

TCP/IP Architecture

Exercise 1.1 *Elaine is sitting in front of lrcpc3 and connects to machine 'ezinfo.ethz.ch' by Telnet. A clairvoyant angel has read all the frames passing on the network. Here is the first packet resulting from this activity:*

```
ETHER: ----- Ether Header -----
ETHER:
ETHER: Packet 1 arrived at 19:03:32.39
ETHER: Packet size = 60 bytes
ETHER: Destination = ff:ff:ff:ff:ff:ff
ETHER: Source = 0:0:c0:b8:c2:8d
ETHER: Ethertype = 0806
ETHER:
ARP: ----- ARP/RARP Frame -----
ARP:
ARP: Hardware type = 1
ARP: Protocol type = 0800 (IP)
ARP: Length of hardware address = 6 bytes
ARP: Length of protocol address = 4 bytes
ARP: Opcode 1 (ARP Request)
ARP: Sender's hardware address = 0:0:c0:b8:c2:8d
ARP: Sender's protocol address = 128.178.156.7, lrcpc3.epfl.ch
ARP: Target hardware address = ?
ARP: Target protocol address = 128.178.156.1, in-inr-e4.epfl.ch
```

1. *What is this frame used for in this exchange?*
2. *What stations receive this frame? What stations reply to it?*
3. *How can we determine if a frame is an ARP frame?*

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Exercise 1.2 *Among the packets observed, shortly afterwards, we find the following two:*

```
ETHER: ----- Ether Header -----
ETHER:
ETHER: Packet 2 arrived at 19:03:32.39
ETHER: Packet size = 74 bytes
ETHER: Destination = 0:0:c:2:78:36
ETHER: Source = 0:0:c0:b8:c2:8d
ETHER: Ethertype = 0800
ETHER:
IP: ----- IP Header -----
IP:
IP: Version = 4
IP: Header length = 20 bytes
IP: Type of service = 0x00
IP: xxx. .... = 0 (precedence)
IP: ...0 .... = normal delay
IP: .... 0... = normal throughput
IP: .... .0.. = normal reliability
IP: Total length = 60 bytes
IP: Identification = 2947
IP: Flags = 0x0
IP: .0.. .... = may fragment
IP: ..0. .... = last fragment
IP: Fragment offset = 0 bytes
IP: Time to live = 64 seconds/hops
IP: Protocol = 17
IP: Header checksum = c2ba
```

IP: Source address = 128.178.156.7
IP: Destination address = 128.178.15.8, IP: No options
IP:
UDP: ----- UDP Header -----
UDP:
UDP: Source port = 1267
UDP: Destination port = 53 (DNS)
UDP: Length = 40
UDP: Checksum = B672
UDP:
DNS: ----- DNS: -----
DNS:
DNS: ""
DNS:
ETHER: ----- Ether Header -----
ETHER:
ETHER: Packet 3 arrived at 19:03:32.40
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ETHER: Packet size = 202 bytes
ETHER: Destination = 0:0:c0:b8:c2:8d, Western Digital
ETHER: Source = 0:0:c:2:78:36, Cisco
ETHER: Ethertype = 0800
ETHER:
IP: ----- IP Header -----
IP:
IP: Version = 4
IP: Header length = 20 bytes
IP: Type of service = 0x00
IP: xxx. = 0 (precedence)
IP: ...0 = normal delay
IP: 0... = normal throughput
IP:0.. = normal reliability
IP: Total length = 188 bytes
IP: Identification = 38579
IP: Flags = 0x0
IP: .0.. = may fragment
IP: ..0. = last fragment
IP: Fragment offset = 0 bytes
IP: Time to live = 58 seconds/hops
IP: Protocol = 17
IP: Header checksum = 3d0a
IP: Source address = 128.178.15.8,
IP: Destination address = 128.178.156.7,
IP: No options
IP:
UDP: ----- UDP Header -----
UDP:
UDP: Source port = 53
UDP: Destination port = 1267
UDP: Length = 168
UDP: Checksum = 0000
UDP:
DNS: ----- DNS: -----
DNS:
DNS: ""
DNS:

1. *What has happened?*
2. *What is lrpc3's IP address? and ezinfo.ethz.ch's? What is the source IP address of packet 3. Which is the source MAC?*
3. *What is UDP port 53 reserved for? 1267? How can a UDP packet be recognised?*
4. *Comment on the value of the TTL fields.*
5. *Comment on the UDP checksum.*