Subject Abdelrahman Adel AbdelFattah — Sheet 1 — Date 1700 12296

1 Essay Questions

1) First of all it depends on the speed of the ethernet & USB standard. But generally in most cases, Ethernet would be Faster to give it to someone.

2) WiFi: which is generally used for home networks. (WLANs) inside the buildings with a range of 100 ft : 11, 54, 450 Mbps

Cellar networks: mobile Providers with a range of 10's Km 10's Mbps

Bluetooth: which is used for low power & embedded applications

3) a) Circuit Switching > Packet Switching

- Decreases the delay between users before and during Connections
- A more steady bandwith because of a dedicated channel & ~~Constant~~ Consistent data transmission Rate
- Packets are always delivered in the Correct order.

6) ~~FDM: Frequency~~ TDM > FDM

- TDM is a newer Technology & it saves bandwidth and there is low interference between signals

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4) • Processing delay → Fixed

• Transmission delay → Fixed

• Propagation delay → Fixed

• Queuing delay → Variable

5) • Application layer → Communication between applications on Two different end systems

• Transport layer → Collecting the application layer & transfer to network layer

• Network layer → Transfer from one system to another

~~Physical layer~~ →

• Link layer → Communication between one device & it's neighbor

• Physical layer → Data to bits to be transferred through wires

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2 Problems

1) $L = 1{,}000$ bytes
$= 8{,}000$ bits

$d = 2{,}500$ km
$= 2.5 \times 10^6$ meters

$S = 2.5 \times 10^8$ m/s

$R = 2{,}000{,}000$ bits/second
$= 250 \times 10^3$ bytes/second

- Transmission Delay $= \frac{L}{R} = 4$ milliseconds
- Propagation Delay $= d/S = \frac{2.5 \times 10^6}{2.5 \times 10^8} = 10$ milliseconds

Total $= 4 + 10 = 14$ milliseconds

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2) $R = 10{,}000{,}000$ bits/second
$= 1.25 \times 10^6$ bytes/second

$d = 36 \times 10^3$ km
$= 36 \times 10^6$ meters

$S = 2.4 \times 10^8$ m/s

a) Propagation Delay $= d/S = 150$ milliseconds

b) Bandwidth delay $= 1.5 \times 10^9$ bits

c) $x = 3.75 \times 10^6$ bits

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3) $R1 = 500{,}000$ bits/s $= 500 \times 10^3$ bit/second

$R2 = 2 \times 10^6$ bit/second

$R3 = 1 \times 10^6$ bit/second

a) Throughput is the least ~~speed~~ Rate $= 500 \times 10^3$ bits/second

b) $\frac{4 \times 10^8 \times 8}{500 \times 10^3} = 64$ seconds

c) Throughput $= 100 \times 10^3$ bits/second

$\frac{4 \times 10^8 \times 8}{100 \times 10^3} = 320$ seconds

4) $R = 2 \times 10^6$ bits

a) $\frac{2\text{Mbps}}{1\text{Mbps}} = 2$ users

b) if 2 or less then no delay but if 3 then there will be a delay

c) 20% of the time $\left(\frac{1}{5}\right)$

d) $0.2 \times 0.2 \times 0.2 = 8 \times 10^{-3}$ probability

$= 0.8\%$ of the time