Tele-Traffic Theory-RAE 555: Nithin Anil 231AEM008

Traffic as a service system load

Static Model: Provides a simplified view, useful for analyzing a system's state at a given moment.

Dynamic Model: Captures the flow and dynamics of traffic over time, considering arrivals and departures.

Relevance to Traffic as a Service System:

- Understanding the load on a service system involves examining both static and dynamic aspects, considering input-output relationships and system behavior over time.

Real Network Model

Queue Size of Green packet: Refers to the number of packets in the queue associated with the green. It indicates the workload waiting to be processed.

Router Load: This represents the overall demand or activity on the router, taking into account the arrival and departure of packets.

Duration of Yellow Packet in Queue: The time the yellow packet spends waiting in the queue before being processed.

Processing Time of Green Packet: The time it takes for the router to process the green packet.

$\overline{N} \equiv \overline{L}$

- This equation suggests that the average number of entities ($\overline{N}$) in the system is equivalent to the average number of entities in the queue ($\overline{L}$). In queuing theory, $\overline{N}$ often represents the average number of entities in the entire system, while $\overline{L}$ specifically represents the average number of entities in the queue.

$\overline{T} \equiv \overline{W}$

- This equation implies that the average time an entity spends in the system ($\overline{T}$) is equivalent to the average time an entity spends waiting in the queue ($\overline{W}$). Similarly to the first equation, $\overline{T}$ typically represents the average time in the entire system, while $\overline{W}$ represents the average time spent waiting in the queue.

- **Interpretation:**
    - These equations are fundamental in queuing theory, establishing relationships between average numbers and average times in a queuing system.
    - They provide insights into the balance between entities in the system and those waiting in the queue, as well as the relationship between overall time spent in the system and time spent waiting.

Problem Nr 2.1

- Arrival Rate (λ): Arrival rate represents the rate at which entities (in this case, people or customers) arrive at a system. In the context of the parcel locker machine, the arrival would be when a person comes to use the locker, either to drop off or pick up a package.

So, in this scenario:

- Arrival: A person approaching the parcel locker machine to perform a delivery or retrieve a package.
- Arrival Rate (λ): The frequency at which people come to use the parcel locker machine for deliveries or pickups.

Problem Nr 9 Domain

Here the data packets being send from Alice PC to Bob's PC Through the Web. The arrival rate of data packets at the web is denoted as A(t) and the rate at which it is departed is denoted as D(t).

After drawing the graph of A(t) and D(t), X(t) can be found out as;

$X(t) = A(t) – D(t)$