Große Übung
Computer Networks

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Knowledge Acquisition so far...

Chapter 1: some Questions

1. What is a Computer Network
   a. as opposed to a BUS?
   b. as opposed to a Terminal Network?
2. What groups of standardization organizations exist?
3. Why is standardization especially relevant for Computer Networks?
4. How and why can a communication system be structured into layers?
5. Draw and label a picture of three nodes running an ISO/OSI stack (a-b-c) and fully explain the consequences of an e-mail sent from a to c!
6. Explain the following words: layer, protocol, service, service primitive!
7. Draw and label of an ISO/OSI stack side-by-side to a TCP/IP stack such that corresponding layers are on the same level. Describe similarities and difference.
8. Discuss the differences between OSI and IP, both of the reference model and the actual protocols.

Chapter 2a: some Questions

1. You are able to define and explain the function of the Physical Layer!
2. You can classify time-dependend signals and name, sketch, and explain examples!
3. What is the purpose of line coding? What are the problems when transmitting with electricity? What are desirable properties of line codes and why?
4. You know all the line-codes of the slides by heart, can code and decode in them and can compare every two of them according to their features.
5. Explain the difference between bit and baud rate!
6. Explain the terms modulation and modem!
7. Name and explain the three modulation techniques from the slides, including drawn examples.
8. Explain multiplexing in the context of transmission paths/channels!
9. Explain FDM, the two flavours of TDM and discuss the pros and cons!
10. Explain the fundamental advantages of transmitting data digitally.
11. Explain the fundamental steps of Digitalization.
12. Explain sampling and Nyquists's Theorem using self-drawn examples.
13. Explain Quantization, Quantization error and PCM giving an example.
14. Explain Delta Modulation, PCM and ADPCM!

Chapter 2b: some Questions

15. Explain the difference between synchronous and asynchroneous transmission. Give an example for both!
16. Make a complete figure with explanation of a System as described on Slide 2a-54 transmitting the number sequence 7-2-8-1 from a to b.

1. You are able to name, sketch, and describe the topologies shown in the slides! Furthermore, you can compare them w.r.t. e.g., fault tolerance, cost cable length etc...
2. You can explain the basic cable types featured in the slides. Also, you can in principal compare electrical vs. optical cabling.
3. What are the special properties of Satellite Communication, Wireless LAN, Bluetooth, and Cellular Networks like UMTS/GSM, what are the advantages and disadvantages.
4. How does the physical Layer of V.24 work - in principal?
5. What do members of the xDSL protocol family have in common, how do they work in principal? Make a sketch of the system from Internet to Home.
6. Compare the members of the xDSL family.
7. Why is ADSL asymmetric?
8. Explain QUAM using a self-made diagram. How is ist possible to get multiple bits per baud?
9. How does CAP work, how DMT?

Chapter 3: some Questions

1. Name and explain the Functions of the Data Link Layer
2. What is the reason for transmission errors and how is the nature of their occurence?
3. Explain the terms code and alphabet?
4. Explain error detection/correction with a code?
5. Explain the parity bit? What can you do with it? How do you calculate it?
6. What is the hamming distance of two code words and of a complete code? Give the definition and explain.
7. What can you do with a code having hamming distance e?
8. You are able to explain and use the formular for the lower boundary of redundancy bits to achieve the ability to correct 1Bit erros.
9. Name and explain the advantages/drawbacks of error correcting codes. When are they practically used?

Chapter 3-2: more Questions

10. You can sketch and explain CRC checksum calculation and checking. Name Advantages of CRC over other error detecting codes.
11. How does frame delimiting work? How can you avoid the occurence of frame delimiters inside a message? Draw a layer picture and show where bit stuffing occurs and where frame delimiting. You can also sketch bit stuffing with a FSM.
12. List Explain the use of ACKs and SQNs in DLL protocols.
13. You can list, sketch, and explain protocols using the following design building blocks: ACKs, NACKs, SQNs, Sliding Window Go-Back-N, Selective Repeat... Also, you can deduce the consequences of single design desicions.
14. What is the purpose and the principle of flow control? In which cases do you need it and it which don‘t you (incl. Why).

Chapter 3-3

1. You can explain the header format of HDLC and the purpose of every field.
2. You can explain the different operation modes of HDLC.
3. What is one purpose of the extended control field in HDLC?
4. You know, and are able to reproduce and explain all knowledge about HDLC contained in the slides.
5. How does HDLC manage to send more than 8 packets with only 3Bits for the sequence number?
6. You are able to exercise all algorithms learnt before on the example of HDLC.
7. Draw a layer picture and explain Internet Access with PPP.

Chapter 4-1

1. What is a Local Area Network? Explain different types, explain the location inside the protocol stack.
2. Know and understand different topologies with their respective Advantages/Disadvantages.
3. When and why is Medium Access Control needed?
4. How does (slotted) ALOHA work? Understand the performance study in the slides (add. explanation in Tanenbaum).
5. Explain CSMA/CD and its versions. Understand the effects of persistency on performance (add. explanation in Tanenbaum).
6. You understand, can explain, and calculate with the “Maximum Segment Length”.