

Control Questions for Fundamental Computer Science II - Networks

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1 Basics

1. How does an operating system identify open files within a task ?
2. What is the use of abstract file operations? How are they implemented?
3. what is the function of a receiver and a transmitter in a communication system?
4. What are the characteristics of a WAN? What is it used for? What are the typical problems to be solved? How are they addressed?
5. What are the characteristics of a LAN? What is it used for? What are the typical problems to be solved? How are they addressed?

2 Protocol Architectures

1. What does a network protocol define?
2. Why are protocols implemented using layered architectures?
3. What is a PDU and what is a SAP?
4. What is the relationship between the layers of a network protocol architecture?
5. Give an example for an OSI Layer-1 protocol. What is handled at Layer 1?
6. Give an example for an OSI Layer-2 protocol. What is handled at Layer 2?
7. Give an example for an OSI Layer-3 protocol. What is handled at Layer 3?
8. What is the presentation layer in OSI? What does it do?
9. Do all protocol architecture implementations have an application layer? (Hint: What about routers?)
10. Who is the IETF? What is its relationship to the IESG?
11. What protocols should be implemented by a host connected to the internet? What RFC defines this?
12. What is a RFC anyway? What type of RFCs do exist?
13. What does RFC821 has to say?

3 Physical Layer: Transmission

1. What ISO layer number deals with the physical aspects of transmission?
2. What are the problems addressed by the physical layer?
3. What is usually contained in a physical layer interface specification?
4. What would you expect to find in the specification for a glass fiber interface for a LAN protocol?
5. What is a discrete signal? Can you observe such a signal on a network connection?
6. What is a continuous signal? Can you transmit data using a periodic signal?
7. What is a frequency domain representation of a signal? What is a FFT used for?
8. What is the bandwidth of a signal? What happens if the bandwidth of a square wave is limited by a channel?
9. What is used to transmit an analog signal over a digital line?
10. What is used to transmit a digital signal over an analog line?
11. How are Data Rate, Bandwidth and Noise related to in the Nyquist Theorem?
12. How can you use the bandwidth more efficiently under the Nyquist Theorem?
13. What is problematic assumption of the nyquist theorem ?
14. What is the Shannon Capacity of a channel?
15. Why is the Shannon capacity of a channel more realistic than the bandwidth calculated by using the Nyquist Theorem?
16. What assumption does the Shannon Theorem make about the noise and why is this unrealistic for real-world applications?
17. List examples of guided transmission media.
18. What are the drawbacks and benefits of the different types of glass fibers?
19. What is the advantage of guided media transmission over wireless transmission?
20. What factors do limit the distance covered by terrestrial microwave links?

4 Physical Layer: Coding

1. What are the advantages and disadvantages of a biphase coding?
2. How is the data rate usually affected if the SNR decreases? What will we observe if we do not change the data rate if the SNR decreases?
3. What happens if we increase the SNR and leave the data rate?
4. What do we have to trade against each other if we want to achieve a certain BER?

5. What is scrambling and why is it used?
6. What is quantization noise? How is the quantization noise affected if there are more bits used in the encoding?
7. What is the advantage of nonlinear coding?
8. What is modulation? List three modulation schemes and their advantages and disadvantages. Can they be combined? Give an example.

5 Data Communication

1. What is a synchronous communication interface?
2. What is an asynchronous communication interface?
3. What is a V.24 interface?
4. What is an ISDN BRI ?
5. What is the purpose of a parity bit? How is parity calculated? What is even/odd parity ?
6. What is the Hamming Code?
7. What is the hamming code of 0x74 ?
8. What type of errors can be corrected by the hamming code?
9. What is FEC?
10. What is CRC?
11. How does FEC compare to CRC?
12. What is a good choice for the polynomial of the CRC?

6 Data-Link Protocols

1. What is ARQ? Describe the different types of ARQ.
2. What is HDLC?
3. What is ABM? Why is it often used?
4. When would you use NRM?
5. What is the purpose of the sequence number fields in the HDLC frames?
6. What function has the Poll/Final bit?
7. What is the flag? What is its purpose in HDLC?
8. What is the difference between an unnumbered and a supervisory frame if both do not carry information?

9. How does address expansion work? What is the shortest address possible?
10. When would you use 16 bit control fields instead of 8-bit control fields?
11. What is the FCS? How does HDLC react to a transmission error in the FCS field if the rest of the frame was transmitted correctly?
12. Why does HDLC use bit stuffing? How does it work?
13. What frame does a HDLC station send if it wants to express RNR,4,F? Give the bits of the 8-bit control word. What does this mean?
14. What is a REJ frame used for?
15. How does HDLC recover from a timeout?

7 LAN Protocols

1. What is the purpose of the MAC layer?
2. What is the purpose of the LLC layer?
3. What are common LAN topologies? What is mostly used today? Why?
4. What is the advantage of a double ring topology that is used in FDDI?
5. How does CSMA/CD work?
6. What does 100BaseT4 stands for? What is the difference to 100BaseTX?
7. What is the advantage of 10BaseFX over 10Base5?
8. What are ethernet vendor codes? Why are they used?
9. How many stations can be found in a 10Base5 ethernet segment?
10. How many stations can be found in a switched 100BaseTX-Network?
11. Why is there a lower limit on the size of an ethernet frame?
12. What is a collision domain? Is this relevant with today's ethernet architectures?
13. What is defined by IEEE802.1q?
14. What is defined by IEEE802.3?
15. What is defined by IEEE802.11?
16. What is defined by IEEE802.5?
17. What are the advantages/disadvantages of Token Ring over Ethernet? Describe the difference in operation.
18. What datastructures are needed in a bridge? What protocol layers must be decoded in a bridge?
19. What is the use of the spanning tree protocol implemented by bridges?
20. Why isn't the internet build from many ethernets connected by bridges?

8 TCP/IP

coming soon...