



Počítačové a komunikačné siete

Linková vrstva / Ethernet / Analýza rámcov

Prednáška 2

Opakovanie minulej prednášky

- » Čo je protokol?
- » Aké sieťové modely poznáte?
- » Koľko majú vrstiev?
- » Ako sa tieto vrstvy volajú?

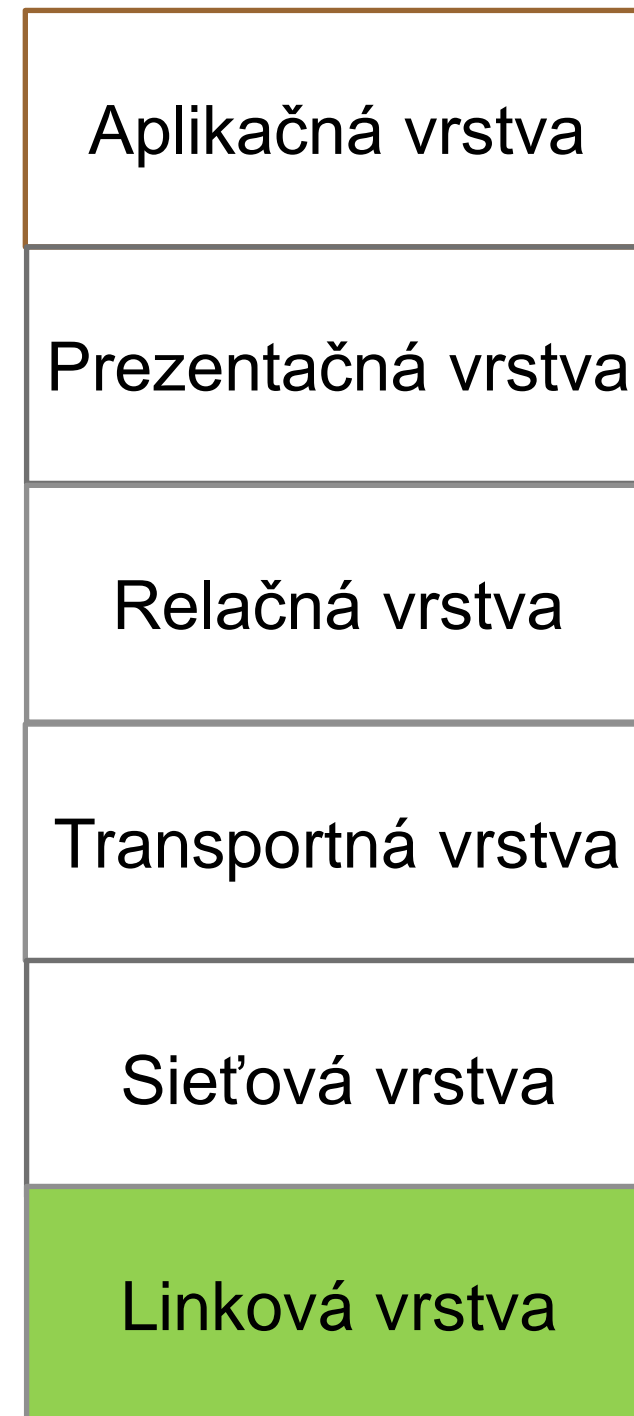
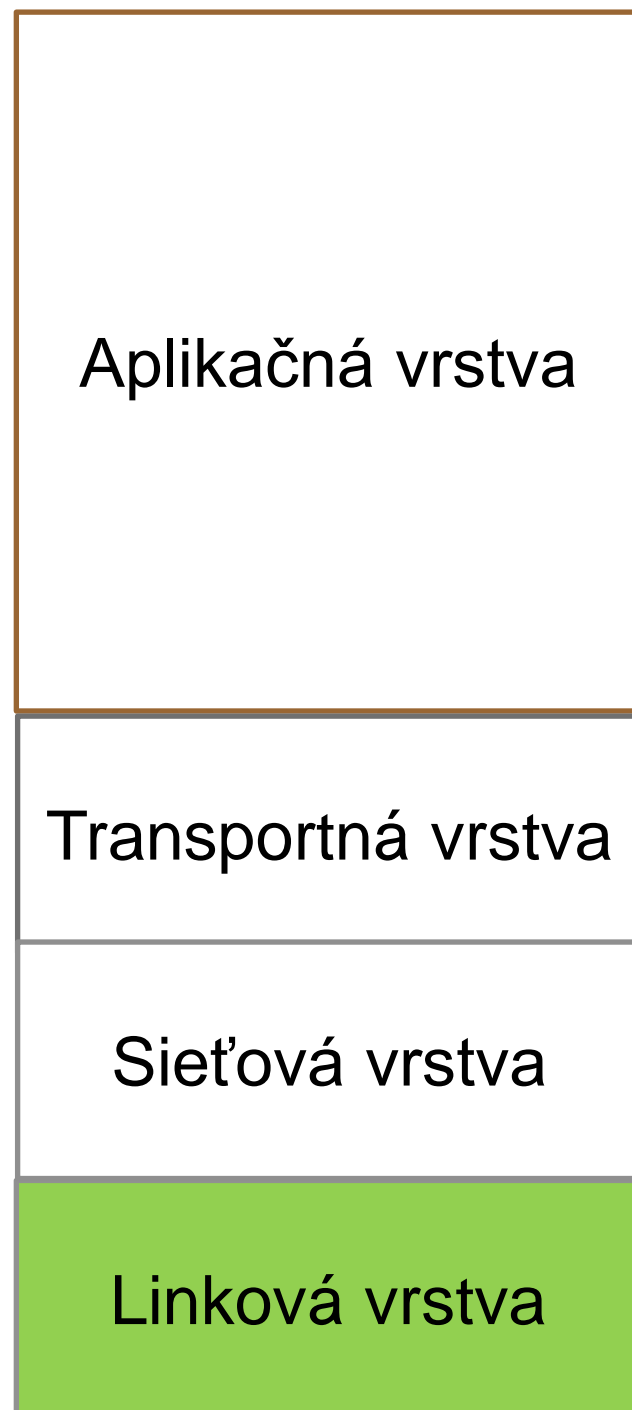
Cisco pri PKS

- » Zvýhodnený kurz CCNA1 pre PKS študentov
- » <http://cisco.fiit.stuba.sk/new.web/poplatky/akademicky-program>
- » Alternatíva ku skúške PKS

Zadanie 1

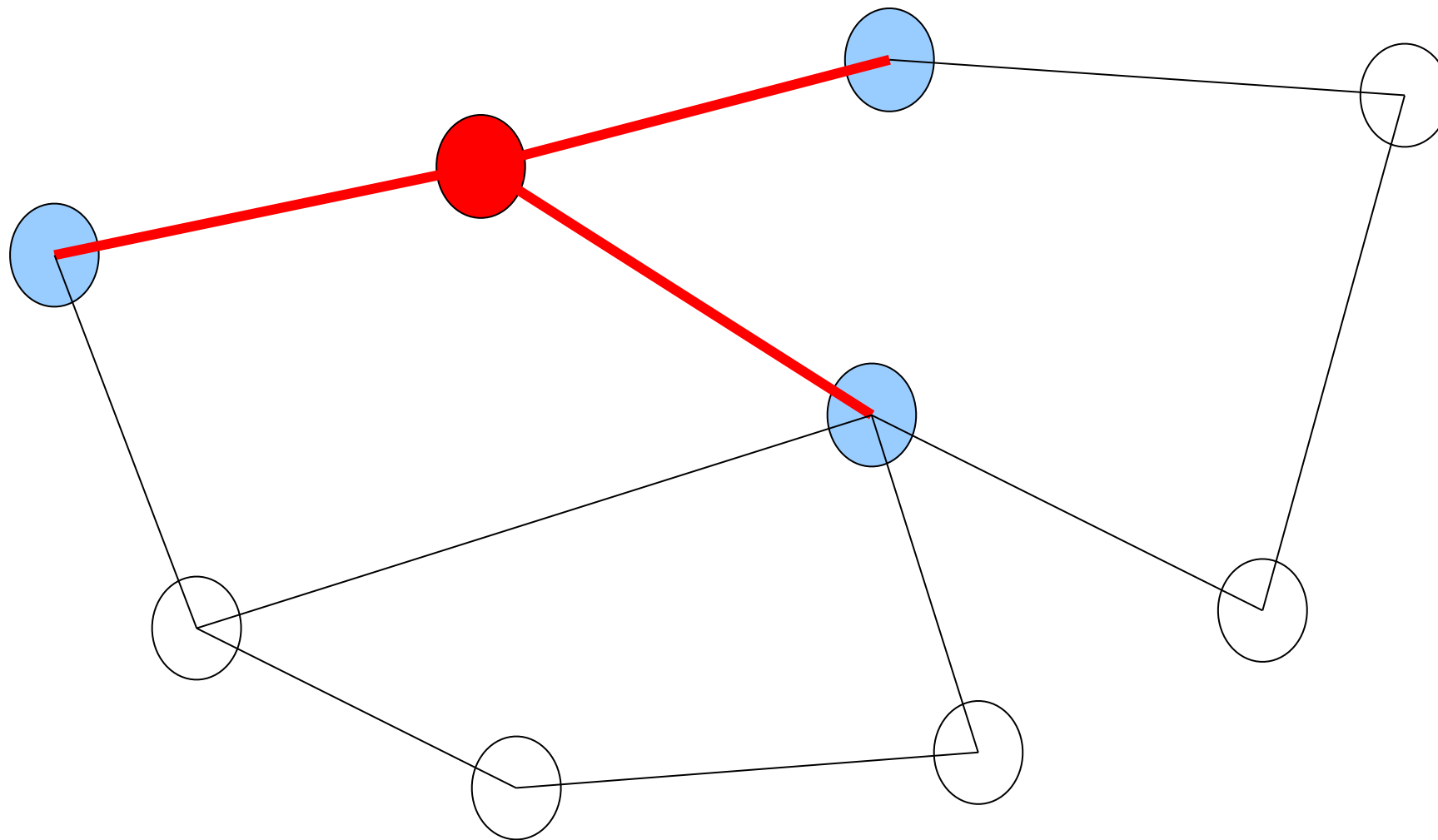
- » Analyzátor rámcov
 - otvoriť PCAP súbor
 - extrahovať rámce
 - analyzovať po bajtoch
- » „zjednodušený wireshark“

Linková vrstva



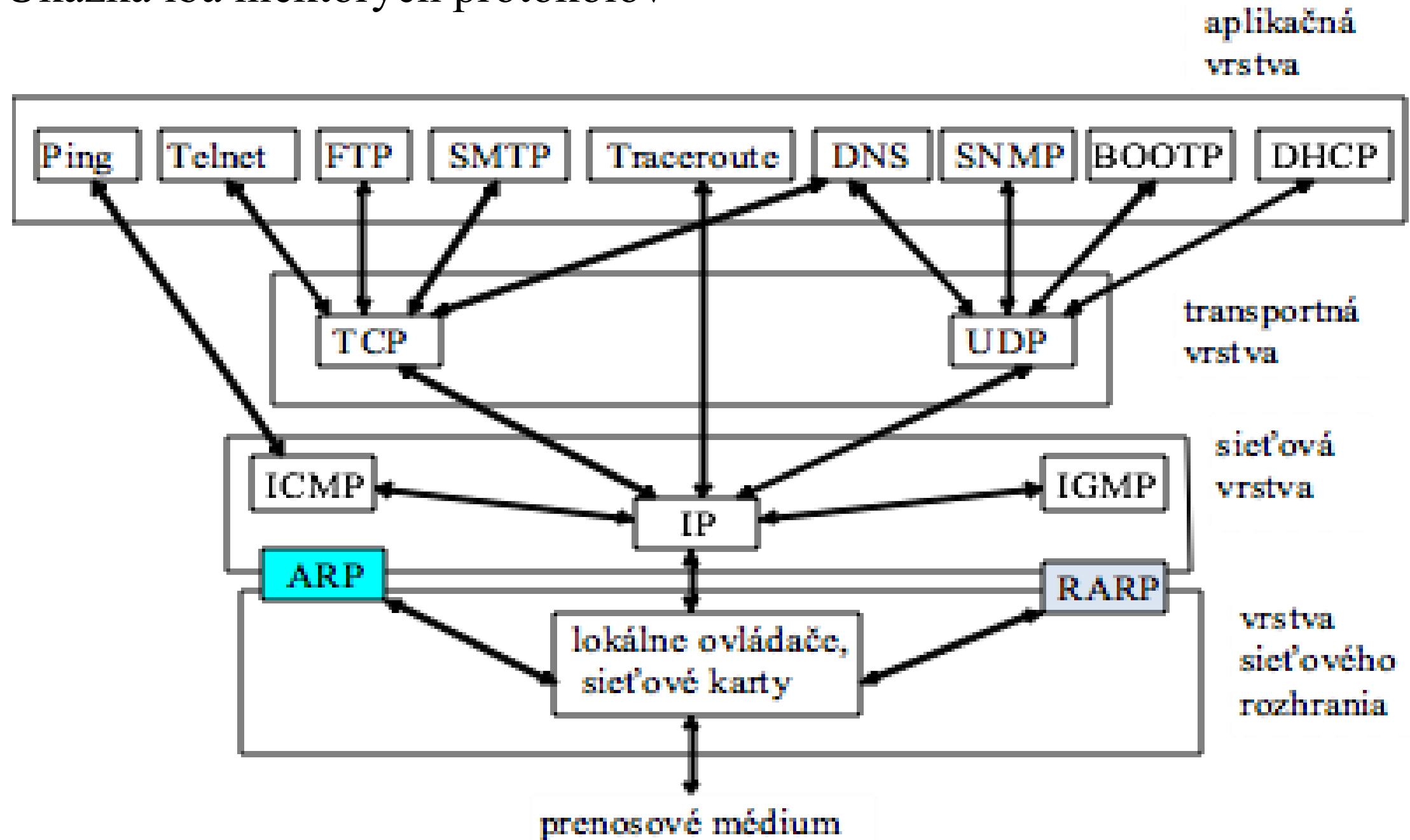
“Pohľad vrstiev” na topológiu siete

dátová vrstva



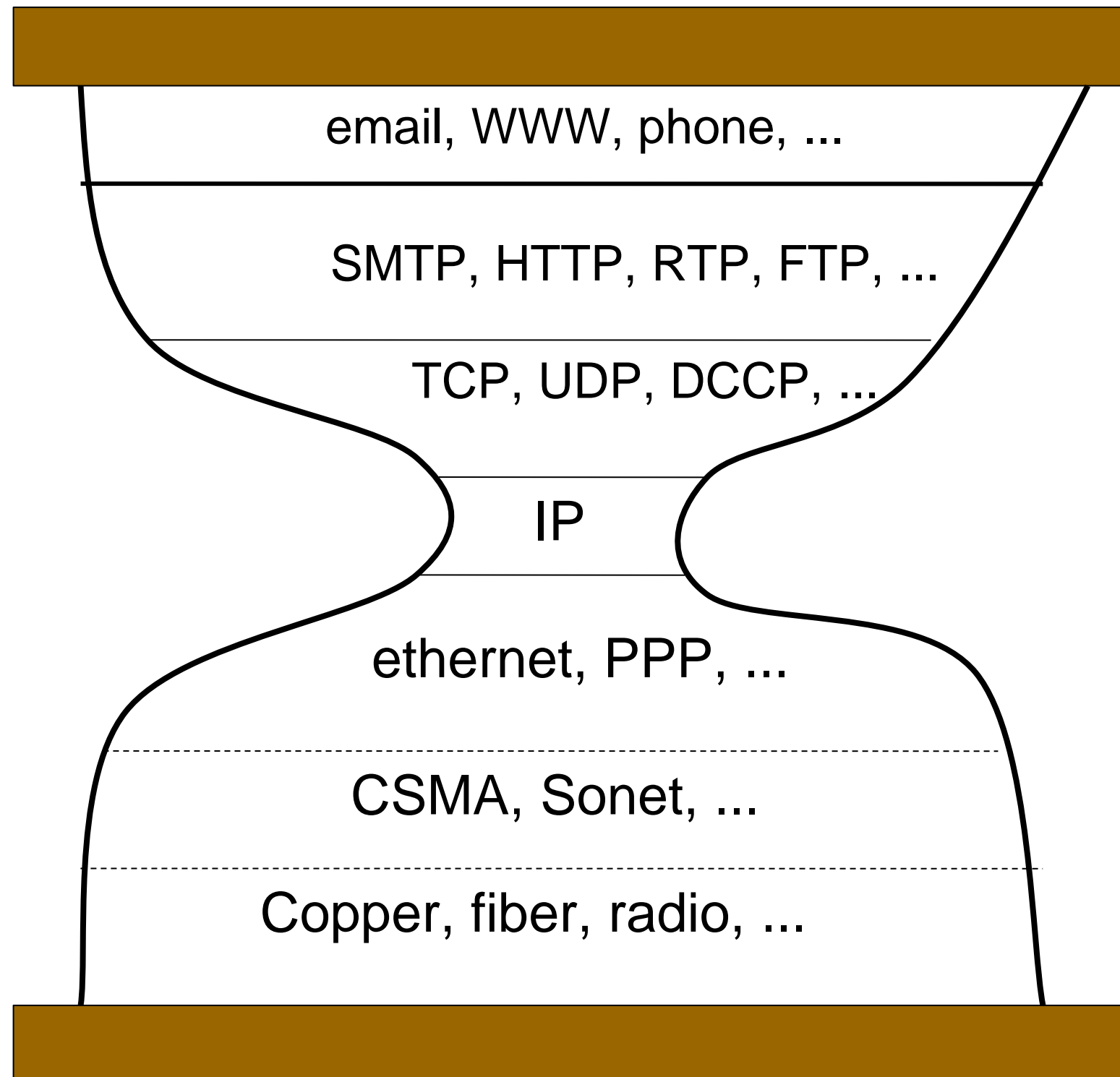
Protokolový zásobník TCP/IP

Ukážka iba niektorých protokolov



The Internet Hourglass

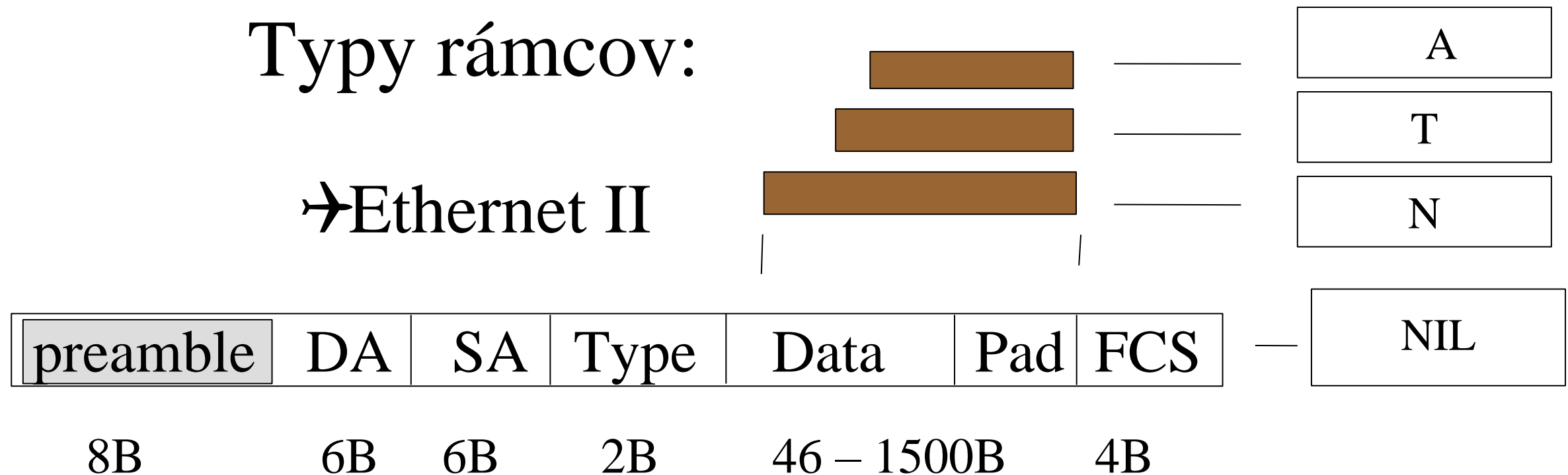
Presented by Steve Deering at London IETF plenary session



Sieť Ethernet – rámce

Typy rámcov:

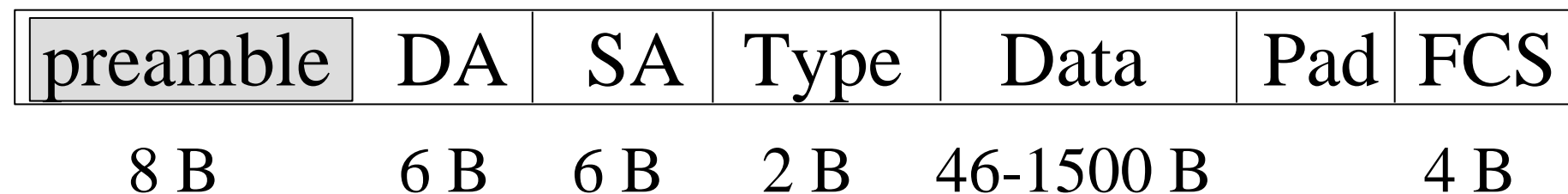
→ Ethernet II



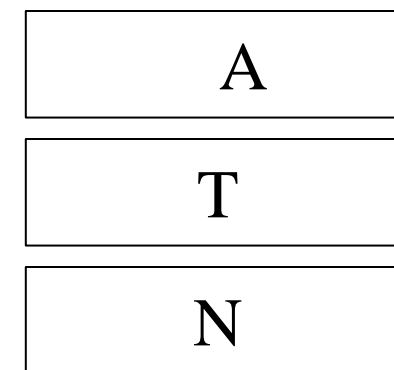
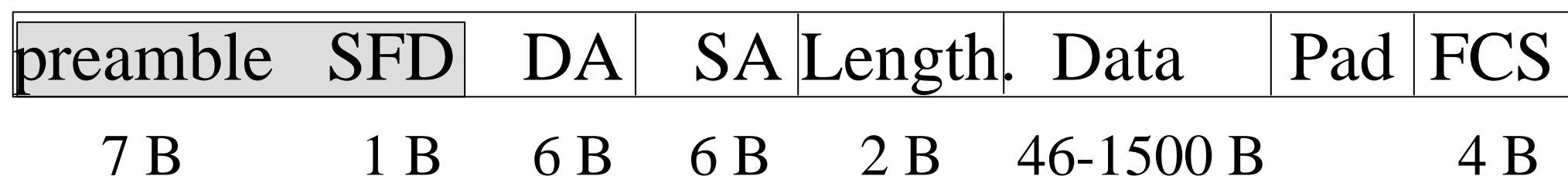
Sieť Ethernet – rámce

Typy rámcov:

→ Ethernet II



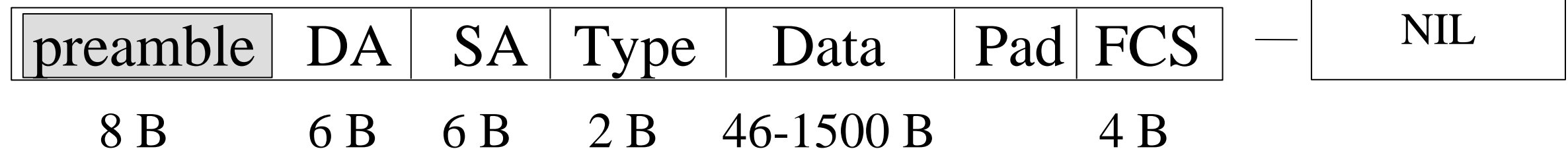
→ IEEE 802.3



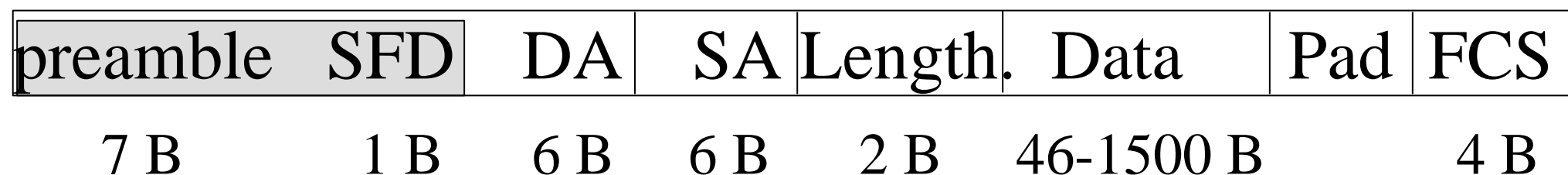
Sieť Ethernet – rámce

Typy rámcov:

→ Ethernet II



→ IEEE 802.3



✦ LLC (802.2)

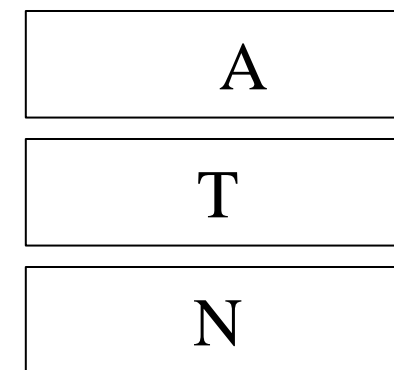
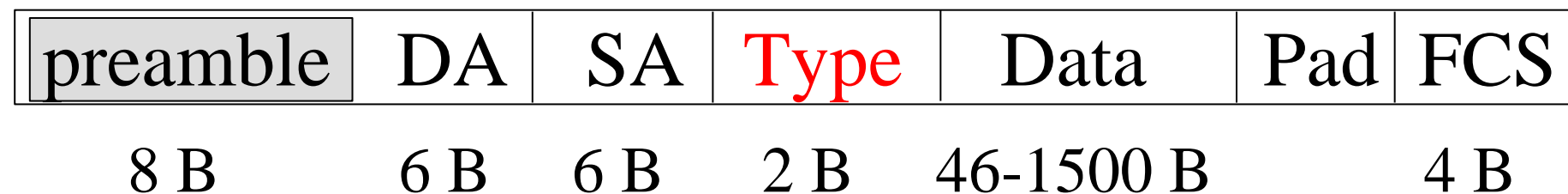
✦ SNAP

✦ "raw"

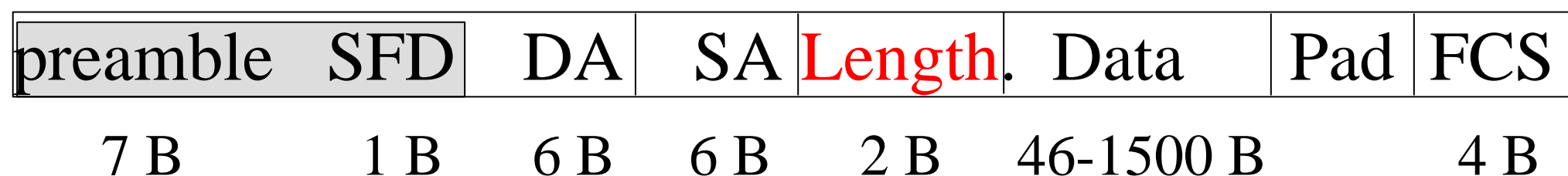
Sieť Ethernet – rámce

Typy rámcov:

→ Ethernet II



→ IEEE 802.3

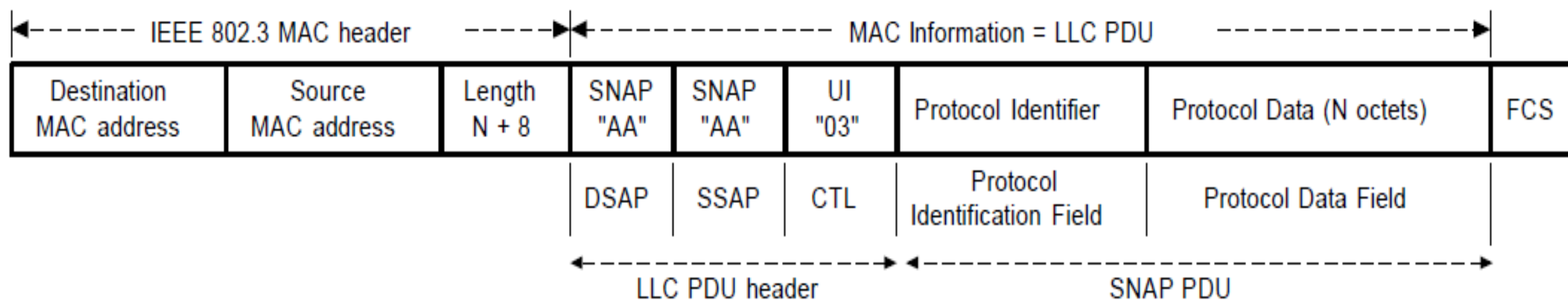


✦ LLC (802.2)

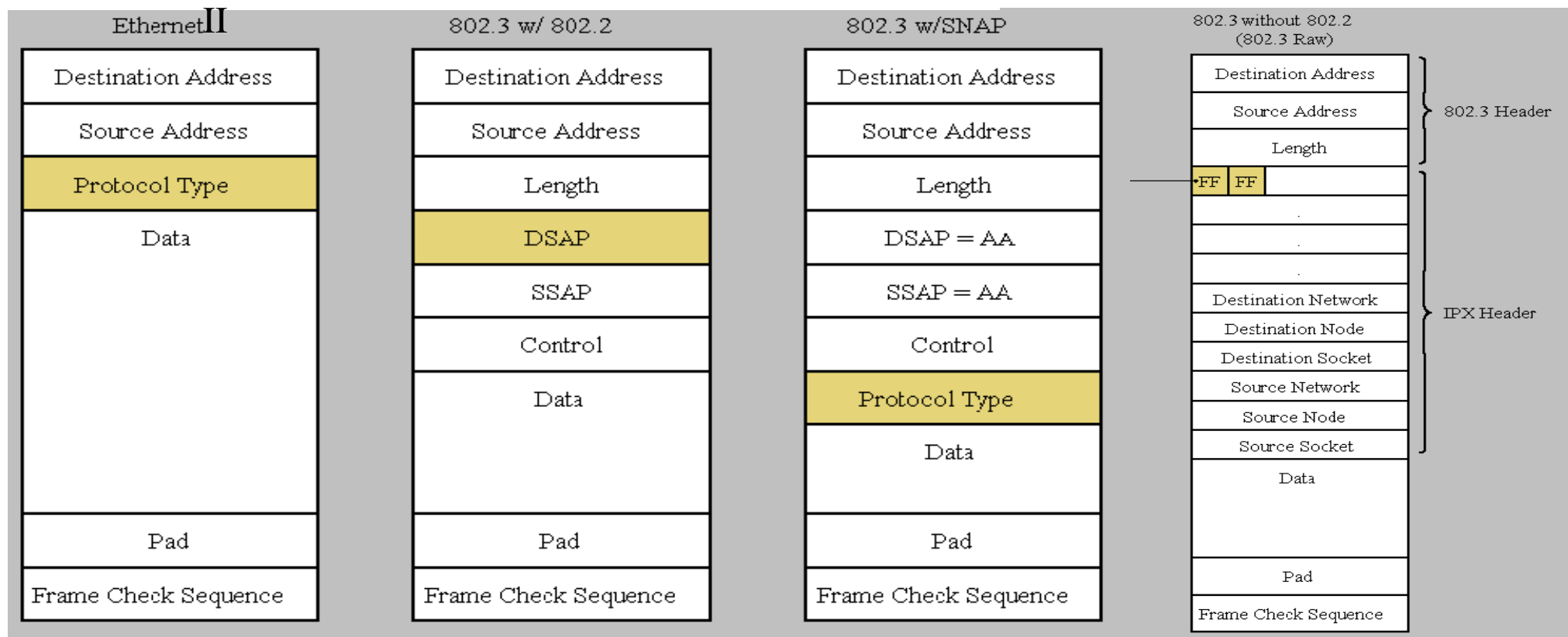
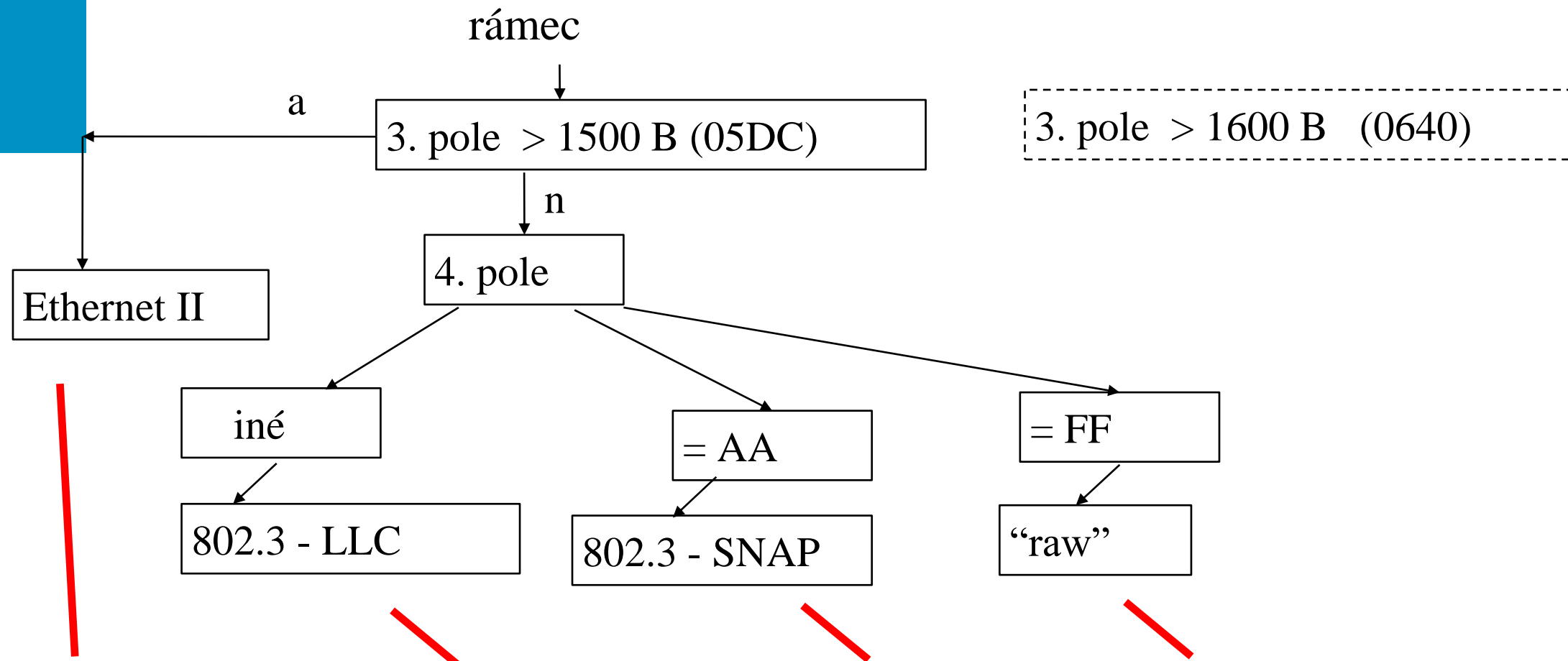
✦ SNAP

✦ "raw"

SNAP PDU v MAC rámci IEEE 802.3



Siet' Ethernet - rámce



802.2 LLC Service Access Points (SAPs)

IEEE SAPs

Hex Function

42 BPDUs

E0 IPX

.....

.....

| No. | Time | Source | Destination | Protocol | Src port | Dst port | length | Info |
|-----|----------|-------------------|-------------------|----------|----------|----------|--------|---|
| 1 | 0.000000 | 3Com_a4:e4:8c | Broadcast | ARP | | | 60 | Who has 147.175.98.147? Tell 147.175.98.1 |
| 2 | 0.466750 | Standard_05:51:2b | Broadcast | ARP | | | 60 | Who has 147.175.98.116? Tell 147.175.98.30 |
| 3 | 1.002145 | 147.175.98.238 | 147.175.98.1 | NBNS | netbios- | netbios- | 92 | Name query NB ENIGMA<20> |
| 4 | 1.003246 | 147.175.98.1 | 147.175.98.238 | NBNS | netbios- | netbios- | 104 | Name query response NB 147.175.98.232 |
| 5 | 1.003385 | WesternD_d7:80:c2 | Broadcast | ARP | | | 42 | Who has 147.175.98.232? Tell 147.175.98.238 |
| 6 | 1.004018 | 3Com_13:97:df | WesternD_d7:80:c2 | ARP | | | 60 | 147.175.98.232 is at 00:04:76:13:97:df |
| 7 | 1.004053 | 147.175.98.238 | 147.175.98.232 | TCP | omnivisi | netbios- | 62 | omnivision > netbios-ssn [SYN] Seq=0 Win=16384 Len=0 |
| 8 | 1.004726 | 147.175.98.232 | 147.175.98.238 | TCP | netbios- | omnivisi | 62 | netbios-ssn > omnivision [SYN, ACK] Seq=0 Ack=1 Win=0 Len=0 |
| 9 | 1.004839 | 147.175.98.238 | 147.175.98.232 | TCP | omnivisi | netbios- | 54 | omnivision > netbios-ssn [ACK] Seq=1 Ack=1 Win=1792 Len=0 |
| 10 | 1.004930 | 147.175.98.238 | 147.175.98.232 | NBSS | omnivisi | netbios- | 126 | Session request, to ENIGMA<20> from AA-DD4PZ2V1PC |
| 11 | 1.005817 | 147.175.98.232 | 147.175.98.238 | NBSS | netbios- | omnivisi | 60 | Positive session response |
| 12 | 1.006030 | 147.175.98.238 | 147.175.98.232 | NBSS | omnivisi | netbios- | 104 | Session request, to ENIGMA<20> from AA-DD4PZ2V1PC |

Frame 5 (42 bytes on wire, 42 bytes captured)

Ethernet II, Src: WesternD_d7:80:c2 (00:00:c0:d7:80:c2), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Address Resolution Protocol (request)

Hardware type: Ethernet (0x0001)

Protocol type: IP (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: request (0x0001)

Sender MAC address: WesternD_d7:80:c2 (00:00:c0:d7:80:c2)

Sender IP address: 147.175.98.238 (147.175.98.238)

Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)

Target IP address: 147.175.98.232 (147.175.98.232)

```

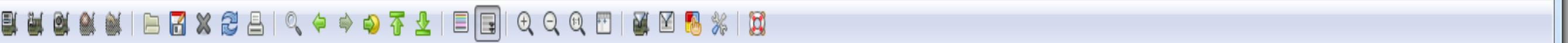
0000  ff ff ff ff ff ff 00 00  c0 d7 80 c2 08 06 00 01
0010  08 00 06 04 00 01 00 00  c0 d7 80 c2 93 af 62 ee
0020  00 00 00 00 00 00 93 af  62 e8

```

```

.....
.....b.
.....b.

```

Filter: Expression... Clear Apply

| No. | Time | Source | Destination | Protocol | Src port | Dst port | length | Info |
|-----|----------|-------------------|-------------------|----------|----------|----------|--------|--|
| 1 | 0.000000 | 3Com_a4:e4:8c | Broadcast | ARP | | | 60 | Who has 147.175.98.147? Tell 147.175.98.1 |
| 2 | 0.466750 | Standard_05:51:2b | Broadcast | ARP | | | 60 | Who has 147.175.98.116? Tell 147.175.98.30 |
| 3 | 1.002145 | 147.175.98.238 | 147.175.98.1 | NBNS | netbios- | netbios- | 92 | Name query NB ENIGMA<20> |
| 4 | 1.003246 | 147.175.98.1 | 147.175.98.238 | NBNS | netbios- | netbios- | 104 | Name query response NB 147.175.98.232 |
| 5 | 1.003385 | WesternD_d7:80:c2 | Broadcast | ARP | | | 42 | Who has 147.175.98.232? Tell 147.175.98.238 |
| 6 | 1.004018 | 3Com_13:97:df | WesternD_d7:80:c2 | ARP | | | 60 | 147.175.98.232 is at 00:04:76:13:97:df |
| 7 | 1.004053 | 147.175.98.238 | 147.175.98.232 | TCP | omnivisi | netbios- | 62 | omnivision > netbios-ssn [SYN] Seq=0 Win=16384 Len=0 MSS= |
| 8 | 1.004726 | 147.175.98.232 | 147.175.98.238 | TCP | netbios- | omnivisi | 62 | netbios-ssn > omnivision [SYN, ACK] Seq=0 Ack=1 Win=65535 |
| 9 | 1.004839 | 147.175.98.238 | 147.175.98.232 | TCP | omnivisi | netbios- | 54 | omnivision > netbios-ssn [ACK] Seq=1 Ack=1 Win=17520 Len= |
| 10 | 1.004930 | 147.175.98.238 | 147.175.98.232 | NBSS | omnivisi | netbios- | 126 | Session request, to ENIGMA<20> from AA-DD4PZ2V1PG5V<00> |
| 11 | 1.005817 | 147.175.98.232 | 147.175.98.238 | NBSS | netbios- | omnivisi | 60 | Positive session response |
| 12 | 1.006030 | 147.175.98.238 | 147.175.98.232 | SNMP | omnivisi | netbios- | 101 | Netbios-ssn > netbios-ssn [ACK] Seq=1 Ack=1 Win=17520 Len= |

Frame 6 (60 bytes on wire, 60 bytes captured)

Ethernet II, Src: 3Com_13:97:df (00:04:76:13:97:df), Dst: WesternD_d7:80:c2 (00:00:c0:d7:80:c2)

Address Resolution Protocol (reply)

Hardware type: Ethernet (0x0001)
Protocol type: IP (0x0800)
Hardware size: 6
Protocol size: 4
Opcode: reply (0x0002)
Sender MAC address: 3Com_13:97:df (00:04:76:13:97:df)
Sender IP address: 147.175.98.232 (147.175.98.232)
Target MAC address: WesternD_d7:80:c2 (00:00:c0:d7:80:c2)
Target IP address: 147.175.98.238 (147.175.98.238)

| | | |
|------|---|----------------|
| 0000 | 00 00 c0 d7 80 c2 00 04 76 13 97 df 08 06 00 01 | v..... |
| 0010 | 08 00 06 04 00 02 00 04 76 13 97 df 93 af 62 e8 | v.....b. |
| 0020 | 00 00 c0 d7 80 c2 93 af 62 ee 00 00 00 00 00 00 | b..... |
| 0030 | 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |

| No. ↓ | Time | Source | Destination | Protocol | Info |
|-------|-----------|-------------------|-------------------|----------|--|
| 1 | 0.000000 | 192.168.1.3 | 192.168.1.1 | DHCP | DHCP Request - Transaction ID 0x56c83203 |
| 2 | 0.001653 | 192.168.1.1 | 192.168.1.3 | DHCP | DHCP ACK - Transaction ID 0x56c83203 |
| 3 | 15.710976 | 192.168.1.3 | 195.80.171.4 | DNS | standard query A cisco.netacad.net |
| 4 | 15.728807 | 195.80.171.4 | 192.168.1.3 | DNS | standard query response A 128.107.229.50 |
| 5 | 15.736346 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 6 | 15.928457 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 7 | 16.732516 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 8 | 16.925467 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 9 | 17.732481 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 10 | 17.925010 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 11 | 18.732460 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 12 | 18.923814 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 13 | 20.723404 | D-Link_fa:94:63 | HewlettP_06:e0:93 | ARP | who has 192.168.1.3? Tell 192.168.1.1 |
| 14 | 20.723424 | HewlettP_06:e0:93 | D-Link_fa:94:63 | ARP | 192.168.1.3 is at 00:14:38:06:e0:93 |
| 15 | 29.999418 | 192.168.1.3 | 192.168.1.1 | DHCP | DHCP Request - Transaction ID 0xa64ef4b1 |
| 16 | 30.001055 | 192.168.1.1 | 192.168.1.3 | DHCP | DHCP ACK - Transaction ID 0xa64ef4b1 |

+

Frame 1 (342 bytes on wire, 342 bytes captured)

- +

Ethernet II, Src: HewlettP_06:e0:93 (00:14:38:06:e0:93), Dst: D-Link_fa:94:63 (00:0d:88:fa:94:63)
- +

Internet Protocol, Src: 192.168.1.3 (192.168.1.3), Dst: 192.168.1.1 (192.168.1.1)
- +

User Datagram Protocol, Src Port: bootpc (68), Dst Port: bootps (67)
- +

Bootstrap Protocol



11100011...01101010

E3.....6A

| | | |
|------|---|-------------------|
| 0000 | 00 0d 88 fa 94 63 00 14 38 06 e0 93 08 00 45 00 |c.. 8.....E. |
| 0010 | 01 48 71 9c 00 00 80 11 44 b4 c0 a8 01 03 c0 a8 | .Hq..... D..... |
| 0020 | 01 01 00 44 00 43 01 34 65 ac 01 01 06 00 56 c8 | ...D.C.4 e.....V. |
| 0030 | 32 03 00 00 00 00 c0 a8 01 03 00 00 00 00 00 00 | 2..... |

.....FIII

64

```
Hardware type: Ethernet (1)
Protocol type: IPv4 (0x0800)
Hardware size: 6
Protocol size: 4
Opcode: request (1)
Sender MAC address: Cisco_66:72:34 (84:b8:02:66:72:34)
Sender IP address: 147.175.144.1
Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
Target IP address: 147.175.144.205
```

| | | | |
|------|-------------------|-------------------------------|---------------|
| 0000 | ff ff ff ff ff ff | 84 b8 02 66 72 34 08 06 00 01 |fr4... |
| 0010 | 08 00 06 04 00 01 | 84 b8 02 66 72 34 93 af 90 01 |fr4... |
| 0020 | 00 00 00 00 00 00 | 93 af 90 cd 00 00 00 00 00 00 | ..... |
| 0030 | 00 00 00 00 00 00 | 00 00 40 fc 14 62 | @..b |

cmp

No.

Time

Source

Destination

Protocol

Length

Info

1503

20.473952

147.175.14...

213.163.97...

ICMP

70

Destination unreachable (Port unreachable)

▶ Frame 1503: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface 0

▼ Ethernet II, Src: Apple_18:49:e0 (ac:87:a3:18:49:e0), Dst: Cisco_66:72:34 (84:b8:02:66:72:34)

▶ Destination: Cisco_66:72:34 (84:b8:02:66:72:34)

▶ Source: Apple_18:49:e0 (ac:87:a3:18:49:e0)

Type: IPv4 (0x0800)

▼ Internet Protocol Version 4, Src: 147.175.145.224, Dst: 213.163.97.104

0100 = Version: 4

.... 0101 = Header Length: 20 bytes (5)

▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

Total Length: 56

Identification: 0xac04 (44036)

▶ Flags: 0x00

Fragment offset: 0

Time to live: 64

Protocol: ICMP (1)

Header checksum: 0x0000 [validation disabled]

[Header checksum status: Unverified]

Source: 147.175.145.224

Destination: 213.163.97.104

[Source GeoIP: Unknown]

[Destination GeoIP: Unknown]

0000

84 b8 02 66 72 34 ac 87 a3 18 49 e0 08 00 45 00

...fr4.. ..I...E.

0010

00 38 ac 04 00 00 40 01 00 00 93 af 91 e0 d5 a3

.8....@.

0020

61 68 03 03 d3 ac 00 00 00 00 45 88 01 bd 00 00

ah..... ..E.....

0030

40 00 37 11 e5 0c d5 a3 61 68 93 af 91 e0 13 e3

@.7..... ah.....

0040

13 c4 01 a9 00 00

.....

Apply a display filter ... <⌘/>

Expression...

No.

Time

Source

Destination

Protocol

Length

Info

1492

20.465193

13.107.6.1...

147.175.14...

TCP

1434

443 → 60446 [ACK] Seq=4105 Ack=218 Win=262656 Len=1368 TSval=2382096171 TSecr=1049717156 [TCP segment of a reasse...

1493

20.465194

13.107.6.1...

147.175.14...

TLSv1.2

247

Server Hello, Certificate, Certificate Status, Server Key Exchange, Server Hello Done

1494

20.465271

147.175.14...

13.107.6.1...

TCP

66

60446 → 443 [ACK] Seq=218 Ack=2737 Win=128576 Len=0 TSval=1049717168 TSecr=2382096171

1495

20.465272

147.175.14...

13.107.6.1...

TCP

66

60446 → 443 [ACK] Seq=218 Ack=5473 Win=125856 Len=0 TSval=1049717168 TSecr=2382096171

1496

20.465272

147.175.14...

13.107.6.1...

TCP

66

60446 → 443 [ACK] Seq=218 Ack=5654 Win=125664 Len=0 TSval=1049717168 TSecr=2382096171

1497

20.465353

147.175.14...

13.107.6.1...

TCP

66

[TCP Window Update] 60446 → 443 [ACK] Seq=218 Ack=5654 Win=131072 Len=0 TSval=1049717168 TSecr=2382096171

1498

20.470444

Cisco_66:7...

Broadcast

ARP

60

Who has 147.175.145.223? Tell 147.175.144.1

1499

20.472749

147.175.14...

13.107.6.1...

TLSv1.2

141

Client Key Exchange

1500

20.472777

147.175.14...

13.107.6.1...

TLSv1.2

72

Change Cipher Spec

1501

20.472795

147.175.14...

13.107.6.1...

TLSv1.2

111

Encrypted Handshake Message

1502

20.473902

213.163.97...

147.175.14...

SIP

459

Request: OPTIONS sip:100@147.175.145.224 |

1503

20.473952

147.175.14...

213.163.97...

ICMP

70

Destination unreachable (Port unreachable)

▶ Frame 1494: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface 0

▼ Ethernet II, Src: Apple_18:49:e0 (ac:87:a3:18:49:e0), Dst: Cisco_66:72:34 (84:b8:02:66:72:34)

▶ Destination: Cisco_66:72:34 (84:b8:02:66:72:34)

▶ Source: Apple_18:49:e0 (ac:87:a3:18:49:e0)

Type: IPv4 (0x0800)

▼ Internet Protocol Version 4, Src: 147.175.145.224, Dst: 13.107.6.151

0100 = Version: 4

.... 0101 = Header Length: 20 bytes (5)

▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

Total Length: 52

Identification: 0x4b4b (19275)

▶ Flags: 0x02 (Don't Fragment)

Fragment offset: 0

Time to live: 64

Protocol: TCP (6)

Header checksum: 0x0000 [validation disabled]

[Header checksum status: Unverified]

Source: 147.175.145.224

Destination: 13.107.6.151

[Source GeoIP: Unknown]

[Destination GeoIP: Unknown]

0000

84 b8 02 66 72 34 ac 87 a3 18 49 e0 08 00 45 00

...fr4.. ..I...E.

0010

00 34 4b 4b 40 00 40 06 00 00 93 af 91 e0 0d 6b

.4KK@.@.k

0020

06 97 ec 1e 01 bb d0 24 d2 a8 e6 7d 65 a8 80 10

.....\$...}e...

0030

0f b2 39 b8 00 00 01 01 08 0a 3e 91 69 b0 8d fb

..9..... ..>.i...

0040

e7 2b

.+

Source Hardware Address (eth.src), 6 bytes

Packets: 2080 · Displayed: 2080 (100.0%) · Dropped: 0 (0.0%)

Profile: Default

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|---------------|---------------|----------|--------|--|
| 1250 | 19.071179 | fe80::fc90... | ff02::c | SSDP | 181 | M-SEARCH * HTTP/1.1 |
| 1329 | 19.489090 | 147.175.14... | 66.102.1.1... | STUN | 90 | Binding Request |
| 1332 | 19.512595 | 66.102.1.1... | 147.175.14... | STUN | 74 | Binding Success Response XOR-MAPPED-ADDRESS: 147.175.145.224:54113 |
| 1397 | 19.993818 | fe80::468:... | ff02::1:3 | LLMNR | 86 | Standard query 0x34c8 ANY PC-283 |
| 1398 | 19.994149 | 147.175.14... | 224.0.0.252 | LLMNR | 66 | Standard query 0x34c8 ANY PC-283 |
| 1399 | 19.997193 | 10.92.0.2 | 10.92.255... | NBNS | 92 | Name query NB WORKGROUP<1e> |
| 1403 | 20.010591 | fe80::1962... | ff02::c | SSDP | 208 | M-SEARCH * HTTP/1.1 |
| 1415 | 20.103333 | fe80::468:... | ff02::1:3 | LLMNR | 86 | Standard query 0x34c8 ANY PC-283 |
| 1416 | 20.103360 | 147.175.14... | 224.0.0.252 | LLMNR | 66 | Standard query 0x34c8 ANY PC-283 |
| 1420 | 20.135714 | fe80::898f... | ff02::1:3 | LLMNR | 84 | Standard query 0x8240 A wpad |
| 1422 | 20.135884 | 147.175.14... | 224.0.0.252 | LLMNR | 64 | Standard query 0x8240 A wpad |
| 1426 | 20.156098 | 147.175.14... | 147.175.14... | NBNS | 92 | Name query NB WPAD<00> |

- ▶ Frame 1399: 92 bytes on wire (736 bits), 92 bytes captured (736 bits) on interface 0
- ▼ Ethernet II, Src: HewlettP_a7:f4:67 (00:9c:02:a7:f4:67), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

▶ Destination: Broadcast (ff:ff:ff:ff:ff:ff)

▶ Source: HewlettP_a7:f4:67 (00:9c:02:a7:f4:67)

Type: IPv4 (0x0800)
- ▶ Internet Protocol Version 4, Src: 10.92.0.2, Dst: 10.92.255.255
- ▼ User Datagram Protocol, Src Port: 137, Dst Port: 137

Source Port: 137

Destination Port: 137

Length: 58

Checksum: 0xa12b [unverified]

[Checksum Status: Unverified]

[Stream index: 21]
- ▶ NetBIOS Name Service

| | | |
|------|---|-------------------|
| 0000 | ff ff ff ff ff ff 00 9c 02 a7 f4 67 08 00 45 00 |g..E. |
| 0010 | 00 4e 32 e4 00 00 80 11 f3 01 0a 5c 00 02 0a 5c | .N2..... ..\...\ |
| 0020 | ff ff 00 89 00 89 00 3a a1 2b c5 06 01 10 00 01 |: .+..... |
| 0030 | 00 00 00 00 00 00 20 46 48 45 50 46 43 45 4c 45 | F HEPFCELE |
| 0040 | 48 46 43 45 50 46 46 46 41 43 41 43 41 43 41 43 | HFCEPFFF ACACACAC |
| 0050 | 41 43 41 43 41 42 4f 00 00 20 00 01 | ACACAB0. . . |

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-----------|---------------|---------------|----------|--------|---|
| 1 | 0.000000 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 2 | 2.006303 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 3 | 4.009585 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 4 | 6.014086 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 5 | 8.019261 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 6 | 10.024010 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 7 | 12.030370 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 8 | 14.033632 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 9 | 16.038664 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 10 | 18.043387 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 11 | 20.048488 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |
| 12 | 22.052880 | Cisco_87:8... | Spanning-t... | STP | 60 | Conf. Root = 32768/100/00:1c:0e:87:78:00 Cost = 4 Port = 0x8004 |

▼ Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)

Encapsulation type: Ethernet (1)

Arrival Time: Oct 24, 2007 15:55:55.413456000 CEST

[Time shift for this packet: 0.000000000 seconds]

Epoch Time: 1193234155.413456000 seconds

[Time delta from previous captured frame: 0.000000000 seconds]

[Time delta from previous displayed frame: 0.000000000 seconds]

[Time since reference or first frame: 0.000000000 seconds]

Frame Number: 1

Frame Length: 60 bytes (480 bits)

Capture Length: 60 bytes (480 bits)

[Frame is marked: False]

[Frame is ignored: False]

[Protocols in frame: eth:llc:stp]

[Coloring Rule Name: Broadcast]

[Coloring Rule String: eth[0] & 1]

► IEEE 802.3 Ethernet

▼ Logical-Link Control

► DSAP: Spanning Tree BPDU (0x42)

► SSAP: Spanning Tree BPDU (0x42)

► Control field: U, func=UI (0x03)

| | | |
|------|---|-----------------|
| 0000 | 01 80 c2 00 00 00 00 1c 0e 87 85 04 00 26 42 42 |&BB |
| 0010 | 03 00 00 00 00 00 80 64 00 1c 0e 87 78 00 00 00 |d ....x... |
| 0020 | 00 04 80 64 00 1c 0e 87 85 00 80 04 01 00 14 00 | ...d.... |
| 0030 | 02 00 0f 00 00 00 00 00 00 00 00 00 | ..... ..... |

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|----------|-------------|---------------|----------|--------|---------------------------------------|
| 1 | 0.000000 | 0.0.0.0 | 255.255.25... | DHCP | 314 | DHCP Discover - Transaction ID 0x3d1d |
| 2 | 0.000295 | 192.168.0.1 | 192.168.0.... | DHCP | 342 | DHCP Offer - Transaction ID 0x3d1d |
| 3 | 0.070031 | 0.0.0.0 | 255.255.25... | DHCP | 314 | DHCP Request - Transaction ID 0x3d1e |
| 4 | 0.070345 | 192.168.0.1 | 192.168.0.... | DHCP | 342 | DHCP ACK - Transaction ID 0x3d1e |

- ▶ Frame 1: 314 bytes on wire (2512 bits), 314 bytes captured (2512 bits)
- ▼ Ethernet II, Src: Grandstr_01:fc:42 (00:0b:82:01:fc:42), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

▶ Destination: Broadcast (ff:ff:ff:ff:ff:ff)

▶ Source: Grandstr_01:fc:42 (00:0b:82:01:fc:42)

Type: IPv4 (0x0800)
- ▶ Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
- ▼ User Datagram Protocol, Src Port: 68, Dst Port: 67

Source Port: 68

Destination Port: 67

Length: 280

Checksum: 0x591f [unverified]

[Checksum Status: Unverified]

[Stream index: 0]
- ▶ Bootstrap Protocol (Discover)

| | | |
|------|---|-----------------|
| 0000 | ff ff ff ff ff ff 00 0b 82 01 fc 42 08 00 45 00 |B..E. |
| 0010 | 01 2c a8 36 00 00 fa 11 17 8b 00 00 00 00 ff ff | .,.6..... |
| 0020 | ff ff 00 44 00 43 01 18 59 1f 01 01 06 00 00 00 | ...D.C.. Y..... |
| 0030 | 3d 1d 00 00 00 00 00 00 00 00 00 00 00 00 00 | =..... |
| 0040 | 00 00 00 00 00 00 00 0b 82 01 fc 42 00 00 00 00 |B.... |
| 0050 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |
| 0060 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |
| 0070 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |
| 0080 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |
| 0090 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |
| 00a0 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |
| 00b0 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |
| 00c0 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ..... |

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|---------------|---------------|----------|--------|---|
| 2210 | 23.369371 | 147.175.14... | 147.175.1... | HTTP | 672 | GET / HTTP/1.1 |
| 2307 | 23.714984 | 147.175.1... | 147.175.14... | HTTP | 1332 | HTTP/1.1 200 OK (text/html) |
| 2327 | 23.875527 | 147.175.14... | 147.175.1... | HTTP | 579 | GET /new/web_css/normalize.min.css HTTP/1.1 |
| 2330 | 23.876343 | 147.175.1... | 147.175.14... | HTTP | 958 | HTTP/1.1 200 OK (text/css) |
| 2342 | 23.884978 | 147.175.14... | 147.175.1... | HTTP | 697 | GET /css/bootstrap.min.css HTTP/1.1 |
| 2478 | 23.888307 | 147.175.1... | 147.175.14... | HTTP | 539 | HTTP/1.1 200 OK (text/css) |
| 2487 | 23.894476 | 147.175.14... | 147.175.1... | HTTP | 585 | GET /new/web_css/bootstrap-theme.min.css HTTP/1.1 |
| 2510 | 23.895751 | 147.175.1... | 147.175.14... | HTTP | 370 | HTTP/1.1 200 OK (text/css) |
| 2531 | 23.902009 | 147.175.14... | 147.175.1... | HTTP | 700 | GET /css/font-awesome.min.css HTTP/1.1 |
| 2558 | 23.903340 | 147.175.1... | 147.175.14... | HTTP | 548 | HTTP/1.1 200 OK (text/css) |
| 2574 | 23.910286 | 147.175.14... | 147.175.1... | HTTP | 578 | GET /new/web_css/flickity.min.css HTTP/1.1 |
| 2577 | 23.910965 | 147.175.1... | 147.175.14... | HTTP | 1150 | HTTP/1.1 200 OK (text/css) |

- ▶ Frame 2210: 672 bytes on wire (5376 bits), 672 bytes captured (5376 bits) on interface 0
- ▼ Ethernet II, Src: Apple_18:49:e0 (ac:87:a3:18:49:e0), Dst: Cisco_66:72:34 (84:b8:02:66:72:34)
 - ▶ Destination: Cisco_66:72:34 (84:b8:02:66:72:34)
 - ▶ Source: Apple_18:49:e0 (ac:87:a3:18:49:e0)
 - Type: IPv4 (0x0800)
- ▶ Internet Protocol Version 4, Src: 147.175.145.224, Dst: 147.175.1.54
- ▶ Transmission Control Protocol, Src Port: 62296, Dst Port: 80, Seq: 1, Ack: 1, Len: 606
- ▶ Hypertext Transfer Protocol

```
0000 84 b8 02 66 72 34 ac 87 a3 18 49 e0 08 00 45 00 ...fr4.. ..I...E.
0010 02 92 dd 72 40 00 40 06 00 00 93 af 91 e0 93 af ...r@.@. ....
0020 01 36 f3 58 00 50 64 52 7b fd c6 c0 8d ee 80 18 .6.X.PdR {...
0030 10 08 bc f9 00 00 01 01 08 0a 3e a8 d2 06 8c 38 ..... ..>....8
0040 2f 38 47 45 54 20 2f 20 48 54 54 50 2f 31 2e 31 /8GET / HTTP/1.1
0050 0d 0a 48 6f 73 74 3a 20 77 77 77 2e 66 69 69 74 ..Host: www.fiit
0060 2e 73 74 75 62 61 2e 73 6b 0d 0a 41 63 63 65 70 .stuba.s k..Accep
0070 74 3a 20 74 65 78 74 2f 68 74 6d 6c 2c 61 70 70 t: text/ html,app
0080 6c 69 63 61 74 69 6f 6e 2f 78 68 74 6d 6c 2b 78 lication /xhtml+x
0090 6d 6c 2c 61 70 70 6c 69 63 61 74 69 6f 6e 2f 78 ml,appli cation/x
00a0 6d 6c 3b 71 3d 30 2e 39 2c 2a 2f 2a 3b 71 3d 30 ml;q=0.9 ,*/*;q=0
00b0 2e 38 0d 0a 55 70 67 72 61 64 65 2d 49 6e 73 65 .8..Upgr ade-Inse
00c0 63 75 72 65 2d 52 65 71 75 65 73 74 73 3a 20 31 cure-Req uests: 1
```


| No. ↓ | Time | Source | Destination | Protocol | Info |
|-------|-----------|-------------------|-------------------|----------|--|
| 1 | 0.000000 | 192.168.1.3 | 192.168.1.1 | DHCP | DHCP Request - Transaction ID 0x56c83203 |
| 2 | 0.001653 | 192.168.1.1 | 192.168.1.3 | DHCP | DHCP ACK - Transaction ID 0x56c83203 |
| 3 | 15.710976 | 192.168.1.3 | 195.80.171.4 | DNS | standard query A cisco.netacad.net |
| 4 | 15.728807 | 195.80.171.4 | 192.168.1.3 | DNS | standard query response A 128.107.229.50 |
| 5 | 15.736346 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 6 | 15.928457 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 7 | 16.732516 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 8 | 16.925467 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 9 | 17.732481 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 10 | 17.925010 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 11 | 18.732460 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 12 | 18.923814 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 13 | 20.723404 | D-Link_fa:94:63 | HewlettP_06:e0:93 | ARP | who has 192.168.1.3? Tell 192.168.1.1 |
| 14 | 20.723424 | HewlettP_06:e0:93 | D-Link_fa:94:63 | ARP | 192.168.1.3 is at 00:14:38:06:e0:93 |
| 15 | 29.999418 | 192.168.1.3 | 192.168.1.1 | DHCP | DHCP Request - Transaction ID 0xa64ef4b1 |
| 16 | 30.001055 | 192.168.1.1 | 192.168.1.3 | DHCP | DHCP ACK - Transaction ID 0xa64ef4b1 |

Frame 1 (342 bytes on wire, 342 bytes captured)

- Ethernet II, Src: HewlettP_06:e0:93 (00:14:38:06:e0:93), Dst: D-Link_fa:94:63 (00:0d:88:fa:94:63)

Internet Protocol, Src: 192.168.1.3 (192.168.1.3), Dst: 192.168.1.1 (192.168.1.1)

User Datagram Protocol, Src Port: bootpc (68), Dst Port: bootps (67)

Bootstrap Protocol



11100011...01101010

E3.....6A

| | | |
|------|---|-------------------|
| 0000 | 00 0d 88 fa 94 63 00 14 38 06 e0 93 08 00 45 00 |c.. 8.....E. |
| 0010 | 01 48 71 9c 00 00 80 11 44 b4 c0 a8 01 03 c0 a8 | .Hq..... D..... |
| 0020 | 01 01 00 44 00 43 01 34 65 ac 01 01 06 00 56 c8 | ...D.C.4 e.....V. |
| 0030 | 32 03 00 00 00 00 c0 a8 01 03 00 00 00 00 00 00 | 2..... |

| No. ↓ | Time | Source | Destination | Protocol | Info |
|-------|-----------|-------------------|-------------------|----------|--|
| 1 | 0.000000 | 192.168.1.3 | 192.168.1.1 | DHCP | DHCP Request - Transaction ID 0x56c83203 |
| 2 | 0.001653 | 192.168.1.1 | 192.168.1.3 | DHCP | DHCP ACK - Transaction ID 0x56c83203 |
| 3 | 15.710976 | 192.168.1.3 | 195.80.171.4 | DNS | standard query A cisco.netacad.net |
| 4 | 15.728807 | 195.80.171.4 | 192.168.1.3 | DNS | standard query response A 128.107.229.50 |
| 5 | 15.736346 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 6 | 15.928457 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 7 | 16.732516 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 8 | 16.925467 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 9 | 17.732481 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 10 | 17.925010 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 11 | 18.732460 | 192.168.1.3 | 128.107.229.50 | ICMP | Echo (ping) request |
| 12 | 18.923814 | 128.107.229.50 | 192.168.1.3 | ICMP | Echo (ping) reply |
| 13 | 20.723404 | D-Link_fa:94:63 | HewlettP_06:e0:93 | ARP | who has 192.168.1.3? Tell 192.168.1.1 |
| 14 | 20.723424 | HewlettP_06:e0:93 | D-Link_fa:94:63 | ARP | 192.168.1.3 is at 00:14:38:06:e0:93 |
| 15 | 29.999418 | 192.168.1.3 | 192.168.1.1 | DHCP | DHCP Request - Transaction ID 0xa64ef4b1 |
| 16 | 30.001055 | 192.168.1.1 | 192.168.1.3 | DHCP | DHCP ACK - Transaction ID 0xa64ef4b1 |

+

Frame 1 (342 bytes on wire, 342 bytes captured)

- +

Ethernet II, Src: HewlettP_06:e0:93 (00:14:38:06:e0:93), Dst: D-Link_fa:94:63 (00:0d:88:fa:94:63)
- +

Internet Protocol, Src: 192.168.1.3 (192.168.1.3), Dst: 192.168.1.1 (192.168.1.1)
- +

User Datagram Protocol, Src Port: bootpc (68), Dst Port: bootps (67)
- +

Bootstrap Protocol



11100011...01101010

E3.....6A

| | | |
|------|---|-------------------|
| 0000 | 00 0d 88 fa 94 63 00 14 38 06 e0 93 08 00 45 00 |c.. 8.....E. |
| 0010 | 01 48 71 9c 00 00 80 11 44 b4 c0 a8 01 03 c0 a8 | .Hq..... D..... |
| 0020 | 01 01 00 44 00 43 01 34 65 ac 01 01 06 00 56 c8 | ...D.C.4 e.....V. |
| 0030 | 32 03 00 00 00 00 c0 a8 01 03 00 00 00 00 00 00 | 2..... |

.....FIII

64

| No. | Time | Source | Destination | Protocol | Info |
|-----|----------|-------------------|----------------|----------|--|
| 17 | 6.768083 | 147.175.98.238 | 147.175.99.30 | DNS | Standard query PTR 28.98.175.147.in-addr.arpa |
| 18 | 6.791664 | 147.175.99.30 | 147.175.98.238 | DNS | Standard query response PTR Golem.dcs.elf.stuba.sk |
| 19 | 7.539818 | 147.175.98.238 | 147.175.99.30 | DNS | Standard query A Golem.dcs.elf.stuba.sk |
| 20 | 7.542592 | 147.175.99.30 | 147.175.98.238 | DNS | Standard query response A 147.175.98.28 |
| 21 | 7.589691 | 147.175.98.238 | 209.11.45.139 | TCP | cnrprotocol > http [SYN] Seq=0 win=16384 Len=0 MSS=1 |
| 22 | 7.687735 | 209.11.45.139 | 147.175.98.238 | TCP | http > cnrprotocol [SYN, ACK] Seq=0 Ack=1 win=5840 L |
| 23 | 7.687844 | 147.175.98.238 | 209.11.45.139 | TCP | cnrprotocol > http [ACK] Seq=1 Ack=1 win=16560 Len=0 |
| 24 | 7.688471 | 147.175.98.238 | 209.11.45.139 | HTTP | GET /heartbeat?program=weather&partner=CAST1202&id=E |
| 25 | 7.711885 | standard_05:51:2b | Broadcast | ARP | who has 147.175.98.72? Tell 147.175.98.30 |
| 26 | 7.787027 | 209.11.45.139 | 147.175.98.238 | TCP | http > cnrprotocol [ACK] Seq=1 Ack=312 win=6432 Len= |
| 27 | 7.789080 | 209.11.45.139 | 147.175.98.238 | HTTP | HTTP/1.1 200 OK (text/plain) |
| 28 | 7.789103 | 209.11.45.139 | 147.175.98.238 | TCP | http > cnrprotocol [FIN, ACK] Seq=406 Ack=312 win=64 |
| 29 | 7.789173 | 147.175.98.238 | 209.11.45.139 | TCP | cnrprotocol > http [ACK] Seq=312 Ack=407 win=16155 L |
| 30 | 7.790671 | 147.175.98.238 | 209.11.45.139 | TCP | cnrprotocol > http [FIN, ACK] Seq=312 Ack=407 win=16 |

```

+ Frame 21 (62 bytes on wire, 62 bytes captured)
- Ethernet II, Src: WesternD_d7:80:c2 (00:00:c0:d7:80:c2), Dst: 3Com_a4:e4:8c (00:04:76:a4:e4:8c)
  + Destination: 3Com_a4:e4:8c (00:04:76:a4:e4:8c)
  + Source: WesternD_d7:80:c2 (00:00:c0:d7:80:c2)
  Type: IP (0x0800)
+ Internet Protocol, Src: 147.175.98.238 (147.175.98.238), Dst: 209.11.45.139 (209.11.45.139)
+ Transmission Control Protocol, Src Port: cnrprotocol (1096), Dst Port: http (80), Seq: 0, Len: 0

```

| | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|----|----|----|----|----|----|----|-------|----|----|------------------|
| 0000 | 00 | 04 | 76 | a4 | e4 | 8c | 00 | 00 | c0 | d7 | 80 | c2 | 08 00 | 45 | 00 | ..v.....E. |
| 0010 | 00 | 30 | 07 | 1d | 40 | 00 | 80 | 06 | fe | 76 | 93 | af | 62 ee | d1 | 0b | .0..@...v..b. |
| 0020 | 2d | 8b | 04 | 48 | 00 | 50 | 71 | 54 | 67 | 27 | 00 | 00 | 00 00 | 70 | 02 | ~..H.PqT g'...p. |
| 0030 | 40 | 00 | 70 | d7 | 00 | 00 | 02 | 04 | 05 | b4 | 01 | 01 | 04 02 | | | @.p..... |

| No. | Time | Source | Destination | Protocol | Info |
|-----|-----------|-----------------------|-------------------------|----------|--|
| 60 | 15.473200 | 30098000.0004757fb302 | 30098000.ffffffffffffff | IPX SAP | General Response |
| 61 | 15.532689 | 3Com_a4:e4:8c | Broadcast | ARP | who has 147.175.98.200? Tell 147.175.98.1 |
| 62 | 15.639916 | 00000000.5254ab148b15 | 00000000.ffffffffffffff | IPX SAP | General Query |
| 63 | 15.813463 | 3Com_13:97:df | NETBIOS- | SMB_NETL | Query for PDC from ENIGMA |
| 64 | 15.830688 | 147.175.98.232 | 147.175.98.255 | NBNS | Name query NB CA&O<1c> |
| 65 | 16.581787 | 147.175.98.232 | 147.175.98.255 | NBNS | Name query NB CA&O<1c> |
| 66 | 17.332795 | 147.175.98.232 | 147.175.98.255 | NBNS | Name query NB CA&O<1c> |
| 67 | 17.754417 | Standard_05:51:2b | Broadcast | ARP | who has 147.175.98.3? Tell 147.175.98.30 |
| 68 | 19.056341 | Standard_05:51:2b | Broadcast | ARP | who has 147.175.98.78? Tell 147.175.98.30 |
| 69 | 20.466129 | 3Com_a4:e4:8c | Broadcast | ARP | who has 147.175.98.5? Tell 147.175.98.1 |
| 70 | 21.650566 | 3Com_c6:b8:1f | Broadcast | ARP | who has 147.175.98.40? Tell 147.175.98.224 |
| 71 | 22.205575 | 3Com_a4:e4:8c | Broadcast | ARP | who has 147.175.98.110? Tell 147.175.98.1 |
| 72 | 22.989780 | 3Com_a4:e4:8c | Broadcast | ARP | who has 147.175.98.142? Tell 147.175.98.1 |

cup (center) (1000 g) (1000 g) (1000 g)

DSAP - 7 Most Significant Bits only (llc.dsap), 1 b... Packets: 373 Displayed: 373 Marked: 0

| No. | Time | Source | Destination | Protocol | S port | D port | Length | Info |
|-----|----------|-----------------------|-----------------------|----------|--------|--------|--------|--------------------------|
| 35 | 2.503287 | d0:67:e5:a4:5d:aa | CDP/VTP/DTP/PAgP/UDLD | CDP | | | 112 | Device ID: CN0F14WF2829 |
| 36 | 2.525909 | 147.175.145.174 | 255.255.255.255 | UDP | 17500 | 17500 | 186 | Source port: 17500 Dest |
| 37 | 2.528711 | 147.175.145.174 | 255.255.255.255 | UDP | 17500 | 17500 | 186 | Source port: 17500 Dest |
| 38 | 2.528844 | 147.175.145.174 | 255.255.255.255 | UDP | 17500 | 17500 | 186 | Source port: 17500 Dest |
| 39 | 2.528995 | 147.175.145.174 | 147.175.145.255 | UDP | 17500 | 17500 | 186 | Source port: 17500 Dest |
| 40 | 2.529103 | 147.175.145.174 | 255.255.255.255 | UDP | 17500 | 17500 | 186 | Source port: 17500 Dest |
| 41 | 2.598268 | 3Com_a4:e4:8c | Broadcast | ARP | | | 60 | who has 147.175.98.207? |
| 42 | 2.611220 | 3Com_a4:e4:8c | Broadcast | ARP | | | 60 | who has 147.175.98.27? |
| 43 | 2.613161 | fe80::1d63:c087:690d: | ff02::c | SSDP | 56226 | ssdp | 208 | M-SEARCH * HTTP/1.1 |
| 44 | 2.621696 | 147.175.145.197 | 224.0.0.2 | IGMP | | | 60 | V2 Leave Group 239.255.6 |
| 45 | 2.622252 | 192.168.0.254 | 239.255.67.250 | IGMP | | | 60 | V2 Membership Query / Jo |
| 46 | 2.623323 | 147.175.145.73 | 239.255.67.250 | IGMP | | | 60 | V2 Membership Report / : |
| 47 | 2.767357 | Cisco_e5:ae:11 | Spanning-tree-(for-br | STP | | | 60 | Conf. TC + Root = 32769, |
| 48 | 2.787335 | fe80::403:5c43:2646:1 | ff02::1:2 | DHCPv6 | dhcpv6 | dhcpv6 | 148 | solicit |
| 49 | 2.814400 | Intel_ad:a2:a7 | Broadcast | ARP | | | 60 | who has 147.175.145.136? |

Frame 35 (112 bytes on wire, 112 bytes captured)

IEEE 802.3 Ethernet

Logical-Link Control

DSAP: SNAP (0xaa)

IG Bit: Individual

SSAP: SNAP (0xaa)

CR Bit: Command

Control field: U, func=UI (0x03)

Organization Code: Cisco (0x00000c)

PID: CDP (0x2000)

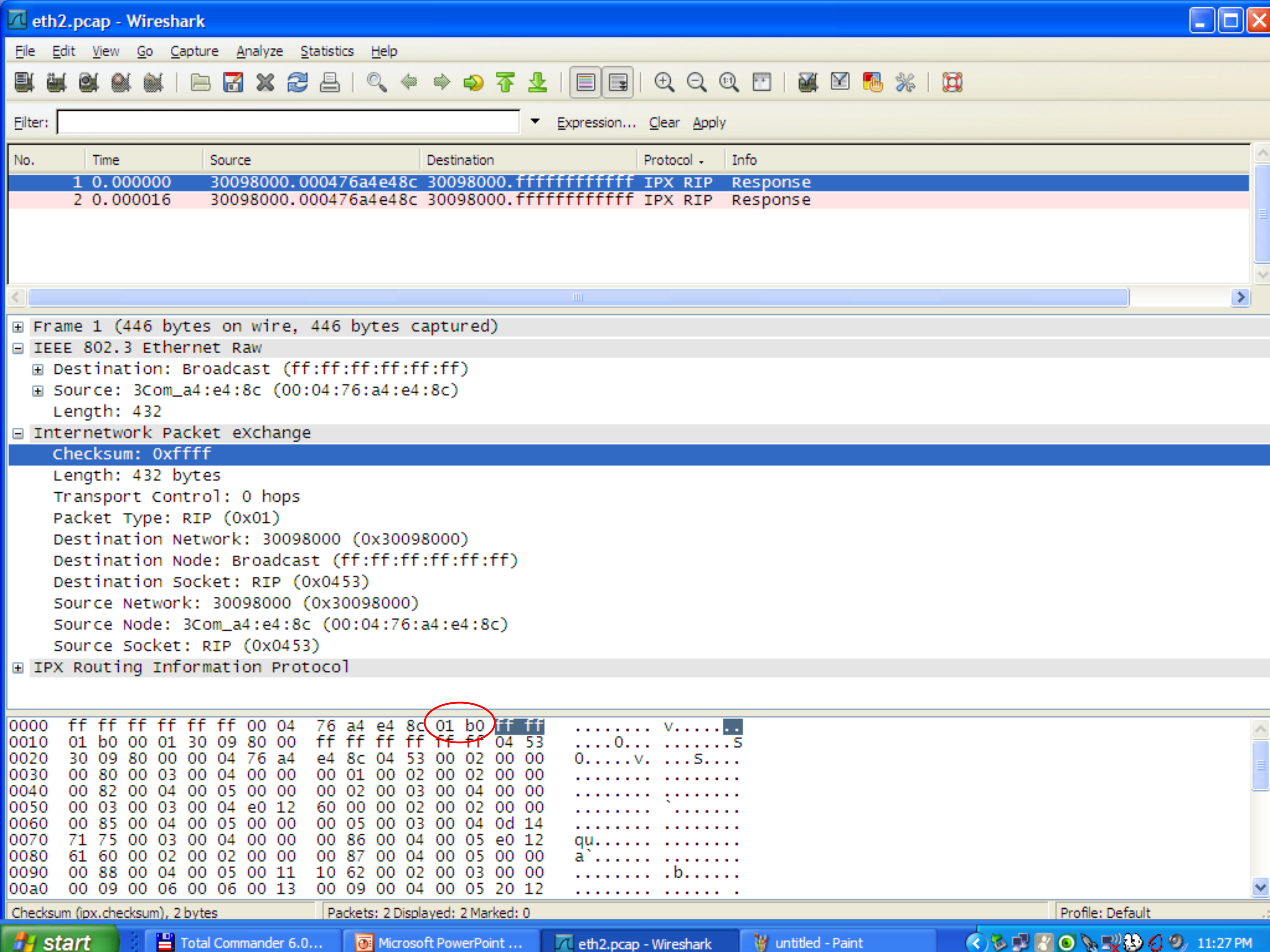
Cisco Discovery Protocol

```

0000  01 00 0c cc cc cc d0 67 e5 a4 5d aa 00 62 aa aa  ....g ..]..b..
0010  03 00 00 0c 20 00 02 b4 ac 5f 00 01 00 1b 43 4e  .... .._....CN
0020  30 46 31 34 57 46 32 38 32 39 38 32 39 45 30 30  0F14WF28 29829E00
0030  39 33 41 30 37 00 06 00 0b 50 43 54 37 30 32 34  93A07... .PCT7024
0040  00 03 00 0c 47 69 31 2f 30 2f 32 33 00 04 00 08  ....Gi1/ 0/23....
0050  00 00 00 01 00 05 00 0b 34 2e 32 2e 30 2e 34 00  .... 4.2.0.4.
0060  02 00 11 00 00 00 01 01 01 cc 00 04 93 af 90 09  ....

```

.... FIIT



Zhrnutie prednášky

- » Linková vrstva:
 - Formát Ethernet rámca
 - Analýza rámcov

Čo nás čaká na budúcej prednáške

- Linková vrstva
- Prístupové metódy
- ARP