Delays in Computer Network

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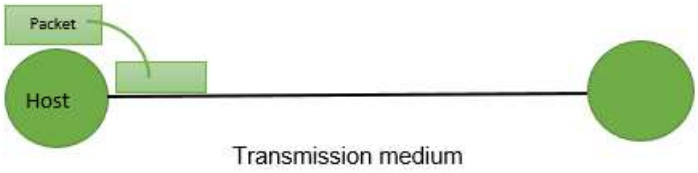
The delays, here, means the time for which the processing of a particular packet takes place. We have the following types of delays in computer network:

1. Transmission Delay:

The time taken to transmit a packet from the host to the transmission medium is called Transmission delay.



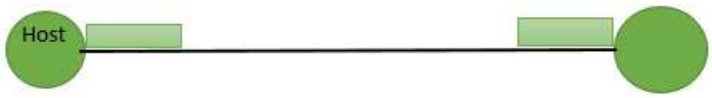
For example, if bandwidth is 1 bps (every second 1 bit can be transmitted on to the transmission medium) and data size is 20 bits then what is the transmission delay ? If in one second, 1 bit can be transmitted then to transmit 20 bits, 20 seconds would be required.

Let B bps is the bandwidth and L bit is the size of the data then transmission delay is,

$$Tt = L/B$$

2. Propagation delay:

After the packet is transmitted to the transmission medium, it has to go through the medium to reach the destination. Hence the time taken by the last bit of the packet to reach the destination is called propagation delay.



Factors affecting propagation delay:

1. **Distance –** It takes more time to reach the destination if the distance of the medium is longer.
2. **Velocity –** If the velocity of the signal is larger then the packet will be received.

```
Tp = Distance / Velocity
```

Note:

```
Velocity =3 X 108 m/s (for air)
Velocity= 2.1 X 108 m/s (for optical fibre)
```

3. Queueing delay:
Let the packet is received by the destination, the packet will not be processed by the destination immediately. It has to wait in queue in something called as buffer. So the amount of time it waits in queue before being processed is called queueing delay. In general we can't calculate queueing delay because we don't have any formula for that.

4. Processing delay:
Now the packet will be taken for processing which is called processing delay. It also doesn't have any formula.

Note: Both queueing delay and processing delay doesn't have any formula because they depend on the speed of the processor and speed of the processor varies from computer to computer.

```
Ttotal = Tt + Tp + Tq + Tpro

Ttotal = Tt+Tp
(when taking Tq and Tpro equals to 0)
```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