# Analyzing Network Protocols with Wireshark

## WHY ARE CORE NETWORK PROTOCOLS SO IMPORTANT TO UNDERSTAND?

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# Module Overview

Wireshark can be daunting

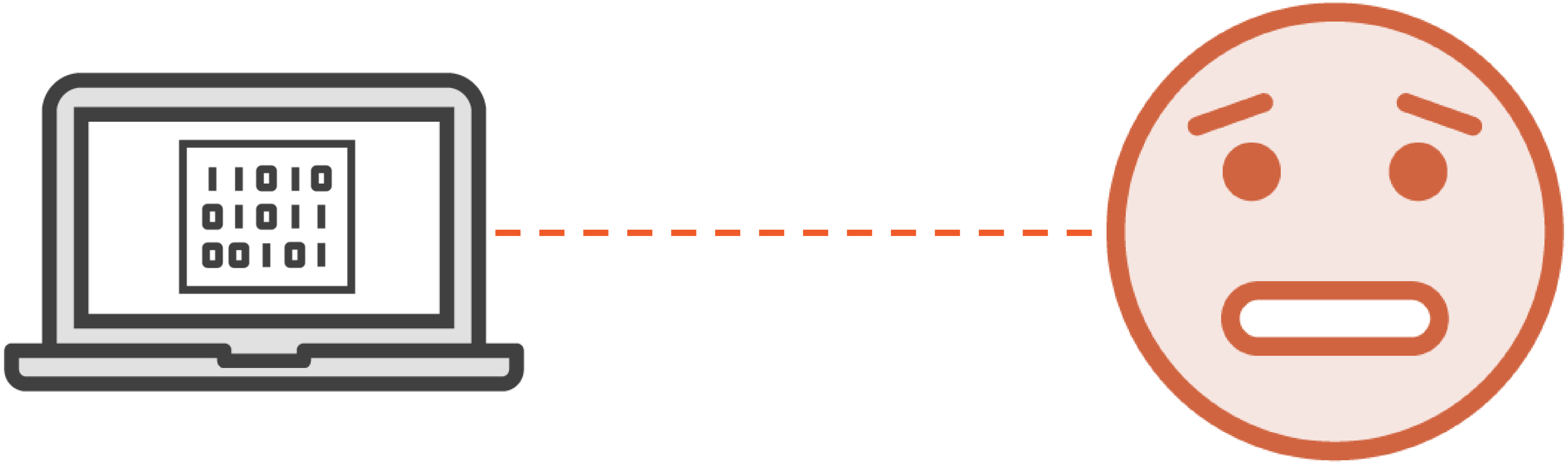
Focus quickly on what matters

What do we mean by core protocols?

Hands-on practice

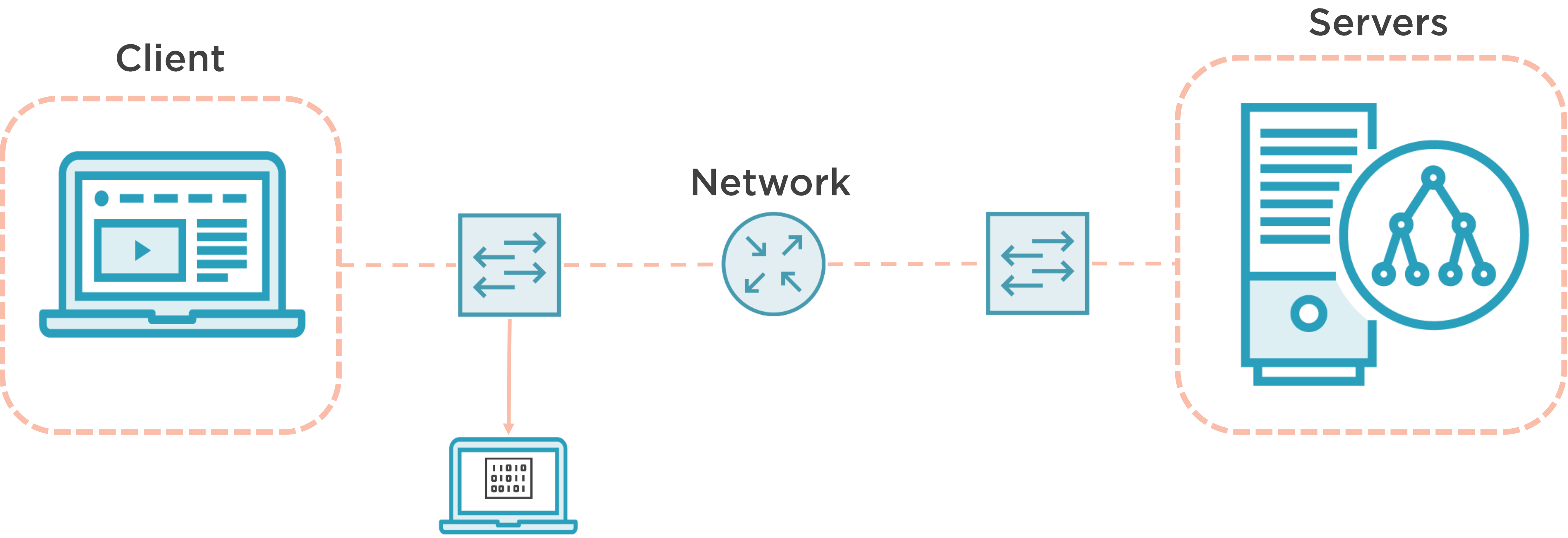
Wireshark can be daunting

# Packet Analysis

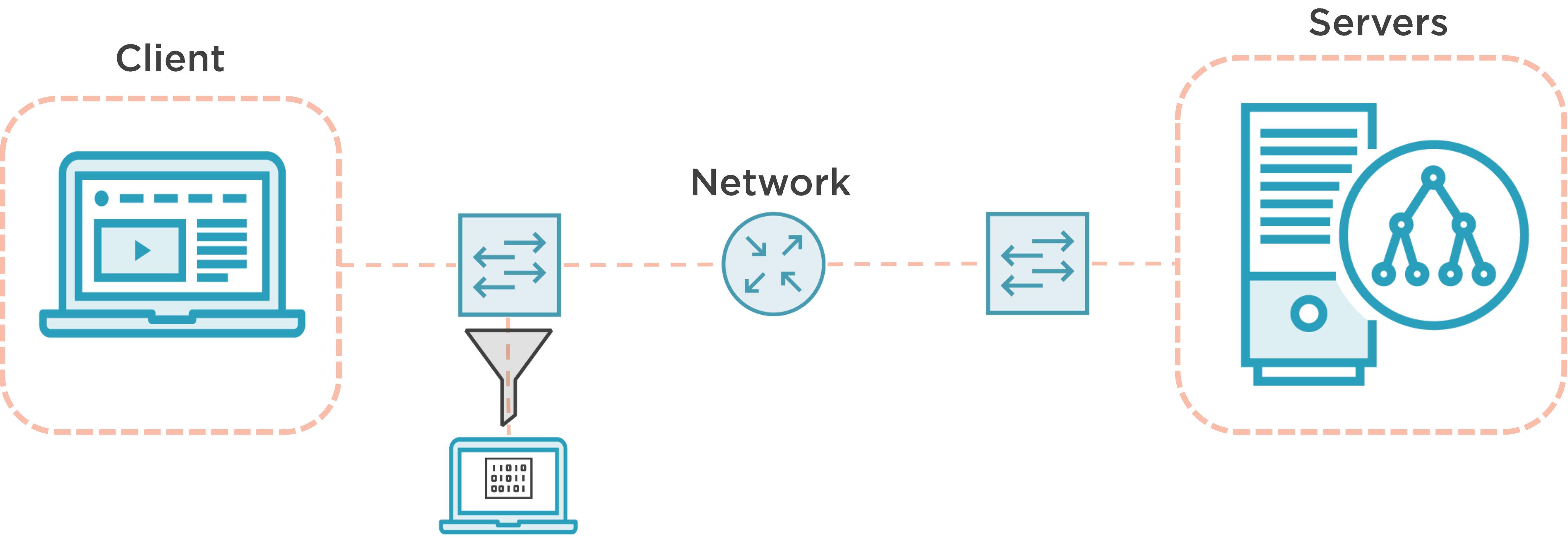


# Focus Quickly on What Matters

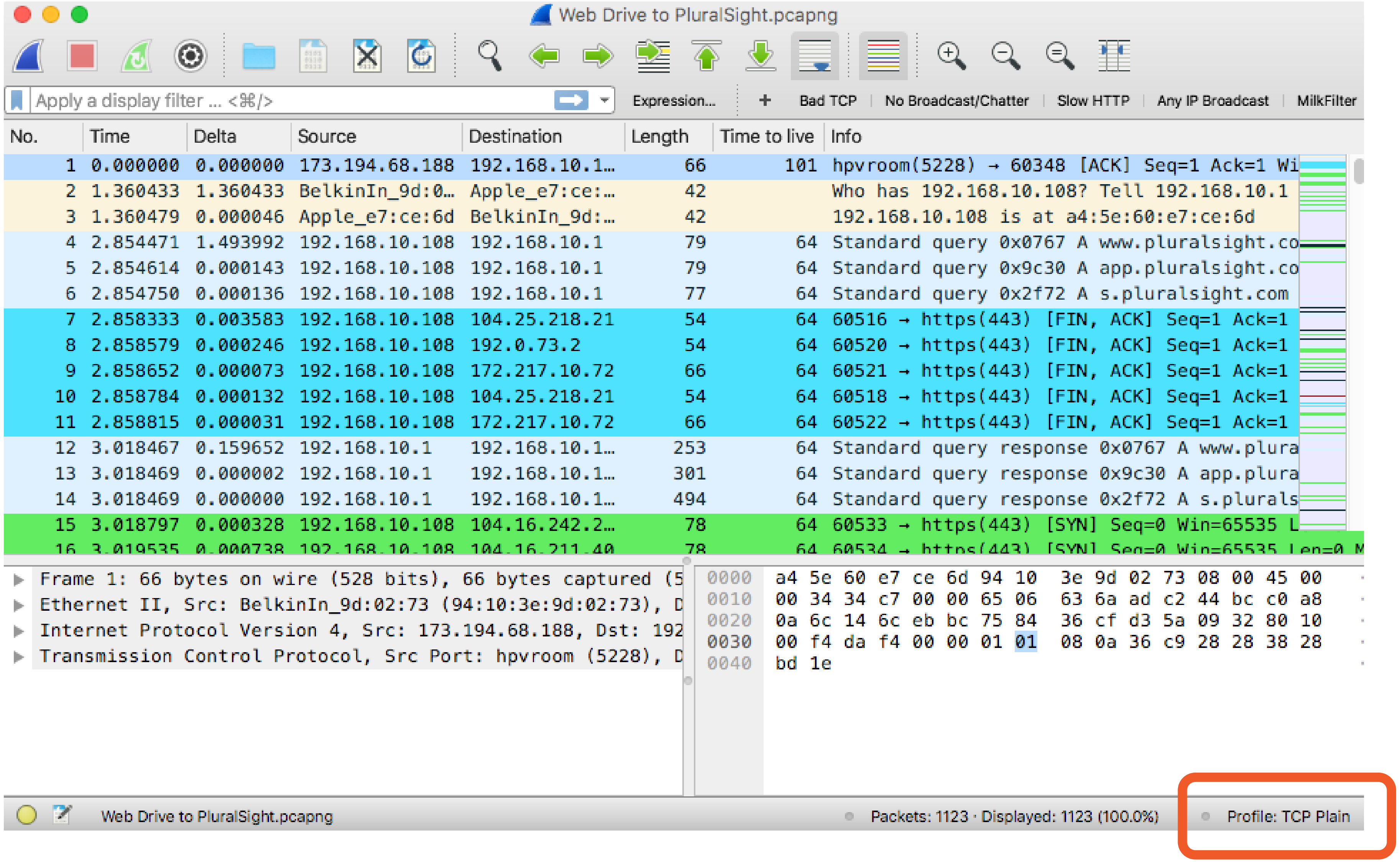
# Create a Smaller Haystack



# Create a Smaller Haystack



# Create Protocol Profiles



Web Drive to PluralSight.pcapng

| No. | Time | Delta | Source | Destination | Length | Time to live | Info |
|---|---|---|---|---|---|---|---|
| 1 | 0.000000 | 0.000000 | 173.194.68.188 | 192.168.10.1… | 66 | 101 | hpvroom(5228) → 60348 [ACK] Seq=1 Ack=1 Wi |
| 2 | 1.360433 | 1.360433 | BelkinIn_9d:0… | Apple_e7:ce:… | 42 | | Who has 192.168.10.108? Tell 192.168.10.1 |
| 3 | 1.360479 | 0.000046 | Apple_e7:ce:6d | BelkinIn_9d:… | 42 | | 192.168.10.108 is at a4:5e:60:e7:ce:6d |
| 4 | 2.854471 | 1.493992 | 192.168.10.108 | 192.168.10.1 | 79 | 64 | Standard query 0x0767 A www.pluralsight.co |
| 5 | 2.854614 | 0.000143 | 192.168.10.108 | 192.168.10.1 | 79 | 64 | Standard query 0x9c30 A app.pluralsight.co |
| 6 | 2.854750 | 0.000136 | 192.168.10.108 | 192.168.10.1 | 77 | 64 | Standard query 0x2f72 A s.pluralsight.com |
| 7 | 2.858333 | 0.003583 | 192.168.10.108 | 104.25.218.21 | 54 | 64 | 60516 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 8 | 2.858579 | 0.000246 | 192.168.10.108 | 192.0.73.2 | 54 | 64 | 60520 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 9 | 2.858652 | 0.000073 | 192.168.10.108 | 172.217.10.72 | 66 | 64 | 60521 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 10 | 2.858784 | 0.000132 | 192.168.10.108 | 104.25.218.21 | 54 | 64 | 60518 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 11 | 2.858815 | 0.000031 | 192.168.10.108 | 172.217.10.72 | 66 | 64 | 60522 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 12 | 3.018467 | 0.159652 | 192.168.10.1 | 192.168.10.1… | 253 | 64 | Standard query response 0x0767 A www.plura |
| 13 | 3.018469 | 0.000002 | 192.168.10.1 | 192.168.10.1… | 301 | 64 | Standard query response 0x9c30 A app.plura |
| 14 | 3.018469 | 0.000000 | 192.168.10.1 | 192.168.10.1… | 494 | 64 | Standard query response 0x2f72 A s.plurals |
| 15 | 3.018797 | 0.000328 | 192.168.10.108 | 104.16.242.2… | 78 | 64 | 60533 → https(443) [SYN] Seq=0 Win=65535 L |
| 16 | 3.019535 | 0.000738 | 192.168.10.108 | 104.16.211.40 | 78 | 64 | 60534 → https(443) [SYN] Seq=0 Win=65535 Len=0 M |

▶ Frame 1: 66 bytes on wire (528 bits), 66 bytes captured (5
▶ Ethernet II, Src: BelkinIn_9d:02:73 (94:10:3e:9d:02:73), D
▶ Internet Protocol Version 4, Src: 173.194.68.188, Dst: 192
▶ Transmission Control Protocol, Src Port: hpvroom (5228), D

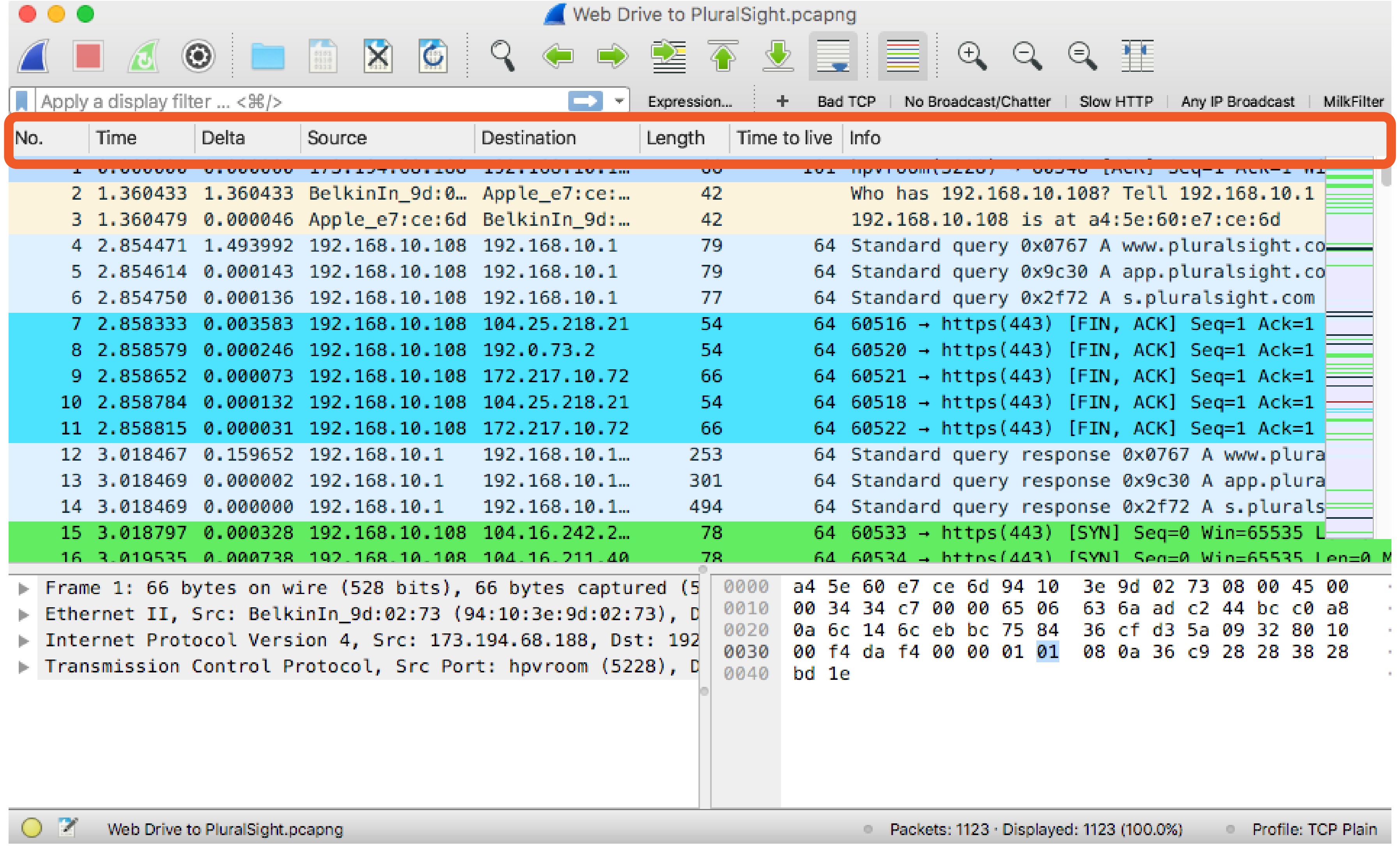
```
0000  a4 5e 60 e7 ce 6d 94 10  3e 9d 02 73 08 00 45 00
0010  00 34 34 c7 00 00 65 06  63 6a ad c2 44 bc c0 a8
0020  0a 6c 14 6c eb bc 75 84  36 cf d3 5a 09 32 80 10
0030  00 f4 da f4 00 00 01 01  08 0a 36 c9 28 28 38 28
0040  bd 1e
```

Web Drive to PluralSight.pcapng

Packets: 1123 · Displayed: 1123 (100.0%)

Profile: TCP Plain

# Create Protocol Profiles



| No. | Time | Delta | Source | Destination | Length | Time to live | Info |
|---|---|---|---|---|---|---|---|
| 1 | 0.000000 | 0.000000 | 173.194.68.188 | 192.168.10.1… | 66 | 101 | hpvroom(5228) → 60540 [ACK] Seq=1 Ack=1 Wi |
| 2 | 1.360433 | 1.360433 | BelkinIn_9d:0… | Apple_e7:ce:… | 42 | | Who has 192.168.10.108? Tell 192.168.10.1 |
| 3 | 1.360479 | 0.000046 | Apple_e7:ce:6d | BelkinIn_9d:… | 42 | | 192.168.10.108 is at a4:5e:60:e7:ce:6d |
| 4 | 2.854471 | 1.493992 | 192.168.10.108 | 192.168.10.1 | 79 | 64 | Standard query 0x0767 A www.pluralsight.co |
| 5 | 2.854614 | 0.000143 | 192.168.10.108 | 192.168.10.1 | 79 | 64 | Standard query 0x9c30 A app.pluralsight.co |
| 6 | 2.854750 | 0.000136 | 192.168.10.108 | 192.168.10.1 | 77 | 64 | Standard query 0x2f72 A s.pluralsight.com |
| 7 | 2.858333 | 0.003583 | 192.168.10.108 | 104.25.218.21 | 54 | 64 | 60516 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 8 | 2.858579 | 0.000246 | 192.168.10.108 | 192.0.73.2 | 54 | 64 | 60520 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 9 | 2.858652 | 0.000073 | 192.168.10.108 | 172.217.10.72 | 66 | 64 | 60521 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 10 | 2.858784 | 0.000132 | 192.168.10.108 | 104.25.218.21 | 54 | 64 | 60518 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 11 | 2.858815 | 0.000031 | 192.168.10.108 | 172.217.10.72 | 66 | 64 | 60522 → https(443) [FIN, ACK] Seq=1 Ack=1 |
| 12 | 3.018467 | 0.159652 | 192.168.10.1 | 192.168.10.1… | 253 | 64 | Standard query response 0x0767 A www.plura |
| 13 | 3.018469 | 0.000002 | 192.168.10.1 | 192.168.10.1… | 301 | 64 | Standard query response 0x9c30 A app.plura |
| 14 | 3.018469 | 0.000000 | 192.168.10.1 | 192.168.10.1… | 494 | 64 | Standard query response 0x2f72 A s.plurals |
| 15 | 3.018797 | 0.000328 | 192.168.10.108 | 104.16.242.2… | 78 | 64 | 60533 → https(443) [SYN] Seq=0 Win=65535 L |
| 16 | 3.019535 | 0.000738 | 192.168.10.108 | 104.16.211.40 | 78 | 64 | 60534 → https(443) [SYN] Seq=0 Win=65535 Len=0 M |

```
▶ Frame 1: 66 bytes on wire (528 bits), 66 bytes captured (5
▶ Ethernet II, Src: BelkinIn_9d:02:73 (94:10:3e:9d:02:73), D
▶ Internet Protocol Version 4, Src: 173.194.68.188, Dst: 192
▶ Transmission Control Protocol, Src Port: hpvroom (5228), D
```

```
0000  a4 5e 60 e7 ce 6d 94 10  3e 9d 02 73 08 00 45 00
0010  00 34 34 c7 00 00 65 06  63 6a ad c2 44 bc c0 a8
0020  0a 6c 14 6c eb bc 75 84  36 cf d3 5a 09 32 80 10
0030  00 f4 da f4 00 00 01 01  08 0a 36 c9 28 28 38 28
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```

Web Drive to PluralSight.pcapng
Packets: 1123 · Displayed: 1123 (100.0%)
Profile: TCP Plain

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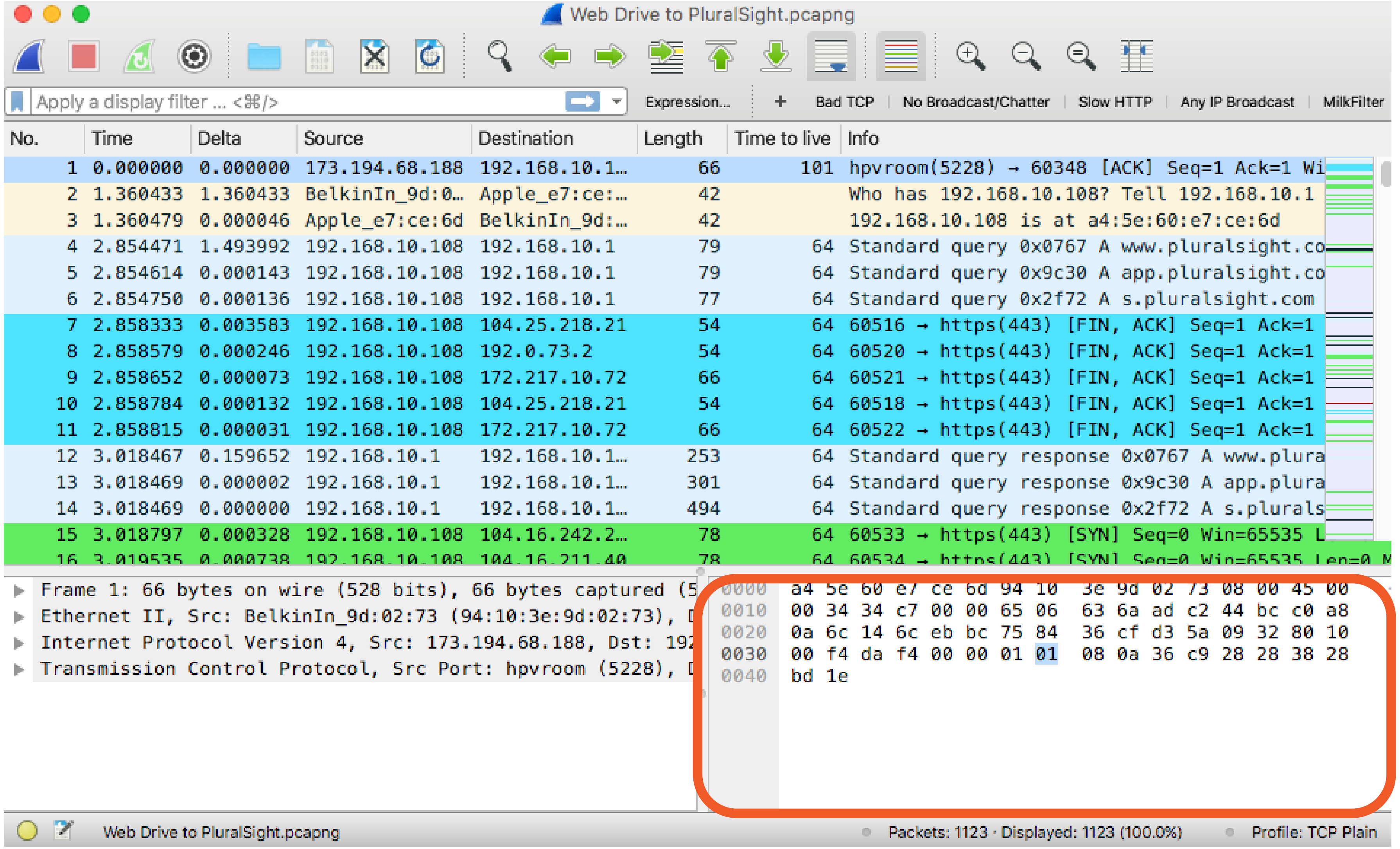

```
No.   Time     Delta    Source           Destination      Length  Time to live  Info
   1  0.000000 0.000000 173.194.68.188   192.168.10.1…      66    101  hpvroom(5228) → 60348 [ACK] Seq=1 Ack=1 Wi
   2  1.360433 1.360433 BelkinIn_9d:0…   Apple_e7:ce:…      42         Who has 192.168.10.108? Tell 192.168.10.1
   3  1.360479 0.000046 Apple_e7:ce:6d   BelkinIn_9d:…      42         192.168.10.108 is at a4:5e:60:e7:ce:6d
   4  2.854471 1.493992 192.168.10.108   192.168.10.1       79     64  Standard query 0x0767 A www.pluralsight.co
   5  2.854614 0.000143 192.168.10.108   192.168.10.1       79     64  Standard query 0x9c30 A app.pluralsight.co
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   7  2.858333 0.003583 192.168.10.108   104.25.218.21      54     64  60516 → https(443) [FIN, ACK] Seq=1 Ack=1
   8  2.858579 0.000246 192.168.10.108   192.0.73.2         54     64  60520 → https(443) [FIN, ACK] Seq=1 Ack=1
   9  2.858652 0.000073 192.168.10.108   172.217.10.72      66     64  60521 → https(443) [FIN, ACK] Seq=1 Ack=1
  10  2.858784 0.000132 192.168.10.108   104.25.218.21      54     64  60518 → https(443) [FIN, ACK] Seq=1 Ack=1
  11  2.858815 0.000031 192.168.10.108   172.217.10.72      66     64  60522 → https(443) [FIN, ACK] Seq=1 Ack=1
  12  3.018467 0.159652 192.168.10.1     192.168.10.1…     253     64  Standard query response 0x0767 A www.plura
  13  3.018469 0.000002 192.168.10.1     192.168.10.1…     301     64  Standard query response 0x9c30 A app.plura
  14  3.018469 0.000000 192.168.10.1     192.168.10.1…     494     64  Standard query response 0x2f72 A s.plurals
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0010  00 34 34 c7 00 00 65 06  63 6a ad c2 44 bc c0 a8
0020  0a 6c 14 6c eb bc 75 84  36 cf d3 5a 09 32 80 10
0030  00 f4 da f4 00 00 01 01  08 0a 36 c9 28 28 38 28
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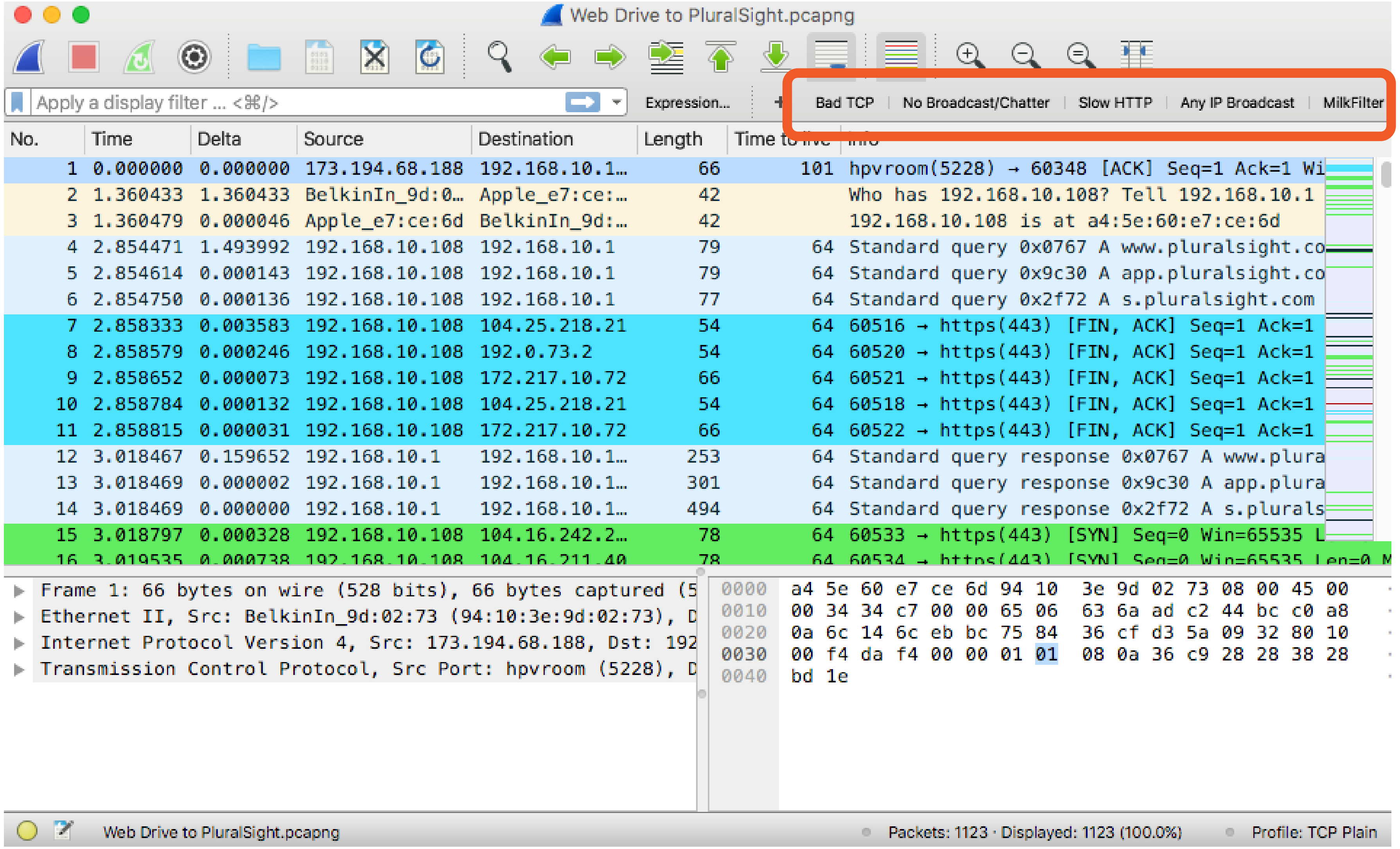

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No.   Time      Delta     Source            Destination       Length  Time to live  Info
   1  0.000000  0.000000  173.194.68.188    192.168.10.1…         66           101  hpvroom(5228) → 60348 [ACK] Seq=1 Ack=1 Wi
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   3  1.360479  0.000046  Apple_e7:ce:6d    BelkinIn_9d:…         42                192.168.10.108 is at a4:5e:60:e7:ce:6d
   4  2.854471  1.493992  192.168.10.108    192.168.10.1          79            64  Standard query 0x0767 A www.pluralsight.co
   5  2.854614  0.000143  192.168.10.108    192.168.10.1          79            64  Standard query 0x9c30 A app.pluralsight.co
   6  2.854750  0.000136  192.168.10.108    192.168.10.1          77            64  Standard query 0x2f72 A s.pluralsight.com
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  12  3.018467  0.159652  192.168.10.1      192.168.10.1…        253            64  Standard query response 0x0767 A www.plura
  13  3.018469  0.000002  192.168.10.1      192.168.10.1…        301            64  Standard query response 0x9c30 A app.plura
  14  3.018469  0.000000  192.168.10.1      192.168.10.1…        494            64  Standard query response 0x2f72 A s.plurals
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0020  0a 6c 14 6c eb bc 75 84  36 cf d3 5a 09 32 80 10
0030  00 f4 da f4 00 00 01 01  08 0a 36 c9 28 28 38 28
0040  bd 1e
```
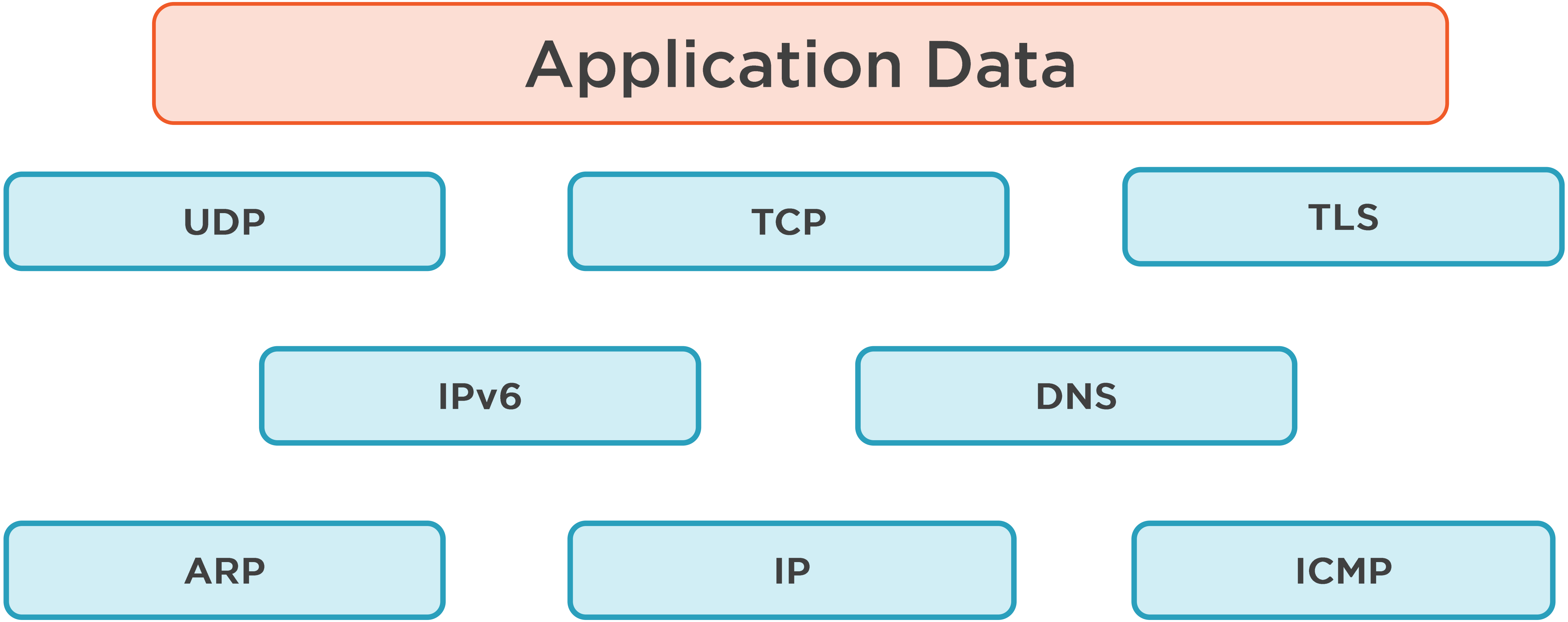

```
Web Drive to PluralSight.pcapng        Packets: 1123 · Displayed: 1123 (100.0%)        Profile: TCP Plain
```

# What Do We Mean by Core Protocols?

# Core Protocols Support Applications



Application Data

UDP

TCP

TLS

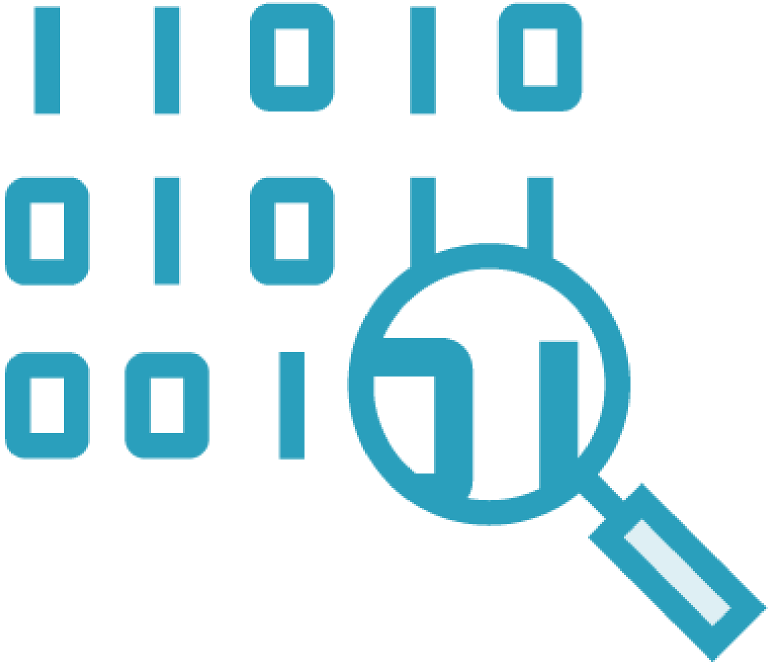
IPv6

DNS

ARP

IP

ICMP



A skilled network analyst is able to quickly read and exonerate these protocols

Or use them to pinpoint the issue

# Demo

Create a protocol profile in Wireshark