

Quiz Solution

Question 1

Host A sends a packet of 1500 bytes to host B via 2 routers. The recommended transmission rates are: 2 Mbps between host A and the first router, 100 Gbps between the 2 routers, and 50 Mbps between the second router and host B.

- (a) Suggest the network access technology for host A and host B.

Host A: digital subscriber line

Host B: Ethernet or wireless LAN

(1 mark)

- (b) Suggest the physical medium for the 3 links.

Between host A and first router: telephone line

Between 2 routers: optical fiber

Between second router and host B: twisted pair cable or radio

(2 marks)

- (c) Calculate the total end-to-end transmission delay for host A to send the packet to host B.

6.24 msec

(2 marks)

Question 2

A network link of rate 54 Mbps, propagation speed 2×10^8 m/s connects to hosts A and B. Host A sends a packet of 1500 bytes to host B. They are separated by 3 Km. Ignore the processing and queuing delays.

- (a) At what time the last bit of the packet leaves host A?

0.222 msec

(2 marks)

- (b) At what time the first bit of the packet reaches host B?

15 μ sec

(2 marks)

- (c) Calculate the end-to-end delay.

0.237 msec

(1 mark)

Question 3

An audio signal has a bandwidth of 20 KHz. It is sampled at the Nyquist rate and quantized into 64 levels.

(a) What is the bit rate of the digital data?

240 Kbps

(1 mark)

(b) How much memory is needed to store 30 minutes of the digital data?

54 Mbytes

(1 mark)

(c) Explain why the digital data cannot be reliably transmitted through a channel with the SNR of 35 dB.

$C = 233$ Kbps, bit rate $>$ Shannon channel capacity

(1 mark)

(d) What is the minimum SNR (in dB) such that the digital data can be reliably transmitted through the channel?

36.1 dB

(2 marks)