January 15th 2019

ECONE **2nd Test** **Group 1**

- There are 16 questions. I will appraise every response from 0 to 1 point.
- It is not allowed to use any electronic devices and paper notes.
- You are allowed to use language dictionaries.
- **Please write concisely and legibly!**

Your first name: …… Your name: ……

1. What is the principle of asynchronous serial communication? The transmitted signal carries only data and no clock for receiver synchronization.
2. Give an example of the SLIP (Serial Line IP) protocol usage. For temporal and local connection between two devices located in the same room.
3. What are the functions of Logical Link Control layer? * common programming interface independent from different MAC protocols, * data streams multiplexing, * control flow for every Service Access Point, * duplicated and lost frames treatment.
4. What are the distance ranges of Ethernet interfaces? e.g.: 15 m, 100 m, 300 m, 500 m, 10 km.
5. What is the principle of CSMA/CD mechanism? CSMA/CD means carrier sense multiple access with collision detection. A transmitter obtaining a frame to send senses the carrier (a medium), and if there is no signal it starts transmission. Next it senses the carrier to discover a collision. If there is no collision to the end of frame, a successful transmission is assumed. If a collision happens the transmission is interrupted and short Collision-Detected signal is transmitted. After silence detection a random delay is taken before a transmission attempt.
6. Can network switches prioritize Ethernet frames? Why? Yes, there is an Ethernet extension header which carries 3-bit priority field.
7. What is the aim of Spanning-Tree protocols in Ethernet networks? The aim is to break loops in the network, to avoid endless circulation of frames.
8. What are the advantages of EPON (Ethernet Passive Optical Network)? * less fibers, * less optical ports, * no power supply for a splitter * easier to manage, * cheaper to maintain.
9. When TCP is a good choice for an application? When a reliable transfer is needed for big data chunks.
10. What for is the “urgent pointer” field of TCP PDU? For enabling transfer of interruption or urgent messages during a connection.
11. What is the purpose of the TCP live / inactivity timers? For discovering a connection lost.
12. How does Explicit Congestion Notification work on IP networks? A heavily loaded router, before congestion occurs, stamps IP packets with ECN bit. Than addressed computer gets to know that the path is overloaded and it is needed to reduce the transmitted volume of data. In the case of TCP connection, the announced *receiver window size* is reduced and appropriate flag bit is set in the TCP acknowledgement message that is sent back.

13. Why SNMP ver.1 is widely used, even thought it is unsecure? Because network owners often deploy a management network which is isolated from the users traffic and access. Moreover, if the SNMP default agent configuration allows for read-only-access, which cannot be harmful for the network.
14. What is the difference between Qualified Certificate and Nonqualified Certificate? A qualified certificate is issued by an approved authority.
15. What is it anycast address, and for what is it used (example of applications)? It is an address that identifies a group of recipients, but only one of them is selected by the network to deliver the packet. It is used by routing protocols and network security applications.
16. What are main advantages of IPv6? Huge address space. No need to use network address translation. Perfect auto-configuration. Built in mobility mechanisms. Routers can work faster.

January 15th 2019

ECONE **2nd Test** **Group 2**

- There are 16 questions. I will appraise every response from 0 to 1 point.
- It is not allowed to use any electronic devices and paper notes.
- You are allowed to use language dictionaries.
- **Please write concisely and legibly!**

Your first name: …… Your name: ……

1. What is the principle of synchronous serial communication? The transmitted signal carries data and clock for receiver synchronization.
2. Give an example of PPP (Point-to-Point Protocol) usage. Today the main PPP application is to create private networks over open Internet. In the past it was widely used for dial-up access to the Internet.
3. What data are carried by the LLC (Logical Link Control) header? The Source Service Access Point and the Destination Service Access Point fields allow recognizing the upper layer protocol that is processing the frame (thus data streams multiplexing). The control field allows for flow control and duplicated / lost frames treatment.
4. What are the transmission speeds of Ethernet interfaces? 10 Mb/s, 100 Mb/s, 1 Gb/s, 10 Gb/s, 40 Gb/s, 100 Gb/s.
5. Does the full-duplex point-to-point Ethernet use the CSMA/CD mechanism? Why? No. There are separate mediums for each direction and only one transmitter on each medium in that case.
6. What is the reason for minimum length of Ethernet frame? The collision detection mechanism requires that the time of frame transmission is longer than time of signal propagation forward and backward via the full medium length. Otherwise a transmitter situated on the end of the medium could not detect a collision.
7. What is the aim of VLANs (Virtual Local Area Network)? Configuration of separated LANs over one physical infrastructure, to raise efficiency and security of the network.
8. What are the pros for Industrial Ethernet deployment? * increased transfer speed, * increased distance range, * ability to use standard Ethernet devices, * cheaper deployment.
9. When TCP is a good choice for an application? When a reliable transfer is needed for big data chunks.
10. Why do we need the silence after connection timer? To guarantee that no one IP packet from previous connection (delayed in a congested router queue) arrive to the destination during the next connection; which would break reliability of TCP.
11. Can we use TCP for multicast transfer and why? We cannot. TCP support point-to-point double direction reliable data transfer.
12. What for is the “window size” field of TCP PDU? This field tells how many bytes the transmitter is allowed to send in subsequent packets. It is used for flow control and congestion avoidance.

13. Why does the standard TCP configuration work inefficiently over radio links? For the reason that the standard TCP takes to mean every lost segment as result of a router congestion and slows down transmission speed.
14. What is a representation of an OBJECT IDENTIFIER (used by SNMP)? An ordered list of positive integers. The numbers from the list form a path in the name tree from the root to the object.
15. How authentication is performed using asymmetric ciphers? The sender uses its private key to cipher a message. The recipient deciphers the message using corresponding public key. Successful decipherment proves authenticity of the sender. A certificate containing the public key contains a description of the key owner and signature of the entity who vouches for the authenticity.
16. What are main disadvantages of NAT (Network Address Translation)? Main Internet concept is broken – no pear to pear visibility disturb many applications. NAT server is a bottleneck for network throughput. Battery save terminals cannot be placed behind a NAT. Disable integrity verification of IP headers (IPSec).