

데이터통신

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|------|--------------|
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| 과제번호 | 01 |
| 분반 | 02 |
| 학과 | 컴퓨터공학과 |
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1. YOUTUBE.COM

| | | | | | |
|----|--------------|----------------|-----------------|---------|---|
| 8 | 0.170330400 | 216.58.197.142 | 192.168.135.128 | TLSv1.2 | 123 Application Data |
| 9 | 0.170977203 | 216.58.197.142 | 192.168.135.128 | TCP | 60 443 → 57590 [ACK] Seq=1 Ack=518 Win=64240 |
| 10 | 0.171189019 | 216.58.197.142 | 192.168.135.128 | TCP | 60 443 → 57588 [ACK] Seq=3763 Ack=826 Win=642 |
| 11 | 0.229709476 | 216.58.197.142 | 192.168.135.128 | TLSv1.2 | 92 Application Data |
| 12 | 0.277371921 | 216.58.197.142 | 192.168.135.128 | TLSv1.2 | 3463 Server Hello, Certificate, Server Key Exch |
| 13 | 0.283366296 | 216.58.197.142 | 192.168.135.128 | TCP | 60 443 → 57590 [ACK] Seq=3410 Ack=611 Win=642 |
| 14 | 0.283739538 | 216.58.197.142 | 192.168.135.128 | TCP | 60 443 → 57590 [ACK] Seq=3410 Ack=788 Win=642 |
| 15 | 0.350631875 | 216.58.197.142 | 192.168.135.128 | TLSv1.2 | 338 New Session Ticket, Change Cipher Spec, En |
| 16 | 0.352046570 | 216.58.197.142 | 192.168.135.128 | TLSv1.2 | 123 Application Data |
| 17 | 0.352543998 | 216.58.197.142 | 192.168.135.128 | TCP | 60 443 → 57590 [ACK] Seq=3763 Ack=826 Win=642 |
| 18 | 0.416762758 | 216.58.197.142 | 192.168.135.128 | TLSv1.2 | 92 Application Data |
| 19 | 58.775983846 | 216.58.197.142 | 192.168.135.128 | TCP | 60 443 → 57590 [ACK] Seq=3801 Ack=872 Win=642 |

▶ Frame 8: 123 bytes on wire (984 bits), 123 bytes captured (984 bits) on interface 0

▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)

▶ Internet Protocol Version 4, Src: 216.58.197.142, Dst: 192.168.135.128

▶ Transmission Control Protocol, Src Port: 443, Dst Port: 57588, Seq: 3694, Ack: 788, Len: 69

▶ Secure Sockets Layer

| | | |
|------|---|-------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 | ..)....P V.>...E. |
| 0010 | 00 6d 49 e7 00 00 80 06 0a b2 d8 3a c5 8e c0 a8 | .mI.....:... |
| 0020 | 87 80 01 bb e0 f4 48 21 70 5d d1 67 6c 1f 50 18 |H! p].gl.P. |
| 0030 | fa f0 59 6e 00 00 17 03 03 00 40 00 00 00 00 00 | ..Yn.....@..... |
| 0040 | 00 00 01 10 eb 59 74 16 47 42 24 7f 11 37 e8 bc |Yt. GB\$.7.. |
| 0050 | ea 02 4c e3 9a 5e 0e 02 dd 18 f8 51 50 c1 45 05 | ..L.^... ..QP.E. |
| 0060 | 99 e0 7c 20 c3 be fe 36 25 9f 93 a9 67 dc bf 31 |6 %...g..1 |
| 0070 | f4 55 58 45 39 46 34 6c a3 33 1c | ..UXE9F41 .3. |

Is the frame an outgoing or an incoming frame?

→ incoming frame 이유 : SRC 의 주소가 Youtube의 주소이고 Dst의 주소가 내 Pc 주소이기 때문에 외부에서 내 컴퓨터로 들어오는 신호의 패킷이다. 같은 이유로 밑의 나머지 4개의 패킷분석결과에 대한 답도 전부 incoming frame이다.

What is the source IP address of the network-layer header in the frame?

→ 192.168.135.128

What is the destination IP address of the network-layer header in the frame?

→ 172.217.163.238

What is the total number of bytes in the whole frame? → 123 bytes

| |
|---|
| ▶ Frame 8: 123 bytes on wire (984 bits), 123 bytes captured (984 bits) on interface 0 |
| ▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10) |
| ▶ Internet Protocol Version 4, Src: 216.58.197.142, Dst: 192.168.135.128 |
| ▶ Transmission Control Protocol, Src Port: 443, Dst Port: 57588, Seq: 3694, Ack: 788, Len: 69 |
| ▶ Secure Sockets Layer |

| | | |
|------|---|-------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 | ..)....P V.>...E. |
| 0010 | 00 6d 49 e7 00 00 80 06 0a b2 d8 3a c5 8e c0 a8 | .mI.....:... |
| 0020 | 87 80 01 bb e0 f4 48 21 70 5d d1 67 6c 1f 50 18 |H! p].gl.P. |
| 0030 | fa f0 59 6e 00 00 17 03 03 00 40 00 00 00 00 00 | ..Yn.....@..... |
| 0040 | 00 00 01 10 eb 59 74 16 47 42 24 7f 11 37 e8 bc |Yt. GB\$.7.. |
| 0050 | ea 02 4c e3 9a 5e 0e 02 dd 18 f8 51 50 c1 45 05 | ..L.^... ..QP.E. |
| 0060 | 99 e0 7c 20 c3 be fe 36 25 9f 93 a9 67 dc bf 31 |6 %...g..1 |
| 0070 | f4 55 58 45 39 46 34 6c a3 33 1c | ..UXE9F41 .3. |

What is the number of bytes in the Ethernet (data-link layer) header?→ 14

What is the number of bytes in the IP header?→ 20

```
▶ Frame 8: 123 bytes on wire (984 bits), 123 bytes captured (984 bits) on interface 0
▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)
▶ Internet Protocol Version 4, Src: 216.58.197.142, Dst: 192.168.135.128
▶ Transmission Control Protocol, Src Port: 443, Dst Port: 57588, Seq: 3694, Ack: 788, Len: 69
▶ Secure Sockets Layer
```

| | | | |
|------|-------------------------|-------------------------|-------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 | 56 e2 3e ae 08 00 45 00 | ..).P V.>...E. |
| 0010 | 00 6d 49 e7 00 00 80 06 | 0a b2 d8 3a c5 8e c0 a8 | .mI.....:.... |
| 0020 | 87 80 01 bb e0 f4 48 21 | 70 5d d1 67 6c 1f 50 18 | ...H! p].gl.P. |
| 0030 | fa f0 59 6e 00 00 17 03 | 03 00 40 00 00 00 00 00 | ..Yn.....@..... |
| 0040 | 00 00 01 10 eb 59 74 16 | 47 42 24 7f 11 37 e8 bc |Yt. GB\$.7.. |
| 0050 | ea 02 4c e3 9a 5e 0e 02 | dd 18 f8 51 50 c1 45 05 | ..L..^.....QP.E. |
| 0060 | 99 e0 7c 20 c3 be fe 36 | 25 9f 93 a9 67 dc bf 31 |6 %...g.1 |
| 0070 | f4 55 58 45 39 46 34 6c | a3 33 1c | ..UXE9F41 .3. |

What is the number of bytes in the TCP header?→ 20

What is the total bytes in the message (at the application layer)?→ $123 - (14 + 20 + 20) = \text{total } 69 \text{ bytes}$

2. NAVER.COM

| | | | | | |
|----|---------------|---------------|-----------------|---------|---|
| 16 | 14.207.230.12 | 210.89.164.90 | 192.168.135.128 | TLSv1.2 | 4096 Application Data, Application Data, Application Data |
| 17 | 132.976302010 | 210.89.164.90 | 192.168.135.128 | TCP | 60 443 → 60592 [ACK] Seq=58619 Ack=208 Win=64240 |
| 18 | 132.983629096 | 210.89.164.90 | 192.168.135.128 | TLSv1.2 | 100 Application Data |
| 19 | 191.979106041 | 210.89.164.90 | 192.168.135.128 | TCP | 60 443 → 60592 [ACK] Seq=58665 Ack=254 Win=64240 |

| | | | | | |
|---|--|--|--|--|--|
| ▶ Frame 18: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface 0 | | | | | |
| ▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10) | | | | | |
| ▶ Internet Protocol Version 4, Src: 210.89.164.90, Dst: 192.168.135.128 | | | | | |
| ▶ Transmission Control Protocol, Src Port: 443, Dst Port: 60592, Seq: 58619, Ack: 208, Len: 46 | | | | | |
| ▶ Secure Sockets Layer | | | | | |

| | | | |
|------|-------------------------|-------------------------|------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 | 56 e2 3e ae 08 00 45 00 | ..)....P V>...E. |
| 0010 | 00 56 37 af 00 00 80 06 | 44 16 d2 59 a4 5a c0 a8 | .V7....D..Y.Z.. |
| 0020 | 87 80 01 bb ec b0 10 d2 | 30 07 7f 93 9c ab 50 18 |0.....P. |
| 0030 | fa f0 81 2f 00 00 17 03 | 03 00 29 60 d2 f3 04 cf | .../....)..... |
| 0040 | cf b3 72 01 c1 ec 08 25 | 13 ed 3d 73 ab 55 57 d9 | ..r....%...s.UW. |
| 0050 | f1 7a 06 cf 12 05 1d c5 | 7e af 44 b4 a0 23 20 67 | .z.....~D..# g |
| 0060 | 2d e4 d3 b9 | | |

Is the frame an outgoing or an incoming frame?

→ incoming frame

What is the source IP address of the network-layer header in the frame?

→ 210.89.164.90

What is the destination IP address of the network-layer header in the frame?

→ 192.168.135.128

What is the total number of bytes in the whole frame? → 100bytes

What is the number of bytes in the Ethernet (data-link layer) header? → 14

| | | | | | |
|---|--|--|--|--|--|
| ▶ Frame 18: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface 0 | | | | | |
| ▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10) | | | | | |
| ▶ Internet Protocol Version 4, Src: 210.89.164.90, Dst: 192.168.135.128 | | | | | |
| ▶ Transmission Control Protocol, Src Port: 443, Dst Port: 60592, Seq: 58619, Ack: 208, Len: 46 | | | | | |
| ▶ Secure Sockets Layer | | | | | |

| | | | |
|------|-------------------------|-------------------------|------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 | 56 e2 3e ae 08 00 45 00 | ..)....P V>...E. |
| 0010 | 00 56 37 af 00 00 80 06 | 44 16 d2 59 a4 5a c0 a8 | .V7....D..Y.Z.. |
| 0020 | 87 80 01 bb ec b0 10 d2 | 30 07 7f 93 9c ab 50 18 |0.....P. |
| 0030 | fa f0 81 2f 00 00 17 03 | 03 00 29 60 d2 f3 04 cf | .../....)..... |
| 0040 | cf b3 72 01 c1 ec 08 25 | 13 ed 3d 73 ab 55 57 d9 | ..r....%...s.UW. |
| 0050 | f1 7a 06 cf 12 05 1d c5 | 7e af 44 b4 a0 23 20 67 | .z.....~D..# g |
| 0060 | 2d e4 d3 b9 | | |

| | | | | | |
|---|--|--|--|--|--|
| ▶ Frame 18: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface 0 | | | | | |
| ▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10) | | | | | |
| ▶ Internet Protocol Version 4, Src: 210.89.164.90, Dst: 192.168.135.128 | | | | | |
| ▶ Transmission Control Protocol, Src Port: 443, Dst Port: 60592, Seq: 58619, Ack: 208, Len: 46 | | | | | |
| ▶ Secure Sockets Layer | | | | | |

| | | | |
|------|-------------------------|-------------------------|------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 | 56 e2 3e ae 08 00 45 00 | ..)....P V>...E. |
| 0010 | 00 56 37 af 00 00 80 06 | 44 16 d2 59 a4 5a c0 a8 | .V7....D..Y.Z.. |
| 0020 | 87 80 01 bb ec b0 10 d2 | 30 07 7f 93 9c ab 50 18 |0.....P. |
| 0030 | fa f0 81 2f 00 00 17 03 | 03 00 29 60 d2 f3 04 cf | .../....)..... |
| 0040 | cf b3 72 01 c1 ec 08 25 | 13 ed 3d 73 ab 55 57 d9 | ..r....%...s.UW. |
| 0050 | f1 7a 06 cf 12 05 1d c5 | 7e af 44 b4 a0 23 20 67 | .z.....~D..# g |
| 0060 | 2d e4 d3 b9 | | |

What is the number of bytes in the IP header? → 20

What is the number of bytes in the TCP header? → 20

What is the total bytes in the message (at the application layer)? → 100-(14+20+20) = 46 bytes

3. daum.net

| | | | | | | |
|----|-------------|----------------|-----------------|---------|-------|-----------------------|
| 16 | 7.415978140 | 203.133.167.16 | 192.168.135.128 | HTTP | 191 | HTTP/1.1 302 Found : |
| 17 | 7.416663112 | 203.133.167.16 | 192.168.135.128 | TCP | 60 | 80 → 55184 [ACK] Seq= |
| 18 | 7.430077815 | 203.133.167.16 | 192.168.135.128 | TCP | 60 | 443 → 34024 [SYN, ACK |
| 19 | 7.431667369 | 203.133.167.16 | 192.168.135.128 | TCP | 60 | 443 → 34024 [ACK] Seq |
| 20 | 7.438370184 | 203.133.167.16 | 192.168.135.128 | TLSv1.2 | 225 | Server Hello, Change |
| 21 | 7.439186163 | 203.133.167.16 | 192.168.135.128 | TCP | 60 | 443 → 34024 [ACK] Seq |
| 22 | 7.440484625 | 203.133.167.16 | 192.168.135.128 | TCP | 60 | 443 → 34024 [ACK] Seq |
| 23 | 7.464221808 | 203.133.167.16 | 192.168.135.128 | TCP | 5894 | 443 → 34024 [PSH, ACK |
| 24 | 7.469815773 | 203.133.167.16 | 192.168.135.128 | TLSv1.2 | 1499 | Application Data |
| 25 | 7.471196615 | 203.133.167.16 | 192.168.135.128 | TLSv1.2 | 10259 | Application Data |
| 26 | 7.477451238 | 203.133.167.16 | 192.168.135.128 | TCP | 1514 | 443 → 34024 [PSH, ACK |
| 27 | 7.478762980 | 203.133.167.16 | 192.168.135.128 | TLSv1.2 | 6104 | Application Data, App |
| 28 | 7.485407189 | 203.133.167.16 | 192.168.135.128 | TLSv1.2 | 8799 | Application Data [TCP |

| | |
|---|---|
| ▶ | Frame 16: 191 bytes on wire (1528 bits), 191 bytes captured (1528 bits) on interface 0 |
| ▶ | Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10) |
| ▶ | Internet Protocol Version 4, Src: 203.133.167.16, Dst: 192.168.135.128 |
| ▶ | Transmission Control Protocol, Src Port: 80, Dst Port: 55184, Seq: 1, Ack: 679, Len: 137 |
| ▶ | Hypertext Transfer Protocol |

| | | | |
|------|-------------------------|-------------------------|---------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 | 56 e2 3e ae 08 00 45 00 | ..).P V.>...E. |
| 0010 | 00 b1 5e 8d 00 00 80 06 | 20 fb cb 85 a7 10 c0 a8 | ...^..... |
| 0020 | 87 80 00 50 d7 90 74 fa | 7a 4b d5 39 7d 1d 50 19 | ...P...t. zK.9}.P. |
| 0030 | fa f0 b7 e3 00 00 48 54 | 54 50 2f 31 2e 31 20 33 |HT TP/1.1 3 |
| 0040 | 30 32 20 46 6f 75 6e 64 | 20 3a 20 4d 6f 76 65 64 | 02 Found : Moved |
| 0050 | 20 54 65 6d 70 6f 72 61 | 72 69 6c 79 0d 0a 4c 6f | Tempora rily...Lo |
| 0060 | 63 61 74 69 6f 6e 3a 20 | 68 74 74 70 73 3a 2f 2f | cation: https:// |
| 0070 | 77 77 77 2e 64 61 75 6d | 2e 6e 65 74 2f 0d 0a 43 | www.daum .net/..C |
| 0080 | 6f 6e 6e 65 63 74 69 6f | 6e 3a 20 63 6c 6f 73 65 | onnectio n: close |
| 0090 | 0d 0a 43 61 63 68 65 2d | 43 6f 6e 74 72 6f 6c 3a | ..Cache- Control: |
| 00a0 | 20 6e 6f 2d 63 61 63 68 | 65 0d 0a 50 72 61 67 6d | no-cach e..Pragm |
| 00b0 | 61 3a 20 6e 6f 2d 63 61 | 63 68 65 0d 0a 0d 0a | a: no-ca che.... |

Is the frame an outgoing or an incoming frame? → incoming

What is the source IP address of the network-layer header in the frame?

→ 203.133.167.16

What is the destination IP address of the network-layer header in the frame?

→ 192.168.135.128

What is the total number of bytes in the whole frame? → 191 bytes

```

▶ Frame 16: 191 bytes on wire (1528 bits), 191 bytes captured (1528 bits) on interface 0
▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)
▶ Internet Protocol Version 4, Src: 203.133.167.16, Dst: 192.168.135.128
▶ Transmission Control Protocol, Src Port: 80, Dst Port: 55184, Seq: 1, Ack: 679, Len: 137
▶ Hypertext Transfer Protocol

```

```

0000  00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00  ..)....P V.>...E.
0010  00 b1 5e 8d 00 00 80 06 20 fb cb 85 a7 10 c0 a8  ..^.....
0020  87 80 00 50 d7 90 74 fa 7a 4b d5 39 7d 1d 50 19  ...P..t. zK.9}.P.
0030  fa f0 b7 e3 00 00 48 54 54 50 2f 31 2e 31 20 33  ....HT TP/1.1 3
0040  30 32 20 46 6f 75 6e 64 20 3a 20 4d 6f 76 65 64  02 Found : Moved
0050  20 54 65 6d 70 6f 72 61 72 69 6c 79 0d 0a 4c 6f  Tempora rily..Lo
0060  63 61 74 69 6f 6e 3a 20 68 74 74 70 73 3a 2f 2f  cation: https://
0070  77 77 77 2e 64 61 75 6d 2e 6e 65 74 2f 0d 0a 43  www.daum .net/..C
0080  6f 6e 6e 65 63 74 69 6f 6e 3a 20 63 6c 6f 73 65  onnectio n: close
0090  0d 0a 43 61 63 68 65 2d 43 6f 6e 74 72 6f 6c 3a  ..Cache- Control:
00a0  20 6e 6f 2d 63 61 63 68 65 0d 0a 50 72 61 67 6d  no-cach e..Pragm
00b0  61 3a 20 6e 6f 2d 63 61 63 68 65 0d 0a 0d 0a  a: no-ca che....

```

What is the number of bytes in the Ethernet (data-link layer) header? → 14

What is the number of bytes in the IP header? → 20

```

▶ Frame 16: 191 bytes on wire (1528 bits), 191 bytes captured (1528 bits) on interface 0
▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)
▶ Internet Protocol Version 4, Src: 203.133.167.16, Dst: 192.168.135.128
▶ Transmission Control Protocol, Src Port: 80, Dst Port: 55184, Seq: 1, Ack: 679, Len: 137
▶ Hypertext Transfer Protocol

```

```

0000  00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00  ..)....P V.>...E.
0010  00 b1 5e 8d 00 00 80 06 20 fb cb 85 a7 10 c0 a8  ..^.....
0020  87 80 00 50 d7 90 74 fa 7a 4b d5 39 7d 1d 50 19  ...P..t. zK.9}.P.
0030  fa f0 b7 e3 00 00 48 54 54 50 2f 31 2e 31 20 33  ....HT TP/1.1 3
0040  30 32 20 46 6f 75 6e 64 20 3a 20 4d 6f 76 65 64  02 Found : Moved
0050  20 54 65 6d 70 6f 72 61 72 69 6c 79 0d 0a 4c 6f  Tempora rily..Lo
0060  63 61 74 69 6f 6e 3a 20 68 74 74 70 73 3a 2f 2f  cation: https://
0070  77 77 77 2e 64 61 75 6d 2e 6e 65 74 2f 0d 0a 43  www.daum .net/..C
0080  6f 6e 6e 65 63 74 69 6f 6e 3a 20 63 6c 6f 73 65  onnectio n: close
0090  0d 0a 43 61 63 68 65 2d 43 6f 6e 74 72 6f 6c 3a  ..Cache- Control:
00a0  20 6e 6f 2d 63 61 63 68 65 0d 0a 50 72 61 67 6d  no-cach e..Pragm
00b0  61 3a 20 6e 6f 2d 63 61 63 68 65 0d 0a 0d 0a  a: no-ca che....

```

What is the number of bytes in the TCP header? → 20

What is the total bytes in the message (at the application layer)? $191 - (14 + 20 + 20) = 137$ bytes

4. tistory.com

| | | | | | |
|----|-------------|-----------------|-----------------|---------|--------------------------|
| 3 | 0.056962212 | 211.231.108.151 | 192.168.135.128 | HTTP | 242 HTTP/1.1 302 |
| 4 | 0.057746437 | 211.231.108.151 | 192.168.135.128 | TCP | 60 80 → 57410 [ACK] Seq |
| 5 | 0.058523840 | 211.231.108.151 | 192.168.135.128 | TCP | 60 80 → 57410 [FIN, PSI |
| 6 | 0.071067825 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45110 [SYN, AI |
| 7 | 0.072724716 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45110 [ACK] S |
| 8 | 0.086778999 | 211.231.108.151 | 192.168.135.128 | TLSv1.2 | 4521 Server Hello, Certi |
| 9 | 0.090114567 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45110 [ACK] S |
| 10 | 0.099943389 | 211.231.108.151 | 192.168.135.128 | TLSv1.2 | 328 New Session Ticket, |
| 11 | 0.113395994 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45110 [ACK] S |
| 12 | 0.135883495 | 211.231.108.151 | 192.168.135.128 | TLSv1.2 | 2926 Application Data, A |
| 13 | 0.137180953 | 211.231.108.151 | 192.168.135.128 | TLSv1.2 | 3839 Application Data, A |
| 14 | 0.140902350 | 211.231.108.151 | 192.168.135.128 | TLSv1.2 | 2043 Application Data, A |
| 15 | 0.142020853 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45110 [ACK] S |
| 16 | 0.142046484 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45110 [ACK] S |
| 17 | 0.724331307 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45116 [SYN, AI |
| 18 | 0.727781355 | 211.231.108.151 | 192.168.135.128 | TCP | 60 443 → 45116 [ACK] S |
| 19 | 0.737293528 | 211.231.108.151 | 192.168.135.128 | TLSv1.2 | 191 Server Hello. Chan |

```
▶ Frame 3: 242 bytes on wire (1936 bits), 242 bytes captured (1936 bits) on interface 0
▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)
▶ Internet Protocol Version 4, Src: 211.231.108.151, Dst: 192.168.135.128
▶ Transmission Control Protocol, Src Port: 80, Dst Port: 57410, Seq: 1, Ack: 352, Len: 188
▶ Hypertext Transfer Protocol
```

```
0000 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 ..)....P V.>...E.
0010 00 e4 8d 9a 00 00 80 06 23 d2 d3 e7 6c 97 c0 a8 .....#...1...
0020 87 80 00 50 e0 42 07 3b 55 30 ed e6 30 65 50 18 ...P.B.; U0..0eP.
0030 fa f0 dc 8b 00 00 48 54 54 50 2f 31 2e 31 20 33 .....HT TP/1.1 3
0040 30 32 20 0d 0a 44 61 74 65 3a 20 46 72 69 2c 20 02 ..Dat e: Fri,
0050 30 38 20 4d 61 72 20 32 30 31 39 20 31 32 3a 35 08 Mar 2 019 12:5
0060 35 3a 31 38 20 47 4d 54 0d 0a 53 65 72 76 65 72 5:18 GMT ..Server
0070 3a 20 41 70 61 63 68 65 0d 0a 4c 6f 63 61 74 69 : Apache ..Locati
0080 6f 6e 3a 20 68 74 74 70 73 3a 2f 2f 74 69 73 74 on: http s://tist
0090 6f 72 79 2e 63 6f 6d 2f 0d 0a 43 6f 6e 74 65 6e ory.com/ ..Conten
00a0 74 2d 4c 65 6e 67 74 68 3a 20 30 0d 0a 53 65 74 t-Length : 0..Set
00b0 2d 43 6f 6f 6b 69 65 3a 20 6b 61 6b 61 6f 5f 73 -Cookie: kakao_s
00c0 65 72 76 65 72 5f 69 64 3d 61 38 38 66 33 33 34 erver_id =a88f334
00d0 63 39 33 3b 20 70 61 74 68 3d 2f 0d 0a 43 6f 6e c93; pat h=/..Con
00e0 6e 65 63 74 69 6f 6e 3a 20 63 6c 6f 73 65 0d 0a nction: close..
00f0 0d 0a ..
```

Is the frame an outgoing or an incoming frame? → incoming

What is the source IP address of the network-layer header in the frame?

→ 211.231.108.151

What is the destination IP address of the network-layer header in the frame?

```
▶ Frame 3: 242 bytes on wire (1936 bits), 242 bytes captured (1936 bits) on interface 0
▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)
▶ Internet Protocol Version 4, Src: 211.231.108.151, Dst: 192.168.135.128
▶ Transmission Control Protocol, Src Port: 80, Dst Port: 57410, Seq: 1, Ack: 352, Len: 188
▶ Hypertext Transfer Protocol
```

```
0000 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 ..)....P V.>...E.
0010 00 e4 8d 9a 00 00 80 06 23 d2 d3 e7 6c 97 c0 a8 .....#...1...
0020 87 80 00 50 e0 42 07 3b 55 30 ed e6 30 65 50 18 ...P.B.; U0..0eP.
0030 fa f0 dc 8b 00 00 48 54 54 50 2f 31 2e 31 20 33 .....HT TP/1.1 3
0040 30 32 20 0d 0a 44 61 74 65 3a 20 46 72 69 2c 20 02 ..Dat e: Fri
```

→ 192.168.135.128

What is the total number of bytes in the whole frame ? -> 242 bytes

What is the number of bytes in the Ethernet (data-link layer) header? → 14

What is the number of bytes in the IP header? → 20

| | | |
|---|--|--|
| ▶ Frame 3: 242 bytes on wire (1936 bits), 242 bytes captured (1936 bits) on interface 0 | | |
| ▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10) | | |
| ▶ Internet Protocol Version 4, Src: 211.231.108.151, Dst: 192.168.135.128 | | |
| ▶ Transmission Control Protocol, Src Port: 80, Dst Port: 57410, Seq: 1, Ack: 352, Len: 188 | | |
| ▶ Hypertext Transfer Protocol | | |

| | | |
|------|---|-------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 | ..)....P V.>...E. |
| 0010 | 00 e4 8d 9a 00 00 80 06 23 d2 d3 e7 6c 97 c0 a8 |#...l... |
| 0020 | 87 80 00 50 e0 42 07 3b 55 30 ed e6 30 65 50 18 | ..P.B.; U0...eP. |
| 0030 | fa f0 dc 8b 00 00 48 54 54 50 2f 31 2e 31 20 33 |HT TP/1.1 3 |
| 0040 | 30 32 20 0d 0a 44 61 74 65 3a 20 46 72 69 2c 20 | 02 ..Dat e: Fri, |
| 0050 | 30 38 20 4d 61 72 20 32 30 31 39 20 31 32 3a 35 | 08 Mar 2 019 12:5 |
| 0060 | 35 3a 31 38 20 47 4d 54 0d 0a 53 65 72 76 65 72 | 5:18 GMT ..Server |

What is the number of bytes in the TCP header? → 20

What is the total bytes in the message (at the application layer)? → $242 - (14 + 20 + 20) = 188$ bytes

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| | | | | | | | |
|----|-------------|---------------|-----------------|---------|------|------------------|---------|
| 13 | 9.107082768 | 104.16.180.45 | 192.168.135.128 | TLSv1.3 | 85 | Application Data | Data |
| 14 | 9.129196101 | 104.16.180.45 | 192.168.135.128 | TCP | 60 | 443 → 60898 | [ACK] S |
| 15 | 9.225003936 | 104.16.180.45 | 192.168.135.128 | TLSv1.2 | 5259 | Application Data | Ap |
| 16 | 9.294651300 | 104.16.180.45 | 192.168.135.128 | TCP | 60 | 443 → 60898 | [ACK] S |
| 17 | 9.295785136 | 104.16.180.45 | 192.168.135.128 | TCP | 60 | 443 → 60898 | [ACK] S |
| 18 | 9.296961416 | 104.16.180.45 | 192.168.135.128 | TCP | 60 | 443 → 60898 | [ACK] S |
| 19 | 9.297480426 | 104.16.180.45 | 192.168.135.128 | TCP | 60 | 443 → 60898 | [ACK] S |

| | |
|---|---|
| ▶ | Frame 13: 85 bytes on wire (680 bits), 85 bytes captured (680 bits) on interface 0 |
| ▶ | Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10) |
| ▶ | Internet Protocol Version 4, Src: 104.16.180.45, Dst: 192.168.135.128 |
| ▶ | Transmission Control Protocol, Src Port: 443, Dst Port: 32778, Seq: 4028, Ack: 794, Len: 31 |
| ▶ | Secure Sockets Layer |

| | | |
|------|---|-------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 | ..)....P V.>...E. |
| 0010 | 00 47 a9 aa 00 00 80 06 2c a0 68 10 b4 2d c0 a8 | .G.....,h..... |
| 0020 | 87 80 01 bb 80 0a 48 88 4b cb b7 b5 6e cd 50 18 |H. K...n.P. |
| 0030 | fa ef d1 49 00 00 17 03 03 00 1a 5e af d3 87 4d | ...I.....^...M |
| 0040 | f8 e0 d1 ec dd c0 7d f7 8a 73 df 34 be aa 49 21 |}...s.4..I! |
| 0050 | 05 9a de 59 5b | ...Y[|

Is the frame an outgoing or an incoming frame? incoming

What is the source IP address of the network-layer header in the frame?

→ 104.16.180.45

What is the destination IP address of the network-layer header in the frame?

→ 192.168.135.128

What is the total number of bytes in the whole frame? → 85bytes

- ▶ Frame 13: 85 bytes on wire (680 bits), 85 bytes captured (680 bits) on interface 0
- ▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)
- ▶ Internet Protocol Version 4, Src: 104.16.180.45, Dst: 192.168.135.128
- ▶ Transmission Control Protocol, Src Port: 443, Dst Port: 32778, Seq: 4028, Ack: 794, Len: 31
- ▶ Secure Sockets Layer

| | | |
|------|---|-------------------|
| 0000 | 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 | ..)....P V.>...E. |
| 0010 | 00 47 a9 aa 00 00 80 06 2c a0 68 10 b4 2d c0 a8 | .G.....,h..... |
| 0020 | 87 80 01 bb 80 0a 48 88 4b cb b7 b5 6e cd 50 18 |H. K...n.P. |
| 0030 | fa ef d1 49 00 00 17 03 03 00 1a 5e af d3 87 4d | ...I.....^...M |
| 0040 | f8 e0 d1 ec dd c0 7d f7 8a 73 df 34 be aa 49 21 |}...s.4..I! |
| 0050 | 05 9a de 59 5b | ...Y[|

What is the number of bytes in the Ethernet (data-link layer) header? → 14

What is the number of bytes in the IP header ? → 20

```

▶ Frame 13: 85 bytes on wire (680 bits), 85 bytes captured (680 bits) on interface 0
▶ Ethernet II, Src: Vmware_e2:3e:ae (00:50:56:e2:3e:ae), Dst: Vmware_8e:f4:10 (00:0c:29:8e:f4:10)
▶ Internet Protocol Version 4, Src: 104.16.180.45, Dst: 192.168.135.128
▶ Transmission Control Protocol, Src Port: 443, Dst Port: 32778, Seq: 4028, Ack: 794, Len: 31
▶ Secure Sockets Layer

```

| | | |
|------|---|-----------------|
| 0000 | 00 0c 29 8e f4 10 00 50 56 e2 3e ae 08 00 45 00 | ..).P V.>...E. |
| 0010 | 00 47 a9 aa 00 00 80 06 2c a0 68 10 b4 2d c0 a8 | .G.....,h.... |
| 0020 | 87 80 01 bb 80 0a 48 88 4b cb b7 b5 6e cd 50 18 | ...H.K...n.P. |
| 0030 | fa ef d1 49 00 00 17 03 03 00 1a 5e af d3 87 4d | ...I...^...M |
| 0040 | f8 e0 d1 ec dd c0 7d f7 8a 73 df 34 be aa 49 21 |}..s.4..I! |
| 0050 | 05 9a de 59 5b | ...Y[|

What is the number of bytes in the TCP header? → 20

What is the total bytes in the message (at the application layer)? → $85 - (14 + 20 + 20) = 31$ bytes

과제 후기

이번과제는 WireShark의 기본적인 사용법을 익히는게 목표였던 것 같다.

Ethernet Header, TCP header, IP header의 크기가 각각 14, 20, 20 바이트로 정해져 있는 것을 알게 되었다.