III. Public Transport Terminology

Public Transport Service Planning and Regulation: An Introduction

Planning and Analysis Building Blocks

Cost Analysis	Schedule Building	Demand/Revenue Analysis
Performance Analysis		
Measures & Standards		Service Monitoring
Service Design		Fare Setting
Physical Environment Market Factors		Focus of Discussion

Basic Public Transport Terms

Service

- Route Alignment
- Terminal (Route)
- Garage (Parking and Maintenance)
- Span of Service
- Interval (Frequency)
- Time
  - Running
  - Terminal
  - Cycle
- Bus (Train) Requirements

Cost

- Capital
- Operating
- Life-Cycle
- Avoidable

Output

- Ridership
- Commercial Hours/KM
- Dead Hours/KM
- Vehicle Hours/KM
- Occupancy Factor
- Capacity Utilization
- Passengers at Maximum Load Point

Comments on Terminology

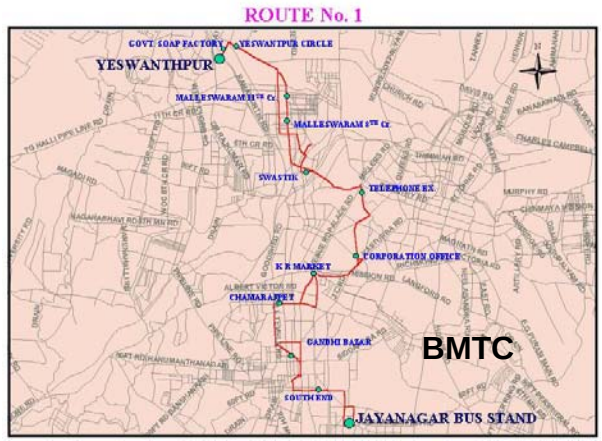
- **Public transport systems sometimes use different terms to define the same operating concepts**
- **This presentation:**
  - **Uses common terminology found in many countries**
  - **Is generally consistent with:**

    Molinero, Angel. Transporte Público: Planeación, Diseño, Operación y Administración, Quinta del Agua Ediciones,2003, México.

Route Alignment

Path Over Which the Bus Travels

- **Balance between coverage and directness**
- **Maybe different alignments based on time of day**
  - **Some systems give new route name to each separate alignment and/or direction**



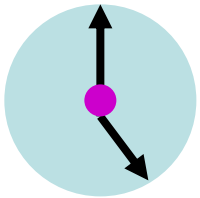
Terminal

The end of a route

- **May be shared by several routes**
- **May also be served by different modes**
  - **Intercity bus or feeder**
- **Bus stations often provided at major terminals**

Garage (Parking and Maintenance)

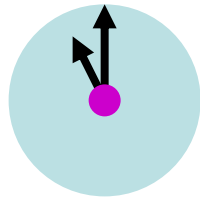
- Operating facility
- Functions (more added as number of buses increases)
  - Parking
  - Daily, routine servicing
  - Vehicle repair
  - Driver assignment
- Can also be called patio



Start
5 am

Span of Service

End
11pm



Total Clock Hours Over Which Public Transport Service is Operated

- **Common spans of service**
  - **Work days**
    - **All day (covers both peak commuting periods)**
    - **AM, PM peak commuting hours only**
    - **“Owl” (early morning) service**
  - **Saturday service**
  - **Sunday and holiday service**

Interval (Frequency)

Time in Minutes Between Two Arrivals (or Departures) of Buses or Trains

e.g., At an interval of 10 minutes, a bus or train departs every 10 minutes

- **Interval is the inverse measure of service frequency**

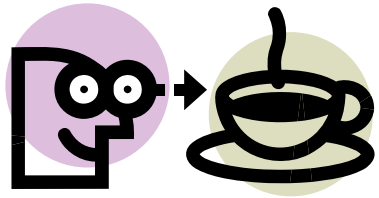
(60/interval) = Buses/Hour

Running Time

Travel Time From One Terminal to the Other Terminal

e.g., The running time for a bus that leaves Terminal A at 7:00 AM and arrives at Terminal B at 7:50 AM is 50 minutes

- **Running times often vary by direction and time of day, so monitoring is important:**
  - ***Efficient scheduling of vehicles***
  - ***Good passenger information***



Terminal Time

Time scheduled for a respective vehicle between when it arrives at a terminal and when it departs for its next trip

e.g., "A bus arrives at Terminal B at 7:50 AM and departs on its next trip at 8:00 AM. The terminal time is 10 minutes"

- **Reasons for terminal time**
  - **Time to get back on schedule if the trip arrives late at terminal**
  - **A rest break for the driver**
- **Often 12-18% of running time**
- **Requires space at terminal for parking the bus**

Cycle Time

Total Time Required for a Vehicle to Make a Complete Round Trip on a Route

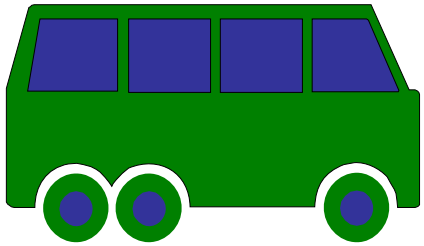
Cycle Time = Round Trip Running Time + Terminal Time

e.g., One-Way Running Time = 50 minutes each direction

Terminal Time = 10 minutes at each terminal

Cycle Time = (50 minutes X 2) + (10 minutes X 2)

= 120 Minutes



Bus Requirements

Number of buses (vehicles) required to operate a transport route for a given interval

Buses in service = Cycle time/Interval

e.g.,

Cycle time = 120 minutes

Interval = 10 minutes

Buses in service = 120/10 = 12

- **The number must be an integer (whole number)**

The Planner's Dilemma: Required Number of Buses Is Not An Integer

- **Problem**
  - **Cycle Time = 72; Interval = 11**
  - **Buses in Service = 72/11 = 6.5**

- **Solution 1: Add additional terminal time**
  - **Buses in Service = (72 *+ 5*)/11 = 7**
- **Solution 2: Reduce interval**
  - **Buses in Service = (72)/*9* = 8**
- **Solution 3: "Stretch" interval**
  - **Buses in Service = (72)/*12* = 6**

Costs

- ***Capital*** ***(acquisition of assets such as vehicles, stops, terminals, and garages)***

- ***Operating/Maintenance*** ***(e.g., wages, benefits, fuel, and parts)***

Life-Cycle and Immediate Costing

- ***Life-Cycle Costing*** **considers both operating and capital expenses over the lives of assets**
  - **Funds for eventual bus or infrastructure replacement *are included***
- ***Short Term "Immediate" Costing*** **considers only operating/ maintenance expenses (immediate)**
  - **Funds for eventual bus or infrastructure replacement *are not included***

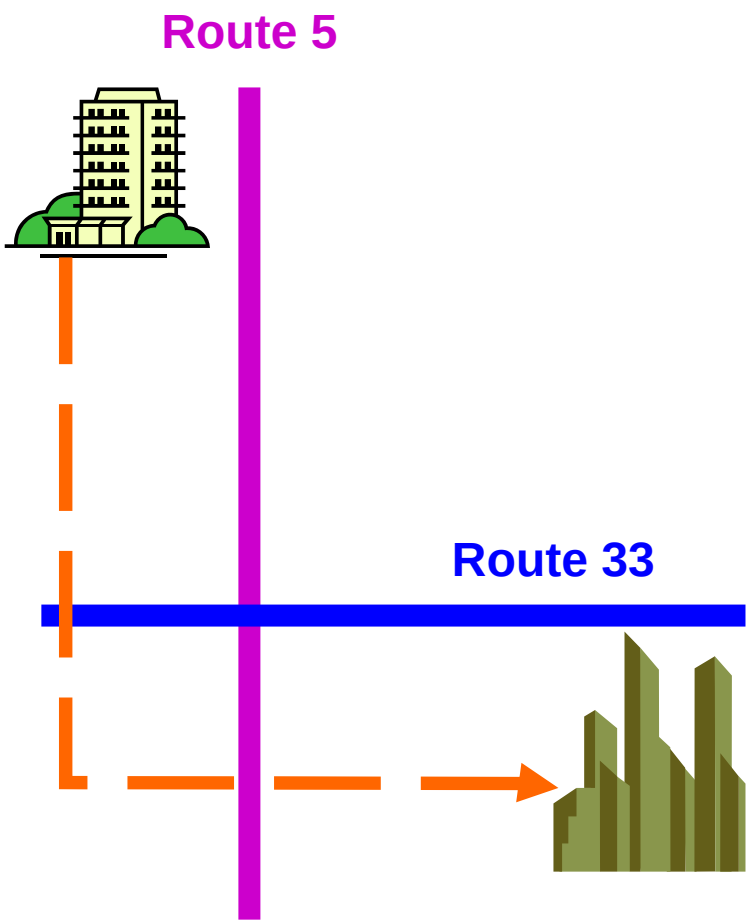
- ***Financial Sustainability Depends On Life-Cycle Costing***

Ridership

Number of Passengers

- **Boarding Passengers**
  - **Counted each time a passenger boards a vehicle**
  - **Most common measure of ridership**
- **Person (Origin-Destination) Trips**
  - **Counted once for each origin-to-destination journey, irrespective of transfers**
  - **Smaller number than boarding passengers**

Boarding Passengers and Person Trips



One passenger travels from home to work

Boards Route 5, transfers to Route 33, and gets off at work

Boarding passengers = 2

Person trips = 1

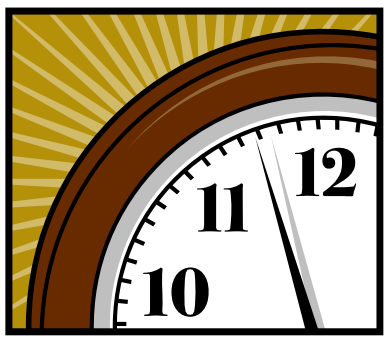
Commercial Hours and Kilometers

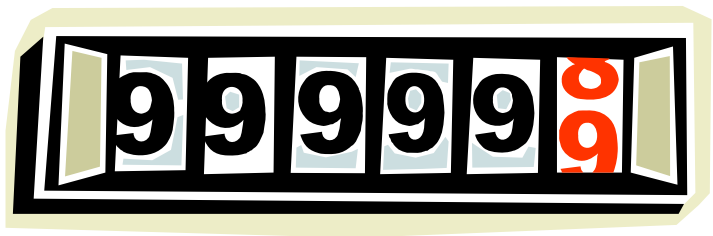
Hours and Kilometers Operated When Transport Vehicles Available to Public

Includes:

- **Running time**
- **Terminal time**

- **Sometimes called *effective hours or kilometers***

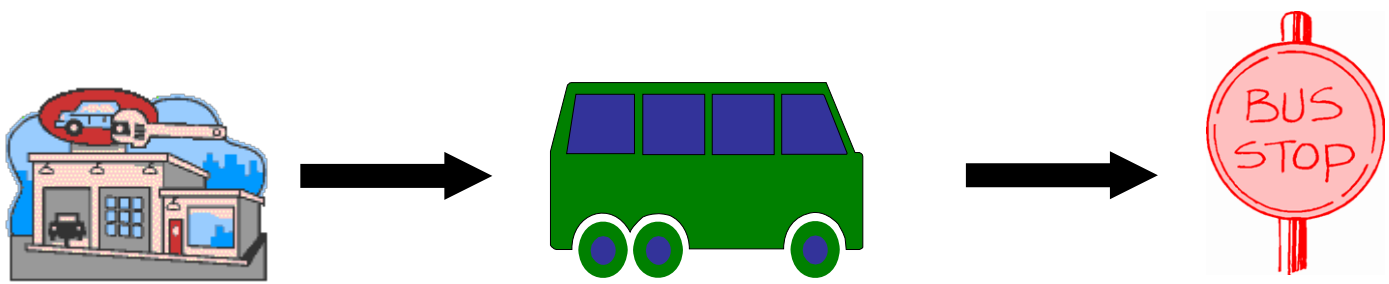




Dead Hours and Kilometers

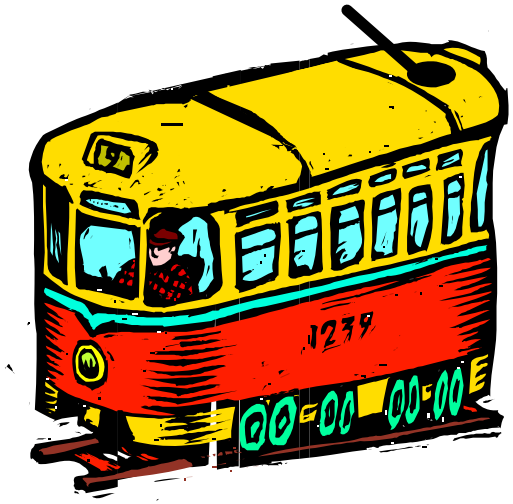
Hours and Kilometers Traveled By Transport Vehicle When Not In Revenue Service

- **Includes hours (KM) that a vehicle travels between either**
  - **The garage and route or**
  - **Two routes when the vehicle changes routes**



Vehicle Hours and Kilometers

Hours and Kilometers Traveled From Pull-Out from Garage to Pull-In



- **Includes**
  - **Commercial time**
  - **Dead time**
- **Does not include other KM/hours such as training**

Occupancy (Load) Factor

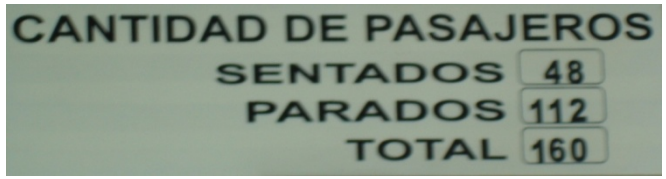
Passengers onboard expressed as a percent of available seats

e.g.,
Number of Passengers on the Bus = 120
Number of Seats on the Bus = 48
Occupancy Factor =120/48
= 2.2 or 220%

- **Occupancy factors among public transport companies/operators vary**
  - **–Seating configurations**
  - **–Policies regarding standing passengers**

BMTC

Capacity Utilization



Percent of vehicle capacity used

Capacity = Number of seats + Number of Permitted Standees

e.g.,

Number of Passengers on the Bus = 120

Vehicle Capacity = 160

Capacity Utilization = 120/160

= 0.75 or 75%

- **The number of standees depends on local policies**
  - **–Area per standee (crowding)**
  - **–Length of trip times**

Importance of Capacity Utilization (Occupancy Factor)

- **Key input for scheduling vehicles to adequately serve passenger demand**

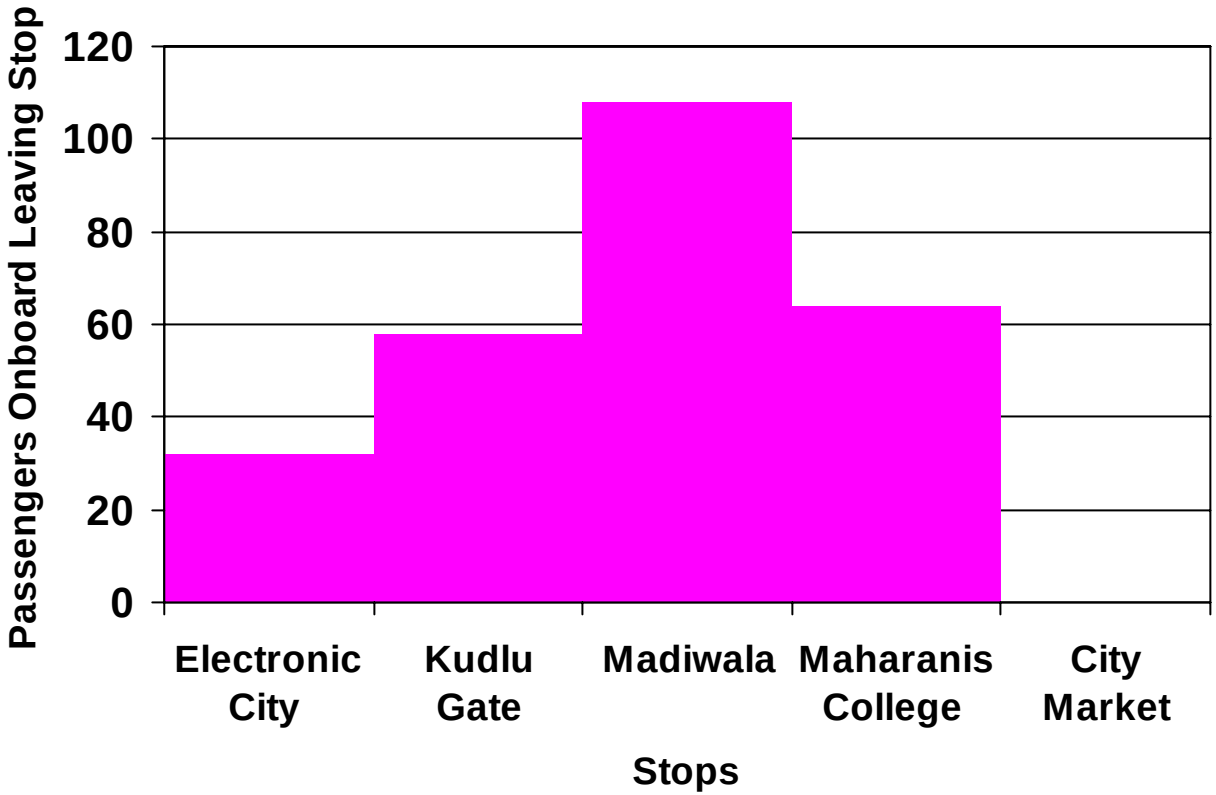
- **Reflects policies impacting quality of service**
  - **Portion of vehicle space devoted to seating and standing**
  - **Degree of crowding (area/user)**
  - **Maximum standing times**

Passengers at the Maximum Load Point

Number of Passengers On-Board a Transit Vehicle as It Passes the Location on the Route with the Maximum Passengers On-Board

- **Typically on the edge of downtown for routes serving the center city**
- **Used for scheduling vehicles to meet occupancy (load) factor standards or maximum allowed capacity**

Passenger Demand Profile for Radial Route



Summary

- **Defined 20 key public transport terms**

- ***Remember,* using common transport terms makes it easier to:**
  - **Communicate with transport professionals,**
  - **Learn from other transport systems, and**
  - **Compare performance results**