Network Components (Solution)

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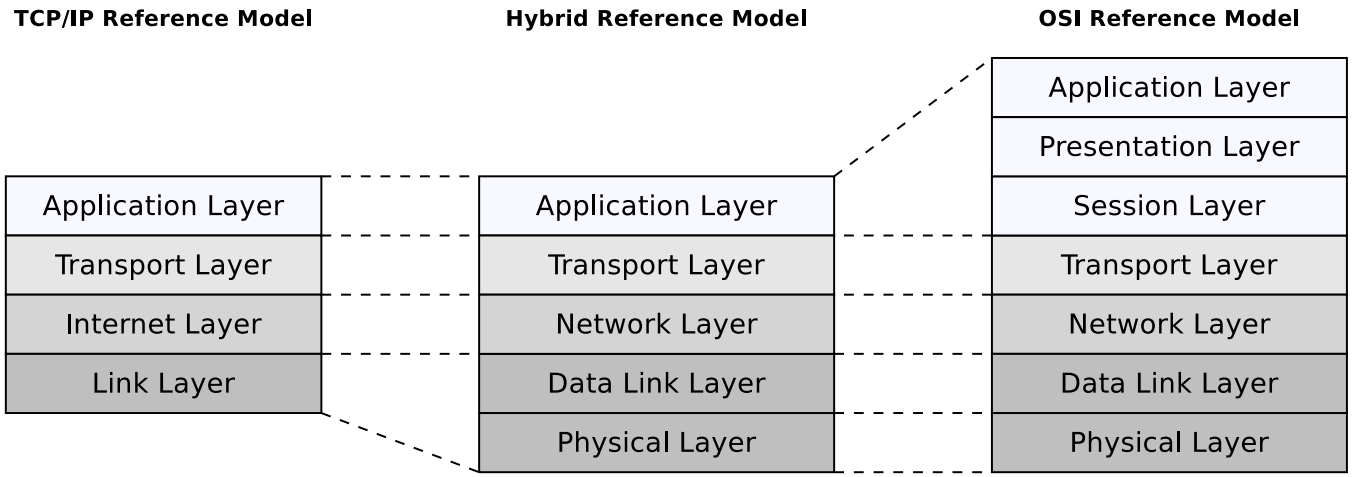
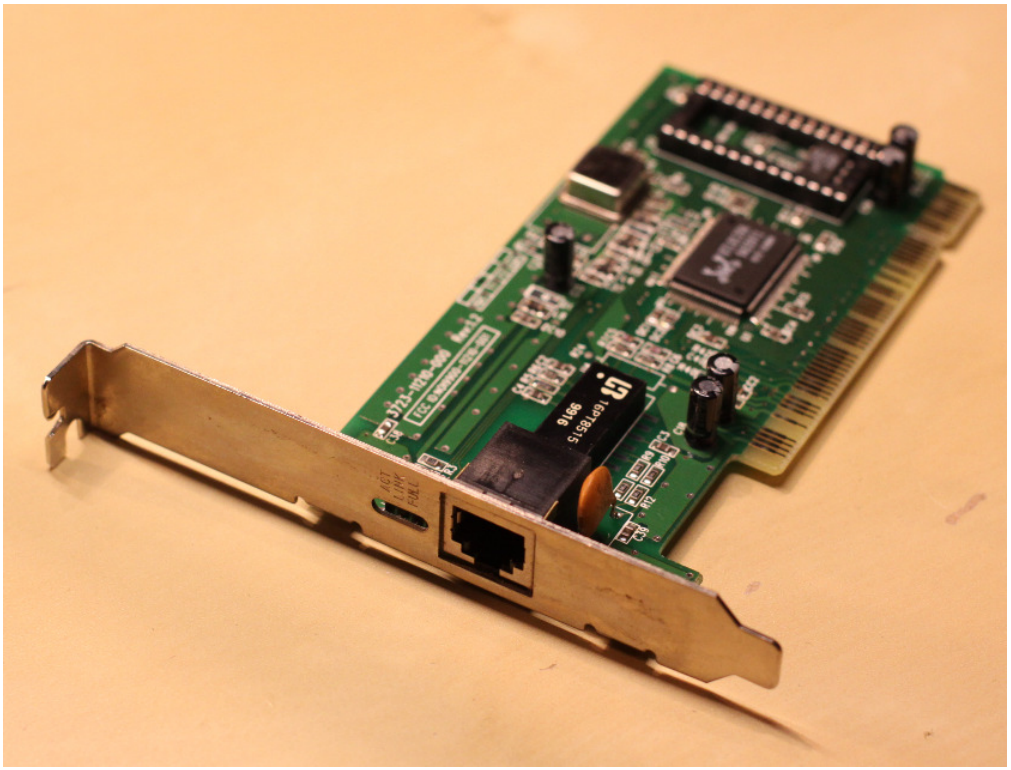
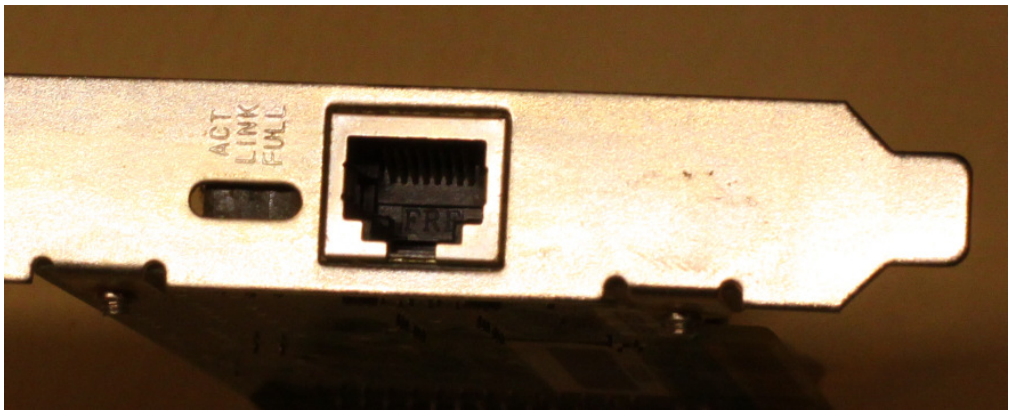
Task

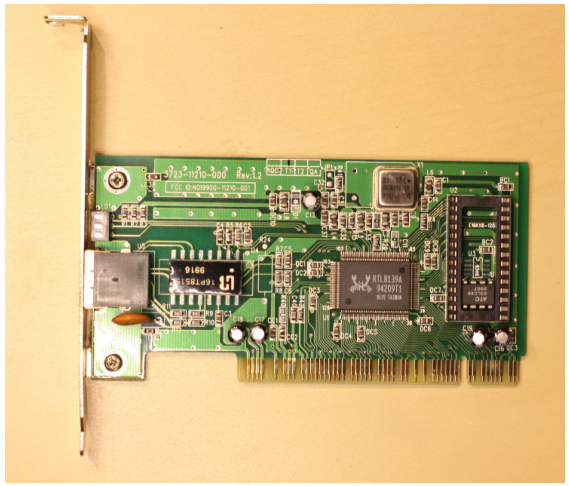
- The slides of this slide set contain photos of various network components
- Try to assign the network components to the layers in the hybrid reference model

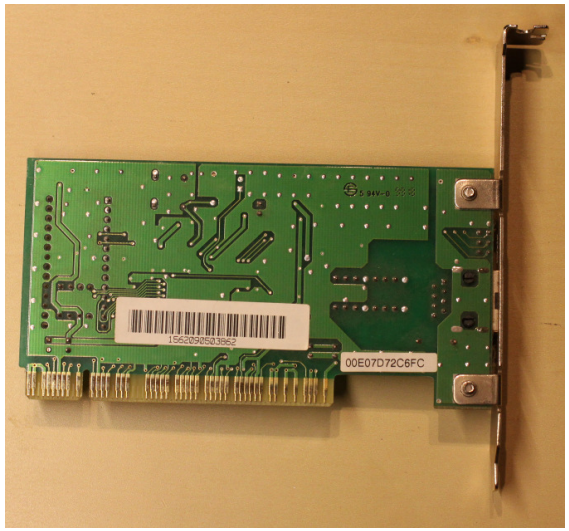


Component 1









PCI Network Interface Card with Realtek Chipset

- PCI network interface card (approx. 2000) for 10/100 MBit Ethernet

Layers in the hybrid reference model: 1-2

5 4 3	The functions of layers 3-5 in the hybrid reference model are implemented by the operating system of the computer in which the PCI network card is installed
2 1	The device has a MAC address Connector for Ethernet 10BASE-T and 100BASE-TX (Fast Ethernet)

Interesting details: 3 LEDs at the slot cover

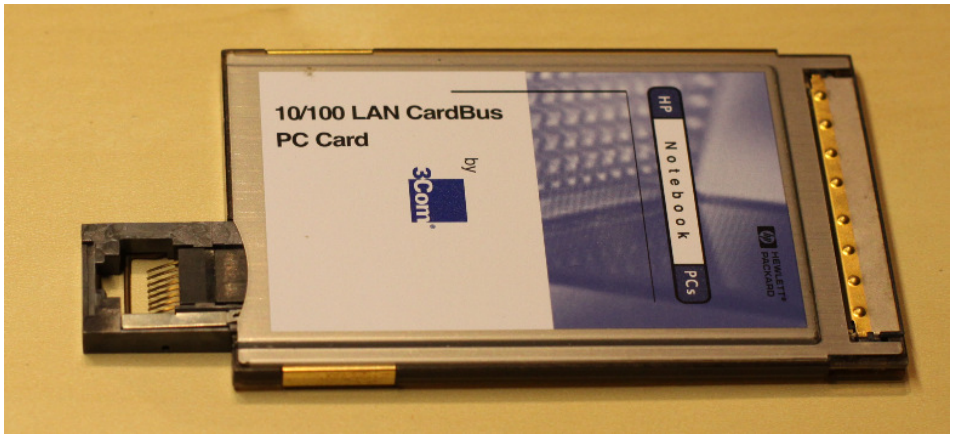
- ACK (= Action): Data is sent or received
- Link: A network cable is connected
- Full (= Full-Duplex): Sending and receiving at the same time is possible

Component 2


10/100 LAN CardBus
PC Card
by
3Com
HP
Notebook
PCs
HEWLETT PACKARD


Model 3CXFE575CT
3Com, the 3Com logo, Megahertz, and XJACK are registered trademarks of 3Com Corporation. Portions of this product are covered by U.S. Patent Nos. 5,183,404, 5,336,099, 5,338,210, 5,574,401, 5,434,872, 5,727,972, 5, 530,874, and 5,307,459.
©1999, 3Com Corporation. All rights reserved.
N151
PC Card
10KC14104R6A


10KC14104R6A


10/100 LAN CardBus
PC Card
by
3Com
HP
Notebook
PCs
HEWLETT PACKARD

3Com 10/100 LAN CardBus PC Card 3CXFE575CT

- PCMCIA network card (approx. 2000) for 10/100 MBit Ethernet

Layers in the hybrid reference model: 1-2

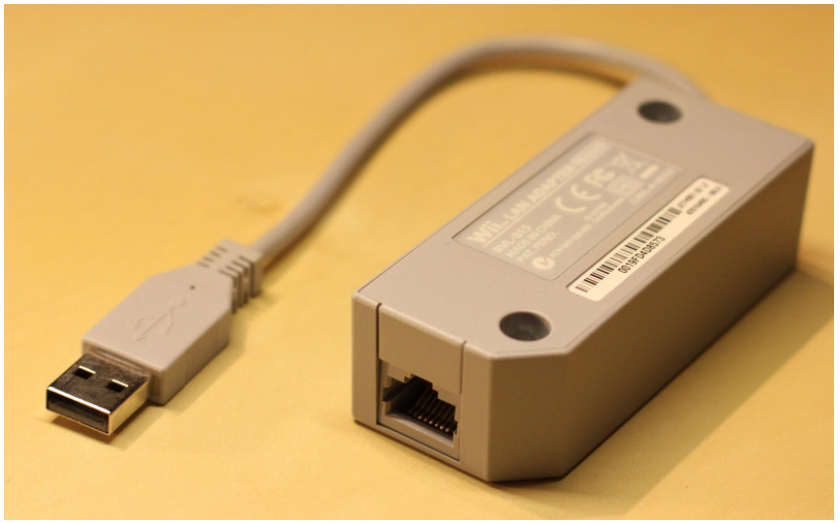
5 4 3	The functions of layers 3-5 in the hybrid reference model are implemented by the operating system of the computer in which the PCMCIA network card is installed
2 1	The device has a MAC address (but not to be seen on the photos!) Connector for Ethernet 10BASE-T and 100BASE-TX (Fast Ethernet)

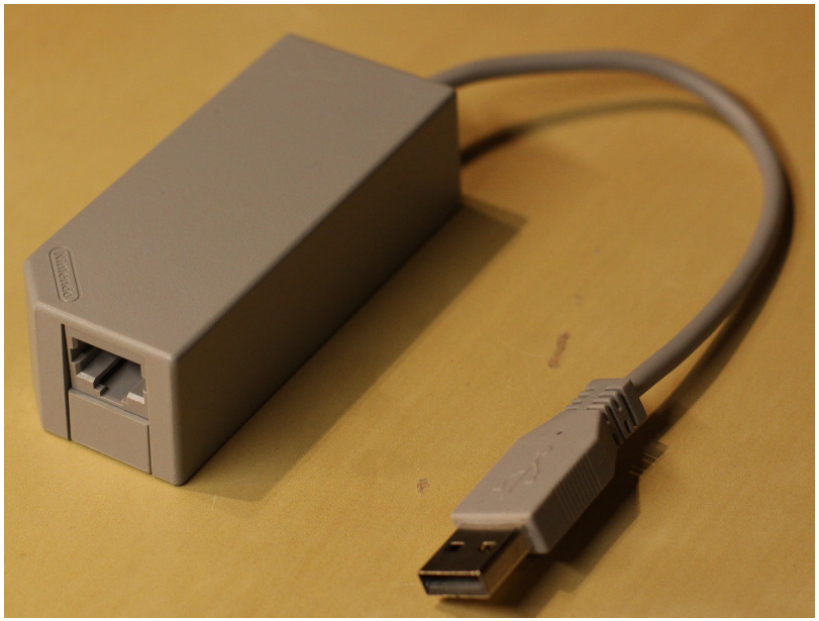
Attention!

- The photos do not show the MAC address, but only a serial number
- The amount of characters matches a MAC address, but the serial number contains characters which are not allowed in hexadecimal notation!

Component 3


Wii LAN ADAPTER
Nintendo
RVL-015
MADE IN CHINA
PAT. PEND.
ACN 060 566 083
D-63760
Großostheim
C/RVL-A-UE(CE)
J27H001.02 LF
0019FD4D8573
42010495 – 00L0





Nintendo Wii LAN-Adapter RVL-015

- USB network card (approx. 2000) for 10/100 MBit Ethernet

Layers in the hybrid reference model: 1-2

5 4 3	The functions of layers 3-5 in the hybrid reference model are implemented by the operating system of the computer with which the USB network adapter is connected to
2 1	The device has a MAC address Connector for Ethernet 10BASE-T and 100BASE-TX (Fast Ethernet)

Component 4


22 / 11 / 5.5 / 2 / 1 Mbps
22 Mbps
IEEE 802.11b+


Model No: GL242201-0T
FCC ID: O7J-GL242201
Canada ID: 3895B12056
This device complies with part 15 of the FCC rules.
Operation is subject to the following two conditions:
(1)This device may not cause harmful interference.
(2)This device must accept any interference
received,including interference that
may cause undesired operation.
Complies with CANADA RSS-210
MAC:
00032F102EDE
S/N:
030112530121 77
0560
Rating:3.3V
Made in Taiwan

PCMCIA-WLAN-Karte GL242201-OT

- No-name PCMCIA card (approx. 2002)

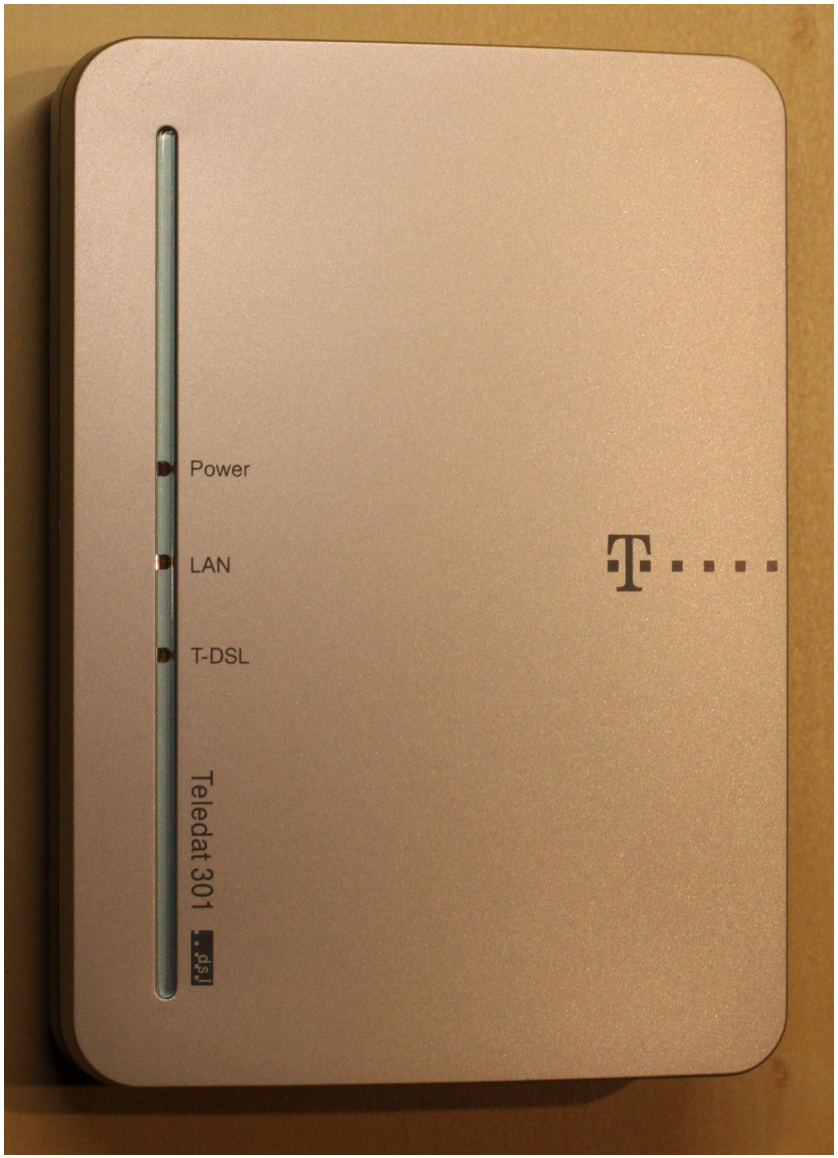
Layers in the hybrid reference model: 1-2

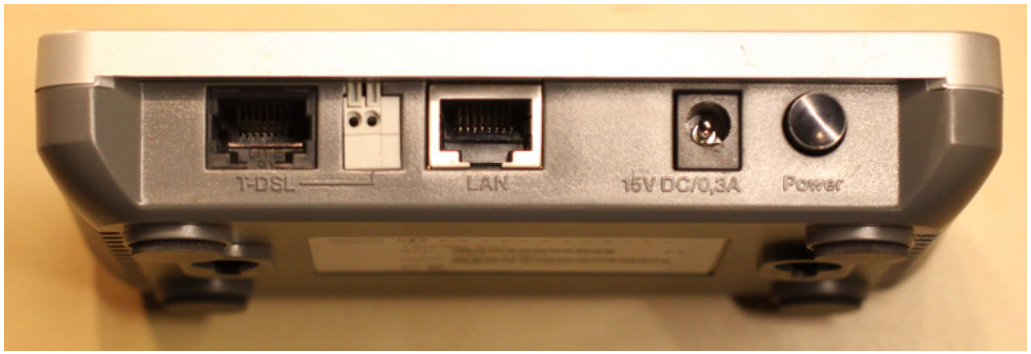
5 4 3	The functions of layers 3-5 in the hybrid reference model are implemented by the operating system of the computer in which the PCMCIA network card is installed
2 1	The device has a MAC address Supports WLAN according to standard 802.11b

Interesting details

- The hardware is identical with D-Link DWL-650+
- The adapter also provides 22 Mbit/s at 40 MHz channel width via a proprietary (vendor-dependent) standard

Component 5


Power
LAN
T-DSL
Teledat 301


T-DSL
LAN
15V DC/0,3A
Power


Deutsche Telekom
Teledat 301
SNr.
T1
H5A113201
MAC
0003C9 81B9FC

Teledat 301 DSL Modem

- External DSL modem

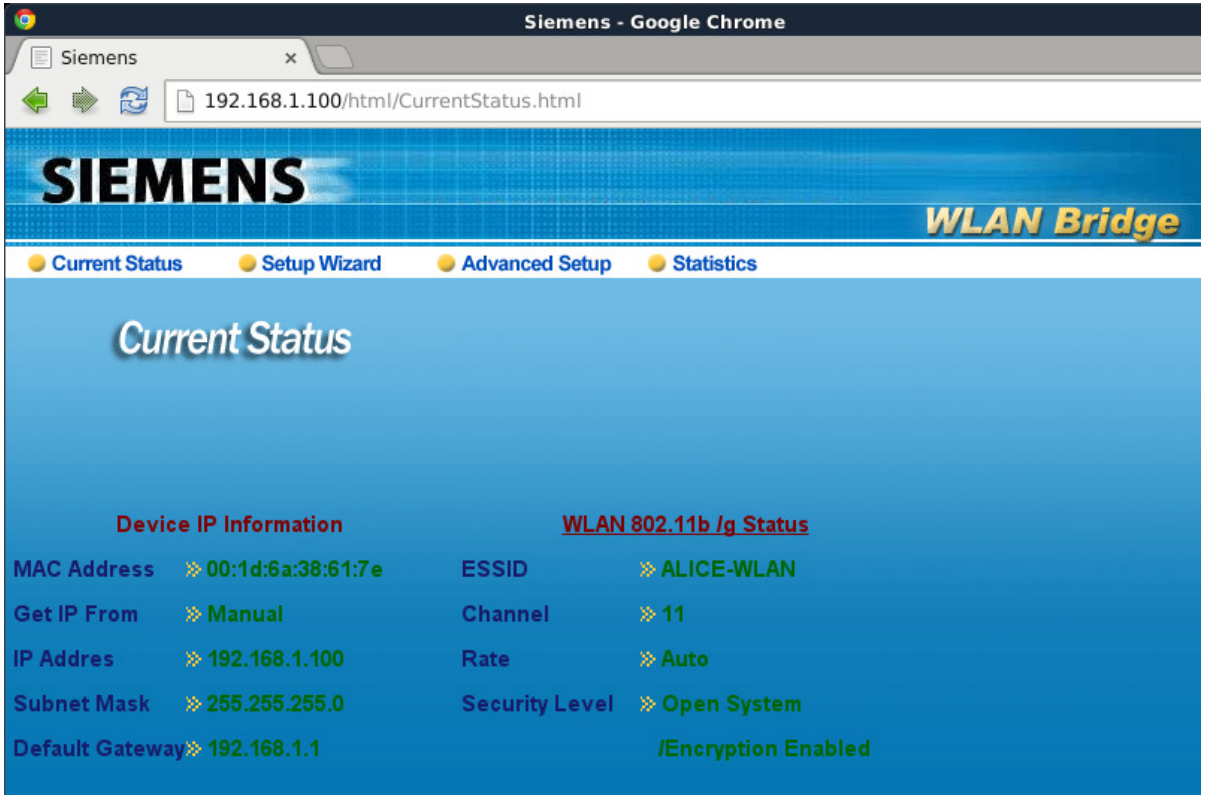
Layers in the hybrid reference model: 1-2

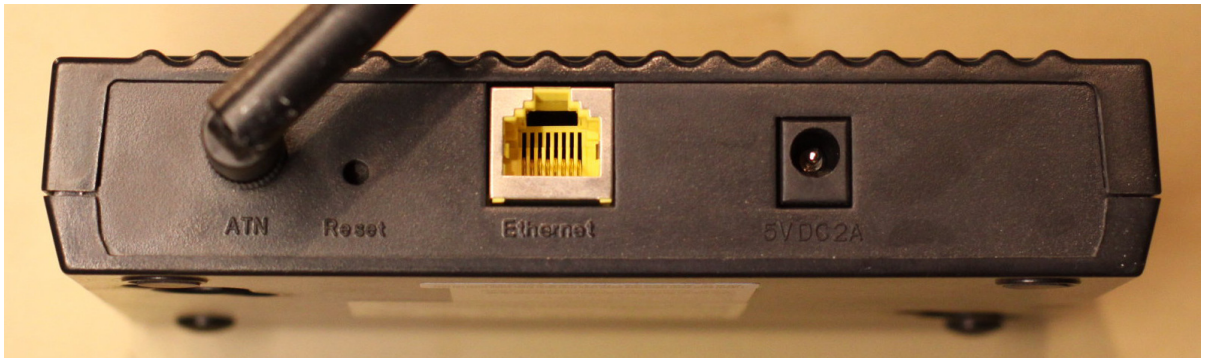
5	—
4	—
3	No logical network address
2	The device has a MAC address
1	Connectors for Ethernet 100BASE-TX and DSL splitter

Component 6


SIEMENS
Power
LAN
WLAN


SIEMENS
Siemens Switzerland Ltd
SIEMENS WLAN Bridge W-011
S1621-Z122-A Code:49DR203
SAP-Nr.:100809
This device is intended for use in the EEA and Switzerland.
Serial Number:CS1621Z122A086001562
Made in China
Kundeninformationen:
Modelname:WLAN WB-011
SSID: ALICE-WLAN
WEP Schluessel: HNA16A0091161
MAC Address: 001D6A38617E


Siemens - Google Chrome
Siemens
192.168.1.100/html/CurrentStatus.html
SIEMENS
WLAN Bridge
Current Status
Setup Wizard
Advanced Setup
Statistics
Current Status
Device IP Information
MAC Address 00:1d:6a:38:61:7e
Get IP From Manual
IP Addres 192.168.1.100
Subnet Mask 255.255.255.0
Default Gateway 192.168.1.1
WLAN 802.11b /g Status
ESSID ALICE-WLAN
Channel 11
Rate Auto
Security Level Open System
/Encryption Enabled


ATN
Reset
Ethernet
5VDC2A

Siemens WLAN Bridge W-011 (approx. 2006)

- Integrates one(!) network device that is connected via Ethernet interface into a WLAN ($\Longrightarrow$ WLAN client)

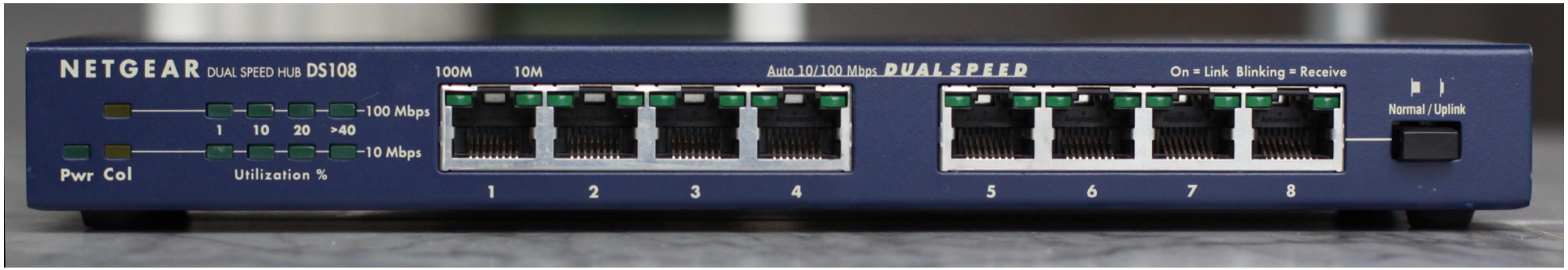
Layers in the hybrid reference model: 1-5

5	SSH server, Telnet server, HTTP server, SNMP client,...
4	Ports for configuration via SSH, Telnet, Web interface,...
3	IP address and netmask are assigned
2	The device has a MAC address
1	Connector for Ethernet 100BASE-TX and WLAN interface

Interessante Details

- Accepts only one MAC address at the Ethernet interface $\Longrightarrow$ not a full-fledged bridge but only a WLAN client
- The hardware is identical to D-Link DWL2100AP, but the firmware is „crippled“

Component 7


NETGEAR DUAL SPEED HUB DS108
100M
10M
Auto 10/100 Mbps DUAL SPEED
On = Link Blinking = Receive
Normal / Uplink
100 Mbps
1 10 20 >40
10 Mbps
Pwr Col
Utilization %
1 2 3 4 5 6 7 8


12Vdc 1.2A


NETGEAR
8 PORT 10/100Mbps Dual Speed Hub
MODEL DS108


NETGEAR
DS108
N269
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference. and (2) this device must accept any interference received. including interference that may cause undesired operation.
この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。
VCCI-A
MADE IN CHINA

Netgear Dual Speed Hub DS108

- Hub = Multiport Repeater (approx. 2000)
- Forwards incoming signals to all ports

Layers in the hybrid reference model: 1

5	—
4	—
3	No logical network address
2	No physical network address
1	Connectors for Ethernet 10BASE-T and 100BASE-TX

Interesting details

- Collision indicator
- Switch for setting port 8 to be an uplink port

Component 8


V.90/56K MODEM
CS RS CD OH RD SD TR MR


CREATIX
Creative Information eXchange
GC 326.0 ~9V/700mA
CE 0682 X
S/N:D105287
040-05301286 MADE IN TAIWAN


POWER
RS-232
MIC
SPK
LINE
PHONE

Creatix Modem

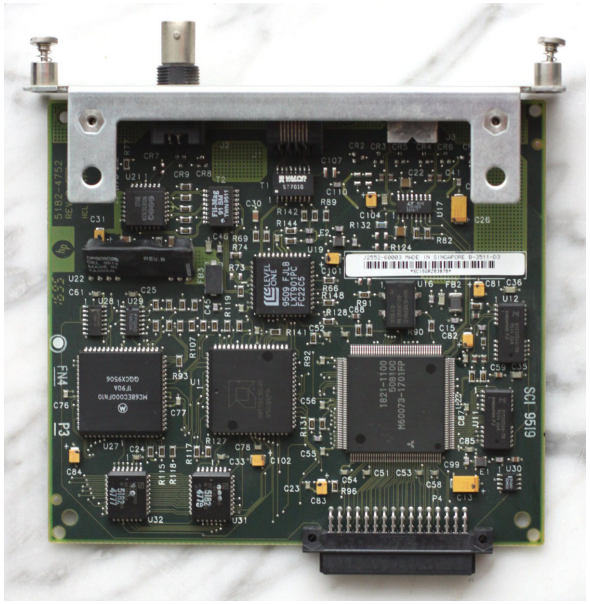
- Analog „narrowband“ modem (approx. 1996) for telephone lines

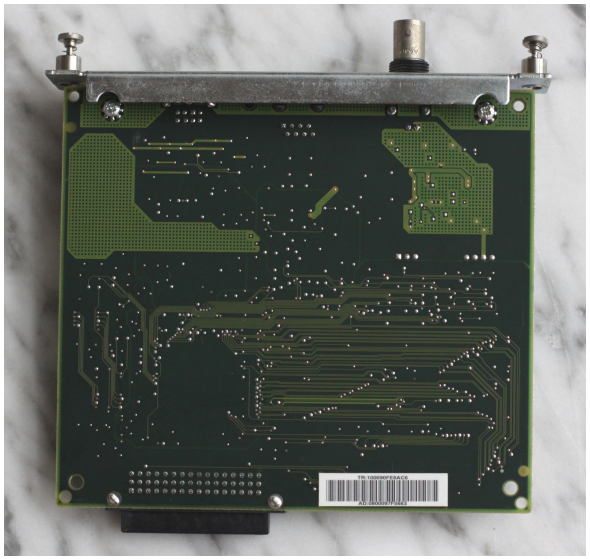
Layers in the hybrid reference model: 1-2

5	—
4	—
3	No logical network address
2	Uses the Point-to-Point Protocol (PPP) to establish, maintain, and terminate point-to-point connections. No physical network address
1	Modulates digital information to be transmitted onto a carrier frequency in the high-frequency range. Demodulates received signals

Component 9


```
# telnet 10.0.0.5
Trying 10.0.0.5...
Connected to 10.0.0.5
Escape character is '^]'.

HP JetDirect

Please type "?" for HELP, or "/" for current settings

> /
===JetDirect Telnet Configuration===
Firmware Rev.    : A.08.49
MAC Address      : 08:00:09:7f:56:63
Config By        : USER SPECIFIED
IP Address       : 10.0.0.5
Subnet Mask      : 255.255.255.0
Default Gateway  : 10.0.0.1
Syslog Server    : Not Specified
Idle Timeout     : 90 Seconds
Set Cmnty Name   : Not Specified
Host Name        : LASERJET
DHCP Config      : Disabled
```





HP JetDirect J2552B Print Server

- Print server (approx. 1996) for HP LaserJet printers

Layers in the hybrid reference model: 1-5

5	Configuration is possible via Telnet, among other things. Newer print servers also include SSH server, SNMP client and/or a web interface (HTTP server), automatic network configuration is possible via DHCP client
4	Uses TCP port 9100 as default entry point to the printer
3	IP address and netmask are assigned
2	The device has a MAC address
1	Connectors for Ethernet 10BASE2, 10BASE-T and Apple LocalTalk

Component 10

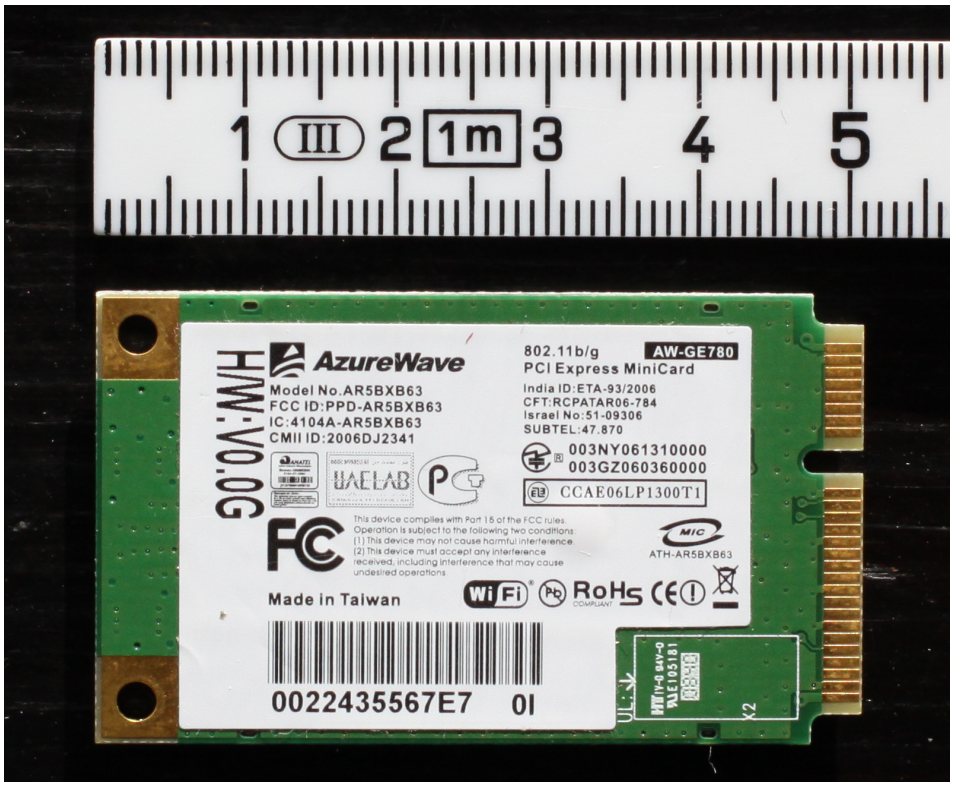
TP-Link TL-SG108 8-Port Gigabit Switch

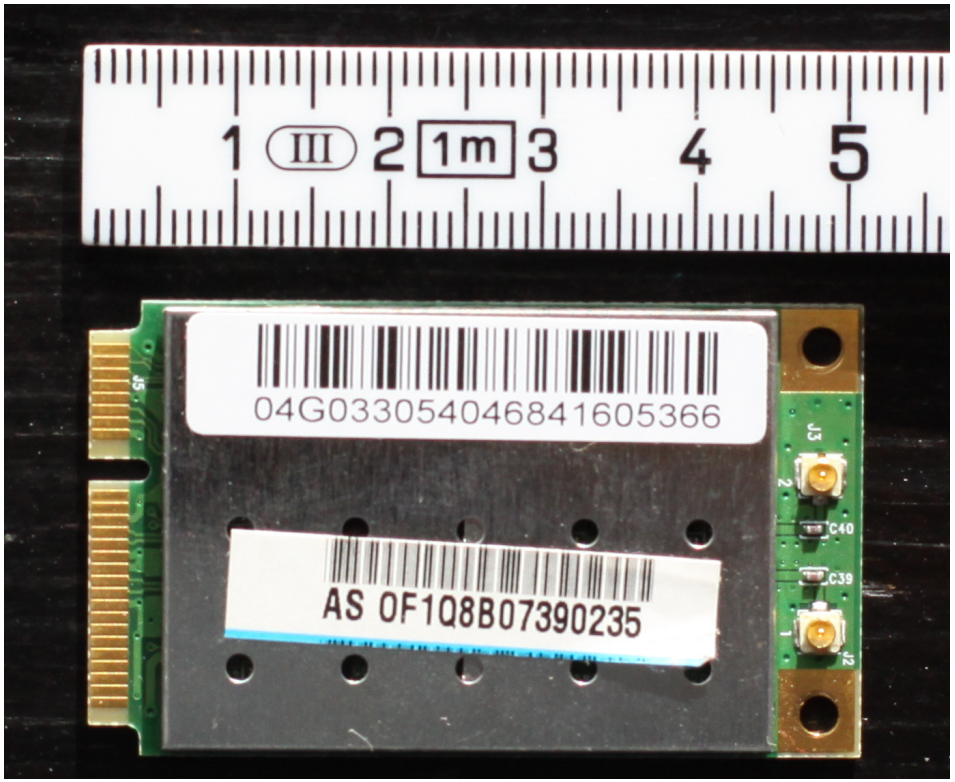
- Layer 2-Switch = Multiport Bridge (2014)
- Learning Bridge
- Unmanaged Switch $\Longrightarrow$ no configuration options
- 2 MB buffer

Layers in the hybrid reference model: 1-2

5	—
4	—
3	No logical network address
2	Connects different physical networks. Learning Bridge $\Longrightarrow$ learns which MAC addresses are connected to which port. No physical network address
1	Connectors for Ethernet 10BASE-T, 100BASE-TX and 1000BASE-T

Component 11





0022435567E7

AzureWave AW-GE780

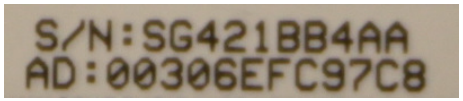
- Mini PCIe WLAN card (2007)
- Such cards are often installed in laptops or so-called „all-in-one“ computers (e.g. Apple iMac)
- The card provides two U.FL connectors (from Hirose Electric) for connecting WLAN antennas

Layers in the hybrid reference model: 1-2

5 4 3	The functions of layers 3-5 in the hybrid reference model are implemented by the operating system of the computer in which the Mini PCIe WLAN card is installed
2 1	The device has a MAC address Supports WLAN according to standard 802.11b and 802.11g

Component 12

```
$ telnet 192.0.0.192
Trying 192.0.0.192...
Connected to 192.0.0.192.
Escape character is '^]'.

HP JetDirect

Please type "?" for HELP, or "/" for current settings
> /

===JetDirect Telnet Configuration===
Firmware Rev.    : F.08.20
MAC Address      : 00:30:6e:fc:97:c8
Config By        : Default IP

IP Address       : 192.0.0.192
Subnet Mask      : Not Specified
Default Gateway  : 192.0.0.192
Syslog Server    : Not Specified
Idle Timeout     : 90 Seconds
Set Cmnty Name   : Not Specified
Host Name        : Not Specified

DHCP Config      : Enabled
Passwd           : Disabled
IPX/SPX          : Enabled
DLC/LLC          : Enabled
Banner page      : Enabled
```



HP JetDirect J3258B Print Server 170X

- Print server (approx. 1999) for HP LaserJet printers

Layers in the hybrid reference model: 1-5

5	Configuration is possible via Telnet, automatic network configuration is possible via DHCP client
4	Uses TCP port 23 for Telnet
3	IP address and netmask are assigned
2	The device has a MAC address
1	Connector for 10BASE-T

Component 13

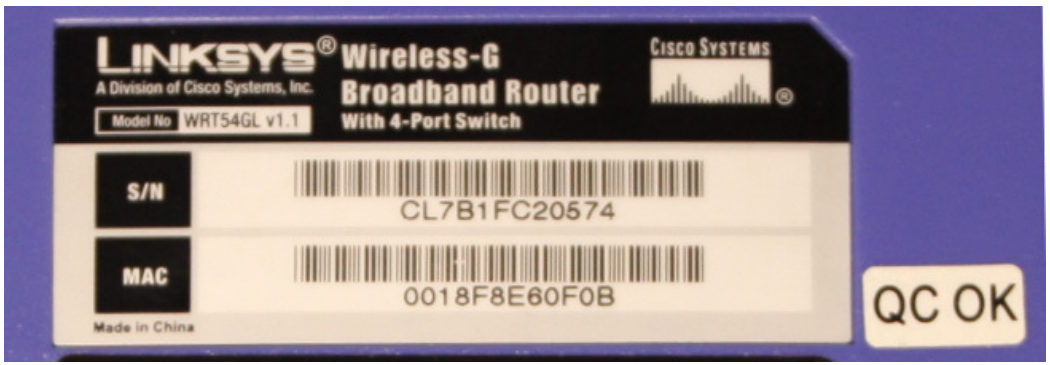
CentreCOM 210TS Twisted Pair Transceiver

- This transceiver is so compact that it can be connected directly to the network interface of a workstation (e.g. Sun SPARCstation). An AUI cable is not necessary

Layers in the hybrid reference model: 1

5	—
4	—
3	—
2	—
1	Physical connection to the transmission medium of a 10BASE-T Ethernet network

Component 14



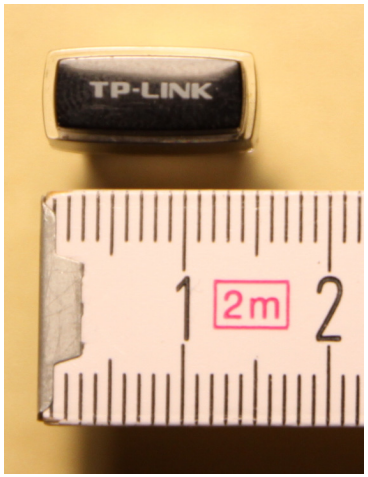
Linksys WRT54GL Wireless Router with 4-Port Switch

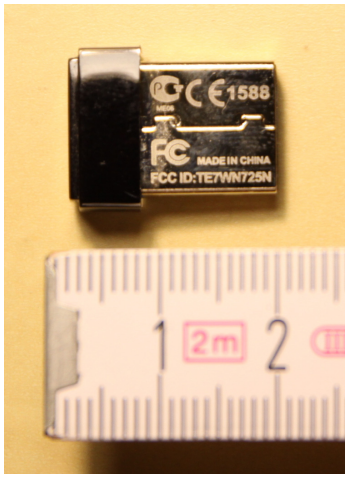
- Router with one WAN port, integrated 4-port Switch and wireless Access Point

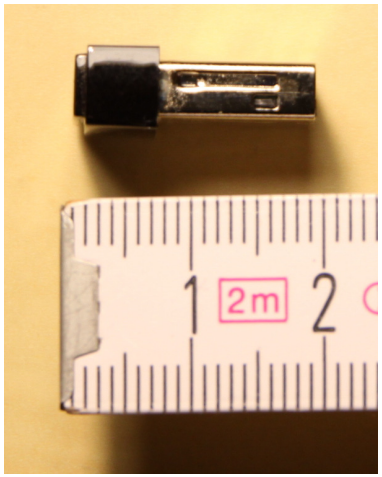
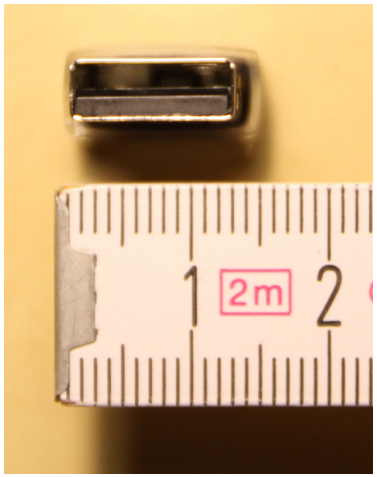
Layers in the hybrid reference model: 1-5

5	HTTP server, DHCP server,...
4	Ports for configuration via web interface,...
3	IP address and netmask are assigned
2	The device has a MAC address
1	Connection for Ethernet 100BASE-TX and WLAN interface

Component 15





```
[221411.207865] usb 1-2: USB disconnect, device number 90
[221703.999606] usb 1-1: USB disconnect, device number 91
[221732.387524] usb 1-1: new high-speed USB device number 92 using xhci_hcd
[221732.528114] usb 1-1: New USB device found, idVendor=0bda, idProduct=8179
[221732.528118] usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[221732.528121] usb 1-1: Product: 802.11n NIC
[221732.528123] usb 1-1: Manufacturer: Realtek
[221732.528126] usb 1-1: SerialNumber: 00E04C0001
[221733.120663] r8188eu: module is from the staging directory, the quality is unknown, you have been warned.
[221733.124373] Chip Version Info: CHIP_8188E_Normal_Chip_TSMC_A_CUT_1T1R_RomVer(0)
[221733.150775] usbcore: registered new interface driver r8188eu
[221733.152618] r8188eu 1-1:1.0 wlx6466b31c4fbc: renamed from wlan0
[221733.177891] IPv6: ADDRCONF(NETDEV_UP): wlx6466b31c4fbc: link is not ready
[221733.178917] r8188eu 1-1:1.0: firmware: direct-loading firmware rtlwifi/rtl8188eufw.bin
[221733.544034] MAC Address = 64:66:b3:1c:4f:bc
```

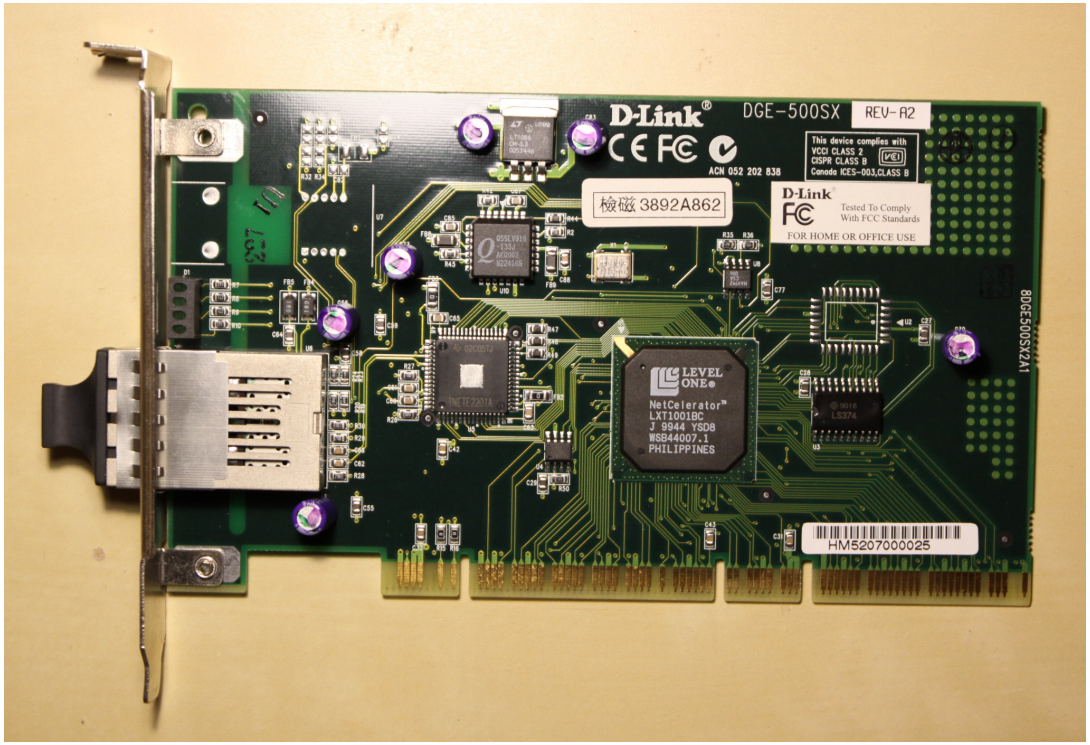
TP-LINK TL-WN725N

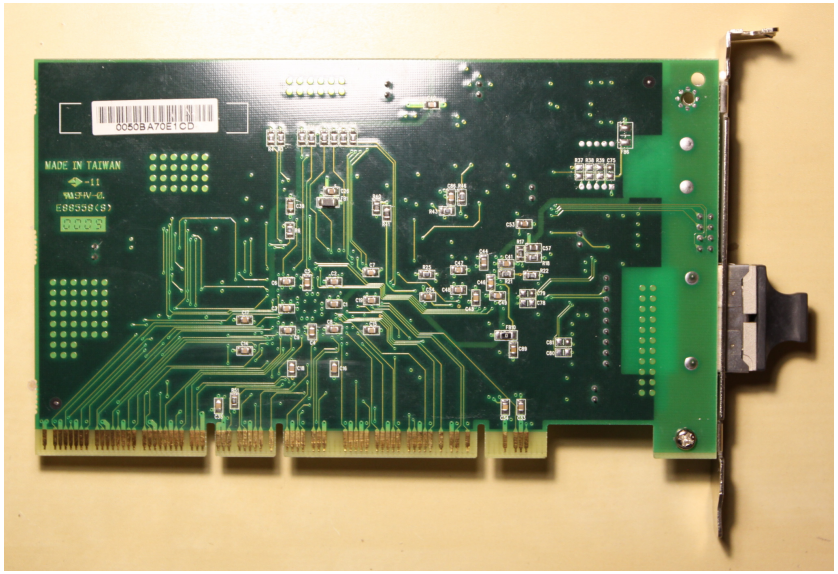
- Nano WLAN USB adapter

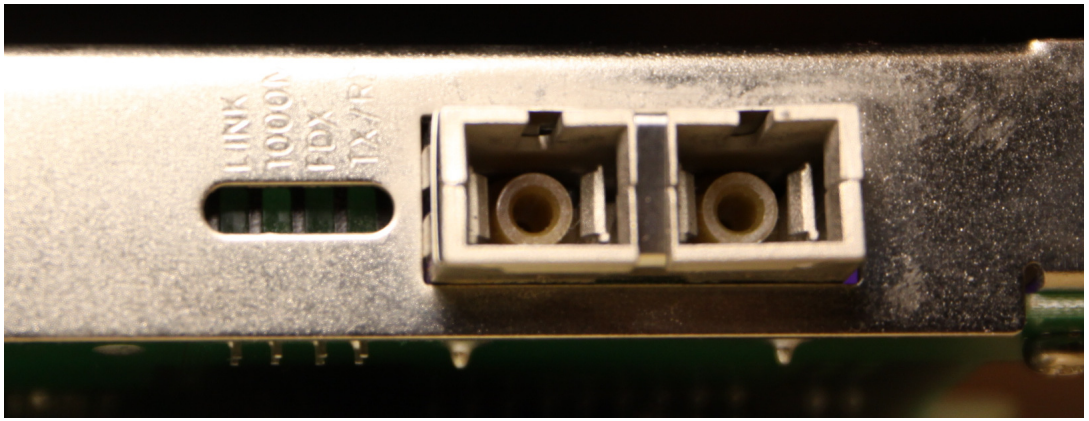
Layers in the hybrid reference model: 1-2

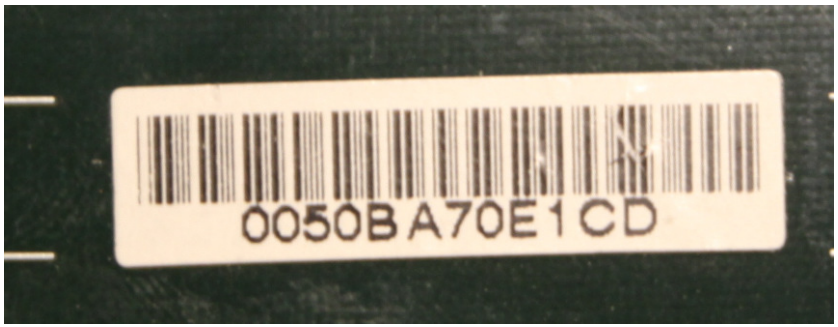
5 4 3	The functions of layers 3-5 in the hybrid reference model are implemented by the operating system of the computer with which the USB network adapter is connected to
2 1	The device has a MAC address Supports WLAN according to standard 802.11b, 802.11g and 802.11n

Component 16









PCI Network Interface Card D-Link DGE-500SX

- PCI network interface card (approx. 1999) for 1 GBit Ethernet via fiber optic cable
- Transmission medium: multimode optical fiber with 850 nm wavelength (full duplex)

Layers in the hybrid reference model: 1-2

5 4 3	The functions of layers 3-5 in the hybrid reference model are implemented by the operating system of the computer in which the PCI network interface card is installed
2 1	The device has a MAC address Connector for Ethernet 1000BASE-SX

Component 17

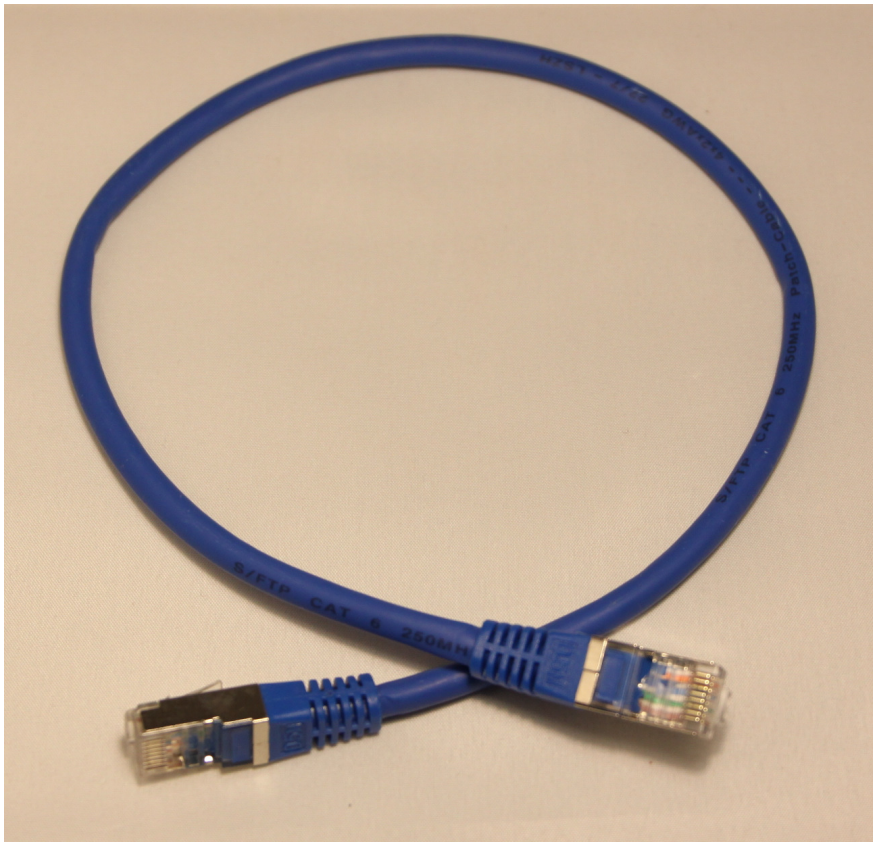
INTERLAN NT1000 IEEE 802.3 Ethernet Transceiver

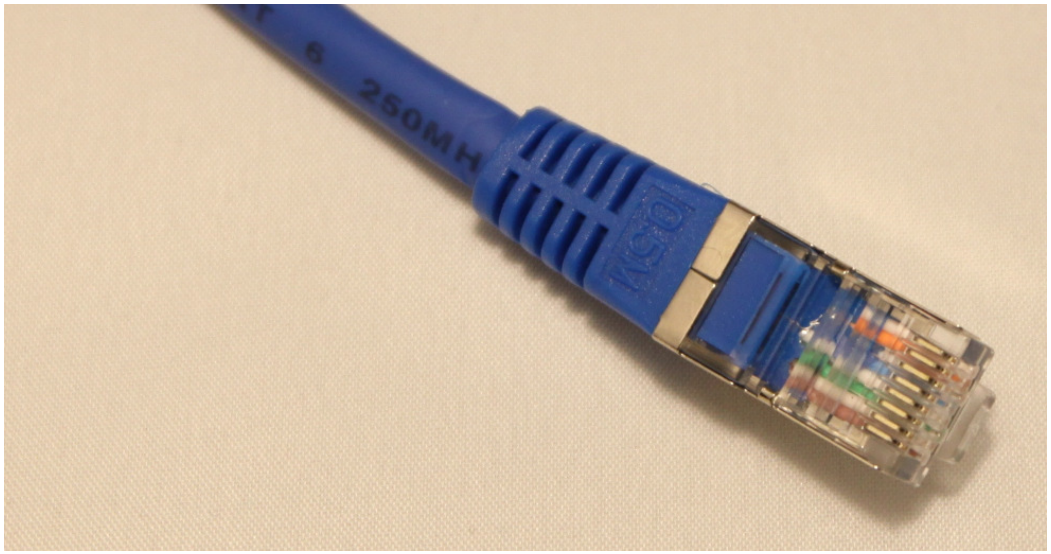
- This transceiver is connected to the network interface of a workstation (e.g. Sun SPARCstation) using an AUI cable

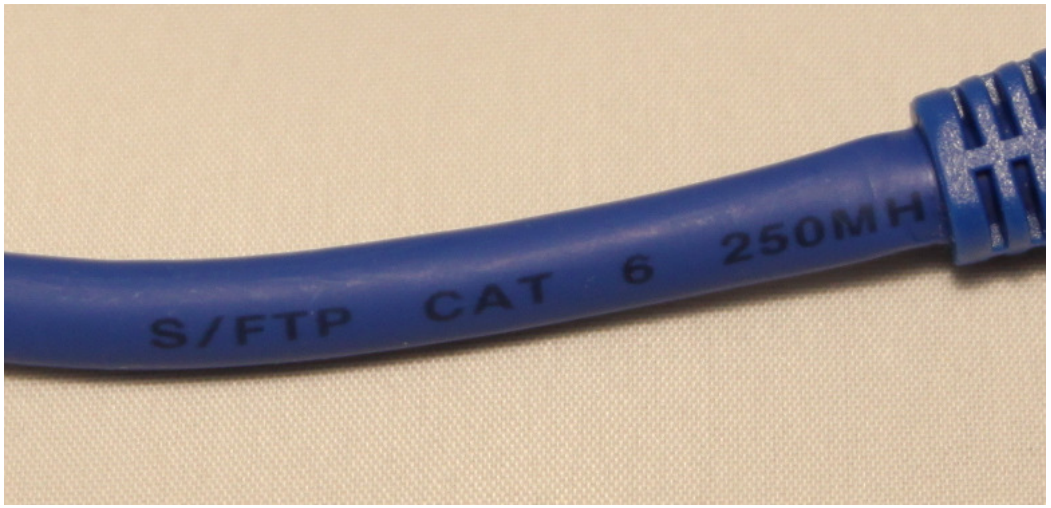
Layers in the hybrid reference model: 1

5	—
4	—
3	—
2	—
1	Physical connection to the shared transmission medium of a 10BASE5 Ethernet network

Component 18







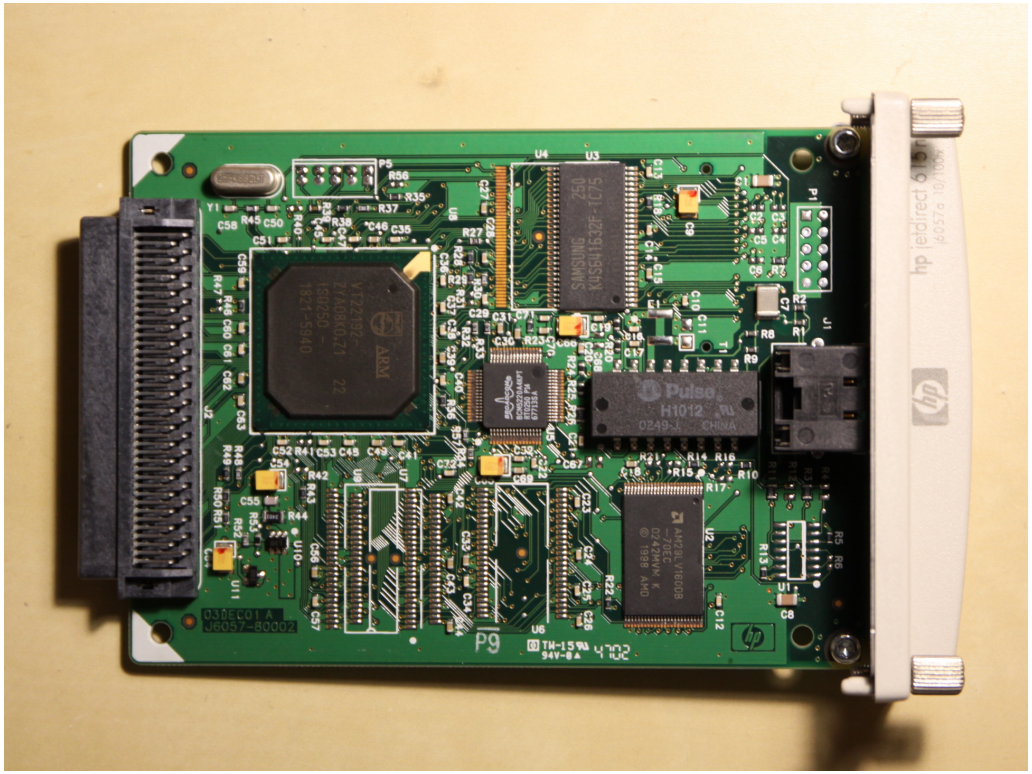
CAT-6 Twisted Pair Ethernet Cable

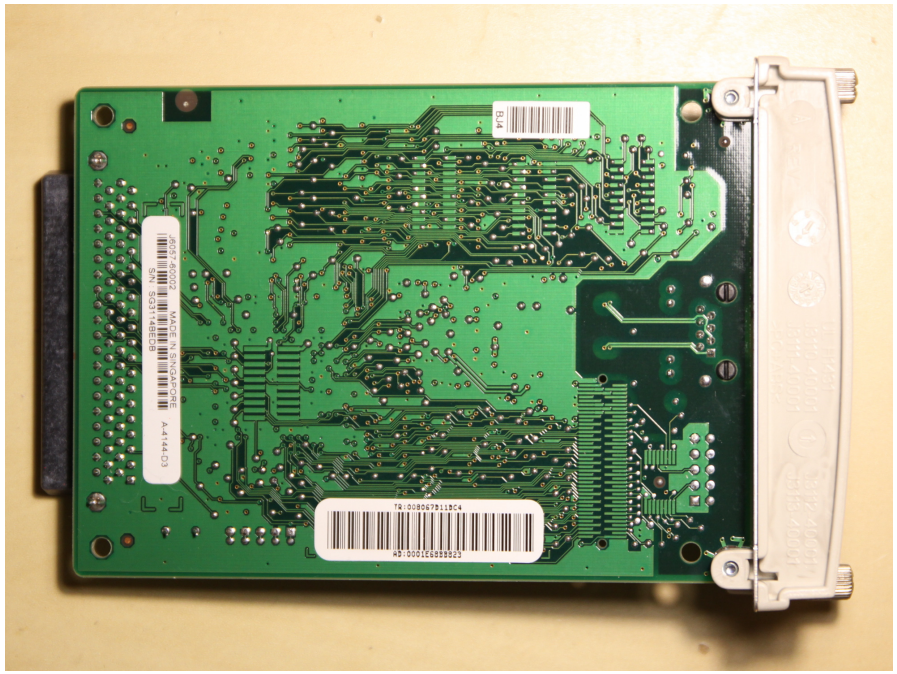
- Screened Foiled Twisted Pair (S/FTP)
  - Pair shielding = aluminum foil shielding
  - Cable shielding = braided shielding
- 8P8C connector (RJ45)

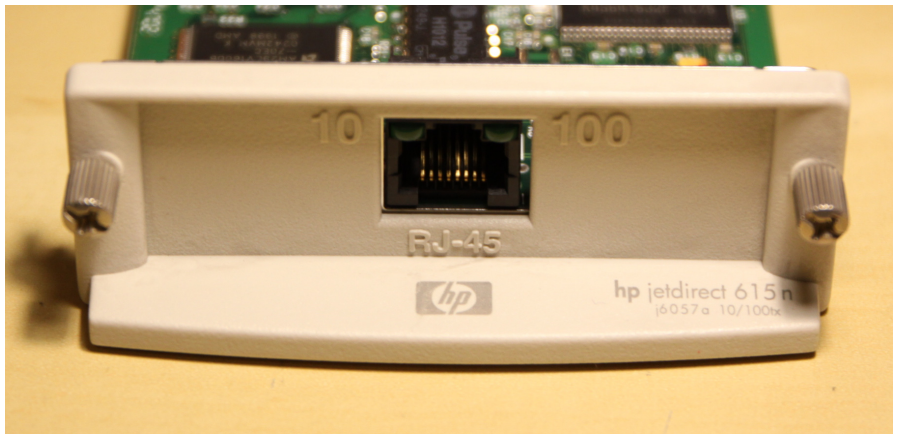
Layers in the hybrid reference model: 1

5	—
4	—
3	—
2	—
1	Transmission medium for Ethernet networks up to a maximum of 10GBASE-T (55 m)

Component 19







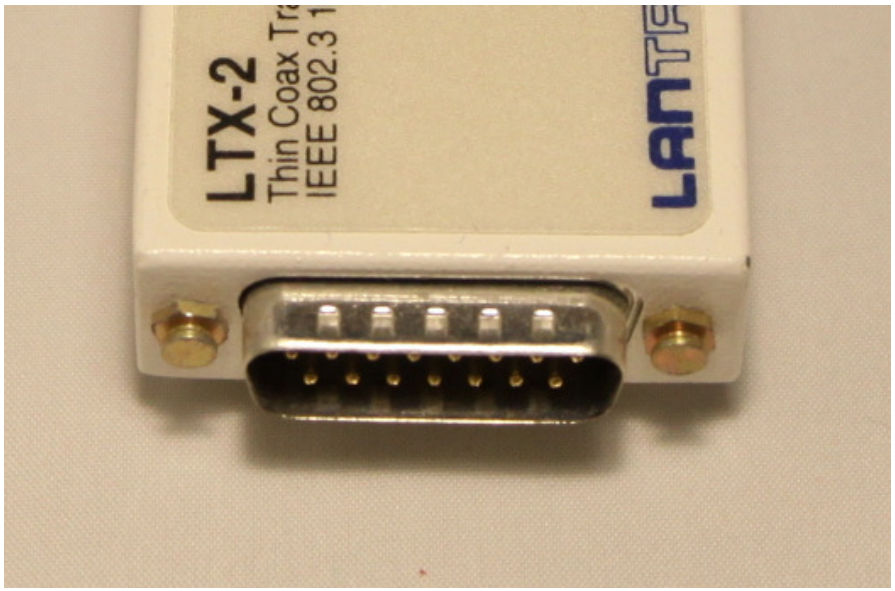
HP Jetdirect 615n Print Server

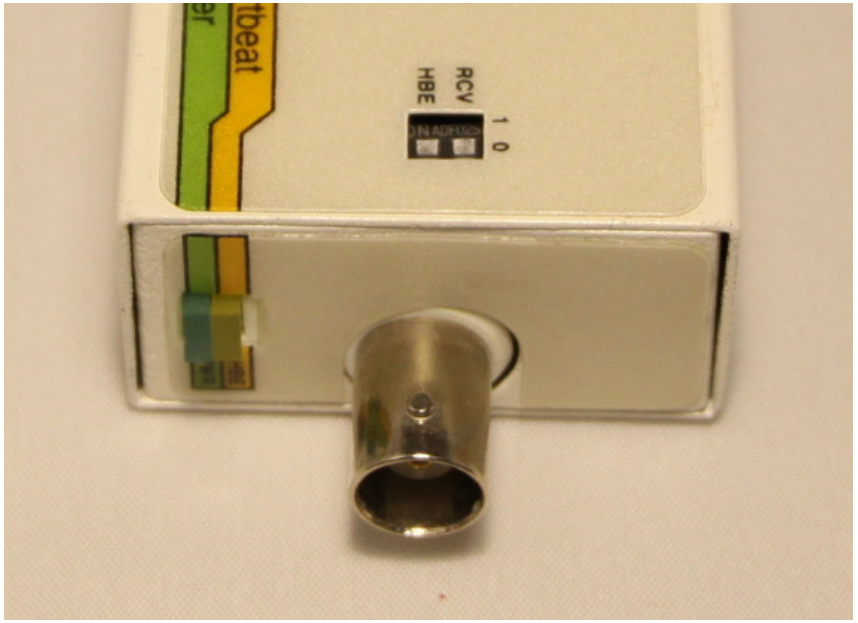
- Print server (approx. 2004) for HP LaserJet printers
- Source: `http://h10032.www1.hp.com/ctg/Manual/c00190293`

Layers in the hybrid reference model: 1-5

5	Configuration is possible via Telnet and web interface (HTTP server), among others. SNMP client included. Network configuration is possible via DHCP client
4	Uses TCP port 9100 as default entry point to the printer, web server uses ports 80 and 443, telnet server uses port 23
3	IP address and netmask are assigned
2	The device has a MAC address
1	Connection for Ethernet 10BASE-T

Component 20





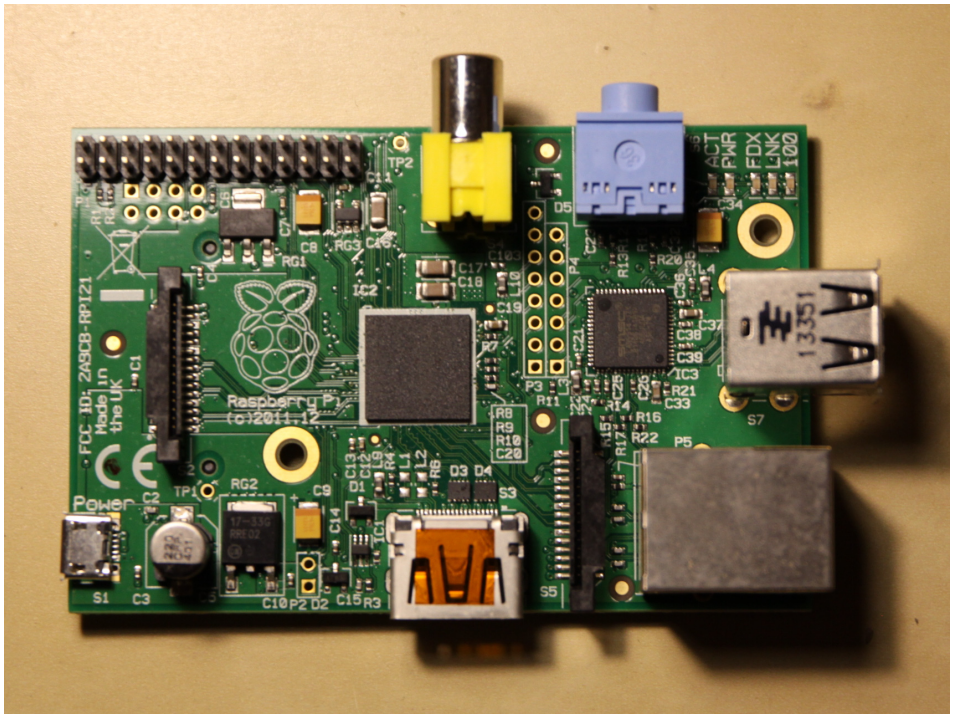
LANTRONIX LTX-2 Thin Coax Transceiver

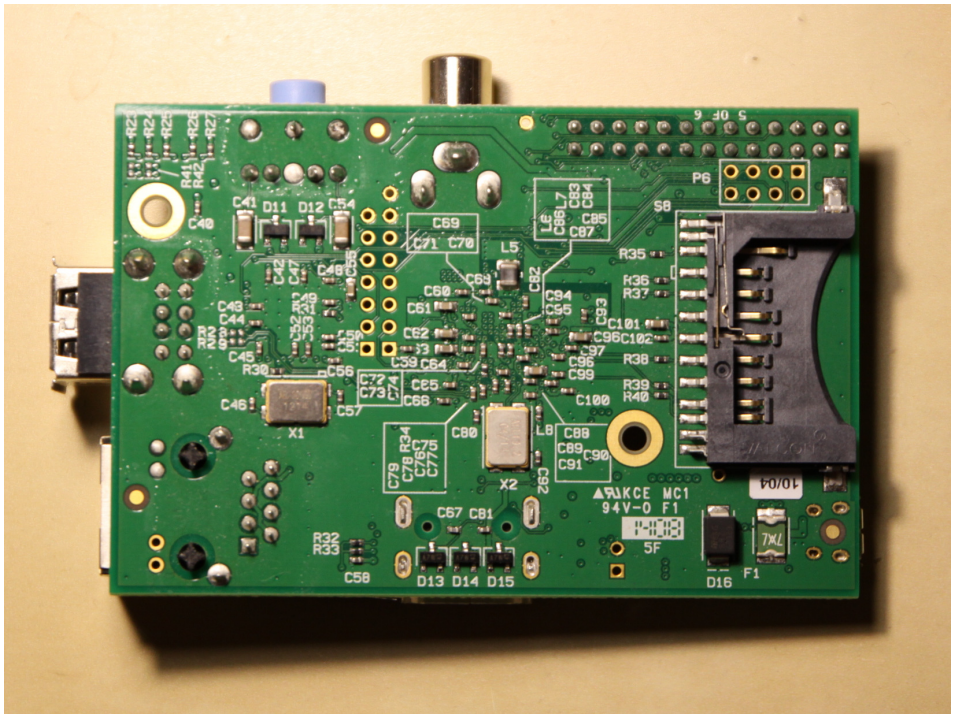
- This transceiver is so compact that it can be connected directly to the network interface of a workstation (e.g. Sun SPARCstation). An AUI cable is not necessary
  - Source: `https://www.artisantg.com/info/ATGboo2v.pdf`

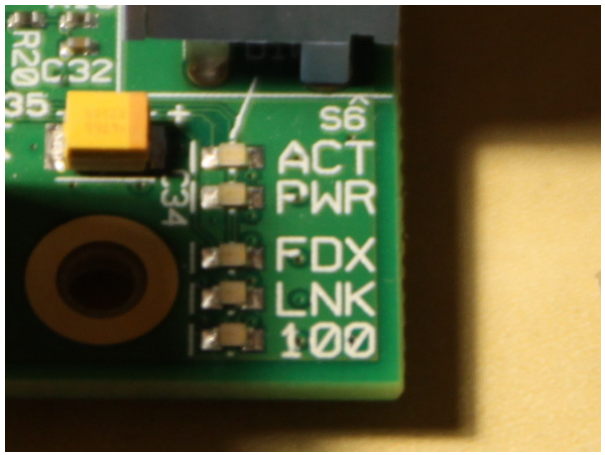
Layers in the hybrid reference model: 1

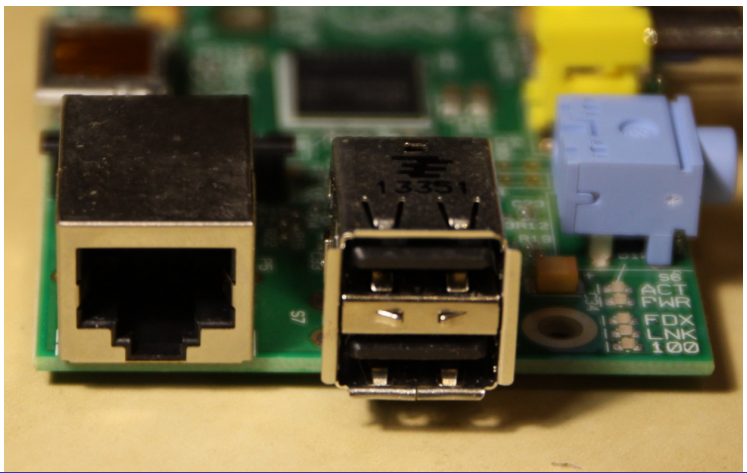
5	—
4	—
3	—
2	—
1	Physical connection to the shared transmission medium of a 10BASE2 Ethernet

Component 21









Raspberry Pi 1B single board computer (2014)

- A terminal device
- Full computer with 700 MHz ARMv6 CPU, 512 MB RAM, SD card slot for mass storage Interface for 10/100 MBit Ethernet

Layers in the hybrid reference model: 1-5

5	Any network services can be installed
4	Ports depend on the deployed network services...
3	IP address and netmask are assigned
2	The device has a MAC address
1	Connection for Ethernet 100BASE-TX

Component 22

- Components of dry air:
  - Nitrogen (N_2)
  - Oxygen (O_2)
  - Argon (Ar)
  - Carbon dioxide (CO_2)
  - Neon (Ne)
  - Helium (He)
  - Methane (CH_4)
  - Krypton (Kr)
  - Hydrogen (H_2)
  - ...

Glass filled with air

Layers in the hybrid reference model: 1

5	—
4	—
3	—
2	—
1	Transmission medium for wireless networks (e.g. WLAN or Bluetooth) or for direct connections via laser Bridge