1. Simulation method for designing Multimedia Networks

→ A simulation method for the design of multimedia n/w introduces 3 basic phases of the simulation method used for multimedia network design.

→ In the preparation phase, the author describes how to goals in measurable terms

→ Next, in the baseline phase, information concerning data capture and the validation of such data are presented.

→ The Third phase of the design process is refered to by the author as the delta phase.

phase I – preparation

phase II – Baseline

phase III – Delta

phase I – preparation

→ phase I tasks Include

- Goals
- Data collection

→ This phase includes the definition of goals and the collection of topology and traffic data for the baseline n/w

1. Identifying Goals

→ A simulation should have clearly defined goals

→ There are 2 principal goals

- The first is to develop a validated baseline model of the network in its current configuration.
- The second is to model the introduction of an asynchronous transfer mode (ATM) backbone

Modeling strategy

1. Decide if modeling is appropriate
2. Determine simulation goals
3. Describe the N/w in one of two sides
4. Combine each goal
5. define the data to be collected.
6. Combine these individual documents into a simulation notebook.

2. Data collection

Example sheet

N/w Type	Node Description	ID
Data	10Base-T hub	DH1

Voice N/w info:

- To collect the topology and traffic information for the voice portion of the N/w
- Here are some recommendations on how the information might be represented in the model.

Video N/w Info

* To collect the topology and traffic information for the video portion of the N/w.
* Here are some recommendations as to how it might be represented in the model.

phase - II → Baseline Model Population and validation

Creating Subnets:

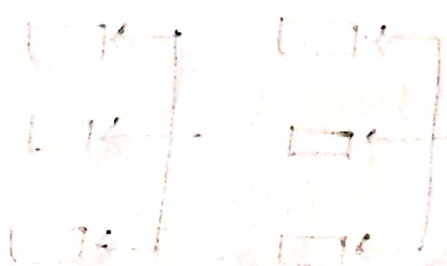
* preliminary steps should be modeling a portion of the network that the network manager understands very well for instance.
* the simplest case of determining the loading of the video portion of the Net.

validating Subnets

* once the subnet is built, it must be validated.
* the process of validation requires running the model and comparing the results against data collected for the real subnet.

Integrating and validating Subnets

* when the subnets have been validated.
* they must be integrated and validated in a stepwise fashion.



phase - III - Alteration of Baseline to Acquire Data

⇒ When a baseline with which to compare is completed and validated, alterations can be introduced.

* The alterations should be introduced with the same care that the baseline was constructed.

completed

Determining Remote Bridge and Router Delays

- The use of Queuing Theory to determine the delays associated with remote bridges and routers
- In addition, it investigates the effects of modifying the operating rate of the WAN links in particular.
- The effect of various communications circuit operating rates on equipment delays.

Waiting Line Analysis

- Queuing theory, the formal term for waiting line analysis, can be traced to the work of A.K Erlang, a Danish mathematician.
- His pioneering work spanned several areas of mathematics, including the dimensioning or sizing of trunk lines to accommodate long-distance calls b/w telephone company exchanges.

Queuing Theory

- Distribution of arriving entities and the time required to service each arrival
- The most common distribution used to represent arrivals is the poisson distribution

$$P(n) = \frac{\lambda^n e^{-\lambda}}{n!}$$

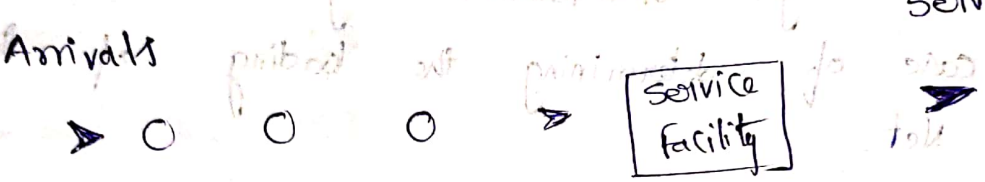
$P(n)$ = probability of n arrivals

λ = mean arrival time

e = 2.71828

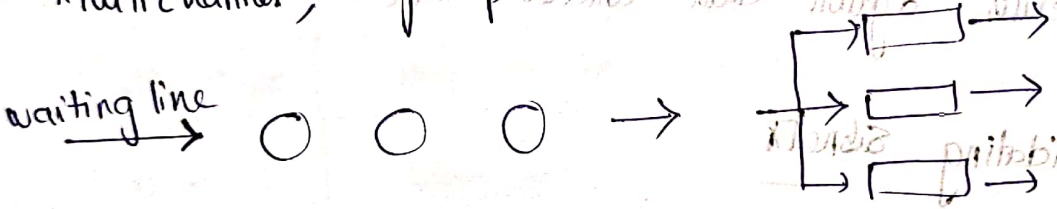
Basic Components

→ Exhibit illustrates the basic components of a simple waiting line system.

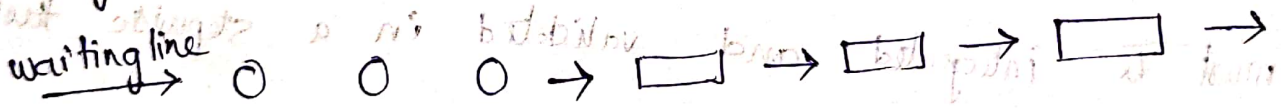


Basic components of a simple waiting Line system.

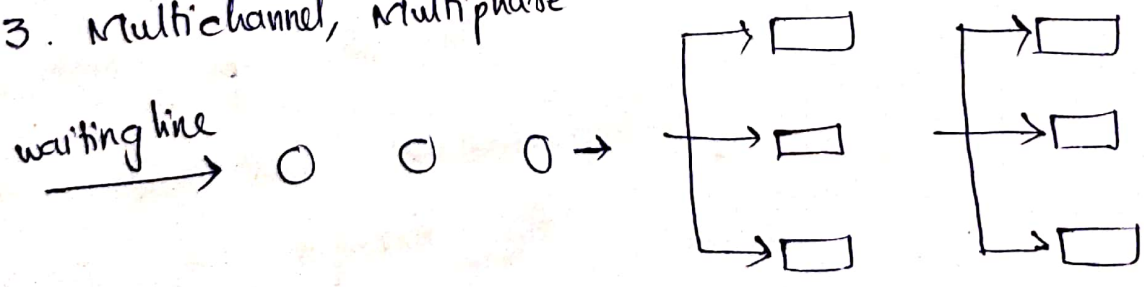
1. Multichannel, single phase



2. Single channel, multiphase



3. Multichannel, multiphase

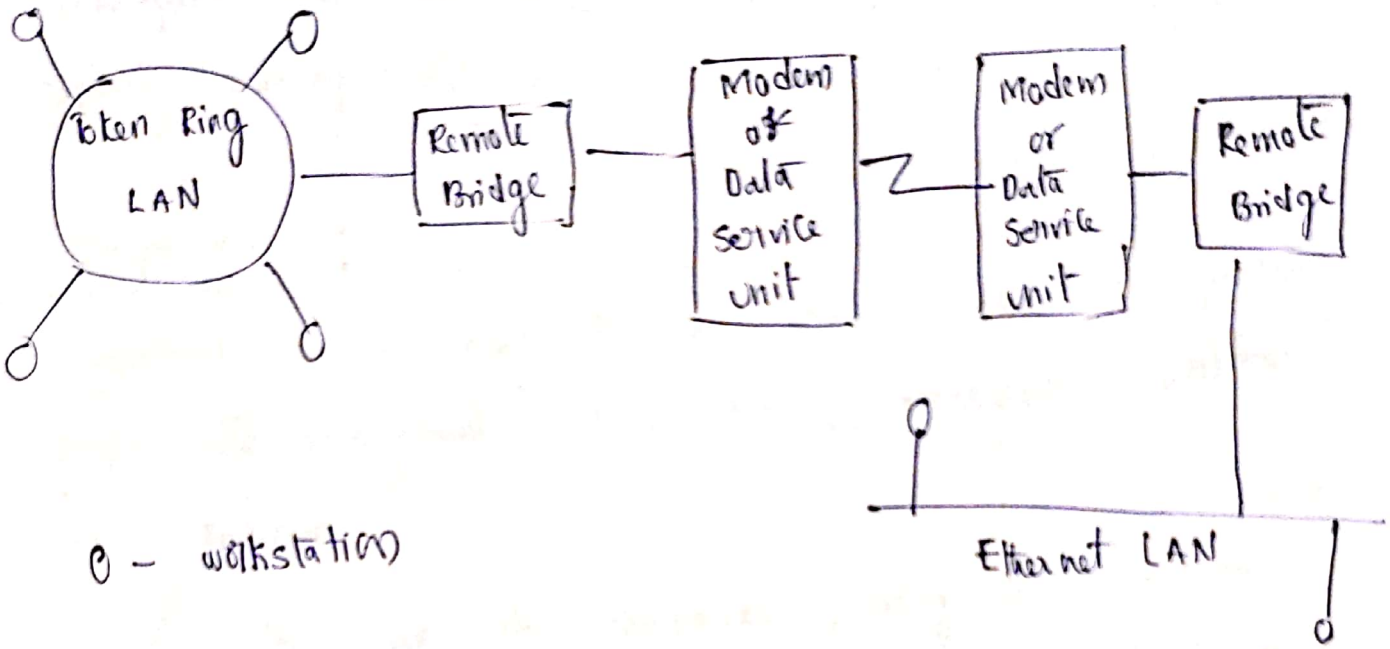


□ service facility

other types of waiting line systems

- The Input process can be considered the arrival of people, objects, or frames of data
- The service facility performs some predefined operation on arrivals.
- The waiting line system illustrated in Exhibit is more formally known as a single channel.
- Single-phase waiting line system is single channel because there is one waiting line.
- One toll booth on a highway or a single-port bridge connected to a LAN are two examples of single-channel, single-phase waiting line systems.
- Above diagrams illustrate 3 additional types of waiting line systems:
  1. Multichannel, single phase
  2. Single channel, multiphase
  3. Multichannel, multiphase

Internet consisting of two LANS connected through remote bridges



Base Lining Tools and Techniques

⇒ There are a variety of network baseline tools and techniques that can be used to facilitate an organization's capacity planning effort.

1. SimpleView :

⇒ Simpleview is an easy to use and relatively inexpensive simple N/w management Protocol (SNMP) management platform from Triticom.

⇒ Through the use of simpleview, users can retrieve statistical information maintained by Remote monitoring N/w Probes

⇒ Simpleview supports a Management information Base (MIB) walk capability, shown in the MIB walk window.

⇒ that lets a user click on an MIB group to select the group starting point or double-click on the group to explode its elements.

2. NEWT :

⇒ Net Manage of Cupertino, California, well known for its Chameleon suite of Internet applications, also markets a program called NEWT

⇒ That can be used to monitor the use of desktop applications

- As well as provide statistics on n/w activity associated with individual users.
- NETWT Monitor on the authors Computer to monitor the no. of simultaneous FTP sessions occuring over a period of time
- NETWT Monitor enables the use of specific types TCP/IP applications.

3. Ether Vision :

- When checking the activity associated with an individual Networks.
- Users can choose from a variety of Network monitoring programs.
- One such program is, EtherVision, also from Triticom.
- EtherVision supports monitoring by either source or Destination address, enabling users to build two baselines.
- Statistics summary presented indicates the frame count over the monitored period of time.
- Current N/w utilization in the form of a horizontal bar graph
- It allows a user to run the program on a workstation connected to an Ethernet LAN.
- EtherVision User can also set the program to generate a report

4. Foundation Manager

- Foundation manager, a product of Network General corporation.
- It is a sophisticated SNMP Network management system (NMS) platform
- that operates on Intel-based computers using different versions of Microsoft windows OS.
- Foundation Manager was upgraded to support the emerging RMONv2 standard
- it can provide a summary of statistics through the application layer, allowing it to replace the use of multiple products to obtain equivalent information.

Remote Bridge:

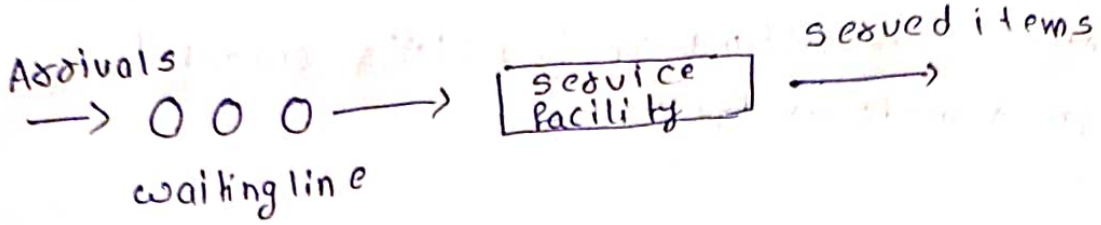
The bridge that connects two geographical separate network. By using telecommunication service such as lease lines or a circuit switched network.

* Waiting line analysis:

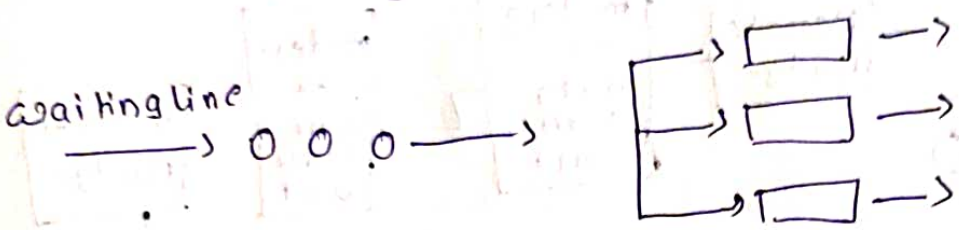
Queing theory examines every component of waiting in line including including arrival process service proces no.of seavers & no.of systems, no.of customes

Basic components:

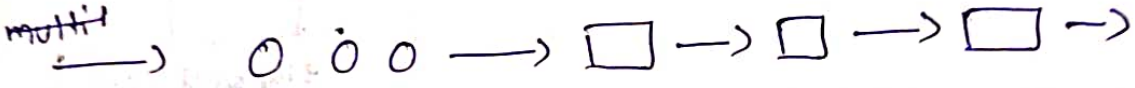
The input process can be considered the arrival of frames of data The service facility performes some predefine operation on arrivals, such as LAN data frame in SDLC (Synchronous Data Link control)



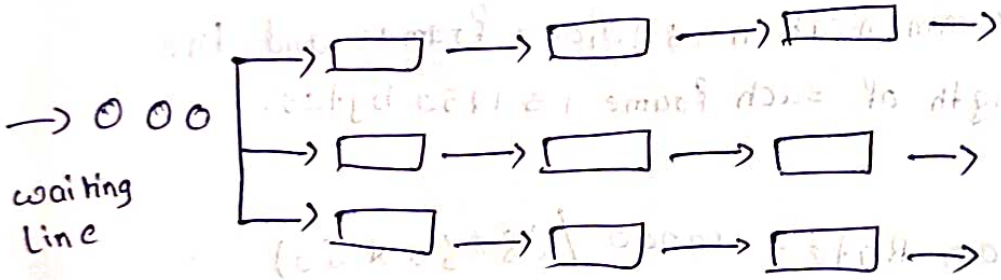
1) multi channel, single phase.



2) single channel, multiphase.



3) multichannel, multiphase.



* Queuing theory

Poission distribution.

$$p(n) = \frac{\lambda^n \cdot e^{-\lambda}}{n!}$$

$p(n)$ = probability of n arrivals

λ = mean arrival time

e = 2.71828

$n!$ = n factorial

$= n(n-1)(n-2)\ldots 1$

* The distribution of arriving entities and time required to service each arrival is done by poisson distribution

: Internet consisting of two LAN's connected through remote bridges.