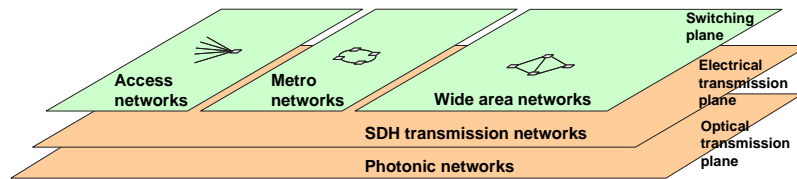
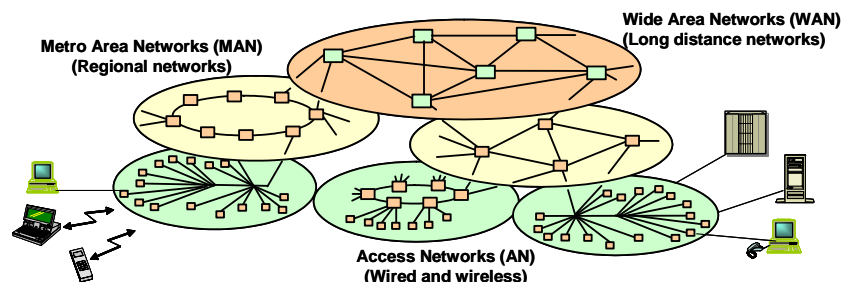


Question 1: Network Architecture and Operation

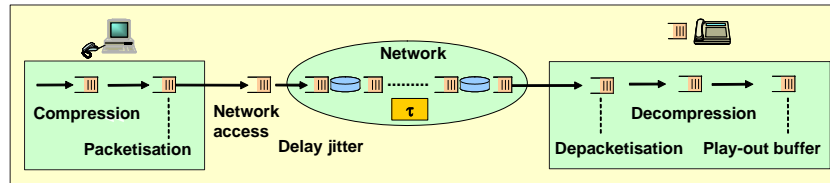


- 1) Give four differences between circuit- and packet switching?
- 2) On which network planes is circuit switching performed?
- 3) Why remains circuit-switching still mandatory in an all-packetized environment?
- 4) In end systems, networking is assigned to protocol layer 3. In the network itself, switching is also done at other protocol layers. Which protocol layers are used and which switching technologies operate at each of these layers?
- 5) What should be the limit of the end-to-end delay in order to guarantee a complete natural interactive communication?
- 6) Is this a mean or maximum value?
- 7) What is the only method to achieve this delay target for a world-wide interactive voice or video connection?
- 8) Which delay components of the connection can be influenced by the method?
- 9) Which two network technologies reduce the delay jitter of the considered network part of the connection?
- 10) Which two network technologies keep the delay between the considered network part constant?
- 11) What is the influence of the access networks at both ends?
- 12) Give the bit rates of the access technologies ADSL, FTTH, WLAN, and UMTS.
- 13) Order these access technologies according to increasing delay.

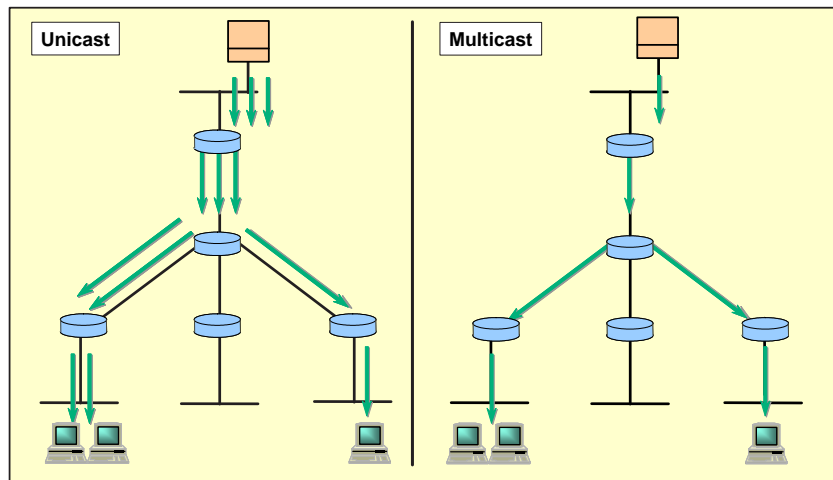
Question 2: Network Architecture and Operation



- 1) List the six planes of the network architecture?
- 2) The two lower planes have the same functionality. Why does this functionality appear twice in the layered network architecture?
- 3) How does the network throughput generally behave, when the network load increases?
- 4) Give the reason for the behavior of the throughput during heavy overload when no congestion control is used?
- 5) What is the difference between a leaky bucket and a token bucket?
- 6) What is the difference between IntServ and DiffServ?

Question 3: Real-Time Connections and Multimedia Protocols

- 1) What is the difference between a traditional and an Internet voice connection?
- 2) Give all delay components in an IP-voice connection.
- 3) What is the value of the signal propagation delay per km in an optical fiber?
- 4) Why one needs a buffer at the receiving side?
- 5) Which protocol is meant by the abbreviation SCTP?
- 6) Give four major properties of SCTP.
- 7) What are the main functions of the protocols RTP, RTCP, and RTSP?
- 8) Which two signaling protocol architectures exist for packetized multimedia?
- 9) What is the payload protocol component of SIP?
- 10) How we can distinguish in SIP between requests and responses?

Question 4: Multicast

- 1) Which two protocol components form the architecture of a multicast environment?
- 2) Which protocol allows an end system to be part of the information distribution?
- 3) Give two basic methods to organize the information distribution over the network?
- 4) What is the main difficulty for operating reliable multicast?
- 5) Give three methods to cope with this difficulty.