

## 6. Data Link Layer

### 6.1 The MAC address

Every Ethernet network card on the world has a unique identifier called the media access control address (MAC address).

**The MAC addresses are necessary to identify a host within a network.**

The MAC address is a 48-bit number. In human-friendly form it is written in six hexadecimal groups.

#### Example:

01-2B-E4-67-8C-AB            or            01:2B:E4:67:8C:AB

### 6.2 The ARP table and ARP request

Every host maintains a so called ARP Table where the host saves all the combinations of a MAC address and an IP address that it has been in contact with.

#### Example of an ARP table:

<u>IP address</u>	<u>MAC address</u>
192.168.0.1	01-2B-E4-67-8C-AB
192.168.0.2	B5-67-92-AD-D1-CC
192.168.0.3	41-74-AC-FE-6F-77

If a host doesn't find the MAC address fitting a certain IP address in its ARP table then the host sends out an ARP request to all hosts on the local network. If there is a host in the network with the called IP address, this host will answer the ARP request by sending its MAC address back to the calling client.

With the arp command you can view the contents of the ARP table on a host.

#### Example:

```
C:\> arp -a
```

### 6.3 Switches

Switches maintain a so called MAC address table in which they store which MAC address is connected to which switch port.

**Example of a MAC address table:**

<u>MAC address</u>	<u>switch port number</u>
01-2B-E4-67-8C-AB	1
B5-67-92-AD-D1-CC	3
41-74-AC-FE-6F-77	3
3C-2D-E4-AB-21-26	4

Thus switches work on the data link layer and not as many believe on the internet layer.