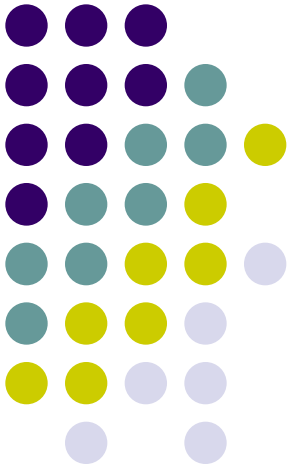
TELECOMMUNICATION BILLING /CHARGING

EEEN 462

Tuesday, June 10, 2025



WHY WE NEED A CHARGING PLAN?

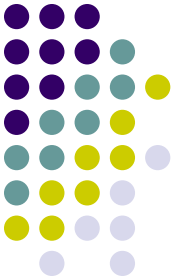
1. Providing a telecommunication service requires investment in capital items as well as meeting operational expenses.
2. The **capital cost** includes that of access networks, switching systems, buildings and land.
3. **Operating costs** include staff salaries, maintenance costs, water and electricity charges and miscellaneous expenses.
4. A telecommunication administration receives its income from its subscribers.
5. A charging plan provides for recovering both the capital costs and the operating costs from subscribers.

CALCULATING THE COSTS

1. The cost of shared resources like the switching equipment is amortised among a large number of subscribers over a period of time.
2. The cost of dedicated resources like the telephone instrument and the subscriber line must be recovered from individual customers.

3. The operating costs must be worked out depending on the quantum of resources used in providing a service and the duration for which these resources are used.

CHARGES LEVIED ON A SUBSCRIBER



- A telecommunication service can levy three categories of charges to a subscriber:
  1. An initial charge for providing a network connection:
  2. Rental or leasing charge
  3. Charges for individual calls made.

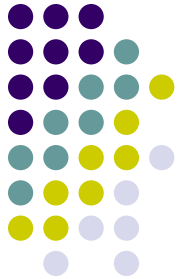
CHARGES TO INDIVIDUAL CALLS

1. Operating costs for telephone exchanges and transmission networks.

2. Government policy e.g. policy on subsidy of local calls by trunk/international calls, taxes or Universal Service Obligation (USO).

3. Communication regulations, e.g. CAK's guidelines on interconnection.

CHARGING METHODS FOR INDIVIDUAL CALLS



1. **Duration Independent Charging**
   - Local calls in the fixed Networks are usually charged on a duration independent-basis.
   - The subscriber meter is incremented once at the start of a local call.
2. **Duration Dependent Charging**
   - Periodic pulse train of pulses from a common pulse generator operate the subscribers meter.
   - Modern exchanges store date, time and duration in seconds for the purpose of charging

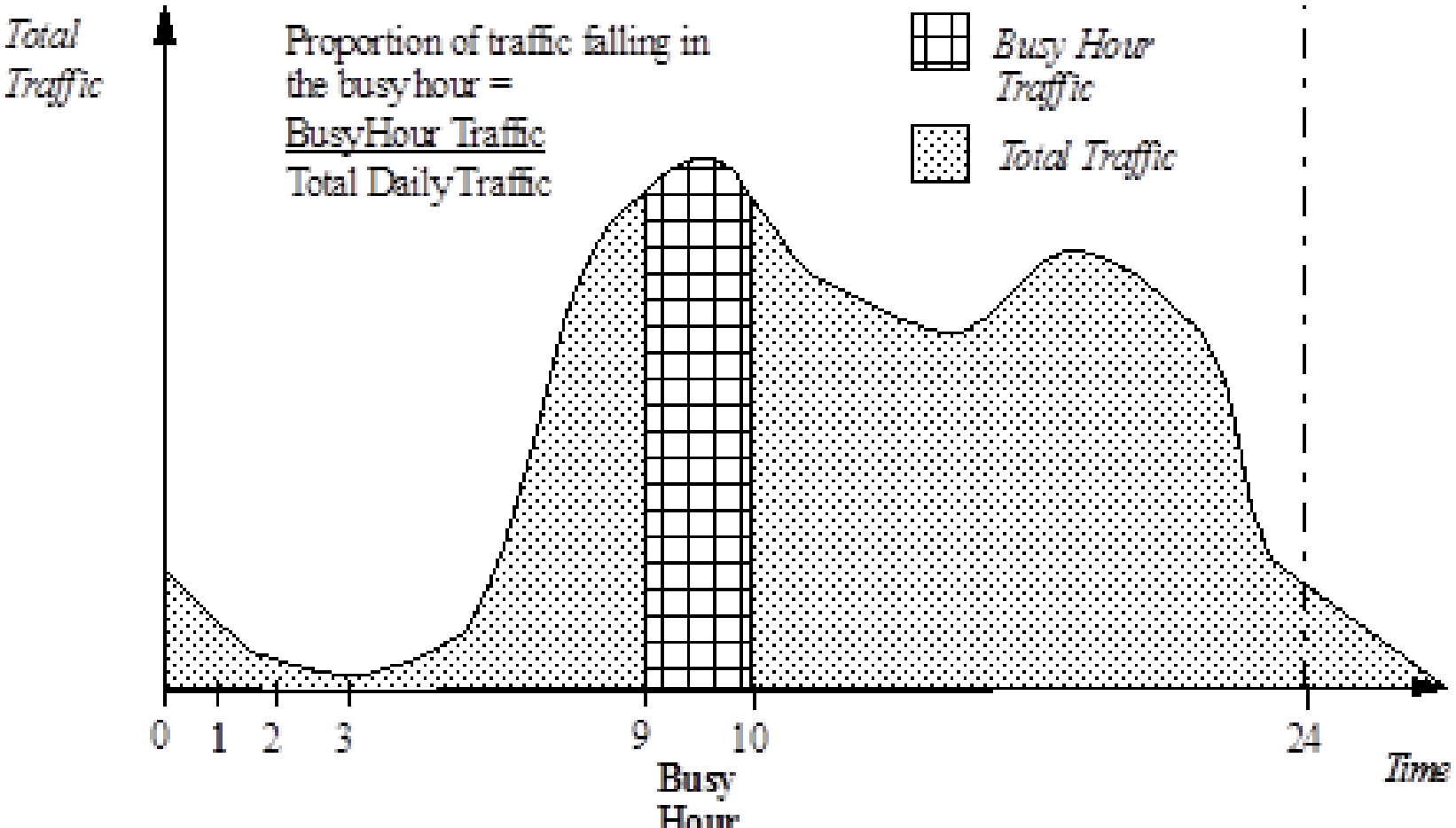
DISTANCE-RELATED CHARGING

Distance (km)	Metering pulse rate (pulses/min)
20 – 50	1.67
50 – 100	5.00
100 – 200	7.50
200 – 500	15.00
500 – 1000	20.00
> 1000	30.00

TARIFF VARIATION

1. Traffic in a telecommunication network varies throughout the day.
2. However telephone exchange capacity is based on the estimated capacity at the busy hour.
3. As a result, a large part of the capacity remains idle during off-peak hours.
4. Most operators lower tariffs to encourage subscribers to call at off-peak hours

BUSY HOUR


Total Traffic
Proportion of traffic falling in the busy hour =
Busy Hour Traffic
Total Daily Traffic
Busy Hour Traffic
Total Traffic
0
1
2
3
9
10
24
Time
Busy Hour

EXAMPLE OF TARIFF VARIATION SCHEME

Period of day	Metre pulse repetition rate
08.00 hours – 19.00 hours	*X*
19.00 hours – 22.00 hours	*X*/2
22.00 hours – 06.00 hours	*X*/4
06.00 hours – 08.00 hours	*X*/2

EXAMPLE

A telephone administration provides leased lines at the rate of Kshs. 600 per km for a minimum rental period of 3 months. MMU, a point-to-point traffic user, has offices located 600 km apart and is confronted with the choice of using STD or leased lines.

At what traffic volume per day, should he move over to leased line?

- Assume 20 working days per month and a rate of Kshs. 1 per unit recorded by the meter.
- Assume that STD calls are charged at Kshs. 20 per minute.

SOLUTION

1. Cost of renting the leased line is 600 x 600 = Kshs. 360,000
2. Cost of STD calls per hour is 60 **X** 20 = Kshs.1200
3. Let the break-even point occur when the STD line is used for **x** hours in three months. Then we have

   1200**x** = **360,000,**

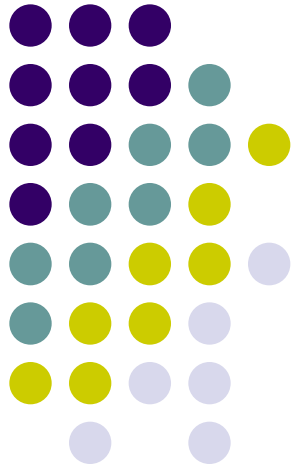
   or

   x = 300 hours in 3 months = 100 Hours in a Month = 5 hours per day

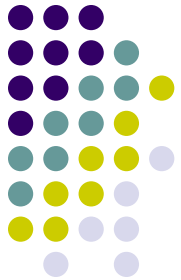
Common Channel Signaling

ECE 526E

Wednesday, 30 May 2018



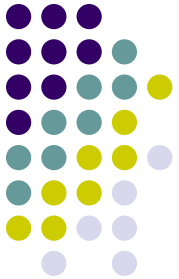
TELECOMMUNICATION NETWORK SIGNALING

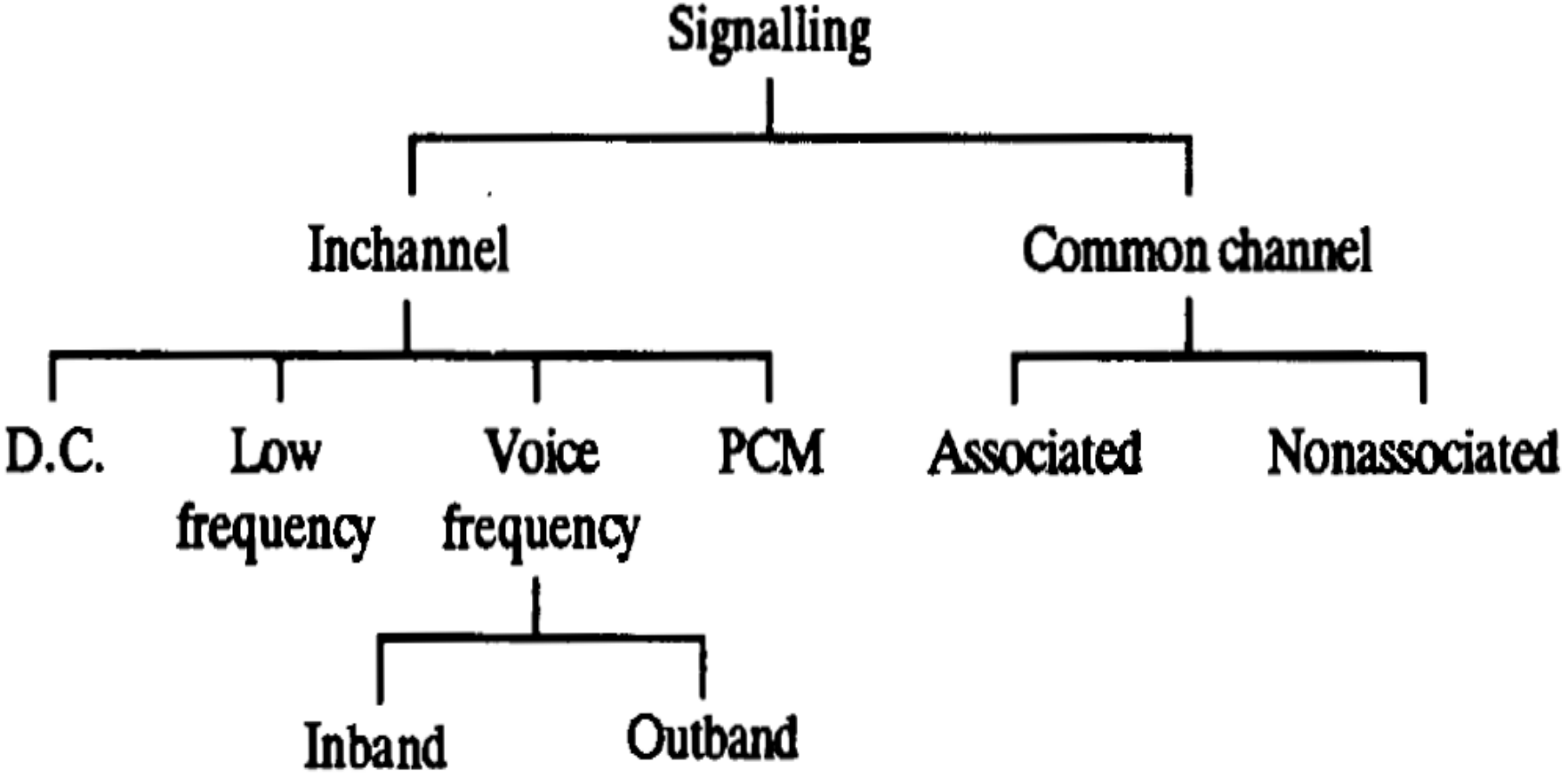


1. Exchange Hierarchy Classification
   - Subscriber loop signaling
   - Intra-exchange or register signaling
   - Inter-exchange or inter-register signaling.

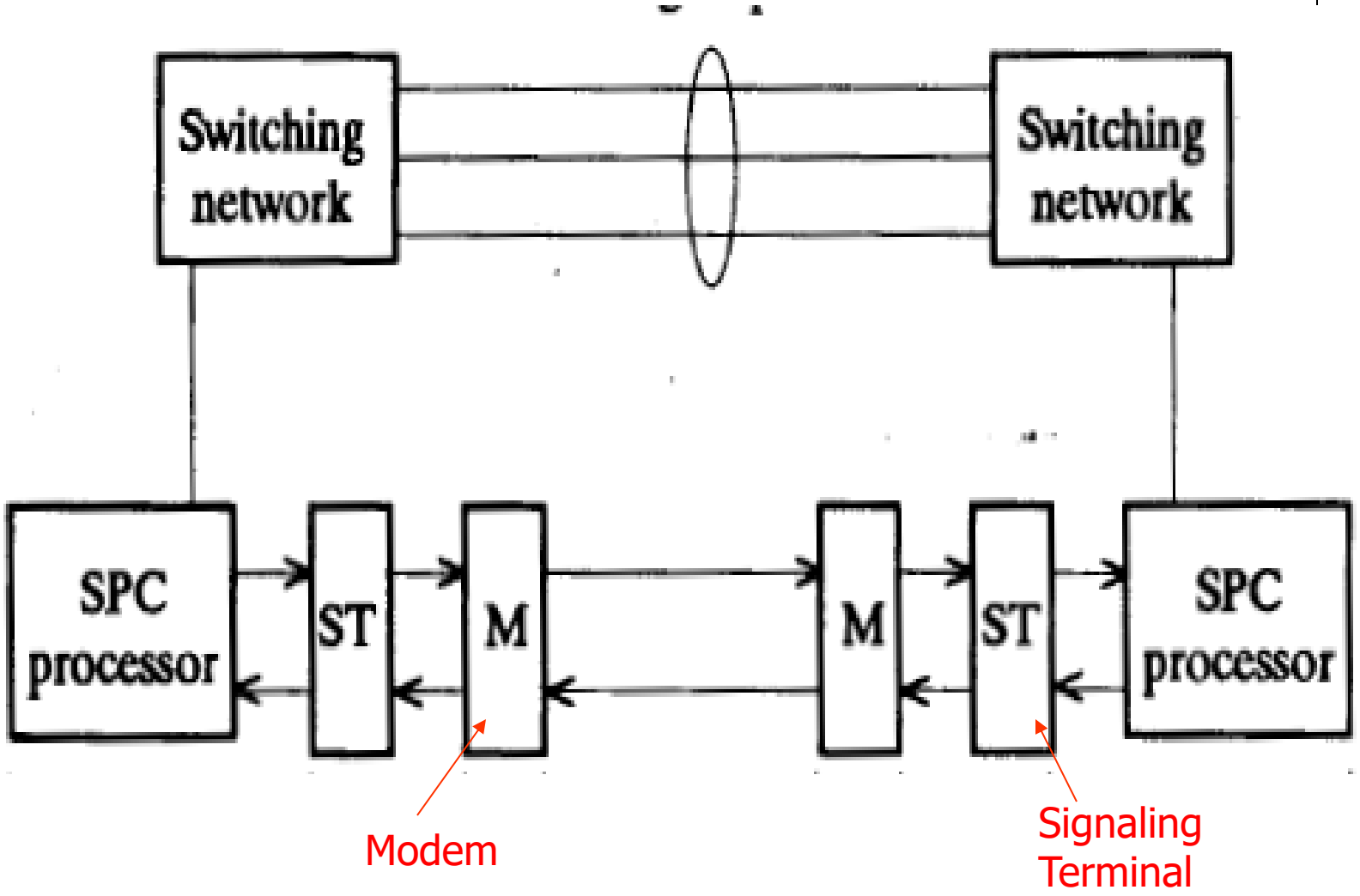
2. Channel-Level Classification
   - In Channel Signaling
   - Common Channel Signaling

SIGNALING TECHNIQUES

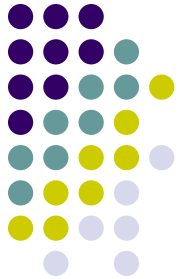




COMMON CHANNEL SIGNALLING



CCS SIGNALLING FRAME FORMAT



COMPARISON OF IN-CHANNEL AND COMMON-CHANNEL

IN-CHANNEL	COMMON-CHANNEL
• Trunks are held up during signalling	• Trunks are not required for signaling
• Interference between Voice and Control Signals may occur	• No interference since the voice and control channels are separate
• Separate signaling equipment is required in each trunk hence expensive	• Only one set of signaling equipment is required for a large group of trunk circuits hence economical
• Can be misused by customers since it is easy to mimic voice signaling	• Control channel is in-accessible to users
• Signalling is relatively slow	• Signalling is much faster
• Speech circuit continuity is assured when signaling is received	• State of speech circuit not automatically assured
• It is difficult to change or add signals	• There is flexibility to add or change signals