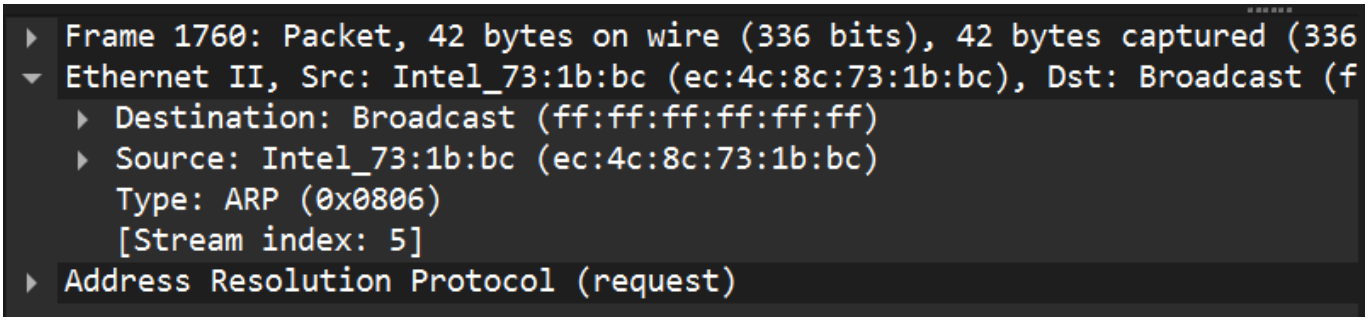
Wireshark抓包实验-2

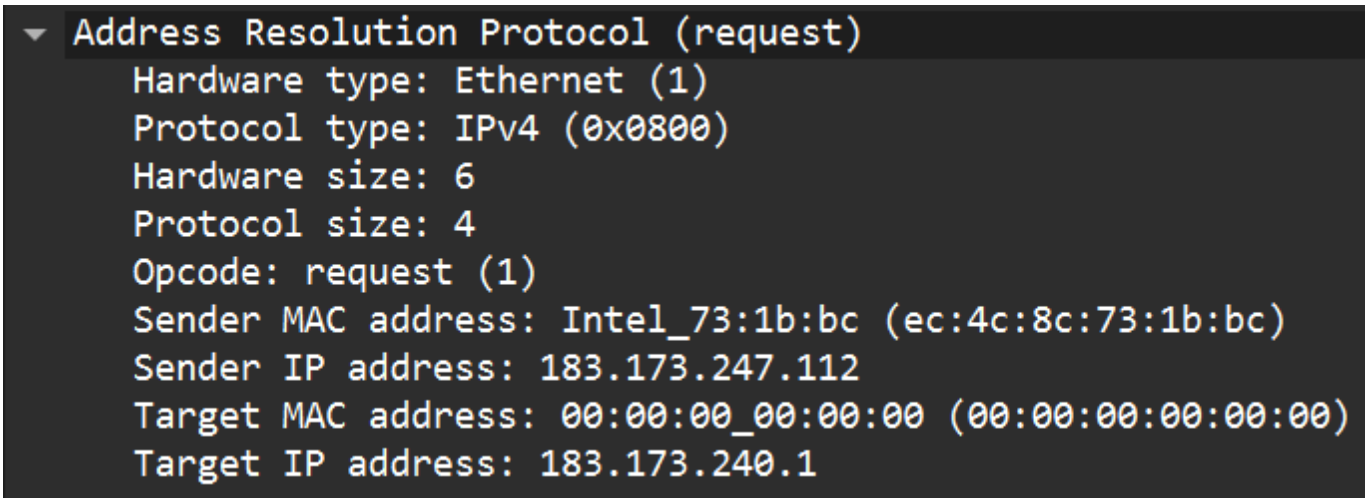
1.

EtherType = 0x0806



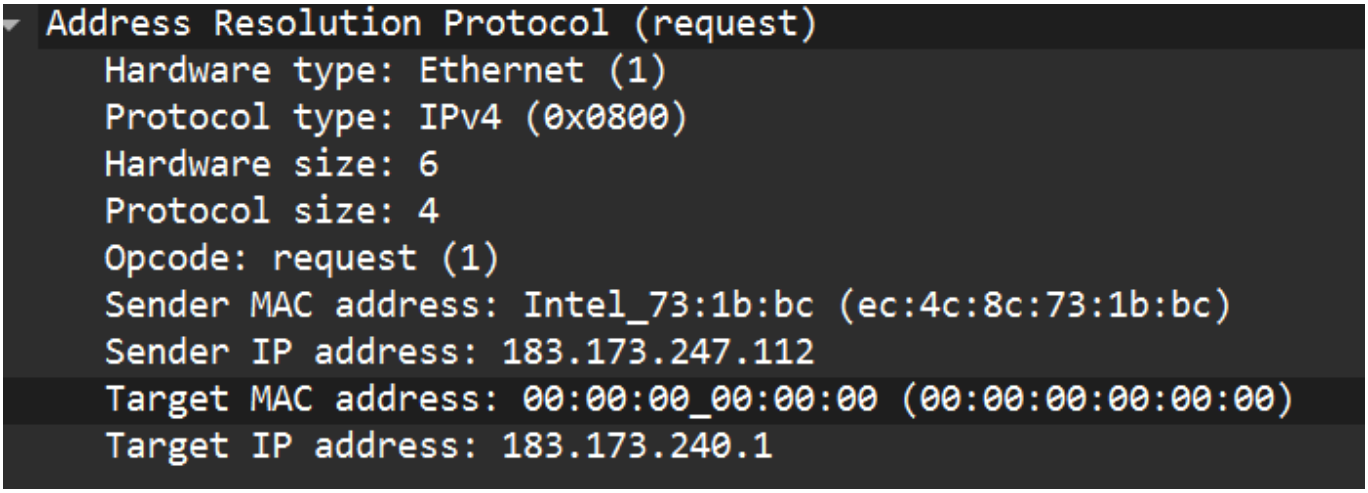
2.

Hardware type（HTYPE，以太网）= 1 Protocol type（PTYPE，IPv4）= 0x0800



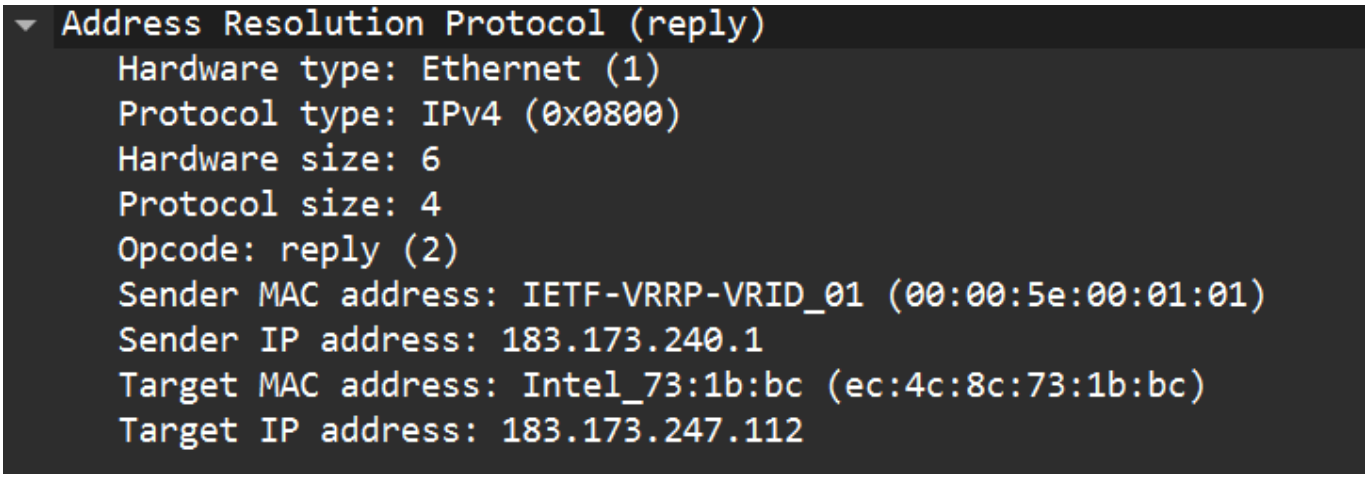
3.

Opcode = 1（request） 源 IP 183.173.247.112 源 MAC ec:4c:8c:73:1b:bc 目的 IP 183.173.240.1 目的 MAC 00:00:00:00:00:00



4.

Opcode = 2（reply） 源 IP 183.173.240.1 源 MAC 00:00:5e:00:01:01 目的 IP 183.173.247.112 目的 MAC ec:4c:8c:73:1b:bc



简述题 （1）

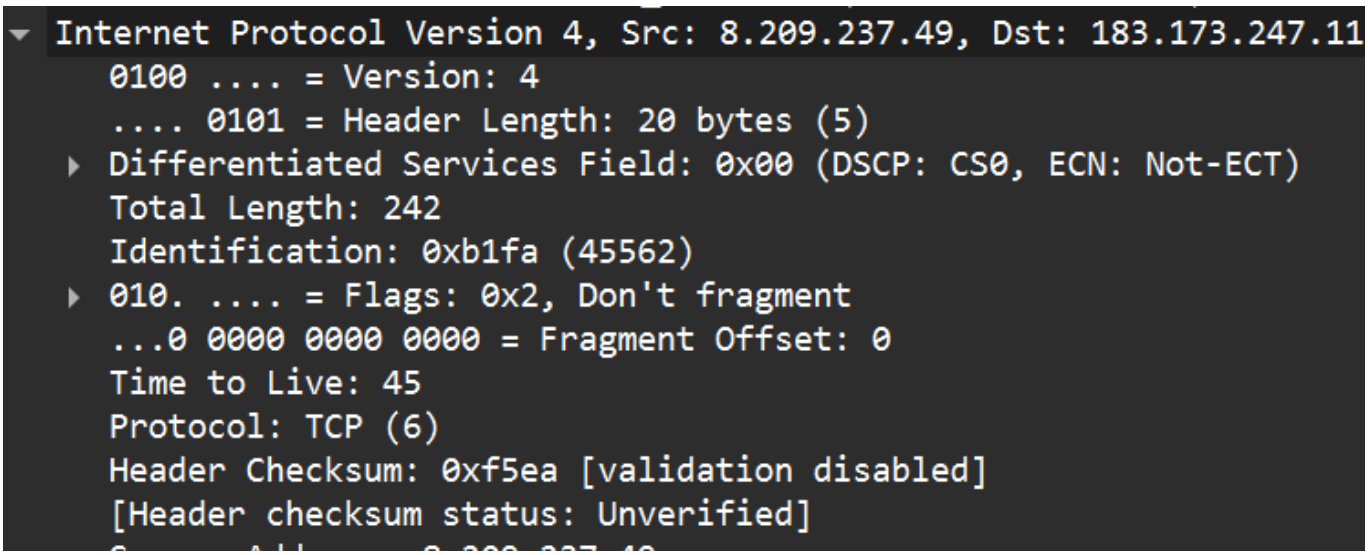
会。局域网内 ping：ARP 解析的是目标主机 IP→MAC；局域网外 ping：ARP 解析的是默认网关 IP→MAC。因为 ARP 只在本链路解析“下一跳”的 MAC，跨网段必须先发给网关。

（2）

影响：广播风暴占带宽/CPU；ARP 表被污染导致断网/错投递；可被用于 ARP 欺骗/中间人/DoS。发现：Wireshark/arpwatch 看到异常频率或 IP-MAC 频繁变更。应对：隔离异常主机、清 ARP 缓存、静态 ARP；交换机启用 DHCP Snooping + DAI、端口安全、限速与分 VLAN。

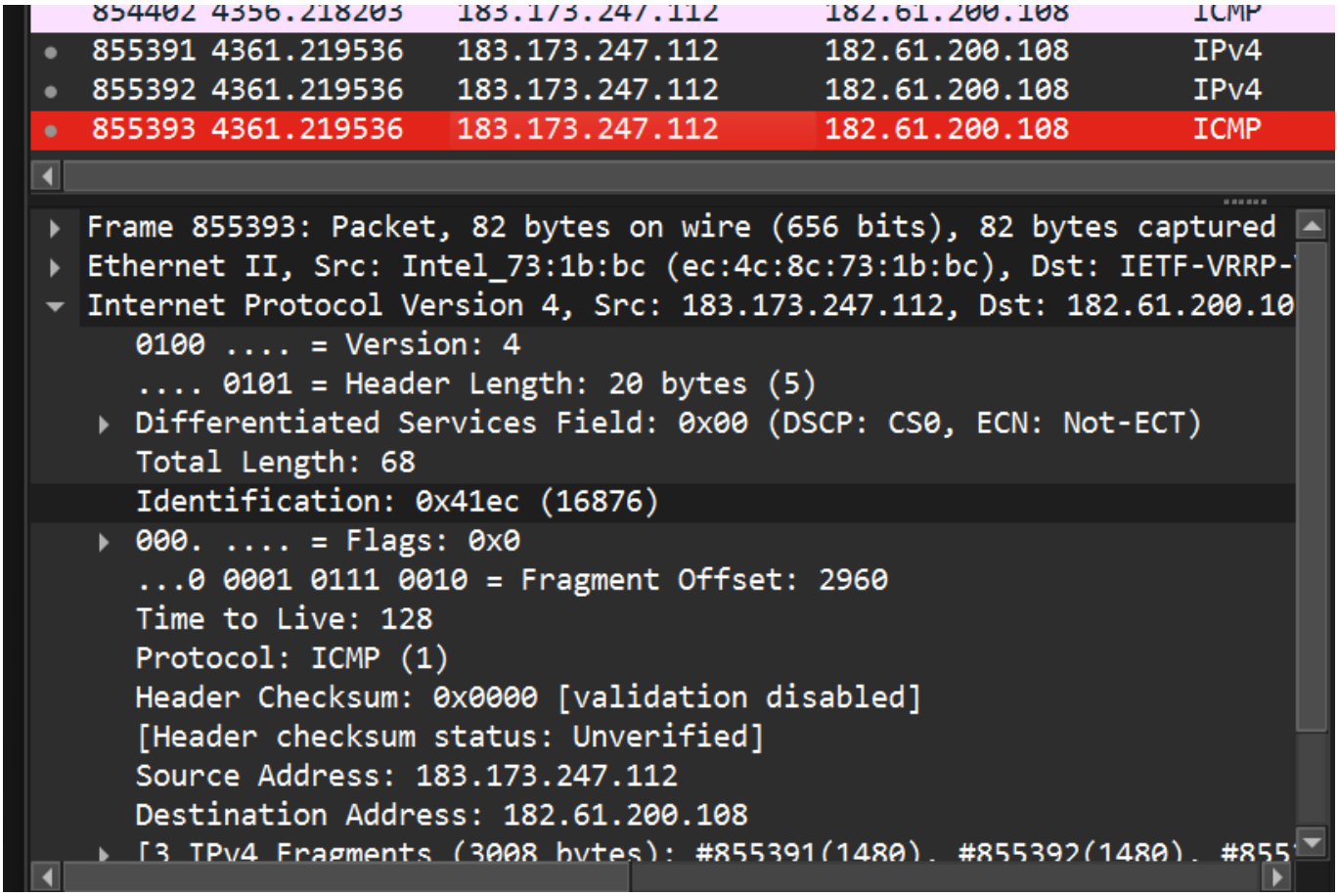
Wireshark抓包实验-3

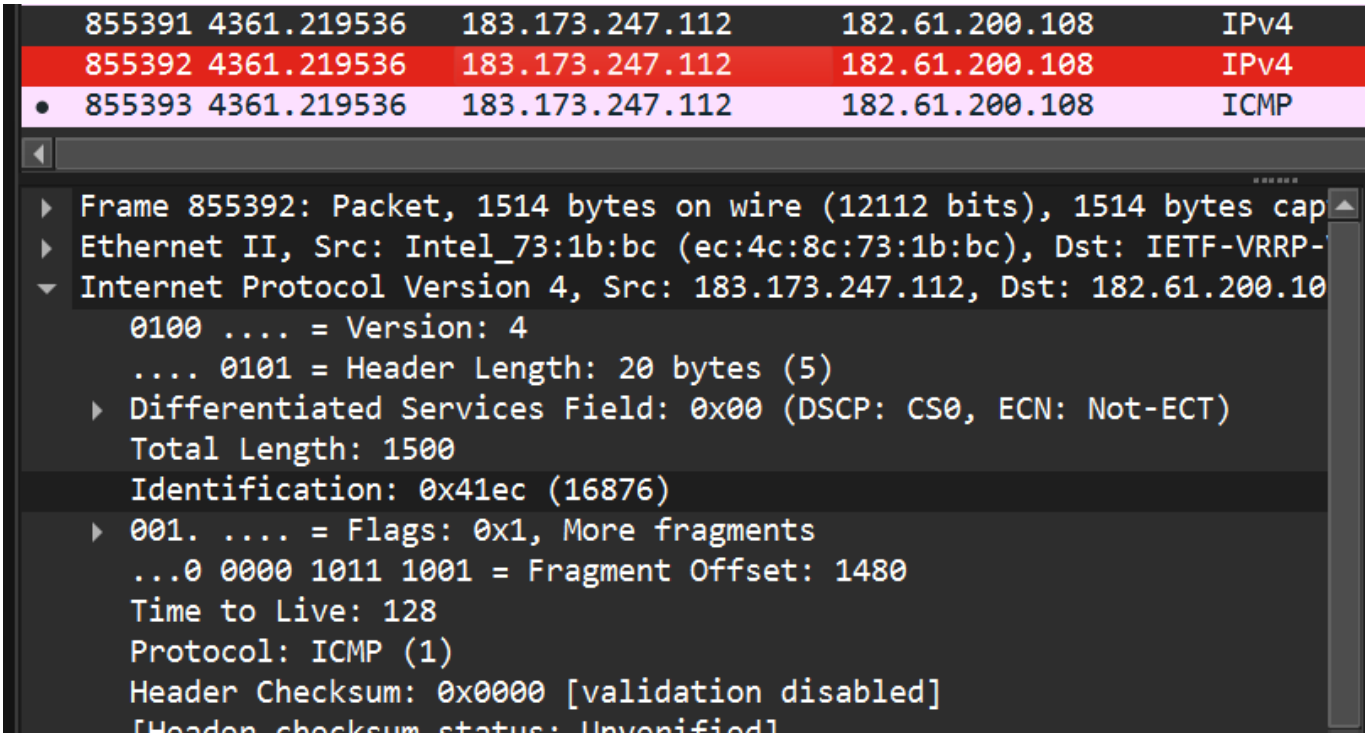
抓包实验1：观察IPv4包与分段现象

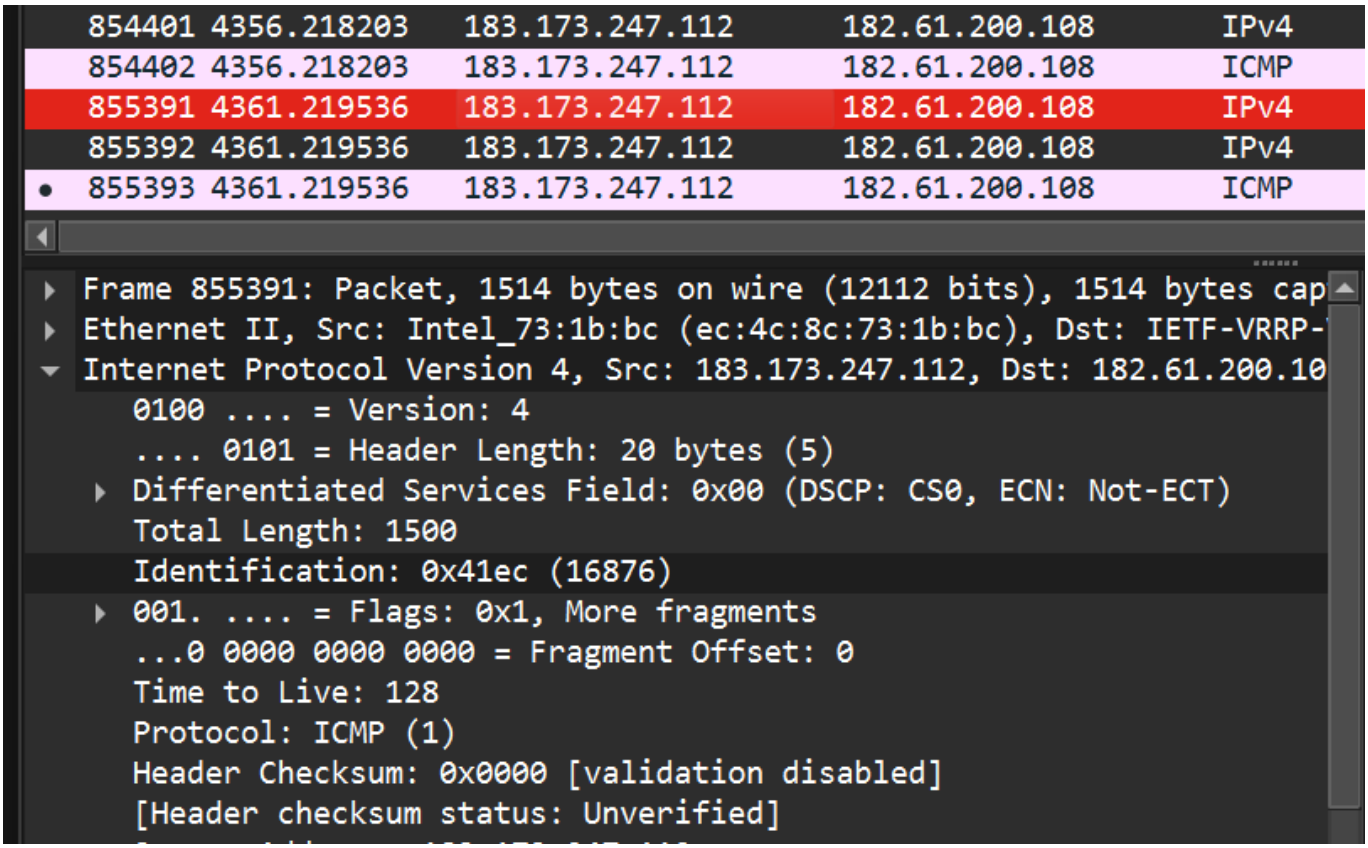


Version = 4 IHL = 5 IHL 单位：32-bit word（4字节），所以 5×4=20 字节头部

(1)

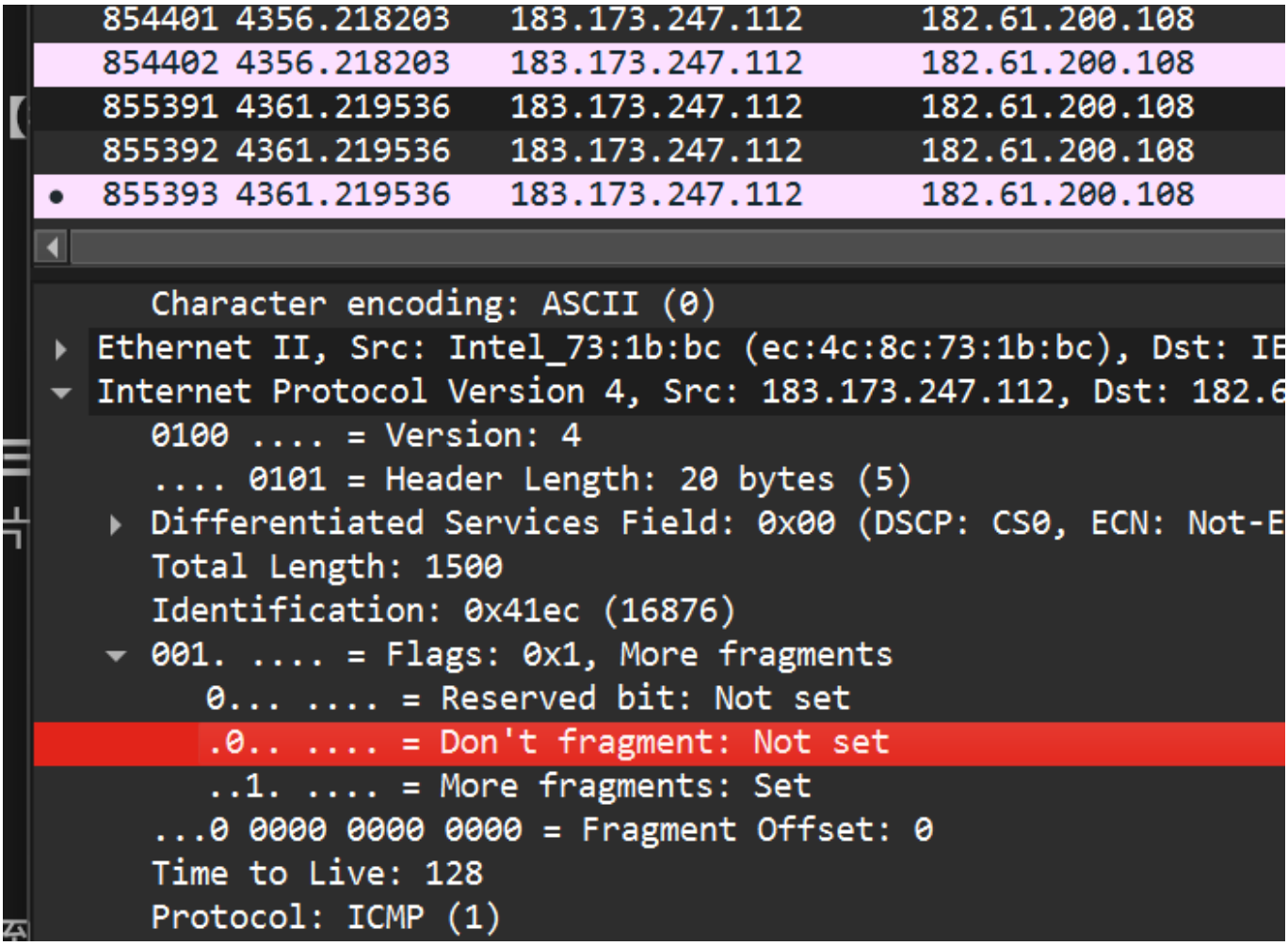

854402 4356.218203 183.173.247.112 182.61.200.108 ICMP
855391 4361.219536 183.173.247.112 182.61.200.108 IPv4
855392 4361.219536 183.173.247.112 182.61.200.108 IPv4
855393 4361.219536 183.173.247.112 182.61.200.108 ICMP
Frame 855393: Packet, 82 bytes on wire (656 bits), 82 bytes captured
Ethernet II, Src: Intel_73:1b:bc (ec:4c:8c:73:1b:bc), Dst: IETF-VRRP-
Internet Protocol Version 4, Src: 183.173.247.112, Dst: 182.61.200.10
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 68
Identification: 0x41ec (16876)
000. .... = Flags: 0x0
...0 0001 0111 0010 = Fragment Offset: 2960
Time to Live: 128
Protocol: ICMP (1)
Header Checksum: 0x0000 [validation disabled]
[Header checksum status: Unverified]
Source Address: 183.173.247.112
Destination Address: 182.61.200.108

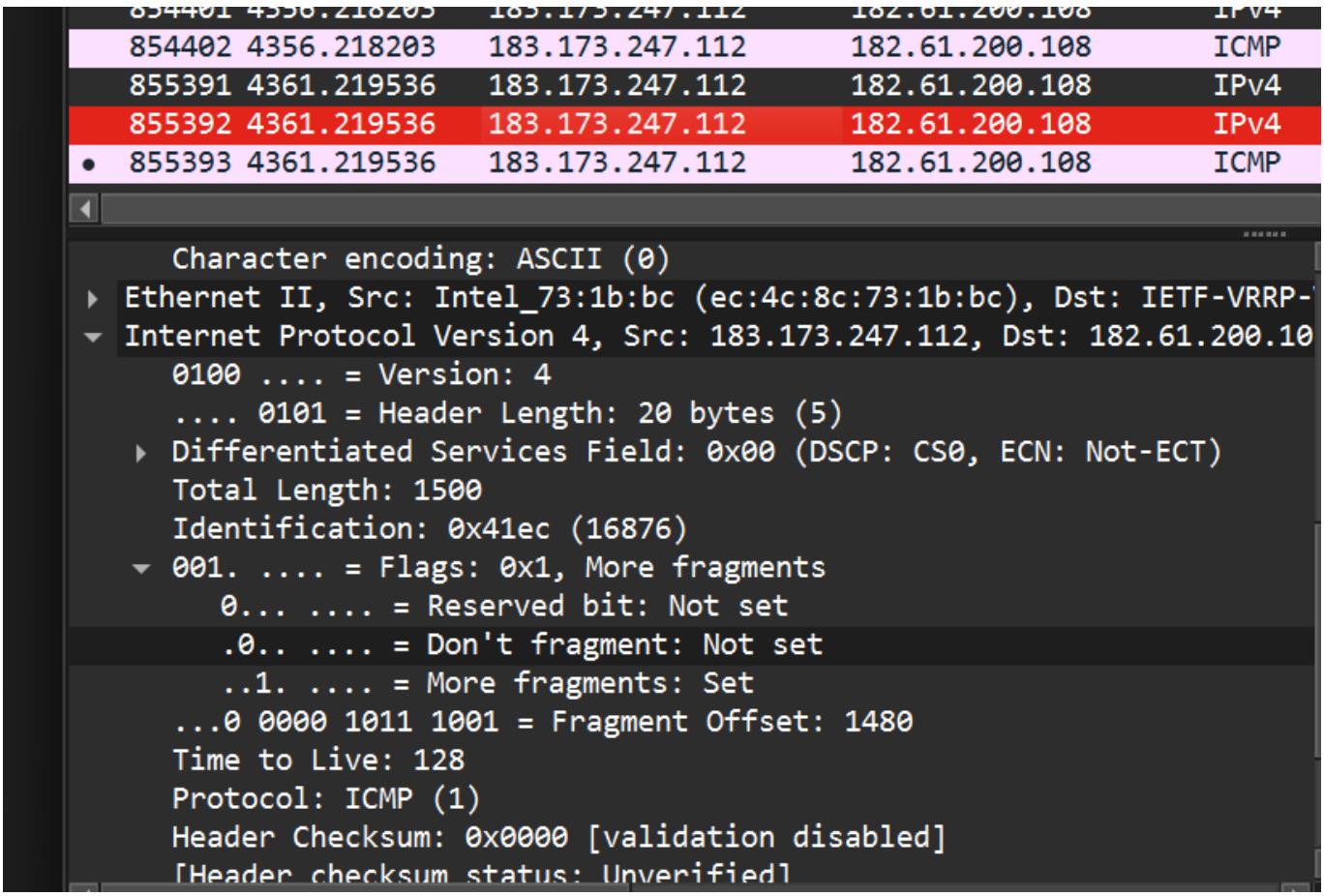

855391 4361.219536 183.173.247.112 182.61.200.108 IPv4
855392 4361.219536 183.173.247.112 182.61.200.108 IPv4
855393 4361.219536 183.173.247.112 182.61.200.108 ICMP
Frame 855392: Packet, 1514 bytes on wire (12112 bits), 1514 bytes cap
Ethernet II, Src: Intel_73:1b:bc (ec:4c:8c:73:1b:bc), Dst: IETF-VRRP-
Internet Protocol Version 4, Src: 183.173.247.112, Dst: 182.61.200.10
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 1500
Identification: 0x41ec (16876)
001. .... = Flags: 0x1, More fragments
...0 0000 1011 1001 = Fragment Offset: 1480
Time to Live: 128
Protocol: ICMP (1)
Header Checksum: 0x0000 [validation disabled]



相等，都是0x41ec

(2)

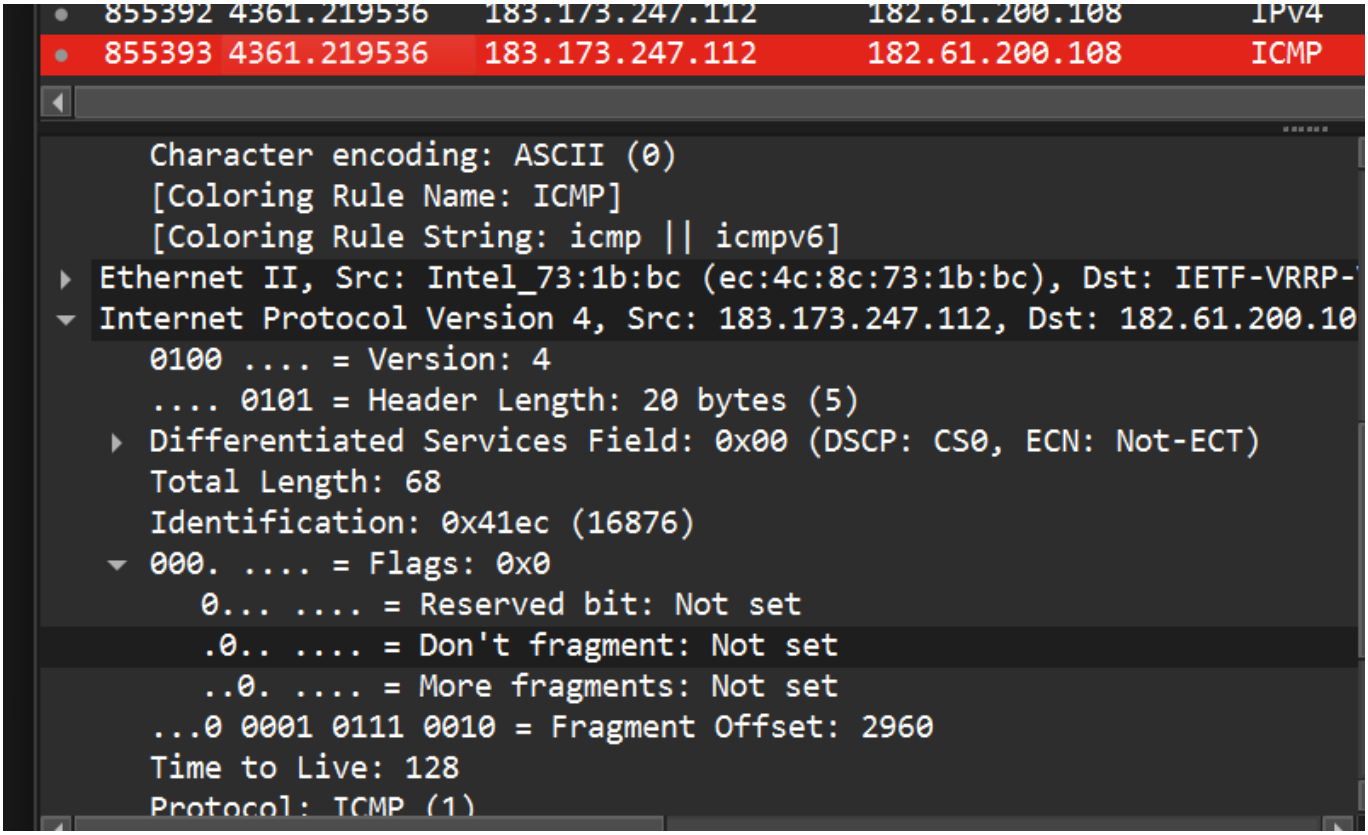

854401 4356.218203 183.173.247.112 182.61.200.108
854402 4356.218203 183.173.247.112 182.61.200.108
855391 4361.219536 183.173.247.112 182.61.200.108
855392 4361.219536 183.173.247.112 182.61.200.108
855393 4361.219536 183.173.247.112 182.61.200.108
Character encoding: ASCII (0)
Ethernet II, Src: Intel_73:1b:bc (ec:4c:8c:73:1b:bc), Dst: IE
Internet Protocol Version 4, Src: 183.173.247.112, Dst: 182.6
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-E
Total Length: 1500
Identification: 0x41ec (16876)
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: 128
Protocol: ICMP (1)


854402 4356.218203 183.173.247.112 182.61.200.108 ICMP
855391 4361.219536 183.173.247.112 182.61.200.108 IPv4
855392 4361.219536 183.173.247.112 182.61.200.108 IPv4
855393 4361.219536 183.173.247.112 182.61.200.108 ICMP
Character encoding: ASCII (0)
Ethernet II, Src: Intel_73:1b:bc (ec:4c:8c:73:1b:bc), Dst: IETF-VRRP-
Internet Protocol Version 4, Src: 183.173.247.112, Dst: 182.61.200.10
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 1500
Identification: 0x41ec (16876)
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: 128
Protocol: ICMP (1)
Header Checksum: 0x0000 [validation disabled]

DF=0：允许分片

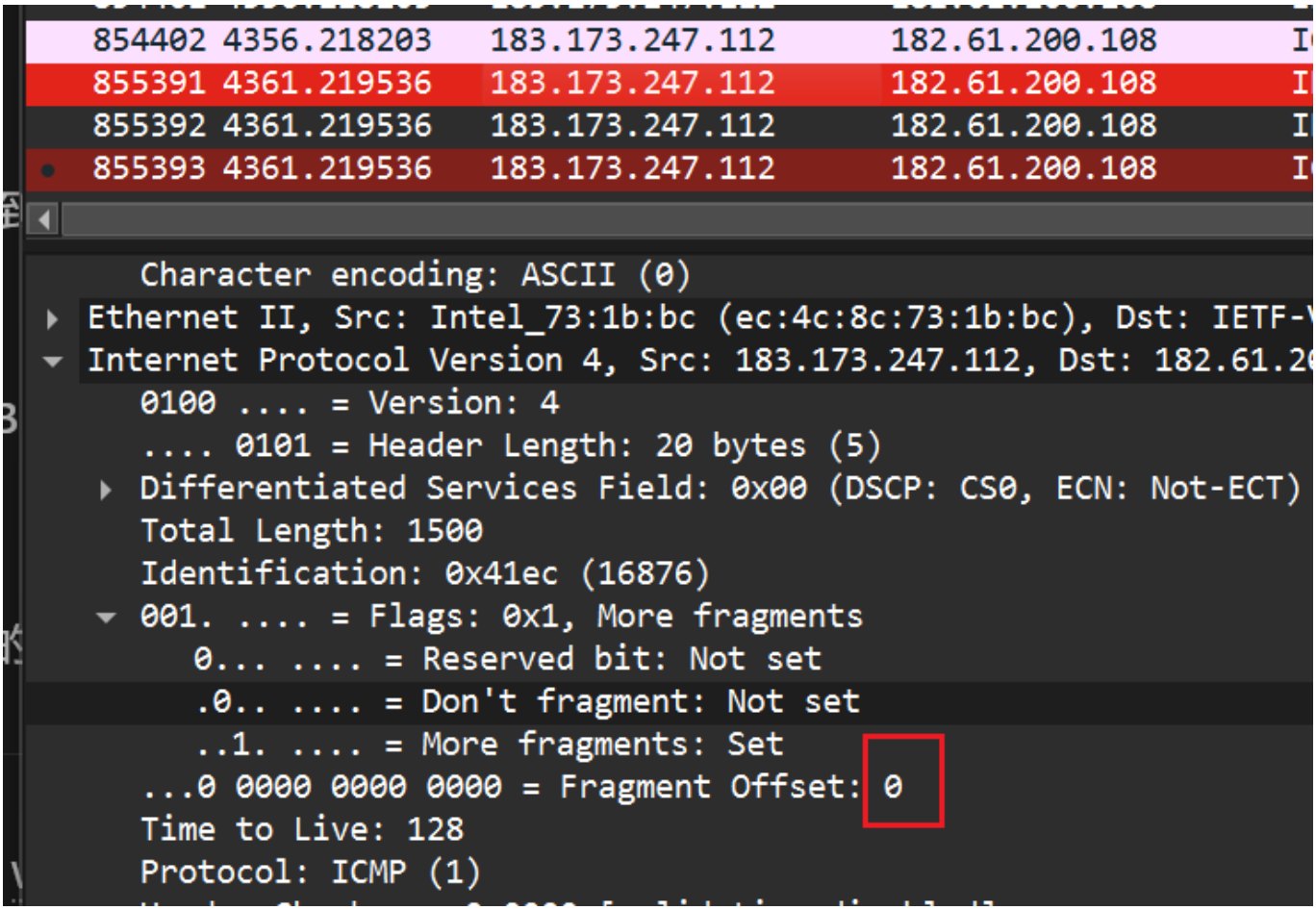
MF=1：后面还有分片

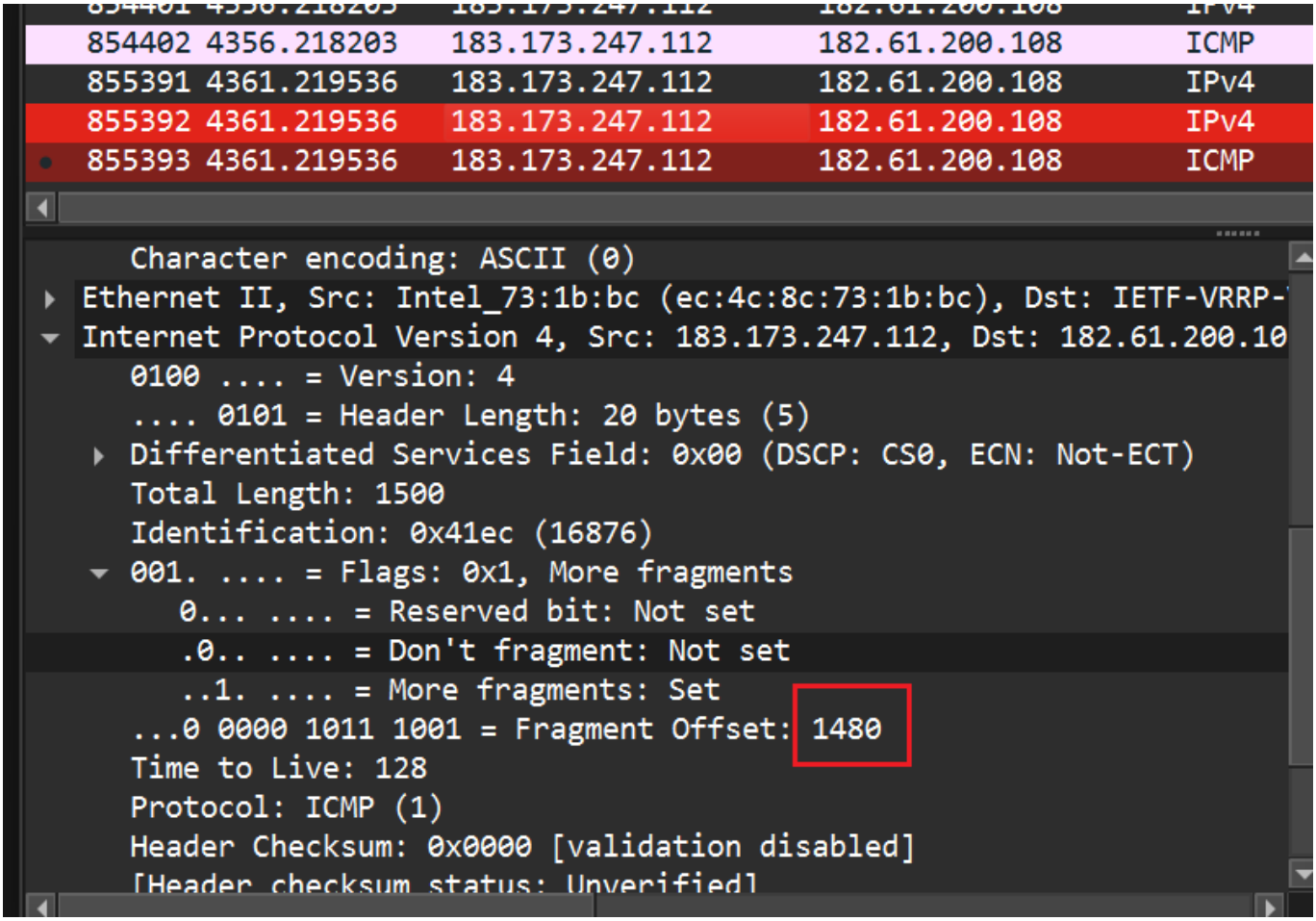
(3)

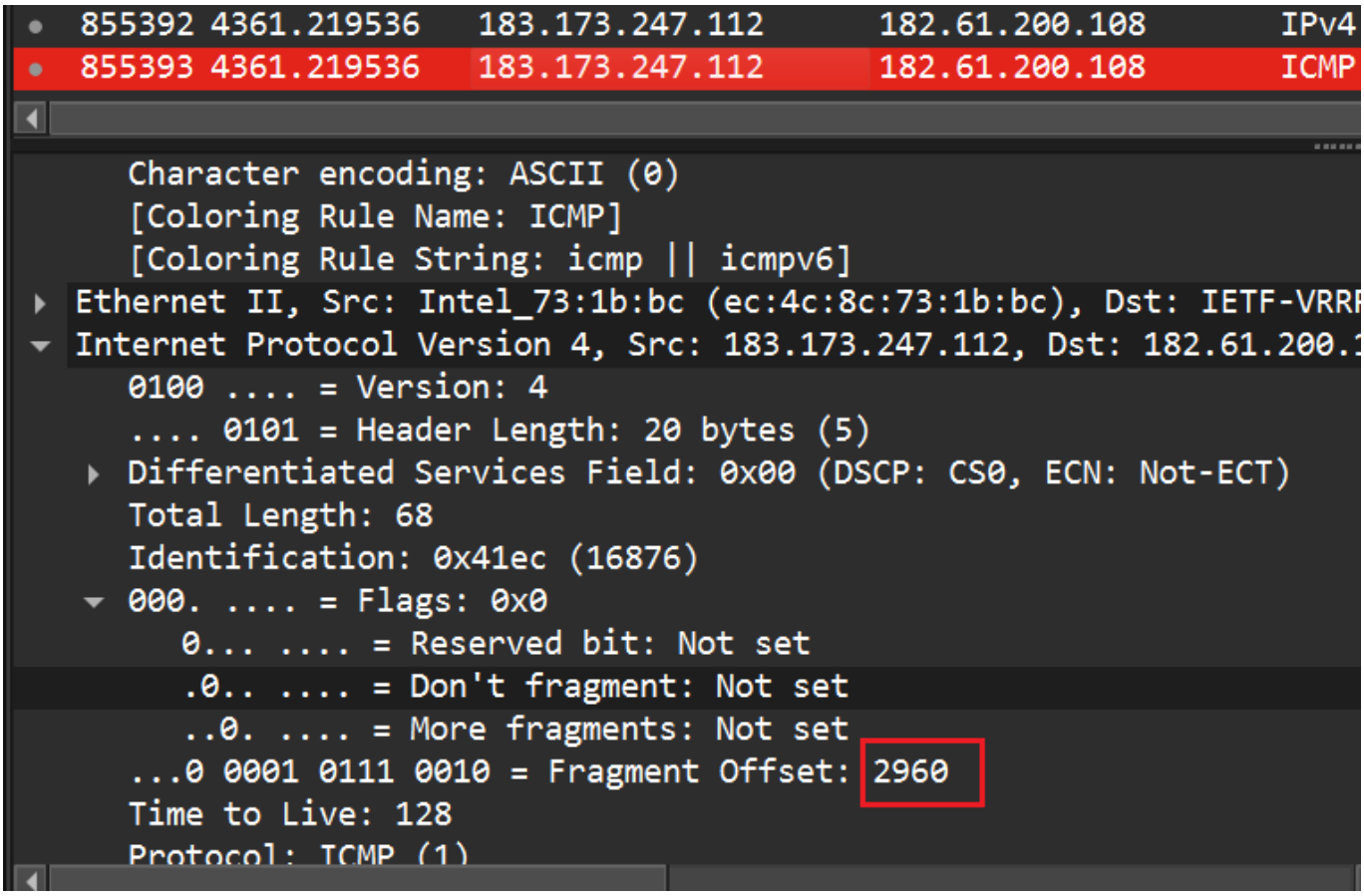


DF=0：允许分片 MF=0：这是最后一个分片

(4)


854402 4356.218203 183.173.247.112 182.61.200.108
855391 4361.219536 183.173.247.112 182.61.200.108
855392 4361.219536 183.173.247.112 182.61.200.108
855393 4361.219536 183.173.247.112 182.61.200.108
Character encoding: ASCII (0)
Ethernet II, Src: Intel_73:1b:bc (ec:4c:8c:73:1b:bc), Dst: IETF-
Internet Protocol Version 4, Src: 183.173.247.112, Dst: 182.61.2
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 1500
Identification: 0x41ec (16876)
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: 128
Protocol: ICMP (1)


854402 4356.218203 183.173.247.112 182.61.200.108 ICMP
855391 4361.219536 183.173.247.112 182.61.200.108 IPv4
855392 4361.219536 183.173.247.112 182.61.200.108 IPv4
855393 4361.219536 183.173.247.112 182.61.200.108 ICMP
Character encoding: ASCII (0)
Ethernet II, Src: Intel_73:1b:bc (ec:4c:8c:73:1b:bc), Dst: IETF-VRRP-
Internet Protocol Version 4, Src: 183.173.247.112, Dst: 182.61.200.10
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 1500
Identification: 0x41ec (16876)
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: 128
Protocol: ICMP (1)
Header Checksum: 0x0000 [validation disabled]
[Header checksum status: Unverified]



分片1 offset = 0

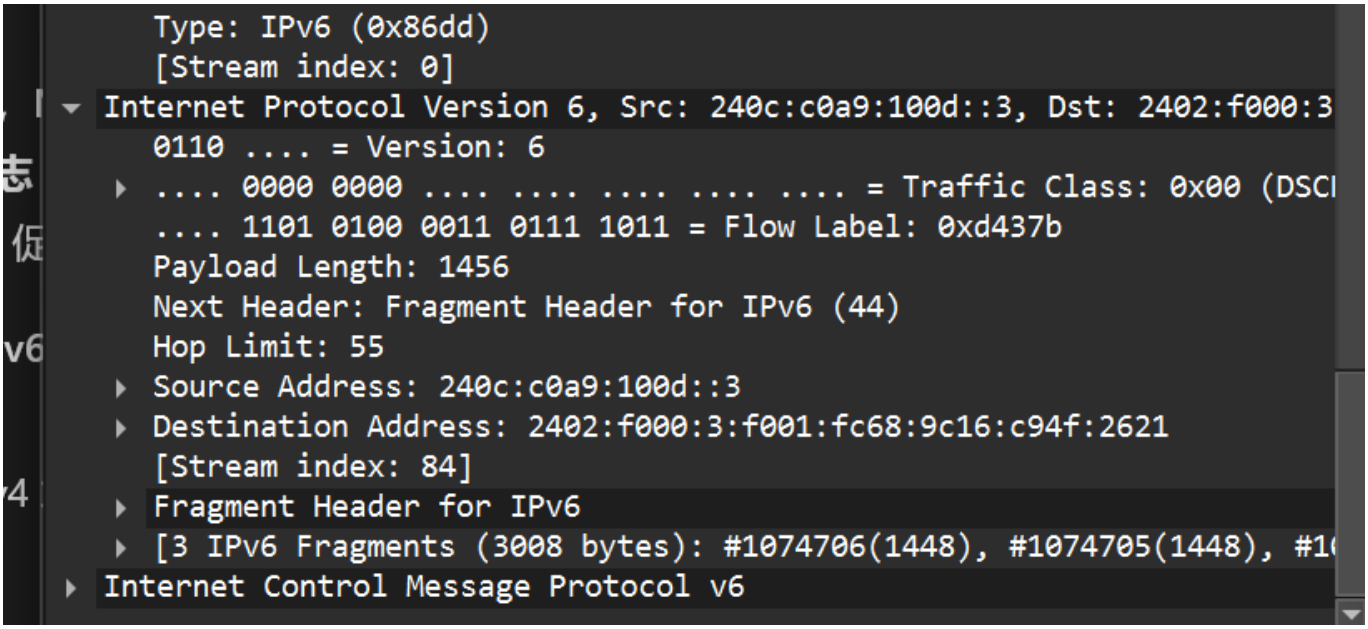
分片2 offset = 1480

分片3 offset = 1480+1480 = 2960

(5) 因为 ping -l 3000 指的是 ICMP 数据部分 3000B 还要加 ICMP 头部 8B 所以进入 IP 层的 payload = 3000 + 8 = 3008B

抓包实验2：观察IPv6包

(1)



Version = 6

源地址 = 240c:c0a9:100d::3

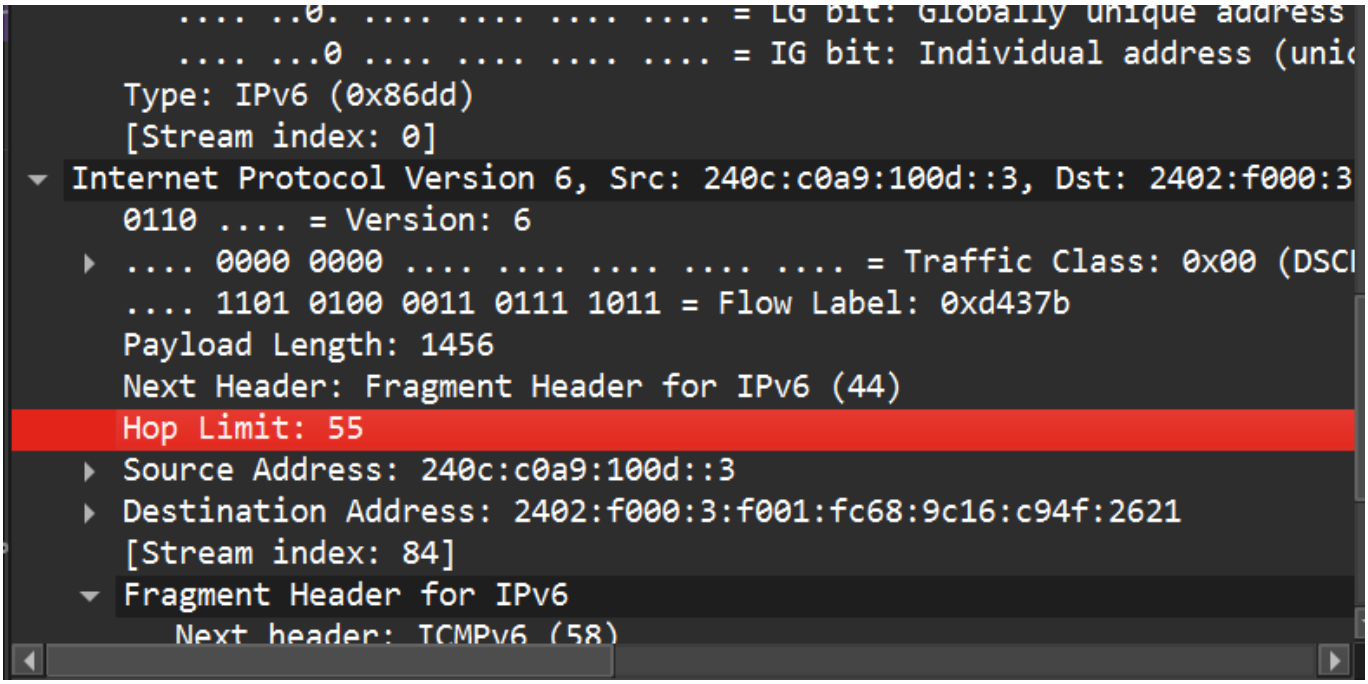
目的地址 = 2402:f000:3:f001:fc68:9c16:c94f:2621

IPv6 地址长度：128 bit = 16 字节

(2)

IPv6 不允许路由器分片，只由源主机分片 通过 Fragment Extension Header（分片扩展头，Next Header=44）里面有 Identification / Fragment Offset / M 标志 若超 MTU，路由器会回 ICMPv6 Packet Too Big 促使源端调整（PMTUD）

(3)



IPv6 用 Hop Limit 替代 IPv4 的 TTL

简述题 （1）什么情况下 IPv4 需要分段？哪里分段？哪里重组？

当 IPv4 报文长度 > 下一跳链路 MTU 且 DF=0 时需要分段。 分段发生在：源主机或中间路由器（IPv4 允许路由器分片） 重组发生在：目的主机（通常不在路由器重组）。

（2）IPv6 头部不含 checksum，如何做完整性校验？

IPv6 不做首部校验：依赖 链路层 CRC/FCS 检错； 端到端依赖 传输层校验和 需要更强安全可用 IPsec 做认证/完整性保护。