TRANSIT SCHEDULING

Basic Approaches

Level of Service Policy Orientation:

Provide a basic service level and maintain it or do nothing at all, i.e.

30 minute headways in off-peak

15 minute headways in peak

no matter what demand is.

Generally used to set minimums for a system or provide enough service to a certain area of the city.

Demand Orientation

Look at current level of demand and provide enough seats to meet that demand. At times or places where the demand doesn't exist to cover costs of service – don't provide it.

Management Viewpoint

Want to meet demand at lowest possible cost. Costs are proportional to vehicle hours and vehicle miles; travel varies by time of day, day of week, time of year. To accommodate peak demand, this may mean excessive service at other times of the day.

It may be in operator's best interest to discourage peak ridership – not worth the cost of adding another full time driver and vehicle to be used for a short time. Need to explore methods for peak shaving – lower prices during the off peak for certain users or overall, use car pool/van pool service, taxi substitute, etc.

Money isn't saved unless an entire run or piece of work is eliminated.

Driver Viewpoint

Drivers want schedules that are easy to meet, convenient layovers, short work days, convenient starting time, pleasant passengers, good days off, high pay. They need to take breaks during the day and have meal times.

Labor contracts with drivers typically specify constraints on operations and scheduling. For example, a drivers working a split shift will need to be paid extra if the work day exceeds a certain amount (i.e. 10 hours). They are paid a 'spread penalty' a percentage of the hourly rate.

Contract provisions have a major effects on schedules, costs, spread penalties, layover provisions, split shifts, etc.

Example Contract Provisions:

Guarantee time: 8 hours

Overtime premium: ½ hour for each hour over 8 hours

Spread time premium: ½ hour for each hour over 10 hours

All breaks less than 20 minutes are paid

Only one unpaid break
No pieces of work greater than 5 hours without a 30 minute break
Pull out, turn in paid

Customer Viewpoint

Customers need to be at their destinations at a given time, want to avoid waiting, long travel time, want reliable service, a safe place to wait, schedules that are easy to remember, availability of service at all hours, weekends, holidays.

User oriented transit – operates directly from origin to destination (no transfers), convenient, reliable schedules, reasonable fare.

Disutility of travel from mode choice studies place a high value on out-of-vehicle time, for example:

Disutility of a trip = in-vehicle time + 2.5 * out-of-vehicle time + fare/value of time.

Out-of-vehicle time (walking, waiting, transferring) is 1 ½ to 7 times as important as in-vehicle time.

Data Needs

Running Times

How long does it take for vehicles to travel each route segment
by time of day?
How much variation is there in travel times?
What is a reasonable time for recovery at the end of the route (layover)?

Possible improvements

Use passes, speed up loading and unloading, eliminate indirect routes, add express service, skip stops, increase stop spacing, parking restrictions preferential treatment, bus loading bays, signal preemption.

Peak Load Point Counts

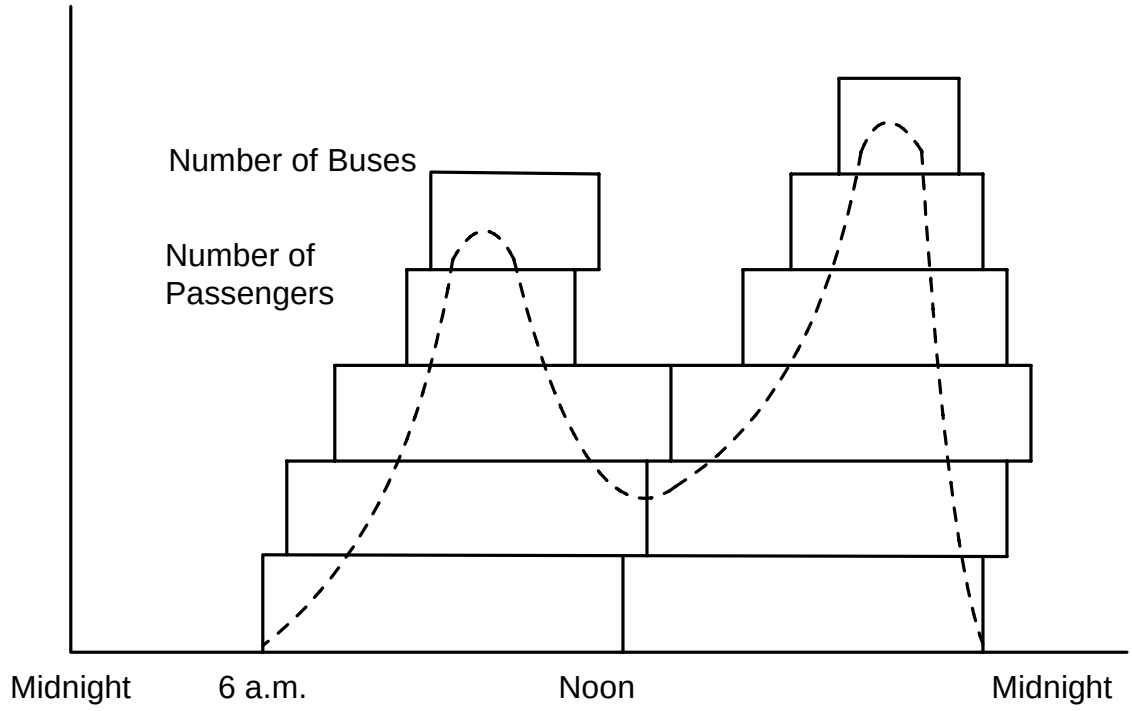
Count the number of people in the vehicles at the route peak load point, in the peak direction and at the peak time of day (triple peak). Conduct on-off counts to give route ridership profile and information to locate peak load point. Service should be set to provide enough buses to accommodate peak load point demand.

Policy

- maximum headway
- span of service – evenings, weekends
- loading standards – maximum load factor (number standing) and/or maximum standing time on the bus
- Stop spacing

Example:

ROUTE PROFILE BY TIME OF DAY
AT PEAK LOAD POINT AND BUS ALLOCATION



The above requires a base service of three buses for two straight shifts each, two split shifts and one afternoon tripper. Six vehicles are required and nine pieces of work. The driver and vehicle used in the tripper may have other assignments on other routes.

Computer scheduling: Most transit systems use a computer based system to do their scheduling. A good manual schedule will be as close to optimal as a computer based schedule, but will take much longer to prepare and not be easily adapted to changes.

For more information see Transit Cooperative Research Program Report 30: "Transit Scheduling Basic and Advanced Methods": available from the TCRP web site

http://www.tcrponline.org/bin/publications.pl