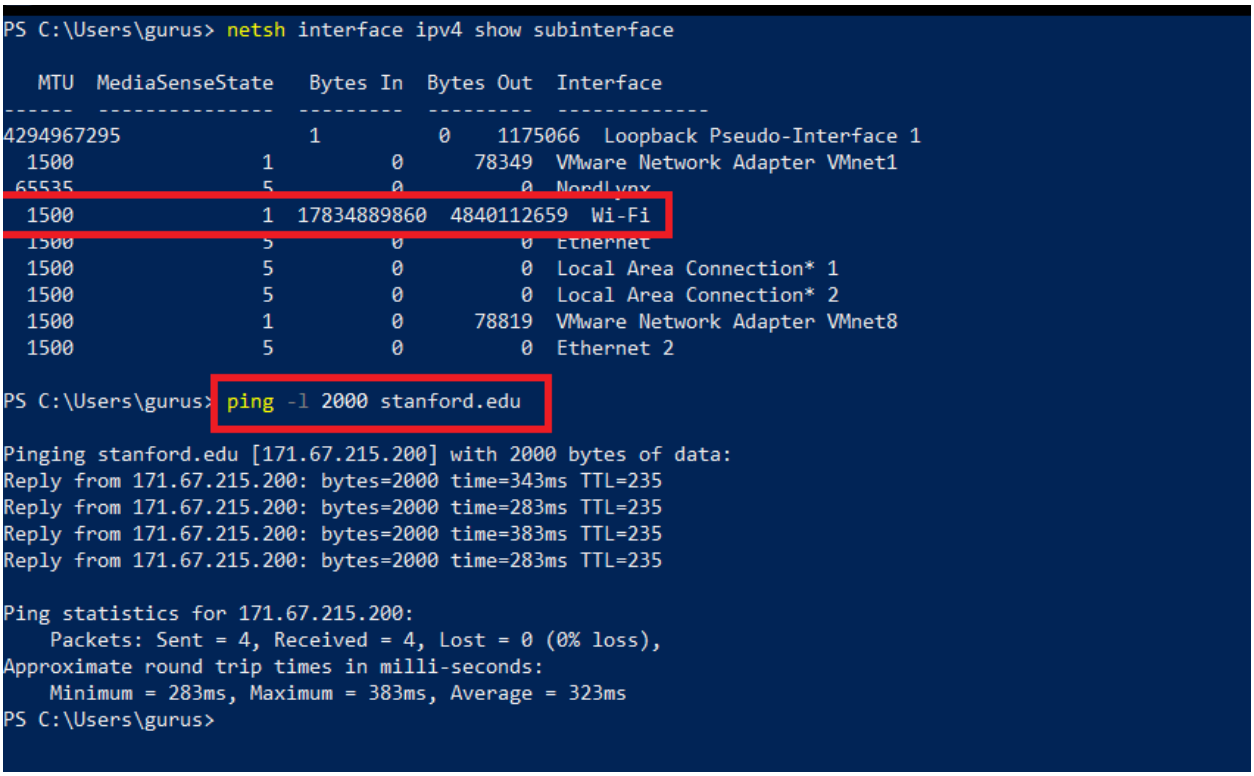
Lab-6

1. **Do something such that your packet needs to be fragmented. How do you know which is the first fragment of the entire datagram? Which is the last fragment? Get the individual offsets of fragments for the complete datagram.**

   Set the MTU value more than 1500 to fragment the packet

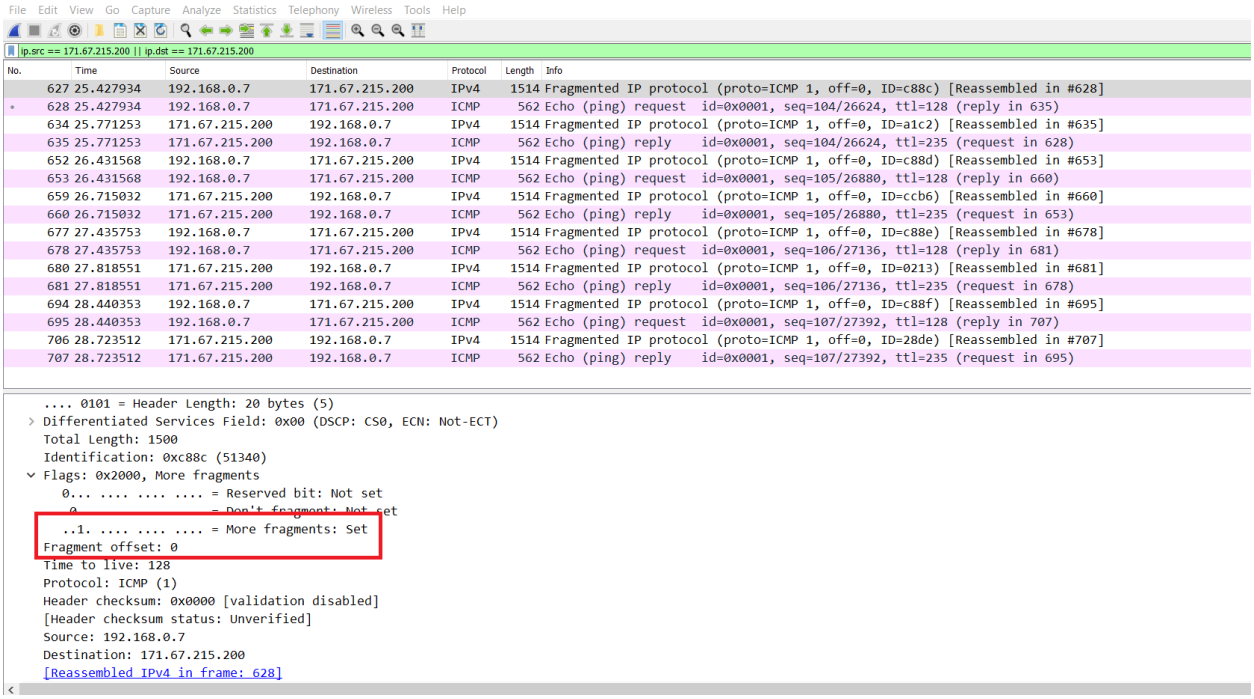
   Ping -l 2000 stanford.edu (MTU =2000, to fragment the packets)



First fragment:

More fragment set to 1(means data is fragmented)

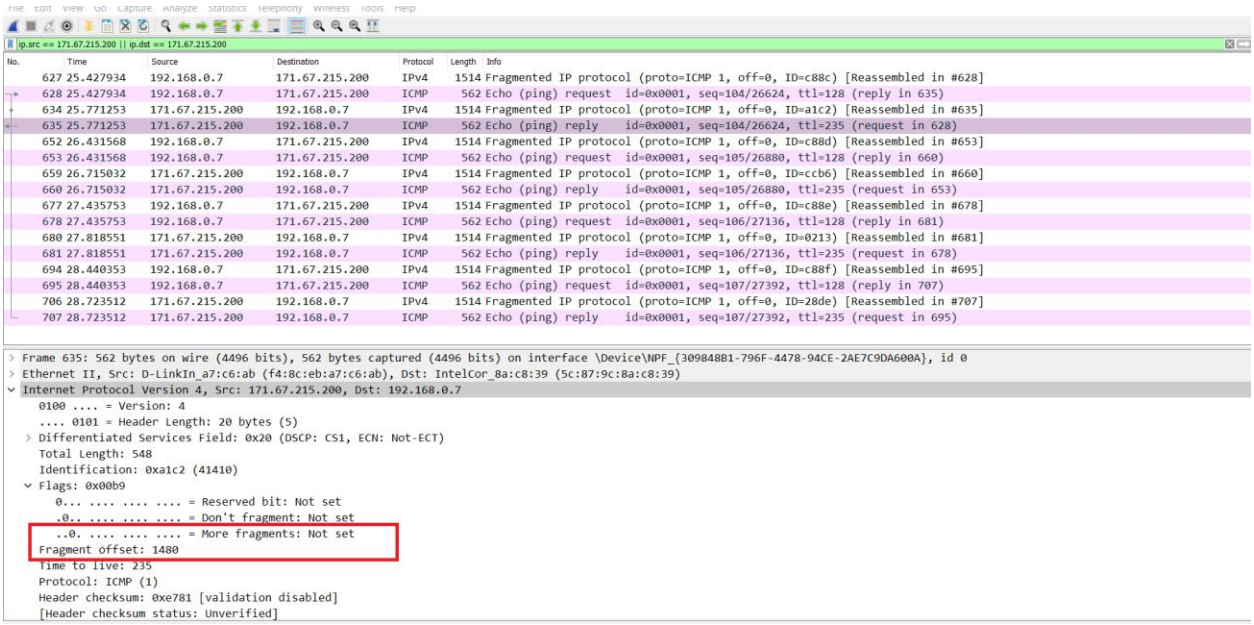
Fragment offset = 0(it is set to zero so it is the first fragment)



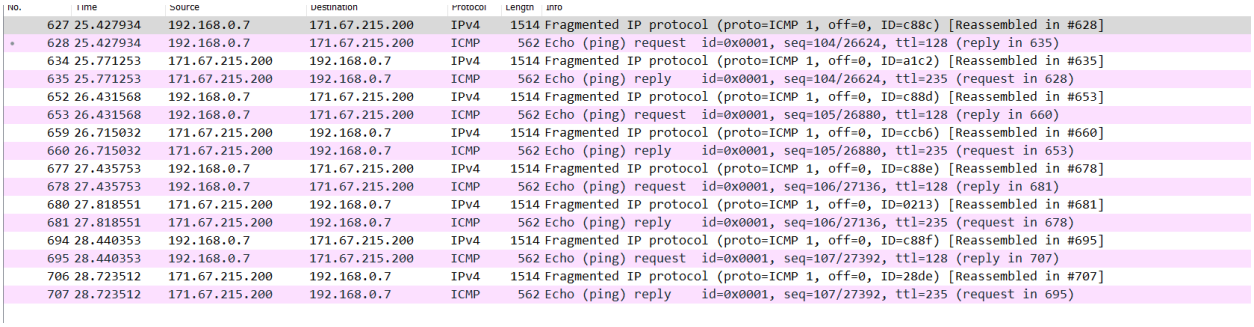
Last Fragment:

More fragment set to 0(means it was the last fragmented packet)

Fragment offset = 1480



Get the individual offsets of fragments for the complete datagram.

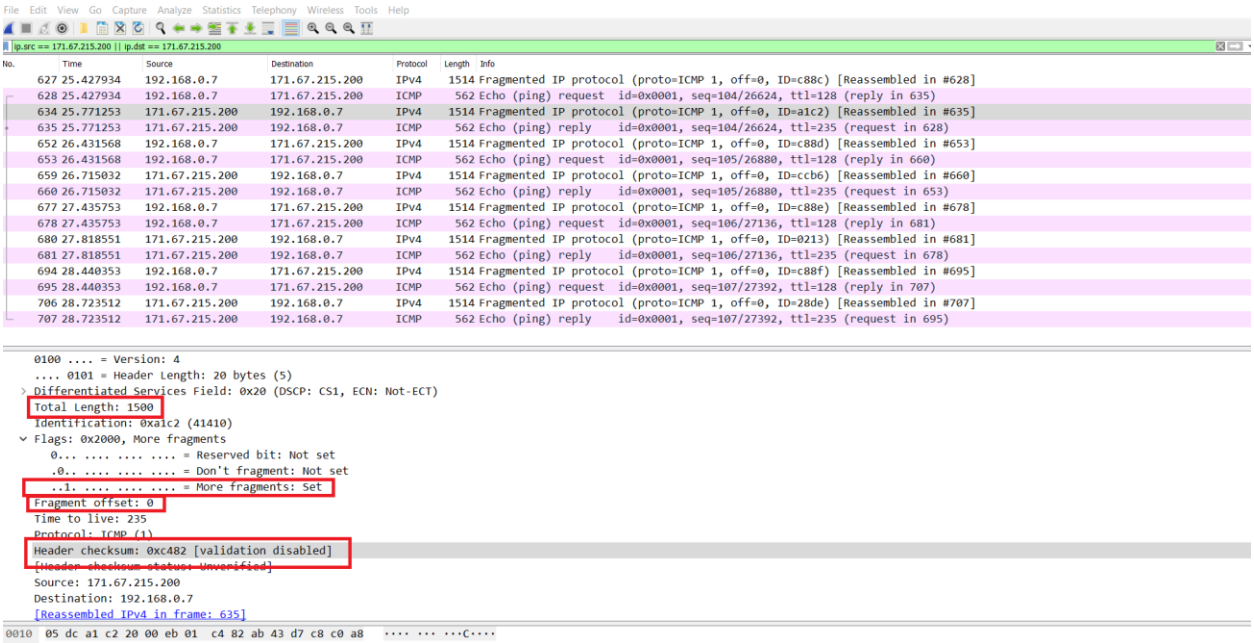


No.	Time	Source	Destination	Protocol	Length	Info
627	25.427934	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88c) [Reassembled in #628]
628	25.427934	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=104/26624, ttl=128 (reply in 635)
634	25.771253	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=a1c2) [Reassembled in #635]
635	25.771253	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=104/26624, ttl=235 (request in 628)
652	26.431568	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88d) [Reassembled in #653]
653	26.431568	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=105/26880, ttl=128 (reply in 660)
659	26.715032	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=ccb6) [Reassembled in #660]
660	26.715032	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=105/26880, ttl=235 (request in 653)
677	27.435753	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88e) [Reassembled in #678]
678	27.435753	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=106/27136, ttl=128 (reply in 681)
680	27.818551	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=0213) [Reassembled in #681]
681	27.818551	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=106/27136, ttl=235 (request in 678)
694	28.440353	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88f) [Reassembled in #695]
695	28.440353	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=107/27392, ttl=128 (reply in 707)
706	28.723512	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=28de) [Reassembled in #707]
707	28.723512	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=107/27392, ttl=235 (request in 695)

Total Length	Source	Destination	More bit	Fragment offset
1500	192.168.0.7	171.67.2125.200	1	0
548	192.168.0.7	171.67.2125.200	0	1480
1500	171.67.2125.200	192.168.0.7	1	0
548	171.67.2125.200	192.168.0.7	0	1480

2. What fields in the IP header change for each fragment in question #1?

- Total length
- Flags
- Checksum
- Fragment Offset



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ip.src == 171.67.215.200 || ip.dst == 171.67.215.200

No.	Time	Source	Destination	Protocol	Length	Info
627	25.427934	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88c) [Reassembled in #628]
628	25.427934	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=104/26624, ttl=128 (reply in 635)
634	25.771253	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=a1c2) [Reassembled in #635]
635	25.771253	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=104/26624, ttl=235 (request in 628)
652	26.431568	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88d) [Reassembled in #653]
653	26.431568	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=105/26880, ttl=128 (reply in 660)
659	26.715032	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=ccb6) [Reassembled in #660]
660	26.715032	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=105/26880, ttl=235 (request in 653)
677	27.435753	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88e) [Reassembled in #678]
678	27.435753	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=106/27136, ttl=128 (reply in 681)
680	27.818551	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=0213) [Reassembled in #681]
681	27.818551	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=106/27136, ttl=235 (request in 678)
694	28.440353	192.168.0.7	171.67.215.200	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88f) [Reassembled in #695]
695	28.440353	192.168.0.7	171.67.215.200	ICMP	562	Echo (ping) request id=0x0001, seq=107/27392, ttl=128 (reply in 707)
706	28.723512	171.67.215.200	192.168.0.7	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=28de) [Reassembled in #707]
707	28.723512	171.67.215.200	192.168.0.7	ICMP	562	Echo (ping) reply id=0x0001, seq=107/27392, ttl=235 (request in 695)

```
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x20 (DSCP: CS1, ECN: Not-ECT)
Total Length: 1500
Identification: 0xa1c2 (41410)
v Flags: 0x2000, More fragments
    0... .... .... .... = Reserved bit: Not set
    .0.. .... .... .... = Don't fragment: Not set
    ..1. .... .... .... = More fragments: Set
Fragment offset: 0
Time to live: 235
Protocol: ICMP (1)
Header checksum: 0xc482 [validation disabled]
[Header checksum status: Unverified]
Source: 171.67.215.200
Destination: 192.168.0.7
[Reassembled IPv4 in frame: 635]
0010  05 dc a1 c2 20 00 eb 01  c4 82 ab 43 d7 c8 c0 a8   .... ... ...C....
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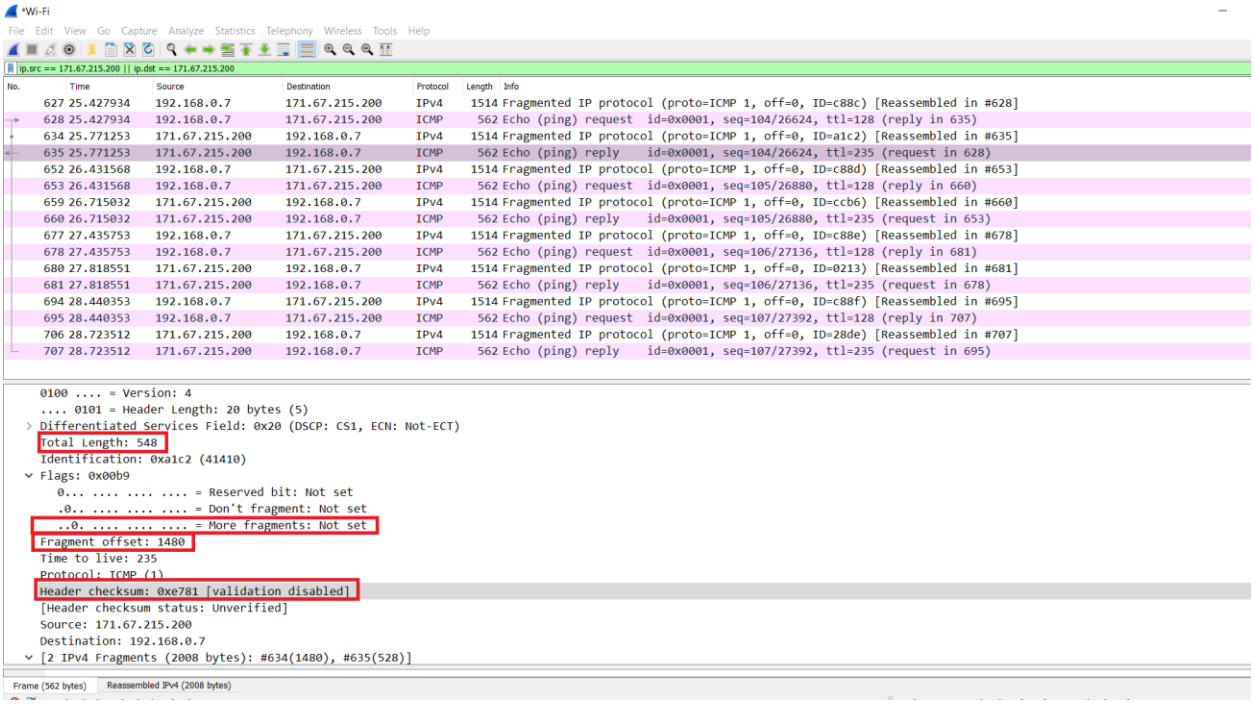
*Wi-Fi
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ip.src == 171.67.215.200 || ip.dst == 171.67.215.200
No. Time Source Destination Protocol Length Info
627 25.427934 192.168.0.7 171.67.215.200 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88c) [Reassembled in #628]
628 25.427934 192.168.0.7 171.67.215.200 ICMP 562 Echo (ping) request id=0x0001, seq=104/26624, ttl=128 (reply in 635)
634 25.771253 171.67.215.200 192.168.0.7 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=a1c2) [Reassembled in #635]
635 25.771253 171.67.215.200 192.168.0.7 ICMP 562 Echo (ping) reply id=0x0001, seq=104/26624, ttl=235 (request in 628)
652 26.431568 192.168.0.7 171.67.215.200 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88d) [Reassembled in #653]
653 26.431568 192.168.0.7 171.67.215.200 ICMP 562 Echo (ping) request id=0x0001, seq=105/26880, ttl=128 (reply in 660)
659 26.715032 171.67.215.200 192.168.0.7 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=ccb6) [Reassembled in #660]
660 26.715032 171.67.215.200 192.168.0.7 ICMP 562 Echo (ping) reply id=0x0001, seq=105/26880, ttl=235 (request in 653)
677 27.435753 192.168.0.7 171.67.215.200 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88e) [Reassembled in #678]
678 27.435753 192.168.0.7 171.67.215.200 ICMP 562 Echo (ping) request id=0x0001, seq=106/27136, ttl=128 (reply in 681)
680 27.818551 171.67.215.200 192.168.0.7 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0213) [Reassembled in #681]
681 27.818551 171.67.215.200 192.168.0.7 ICMP 562 Echo (ping) reply id=0x0001, seq=106/27136, ttl=235 (request in 678)
694 28.440353 192.168.0.7 171.67.215.200 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=c88f) [Reassembled in #695]
695 28.440353 192.168.0.7 171.67.215.200 ICMP 562 Echo (ping) request id=0x0001, seq=107/27392, ttl=128 (reply in 707)
706 28.723512 171.67.215.200 192.168.0.7 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=28de) [Reassembled in #707]
707 28.723512 171.67.215.200 192.168.0.7 ICMP 562 Echo (ping) reply id=0x0001, seq=107/27392, ttl=235 (request in 695)
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x20 (DSCP: CS1, ECN: Not-ECT)
Total Length: 548
Identification: 0xa1c2 (41410)
Flags: 0x00b9
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..0. .... = More fragments: Not set
Fragment offset: 1480
Time to live: 235
Protocol: ICMP (1)
Header checksum: 0xe781 [validation disabled]
[Header checksum status: Unverified]
Source: 171.67.215.200
Destination: 192.168.0.7
[2 IPv4 Fragments (2008 bytes): #634(1480), #635(528)]
Frame (562 bytes)
Reassembled IPv4 (2008 bytes)