: 84
        Identification: 0x32d0 (13008)
    > 000. .... = Flags: 0x0
        ...0 0000 0000 0000 = Fragment Offset: 0
    > Time to Live: 1
        Protocol: ICMP (1)
        Header Checksum: 0x2d2c [validation disabled]
        [Header checksum status: Unverified]
        Source Address: 192.168.1.102
        Destination Address: 128.59.23.100
√ Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0xf7ca [correct]
    [Checksum Status: Good]
    Identifier (BE): 768 (0x0300)
    Identifier (LE): 3 (0x0003)
    Sequence Number (BE): 20483 (0x5003)
    Sequence Number (LE): 848 (0x0350)
    > [No response seen]
    > Data (56 bytes)
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- 2.

ICMP(1)

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> Time to Live: 1
    Protocol: ICMP (1)
```

- 3.

Header Length: 20 bytes

Total Length: 84 bytes

How many bytes are in the payload of the IP datagram ?

84 - 20 = 64 bytes

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.... 0101 = Header Length: 20 bytes (5)
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> Differentiated Services Field: 0x00 (DSC
    Total Length: 84
```

- 4.

没有分片，因为flag字段的Fragment都为0

- ▼ 000. = Flags: 0x0
 - 0... = Reserved bit: Not set
 - .0... = Don't fragment: Not set
 - ..0. = More fragments: Not set
 - ...0 0000 0000 0000 = Fragment Offset: 0

• 5.~7.

从NO.8开始往上一段内容如下:

No.	Time	Source	Destination	Protocol	Length	Info
32	6.439037	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
29	6.408895	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
28	6.388921	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
23	6.358888	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
22	6.338804	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
20	6.308748	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
18	6.288750	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
16	6.258750	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
14	6.238695	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
12	6.208597	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
10	6.188629	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request
8	6.163045	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request

Frame 8

- ▼ Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
 - 0100 = Version: 4
 - 0101 = Header Length: 20 bytes (5)
 - > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
 - Total Length: 84
 - Identification: 0x32d0 (13008)
 - ▼ 000. = Flags: 0x0
 - 0... = Reserved bit: Not set
 - .0... = Don't fragment: Not set
 - ..0. = More fragments: Not set
 - ...0 0000 0000 0000 = Fragment Offset: 0
 - > Time to Live: 1
 - Protocol: ICMP (1)
 - Header Checksum: 0x2d2c [validation disabled]
 - [Header checksum status: Unverified]
 - Source Address: 192.168.1.102
 - Destination Address: 128.59.23.100

Frame 10

- ▼ Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
 - 0100 = Version: 4
 - 0101 = Header Length: 20 bytes (5)
 - > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
 - Total Length: 84
 - Identification: 0x32d1 (13009)
 - ▼ 000. = Flags: 0x0
 - 0... = Reserved bit: Not set
 - .0.. = Don't fragment: Not set
 - ..0. = More fragments: Not set
 - ...0 0000 0000 0000 = Fragment Offset: 0
 - > Time to Live: 2
 - Protocol: ICMP (1)
 - Header Checksum: 0x2c2b [validation disabled]
 - [Header checksum status: Unverified]
 - Source Address: 192.168.1.102
 - Destination Address: 128.59.23.100

Frame 20

- ▼ Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
 - 0100 = Version: 4
 - 0101 = Header Length: 20 bytes (5)
 - > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
 - Total Length: 84
 - Identification: 0x32d6 (13014)
 - ▼ 000. = Flags: 0x0
 - 0... = Reserved bit: Not set
 - .0.. = Don't fragment: Not set
 - ..0. = More fragments: Not set
 - ...0 0000 0000 0000 = Fragment Offset: 0
 - Time to Live: 7
 - Protocol: ICMP (1)
 - Header Checksum: 0x2726 [validation disabled]
 - [Header checksum status: Unverified]
 - Source Address: 192.168.1.102
 - Destination Address: 128.59.23.100

改变: Identification, Time to Live, Header Checksum

不变: Version, Header Length, Differentiated Services Field, Total Length, Flags, Fragment Offset, Protocol, Source Address, Destination Address

必须不变: Version, Header Length, Differentiated Services Field, Protocol, Source Address, Destination Address

必须改变: Identification, Time to Live, Header Checksum

原因：Identification是标识，每一段报文必须唯一；Time to Live是由traceroute发送的TTL递增导致必须改变；Header改变，Checksum必须改变
Identification递增1

• 8.

Identification: 0x9d7c (40316)

Time to Live: 255

No.	Time	Source	Destination	Protocol	Length	Info
330	53.501082	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
274	48.493073	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
219	43.485786	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
179	38.491817	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
135	33.470548	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
94	28.462264	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
65	16.179649	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
40	11.174495	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
9	6.176826	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)

> Frame 9: 70 bytes on wire (560 bits), 70 bytes captured (560 bits)

> Ethernet II, Src: LinksysGroup_da:af:73 (00:06:25:da:af:73), Dst: ActiontecEle_8a:70:1a (00:20:e0:8a:70:1a)

> Internet Protocol Version 4, Src: 10.216.228.1, Dst: 192.168.1.102

0100 = Version: 4
.... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0xc0 (DSCP: CS6, ECN: Not-ECT)
Total Length: 56
Identification: 0x9d7c (40316)
> 000. = Flags: 0x0
0... = Reserved bit: Not set
.0.. = Don't fragment: Not set
..0. = More fragments: Not set
...0 0000 0000 0000 = Fragment Offset: 0
Time to Live: 255
Protocol: ICMP (1)
Header Checksum: 0x6ca0 [validation disabled]
[Header checksum status: Unverified]
Source Address: 10.216.228.1
Destination Address: 192.168.1.102

> Internet Control Message Protocol

Type: 11 (Time-to-live exceeded)
Code: 0 (Time to live exceeded in transit)
Checksum: 0xd946 [correct]
[Checksum Status: Good]
Unused: 00000000

> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100

0100 = Version: 4
.... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 84
Identification: 0x32d0 (13008)
> 000. = Flags: 0x0
0... = Reserved bit: Not set
.0.. = Don't fragment: Not set
..0. = More fragments: Not set
...0 0000 0000 0000 = Fragment Offset: 0
> Time to Live: 1
Protocol: ICMP (1)
Header Checksum: 0xf616 [validation disabled]
[Header checksum status: Unverified]
Source Address: 192.168.1.102
Destination Address: 128.59.23.100

• 9.

Identification变化，因为其唯一性

TTL不变，都是由同一个路由器发送

Frame 9

- Internet Protocol Version 4, Src: 10.216.228.1, Dst: 192.168.1.102
 - 0100 = Version: 4
 - 0101 = Header Length: 20 bytes (5)
 - > Differentiated Services Field: 0xc0 (DSCP: CS6, ECN: Not-ECT)
 - Total Length: 56
 - Identification: 0x9d7c (40316)
 - 000. = Flags: 0x0
 - 0... = Reserved bit: Not set
 - .0... = Don't fragment: Not set
 - ..0. = More fragments: Not set
 - ...0 0000 0000 0000 = Fragment Offset: 0
 - Time to Live: 255
 - Protocol: ICMP (1)
 - Header Checksum: 0x6ca0 [validation disabled]
 - [Header checksum status: Unverified]
 - Source Address: 10.216.228.1
 - Destination Address: 192.168.1.102

Frame 135

- Internet Protocol Version 4, Src: 10.216.228.1, Dst: 192.168.1.102
 - 0100 = Version: 4
 - 0101 = Header Length: 20 bytes (5)
 - > Differentiated Services Field: 0xc0 (DSCP: CS6, ECN: Not-ECT)
 - Total Length: 56
 - Identification: 0x9e2c (40492)
 - 000. = Flags: 0x0
 - 0... = Reserved bit: Not set
 - .0... = Don't fragment: Not set
 - ..0. = More fragments: Not set
 - ...0 0000 0000 0000 = Fragment Offset: 0
 - Time to Live: 255
 - Protocol: ICMP (1)
 - Header Checksum: 0x6bf0 [validation disabled]
 - [Header checksum status: Unverified]
 - Source Address: 10.216.228.1
 - Destination Address: 192.168.1.102

• 10.

Frame 93

分为两片

- [2 IPv4 Fragments (2008 bytes): #92(1480), #93(528)]
 - [\[Frame: 92, payload: 0-1479 \(1480 bytes\)\]](#)
 - [\[Frame: 93, payload: 1480-2007 \(528 bytes\)\]](#)
 - [Fragment count: 2]
 - [Reassembled IPv4 length: 2008]
 - [Reassembled IPv4 data [truncated]: 0800d0c603007703373620aaaaaaaaaaaaaaaaaaaaaa;

- 11.

Frame 92

More fragments: Set 表明分片

Fragment Offset: 0 表明是第一个分片

Total Length: 1500 表明报文长度为1500字节

Total Length: 1500

Identification: 0x32f9 (13049)

001. = Flags: 0x1, More fragments

0... = Reserved bit: Not set

.0.. = Don't fragment: Not set

..1. = More fragments: Set

...0 0000 0000 0000 = Fragment Offset: 0

- 12.

Frame 93

Fragment Offset: 1480 表明不是第一个分片

More fragments: Not set 表明没有后续分片

Total Length: 548

Identification: 0x32f9 (13049)

000. = Flags: 0x0

0... = Reserved bit: Not set

.0.. = Don't fragment: Not set

..0. = More fragments: Not set

...0 0000 1011 1001 = Fragment Offset: 1480

- 13.

对比Frame 92 和 Frame 93可以得到

Total Length, Flags, More fragments, Fragment Offset变化

Header Checksum也变化了

Header Checksum: 0x077b [validation disabled]

Header Checksum: 0x2a7a [validation disabled]

- 14.

Frame 218

分了3片

✓ [3 IPv4 Fragments (3508 bytes): #216(1480), #217(1480), #218(548)]

[Frame: 216, payload: 0-1479 (1480 bytes)]

[Frame: 217, payload: 1480-2959 (1480 bytes)]

[Frame: 218, payload: 2960-3507 (548 bytes)]

[Fragment count: 3]

[Reassembled IPv4 length: 3508]

[Reassembled IPv4 data [truncated]: 0800a9c303009e03373920aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

- 15.

Frame 216, Frame 217, Frame 218

216 43.466136	192.168.1.102	128.59.23.100	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=3323) [Reassembled in #218]
217 43.466808	192.168.1.102	128.59.23.100	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3323) [Reassembled in #218]
218 43.467629	192.168.1.102	128.59.23.100	ICMP	582 Echo (ping) request id=0x0300, seq=40451/926, ttl=1 (no response found!)

变化: Total Length, (Flags, More fragments,)Fragment Offset, Header Checksum

- ✓ 001. = Flags: 0x1, More fragments
 - 0... = Reserved bit: Not set
 - .0.. = Don't fragment: Not set
 - ..1. = More fragments: Set
 - ...0 0000 0000 0000 = Fragment Offset: 0
- ✓ Time to Live: 1
 - > [Expert Info (Note/Sequence): "Time To Live" only 1]
 - Protocol: ICMP (1)
 - Header Checksum: 0x0751 [validation disabled]

- ✓ 001. = Flags: 0x1, More fragments
 - 0... = Reserved bit: Not set
 - .0.. = Don't fragment: Not set
 - ..1. = More fragments: Set
 - ...0 0000 1011 1001 = Fragment Offset: 1480
- ✓ Time to Live: 1
 - > [Expert Info (Note/Sequence): "Time To Live" only 1]
 - Protocol: ICMP (1)
 - Header Checksum: 0x0698 [validation disabled]

- ✓ 000. = Flags: 0x0
 - 0... = Reserved bit: Not set
 - .0.. = Don't fragment: Not set
 - ..0. = More fragments: Not set
 - ...0 0001 0111 0010 = Fragment Offset: 2960
- ✓ Time to Live: 1
 - > [Expert Info (Note/Sequence): "Time To Live" only 1]
 - Protocol: ICMP (1)
 - Header Checksum: 0x2983 [validation disabled]