E7311 – Winter 2022 – Aalto University March 31st, 2022

Possible Exam Questions

Basic Concepts – (Lecture Notes)

1. Define and explain terms: switching (both types), routing, connection oriented and connectionless
2. How can connection/flow state be maintained in network nodes? Methods and their suitability.
3. Define flow state in IP network. How can it be used in a network node? When does this become a vulnerability?
4. Give examples of security vulnerabilities in TCP/IP networks.
5. Discuss the address/identity issues, history and practice in IP networks.
6. List and define different addressing systems used in different network technologies. Discuss the pros and cons of the systems.
7. Describe CIDR.
8. What are the weaknesses of IP technology in the current and future networks and why?
9. Discuss the relation of normal IP network addressing and virtualization of computing?
10. How does SDN generalize the ideas of flow state and network state? What are the implications?
11. What are the arguments for and against IPv6?
12. Discuss the motivation of moving to SDN.

NAT – Network address translation (Lecture Notes)

13. Describe private addressing and address translation: why, how does it work, problems it solves and creates.
14. What kind of flow state is needed in a NAT device?
15. Define the terms “routing”, “forwarding” and switching in packet networks. How do these functions appear in a modern router?
16. How are network state and connection state related, similar or different? What is the generalization?
17. What are the benefits of NAT?
18. Discuss the relation of NATs and application protocols and applications?
19. Describe Endpoint independent mapping behavior in a NAT (use a figure).
20. Describe Address dependent mapping behavior in a NAT (use a figure).
21. Describe Address and port dependent mapping behavior in a NAT (use a figure).
22. Discuss the relation of NAT to host identification on the Internet.
23. Describe the approach called “Unilateral Self Address Fixing”, what are the benefits? How important they are?
24. Describe the principles of STUN protocol.

25. Describe the principles of TURN protocol.
26. Describe Interactive Connectivity Establishment idea and principles.
27. Describe NAT traversal in the Realm Gateway.

Routing in general and Interior Routing (Slides)

28. Discuss the scalability of proactive and reactive routing in different networks.
29. What types of routing approaches exist?
30. When is routing optimal?
31. Discuss Traffic Engineering in IP Networks.
32. Given a network dimensioning, what types of routing approaches exist?
33. What are the strengths and weaknesses of IP routing in the Internet?

34. What kind of weaknesses in distance vector interior routing motivated the move to link state routing?
35. Link state routing idea and principles (without going to protocol specifics).
36. Describe the flooding subprotocol and its properties in Link state routing.
37. Describe the process of “bringing up adjacencies” in Link state routing.
38. Give the Dijkstra shortest path first algorithm.
39. Discuss the advantages of Link state routing protocols.
40. Draw up and describe the network model supported by OSPF.
41. How does OSPF scale in case one switched Ethernet is connected to other networks with many IP routers? Describe the mechanisms used.
42. Describe how OSPF supports the idea of hierarchy in the network. Could this be used efficiently in a data center?
43. Describe Link state advertisement types.
44. Describe briefly the subprotocols in OSPF, what are the roles of each protocol?
45. List and describe advantages and weaknesses of classical link state routing in IP networks.