

Communications and Computer Networks

Summer Term 2023

Exam Details

- Date: 10.08.2023
- 90 minutes
- 50% (50 points) of 100 points needed to pass
 - Bonuspoints will be added
 - More than 100 points are not possible
- 1 DIN A 4 paper, handwritten
- Bring an ID-card and FH-card
- Question types:
 - Multiple Choice
 - Free text
 - Drawing

Multiple Choice

- Every correct answer (correctly marked or correctly not marked) gives one point
- Every wrong answer (incorrect marking) subtracts one point
- No minus points at the end

Example:

Question 1

Question 2

Question 3

Question 4

Answer 1

Question 1 x

Question 2 x

Question 3 x

Question 4

2 points

Answer 2

Question 1

Question 2 x

Question 3

Question 4

2 points

Answer 3

Question 1

Question 2

Question 3 x

Question 4 x

0 points

At least one question from the following topics:

- Shannon Hartley
- Nyquist
- FCS with CRC
- Subnetting (IPv4, IPv6)

- At least one packet header
 - Ethernet
 - IPv4
 - IPv6
 - TCP
 - UDP

- But not only drawing, even naming and (maybe) describing

Relevant topics

- OSI-model
- Understanding of protocols and interconnection
- Understanding of fragmentation and encapsulation
- Understanding of Wireshark

Irrelevant topics

- History
- Mass data
- Long tables
- Wireshark source code
- GNS3 / Cisco-syntax
- Wireshark display filter

Encoding on 10BASE-X Legacy Ethernet:

Manchester Encoding

Encoding on 100Mbps Fast Ethernet:

100BASE-TX: 4B5B Encoding + MLT-3 Encoding

100BASE-FX: 4B5B Encoding + NRZ-I Encoding

Encoding on 1000Mbps Gigabit Ethernet:

1000BASE-T: 8B1Q4 and 4D-PAM5 Encoding

1000BASE-X: 8B10B and NRZ Encoding

Encoding on 10Gbps Ethernet:

10GBASE-X: 8B10B or 64B/66B (depending on the fiber) and NRZ Encoding

10Base5 (Thick-Ethernet, Yellow-Cable)

- Ethernet with 10Mb max. bandwidth
- Maximum cable length per segment is 500 meter.
- Both cable ends must be completed with termination resistors.
- 100 end devices can be connected per segment.
- Distance between two stubs must be a multiple of 2.5m.
- Stubs must not be longer than 50 meters.

10Base-T

- Transmission of 10Mb/s via Twisted Pair Cable
- Hub necessary.
- Maximum distance 100m.
- Two pairs of wires are needed.
- Cables from category 3.
- Full duplex mode available with switch.

100BaseFX

- Transmission of 100Mb/s via optical fibre
- Maximum segment length of 400m.
- Max. distance between two 100BaseFX switches is 2000m

100base2 (Thin-Ethernet, Cheapernet)

- Ethernet via RG58 50Ω coax cable.
- For 10Mb only.
- BNC connector and T-pieces for connections.
- 50Ω termination resistors on both ends.
- Maximum segment length of 185m.
- Minimum station distance: 0.5m.
- Maximum number of stations: 30
- No stubs are allowed.

100Base-T

- Transmission of 100Mb/s via Twisted Pair Cable
- Hub necessary.
- Maximum distance 100m.
- Two pairs of wires are needed.
- Cables from category 5.
- Full duplex mode available with switch.

100BaseT4

- Transmission of 100Mb/s via Cat 3 cable
- All 4 pairs of wires are used.

Clear data (4-Bit Nibble)	Encoded data (5-Bit Codon)
0000	11110
0001	01001
0010	10100
0011	10101
0100	01010
0101	01011
0110	01110
0111	01111
1000	10010
1001	10011
1010	10110
1011	10111
1100	11010
1101	11011
1110	11100
1111	11101