Abstracts of Papers

PARAMETRIC ANALYSIS OF DUAL-MODE STATION OPERATING CHARACTERISTICS

H. Y. Chiu, Applied Physics Laboratory, Johns Hopkins University

Performance and costs of a station can significantly affect a dual-mode system. This paper reports the results of a preliminary analysis of the effects of certain system design factors on serial dock station performance. These design factors include the flow distribution of vehicles into the station and the number of berths in the various queues of the station. The analysis was performed by a simulation of a serial dock station that treats these factors parametrically. In addition to the simulation, an analysis of station cost was done to examine some of the trade-offs between cost and performance.

Several conclusions were drawn concerning the performance of a serial dock station operating with a strategy that gave dock queue priority to vehicles coming into the station from the main line over vehicles coming in from the street.

1. Increasing the line queue rather than the dock queue is much more effective in reducing the number of misses. Also, the line queue is more dependent on the dock dwell time than on the number of berths in the dock queue.
2. The dock queue significantly affects the delays encountered by vehicles in the street queue under the present operating strategies.
3. The exit queue is strongly dependent on the number of berths in the dock queue. Exit queues equal to about half the number of berths in the dock queue are sufficient to keep the average dock delays close to the minimum dock dwell. However, smaller exit queues do tend to produce a smaller probability of large platoons forming on the main line downstream of the station.
4. For a given dock queue size and an assumed limit on the line and street queues, station throughput is relatively independent of line and street flows except that throughput does increase in the absence of either line or street flow.

The analysis of the cost of a serial dock station led to the following conclusions.

1. Dock queue berths are about three times more expensive than a line, street, or exit queue berth.
2. Minimizing station costs will primarily increase street queue delays. Minimizing costs entails reducing the number of dock queue berths, which are important in determining street queue delays.
3. If time shifting is used instead of space shifting, queue costs can significantly reduce station costs. However, time shifting may require a more complex set of controls, which may then become an additional cost to be considered.

FARE COLLECTION AND TICKETING CONSIDERATIONS AT DUAL-MODE STATIONS

William A. Hamberg, Stanford Research Institute
Robert W. Cowan, Transportation Systems Division, General Motors Corporation

Dual-mode transit system concepts are now being developed to provide demand-responsive transportation in metropolitan areas. Since these systems combine the features of demand-responsive service and shared, multiple origin and destination vehicle usage, their ticketing and fare collection functions will be more complex than those of conventional transit systems. Fares are likely to be related to trip distances; fares may also depend on the time of day and characteristics of the traveler. The reservation request and confirmation process associated with demand-responsive systems will result in additional functions. It may also be necessary to verify or control (or do both) the passenger loading of each vehicle. Finally, the possible implementation of a dual-mode transit system in an evolutionary manner, beginning with a single-mode dial-a-bus service, requires that both interim and final goals be considered when the initial ticketing and fare collection concept is designed.

This paper explores these new and expanded functions of ticketing and fare collection for dual-mode transit systems. A case is made for integrating the design of reservation, ticketing, and fare collection functions with the overall design of a dual-mode transit system. Careful integration of these functions will produce a high level of passenger service and economies resulting from shared-vehicle use and extensive automation.