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Exercises in PMMC

Exercise 1

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1) Transmission Media

1.1) Characterize the following transmission media with respect to the three dimensions *error rate* (low, high), *distance* (long, medium, short), *attenuation* (low, medium, high):

a) Copper (UTP)
b) Optical fiber (Monomode)
c) Wireless (WLAN)

1.2) Attenuation in optical fiber refers to...

a) ... the varying frequency of the input signal
☐ true ☐ false
b) ... the varying frequency of the output signal
☐ true ☐ false
c) ... the incidence angle of the input signal
☐ true ☐ false
d) ... the emergent angle of the output signal
☐ true ☐ false
e) ... the reduction of the optical signal power
☐ true ☐ false
f) ... the reduction of the electric signal power
☐ true ☐ false

1.3) For uniform lightwaves the attenuation A (metered in dB/km) can be calculated by formula $A = 10 \log_{10} P1/P2$ *dB*, where P1 is the injected light power and P2 the received light power. An attenuation of 3 dB implies that...

a) the received light power is (approximately) half of the injected light power.
☐ true ☐ false
b) the received light power is (approximately) twice the injected light power.
☐ true ☐ false
c) the received light power is (approximately) a quarter of the injected light power.
☐ true ☐ false
d) the received light power is (approximately) a third of the injected light power.
☐ true ☐ false

2) Information, Data, Messages and Multimedia

2.1) Distinguish the terms *information*, *data*, and *message* in your own words.

2.2) Give an example for *information*, *data* and *message*, respectively.

2.3) Give three examples for application data and characterise each example with respect to *timing*, *mode of interaction*, *direction*, *origin* and *amount of data (compressed vs. uncompressed)*.

2.4) Explain why a video cassette recorder is not a multimedia system.

3) Text, Graphics and Pictures

3.1) Argue if it is more reasonable to store the visual representation of letters as graphics or images.

3.2) Name three applications that only process plain text information and three applications that process rich text information.

3.3) In many editors (*e.g.* eclipse) source code is highlighted by different colors or fonts. Is the source code plain text or rich text?

4) Networks and Quality of Service

4.1) The performance of multimedia systems depends heavily on the two parameters *bandwidth* and *latency*. Give an example of a network with high bandwidth and high latency and an example of a network with low bandwidth and low latency.

4.2) Alice and Bob are connected to the internet via (a satellite link to) the same geostationary satellite 40000 km above their location. Calculate the latency of a VoIP-connection between Alice and Bob under ideal conditions (no scarcity of bandwidth, no congestion, instant data processing in and between host systems).

4.3) Calculate the digital throughput for the following cases:

a) PCM-encoded audio (basis for the calculation be the frequency of a traditional telephone.)
b) Uncompressed HDTV with 1080 lines, a sampling rate of 60Hz, and a pixel depth of 8 bit.