SNS COLLEGE OF TECHNOLOGY

Coimbatore – 35

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19ECT311 / Wireless Communication

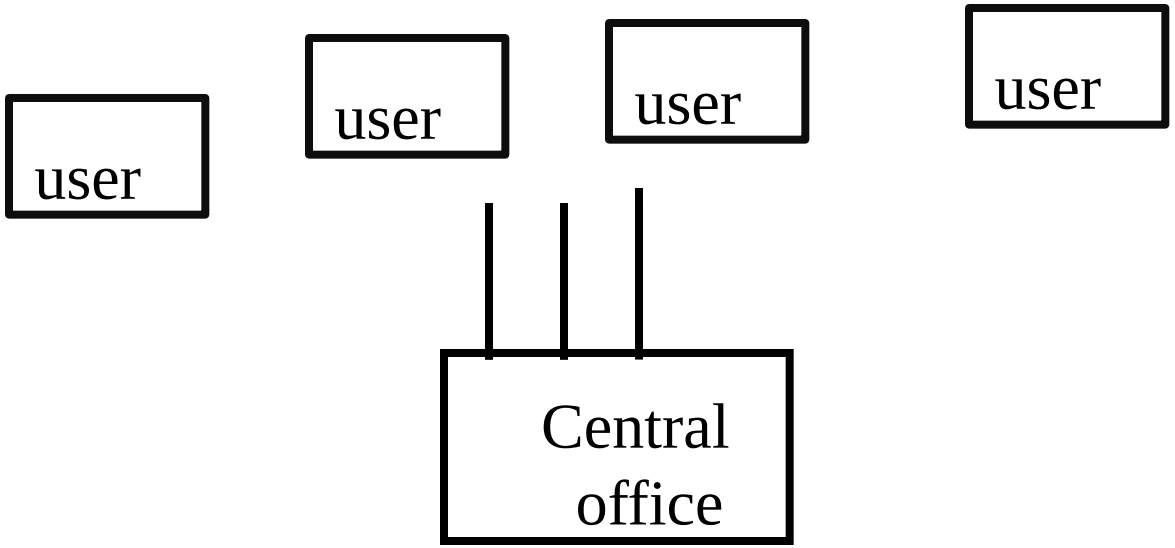
III ECE/ VI SEMESTER

Unit I **-FUNDAMENTALS OF WIRELESS COMMUNICATION**

Topic 7 : Trunking and GOS

Problem Statement

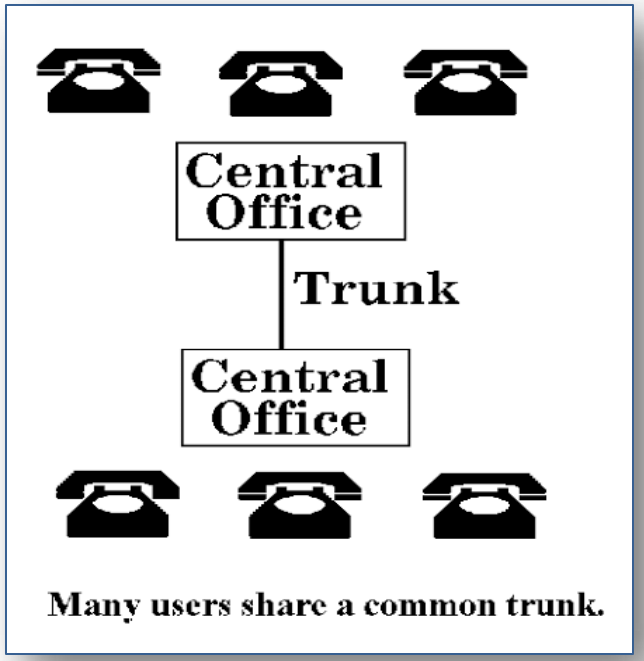
- Limited number of channels
- Many users
- A telephone system has 4 users and 3 channels.
- How?????
- To allot



Trunking Theory

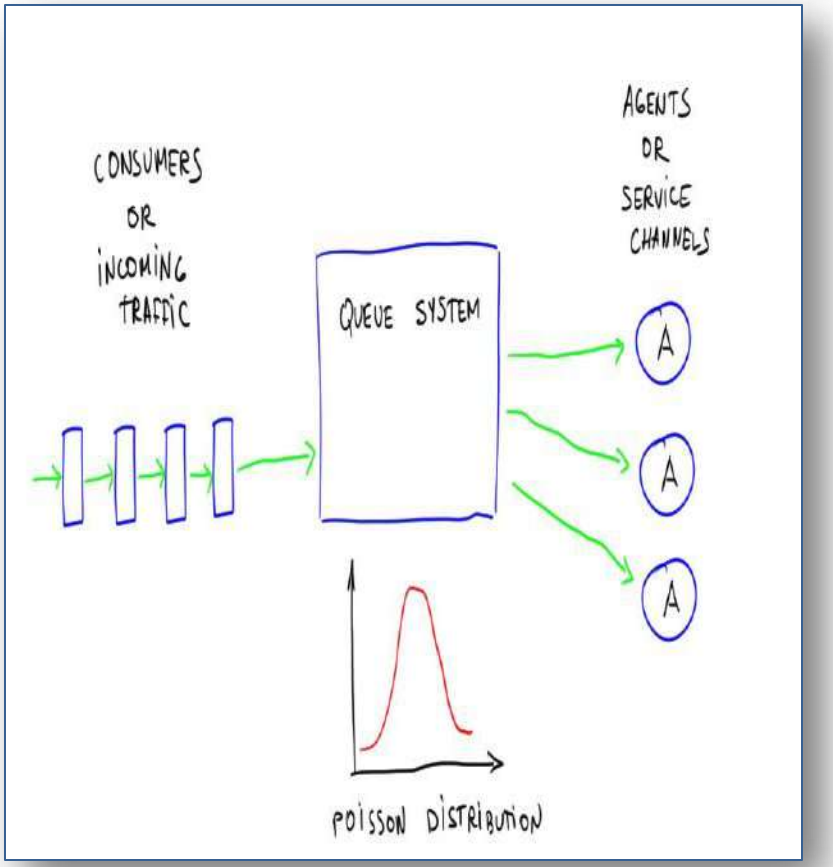
- To determine the required capacity and allocate the proper number of channels in order to meet GOS
- GOS: grade of service is the measure of user's ability to access a trunked system during busiest hour.
- Erlangs: One Erlangs represents the amount of traffic density carried by a channel that is completely occupied

Ex: A radio channel that is occupied for 30 minutes during an hour carries 0.5 Erlangs of traffic



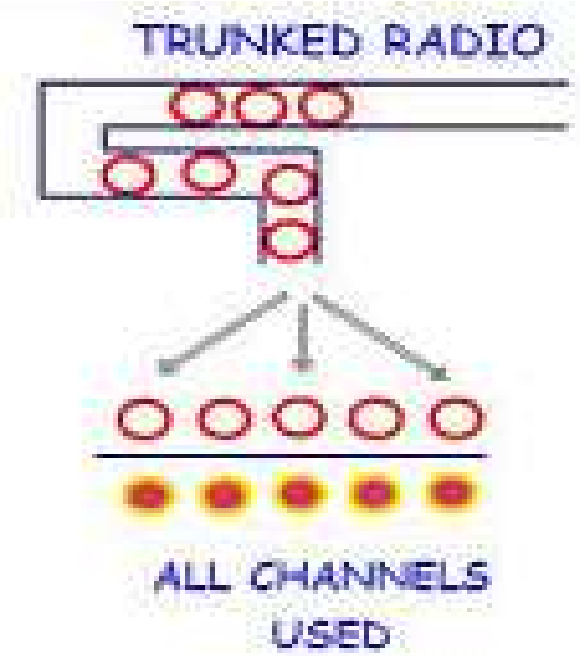
Trunking Theory

- Trunking theory was represented by **Erlang** in the late 19th century
- It helps in establishing a trunked system
- Provides communication services to a large group of users with limited number of available channels in the system

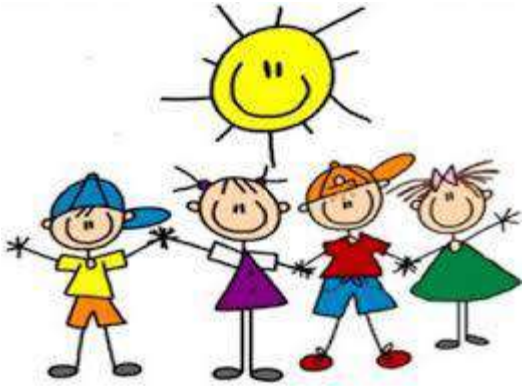


Trunking Theory

- PSTN/cellular radio systems exploits trunking theory
- To cover a large user community with limited number of circuits/frequency spectrum



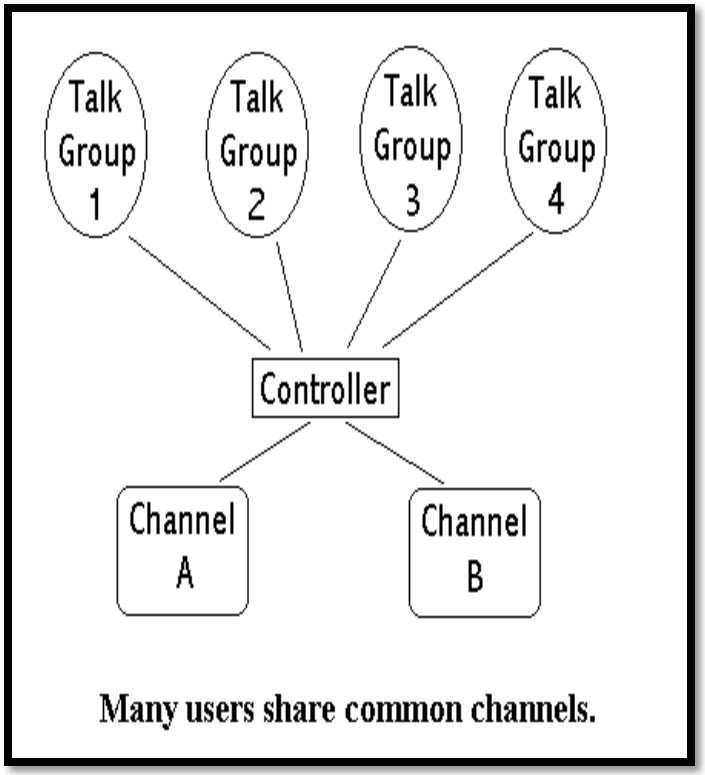
ACTIVITY



- **Activity : Fun videos**

https://www.youtube.com/watch?v=Gh8NmBW_-jg

Trunking Theory



Many users share common channels.

- In a trunked radio system, each user is allocated a channel on a per call basis
- Upon the termination of the call, the previously occupied channel is immediately returned to the pool of channels.
- In telephone system, it is used to determine the number of telephone circuits that need to be allocated for office buildings with hundreds of telephones.

Common terms

- Set-up time: Time required to allocate a channel to the requesting user
- Blocked call: call which can not be completed at the time of request, also called as lost call
- Holding time: average duration of a typical call, denoted by “H”
- Load: traffic intensity across the entire trunked system
- Request rate: the average number of requesting call requests per unit time. It is denoted by “λ”

Types

There are two types of trunked systems

1. **Blocked calls cleared**: It offers no queuing for call request.

- For every requesting user, no set-up time and user is given immediate access to channel if available.
- If no channel is available, the requesting user is blocked and is free to try again later.

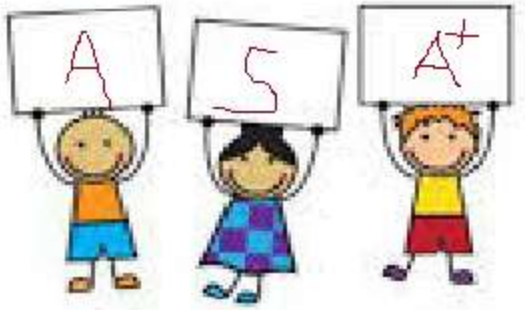
2. Blocked calls delayed:

- **I**t offers a queue to hold the calls which are blocked.
- If channel is not available for the requesting user, the call request may be delayed until a channel becomes available

Grade of Service

- Grade of Service (GOS): The likelihood that a call is blocked.
- Each user generates a traffic intensity of A_u Erlangs given by

$$A_u = \mu H$$



H: average duration of a call.

μ : average number of call requests per unit time

Grade of Service

- For a system containing U users and an unspecified number of channels, the total offered traffic intensity A, is given by

$$A = UA_u$$

- For C channel trunking system, the traffic intensity, A_c is given as

$$A_c = UA_u / C$$

Assessment

1.What is set up time?

2.Define Holding time.

3.State the need for Grade of Service (GOS).