II. Terminology and Basic Relationships

Public Transport

Planning and Regulation:

An Introduction

Planning and Analysis Building Blocks

Schedule Building

Cost Analysis and Financial Planning

Performance Analysis

Measures & Standards

Service Monitoring and Data Collection

Network and Route Design

Fares and Revenue: Policy, Analysis, and Collection

Market Factors and Demand Analysis

Terminology and Basic Relationships

Focus of Discussion

II-2

Basic Public Transport Terms

Service

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

Output

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

Comments on Terminology

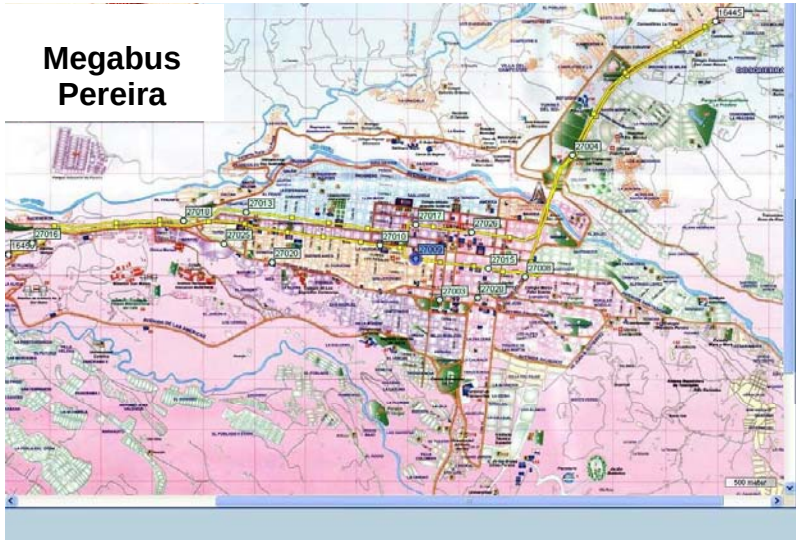
- **Public transport systems sometimes use different terms to define the same operating concepts**

- **This presentation uses common terminology found in many countries**

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**

Megabus Station

BMTC KSB Station

Garage (Parking and Maintenance)

- **Operating facility**
- **Functions (more added as number of buses increases)**
  - **Parking**
  - **Daily, routine servicing**
  - **Vehicle repair**
  - **Driver assignment**

Span of Service

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 (Friday) 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**

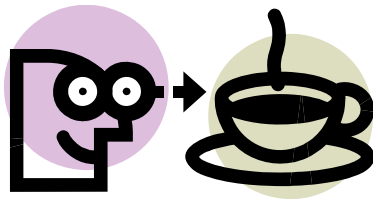
(60/interval) = Buses/Hour

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

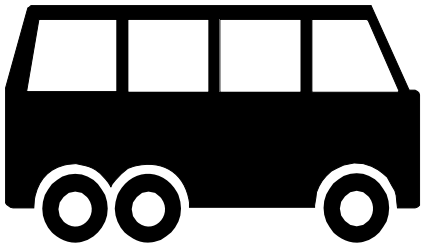
Cycle Time = Round Trip Running Time + Terminal Time

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 requirements = 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**

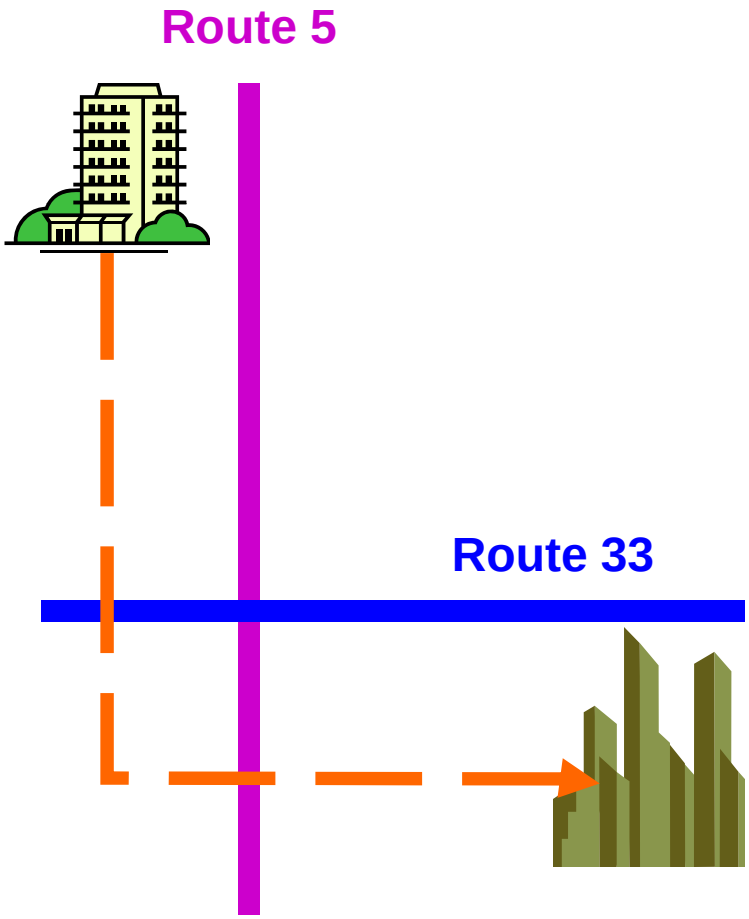
Ridership

Number of Passengers


Casablanca

- **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

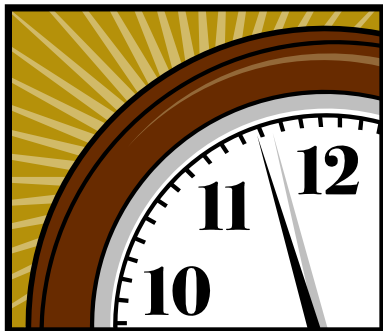
Commercial Hours and Kilometers

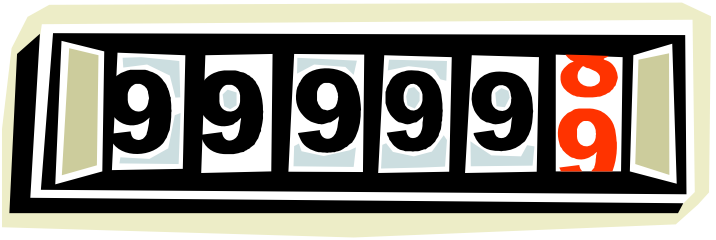
Hours and Kilometers Operated When Transport Vehicles Available to Public

Includes:

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

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

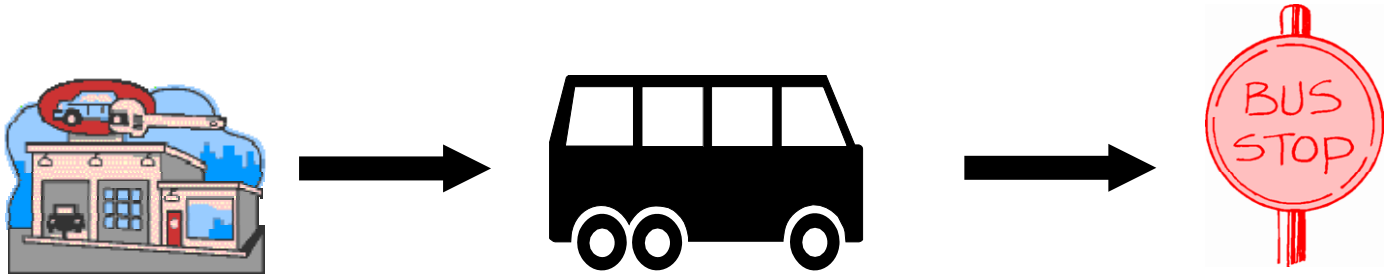




Dead Hours and Kilometers

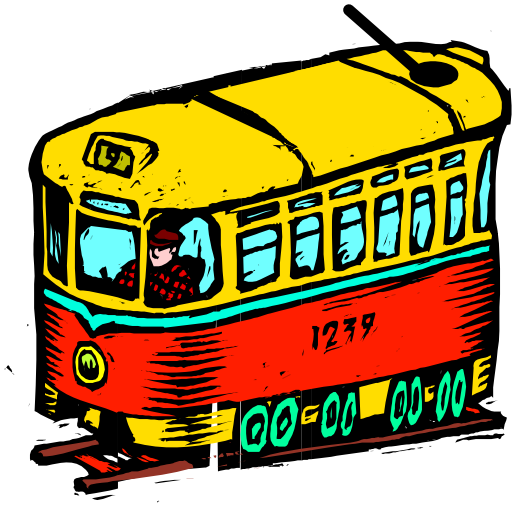
Hours and Kilometers Traveled By Transport Vehicle When Not In Revenue Service

- **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**

Capacity

Maximum number of passengers that can be carried on a vehicle = number of seats + the number of permitted standing passengers

e.g.,
Number of Seats on the Bus = 48
Number of Permitted Standing Passengers = 112
Capacity of the Bus = 48 + 112 = 160 Passengers

Reasons Vehicle Capacities Vary Among Public Transport Operators

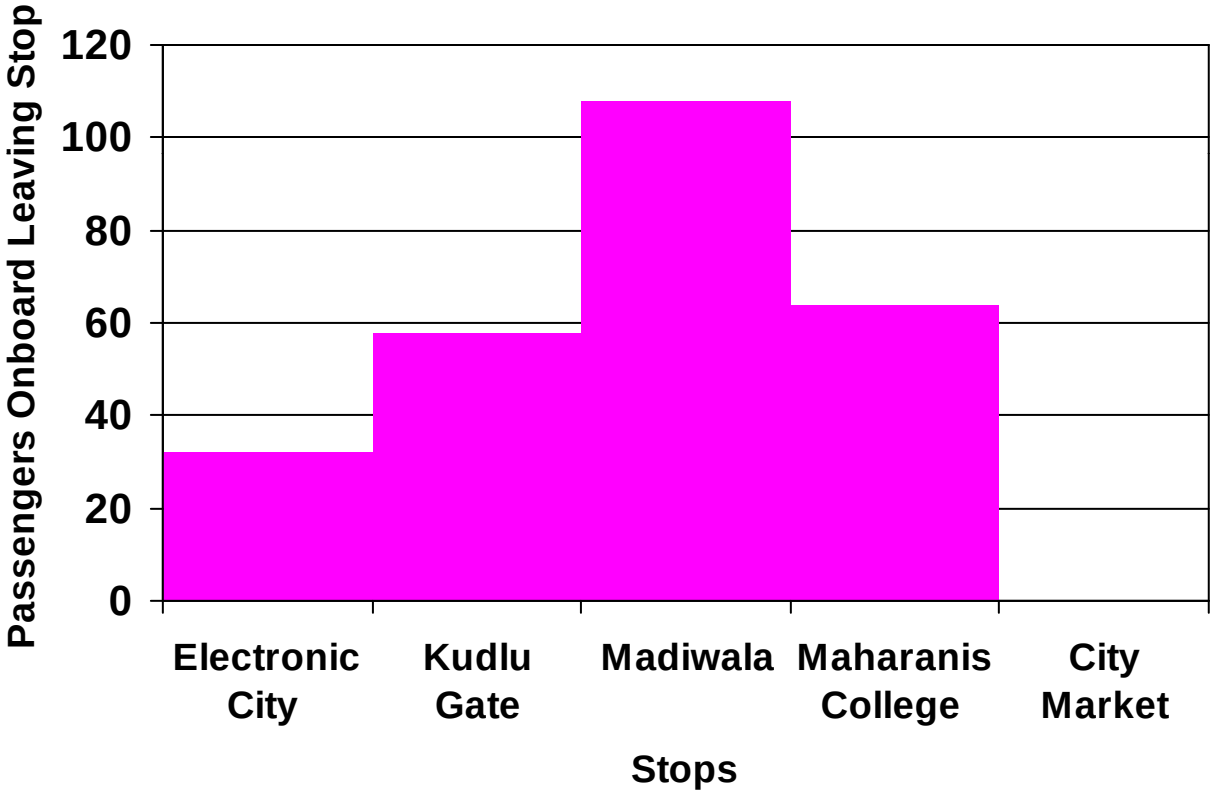
- **Number of doors**
  - Affect loading/unloading times and seating space
- **Low-floor buses**
  - Less interior space, faster loading/unloading times
- **Space allocation for seats and standing areas**
  - Tradeoff between carrying capacity (operations efficiency) and quality of service provided to riders
  - More seats provided when standing times are long
- **Policies regarding standing passengers/meter^2**
  - Tradeoff between carrying capacity (operations efficiency) and quality of service provided to riders
  - Reflect local norms regarding comfortable personal space

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 15 key public transport terms**
- **Using common public transport terms makes it easier to:**
  - **Communicate with transport professionals,**
  - **Learn from other transport systems, and**
  - **Compare performance results**