CENG 3331 Intro to Telecommunication and networks- Homework 7

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Problem 1:

The four general components of a public communications network are:

- Subscribers- the devices that attach to the network
- Subscriber line- the link between the subscriber and the network / also knows as the subscriber loop or local loop / use twisted pair wire
- Exchanges- the switching centers in the network / is knows as an end office if it directly supports subscribers
- Trunks- the branches between exchanges / use either FDM or synchronous TDM

Problem 2:

The advantages of packet switching compared to circuit switching are:

- Better line efficiency
- Packet switching can perform data-rate conversion
- During heavy traffic, packet switching won't block a packet, but it will delay it for a short time if needed
- Packet switching can use priorities and send high priority packets first

Problem 3:

Compared to circuit switching, the advantages and disadvantages of datagram packet switching networks are:

- Datagram has no dedicated transmission path compared to circuit switching which has a dedicated transmission path
- Datagram transmits packets while circuit switching continuously transmits data
- Datagram potentially can store packets until delivery while circuit switching can't store packets
- Datagram establishes a route for each packet while circuit switching establishes a path for the entire conversation
- Datagram has a packet transmission delay but circuit switching has a call setup delay
- Datagram will delay a packet if overloaded, but circuit switching will block it

Compared to circuit switching, the advantages and disadvantages of virtual circuit packet switching networks are:

- Virtual packet has no dedicated transmission path compared to circuit switching which has a dedicated transmission path
- Virtual packet transmits packets while circuit switching continuously transmits data
- Virtual packet will store packets until delivery while circuit switching can't store packets
- Virtual packet uses small switching nodes while circuit switching uses electromechanical or computerized switching nodes
- Virtual packet has speed and code conversion while circuit switching does not
- Virtual packet has dynamic use of bandwidth, but circuit switching has fixed bandwidth

Problem 4:

P = 5 μ_s P_t = 1500 Bytes = 12000 bits R_b = 56 Kb/s = 56000 bits/s

D = 100 miles C = 125000 miles/s M = 4 N = 10

$L = \frac{D}{C} = \frac{100\ miles}{125000\ miles/s}$ = .0008 s

$T = \frac{Pt}{Rb} = \frac{12000\ \text{bits}}{56000\ bits/s}$ = .214 s

T = ML + NT + (M-1)T + (M-1)P = 4L + 10T + 3T + 3P = 4L + 13T + 3P

= 4(.0008) + 13(.214) + 3(.00005) = 2.785 s

Problem 5:

P = 5 μ_s P_t = 1500 Bytes = 12000 bits R_b = 1 Gb/s = 1000000000 bits/s

D = 100 miles C = 125000 miles/s M = 4 N = 10

$L = \frac{D}{C} = \frac{100\ miles}{125000\ miles/s}$ = .0008 s

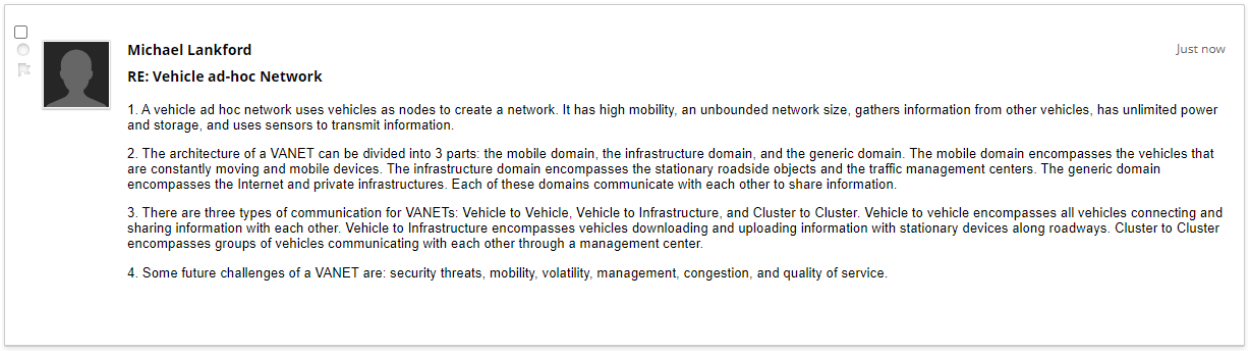
$T = \frac{Pt}{Rb} = \frac{12000\ \text{bits}}{1000000000\ bits/s}$ = .000012

T = ML + NT + (M-1)T + (M-1)P = 4L + 10T + 3T + 3P = 4L + 13T + 3P

= 4(.0008) + 13(.000012) + 3(.000005) = .003371 s

Because this is a datagram packet switched network, the only way to reduce a delay would be to decrease the number of packets sent over the network

Problem 6:



Michael Lankford Just now

RE: Vehicle ad-hoc Network

1. A vehicle ad hoc network uses vehicles as nodes to create a network. It has high mobility, an unbounded network size, gathers information from other vehicles, has unlimited power and storage, and uses sensors to transmit information.

2. The architecture of a VANET can be divided into 3 parts: the mobile domain, the infrastructure domain, and the generic domain. The mobile domain encompasses the vehicles that are constantly moving and mobile devices. The infrastructure domain encompasses the stationary roadside objects and the traffic management centers. The generic domain encompasses the Internet and private infrastructures. Each of these domains communicate with each other to share information.

3. There are three types of communication for VANETs: Vehicle to Vehicle, Vehicle to Infrastructure, and Cluster to Cluster. Vehicle to vehicle encompasses all vehicles connecting and sharing information with each other. Vehicle to Infrastructure encompasses vehicles downloading and uploading information with stationary devices along roadways. Cluster to Cluster encompasses groups of vehicles communicating with each other through a management center.

4. Some future challenges of a VANET are: security threats, mobility, volatility, management, congestion, and quality of service.