Chapter 6: Putting it All Together

- The Service Design/Assessment Process
- Other Resources
- Summary

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THE SERVICE DESIGN/ ASSESSMENT PROCESS

Let's review where we've been. Remember that we suggested the following sequence of steps as your process or methodology for planning or assessing rural transportation services?

1. Review the service types that are available.
2. Establish local goals, objectives, and needs based on your community and its profile.
3. Select and tailor services to reflect community needs.
4. Estimate the volume of service anticipated.
5. Evaluate available resources and forecast funding and service costs.
6. Refer to other sources for help in refining the service design.

We explored some basic service definitions in Chapter 2 and looked at examples of service types in the real world. Chapter 3 examined the various issues to be considered when deciding which type of service to select, including local goals and objectives, the advantages and disadvantages of various service types, taking advantage of community characteristics, how much service to offer, how much service you can afford, and special considerations about service types and combinations of types (steps 2 through 5 above). Chapter 4 highlighted examples of rural transit operations that are successfully tailored to local circumstances and conditions. Chapter 5 was the big numbers chapter: in-depth numerical details of the various service types.

You may now want to delve into the detailed statistical information about the relative performance levels of the different service types. Further detailed information about the characteristics and performance levels of the various rural transportation service types is provided in Appendix D.

We suggest that you go farther than that. If you are really interested in customized perspectives of how the service types fit into communities of various characteristics, we recommend that you use the **Rural Transportation Services computer program** (described in Appendix A) to generate unique peer comparisons to your own locality. The program is available through the Transit Cooperative Research Program of the Transportation Research Board in Washington, D.C. This program really is **designed for persons with very little prior experience with computers**, and you will be able to obtain much more detailed and personalized information from working with that program than you could from any publication.

OTHER RESOURCES

So you've tried all the steps above, and you've made decisions based on the results that other operations have achieved, and you still feel like you need some further guidance in putting all the pieces of the puzzle together. Here's a quick list of sources of assistance in planning and evaluating rural transportation systems.

- **Other references and literature.** The Annotated Bibliography at the end of this manual lists other key references and describes their contents. If you were to get only one of these, it should be the ***Comprehensive Financial Management Guidelines...*** manual which we have referenced several times. In addition, a number of states (including Arizona, California, Michigan, North Carolina, and Ohio) have published manuals for their local transit providers which should be of great help to you.

- **Your state Department of Transportation.** These are the guys from the government who are there to help. Part of their job is to offer assistance to their rural transportation operators, and if they don't have the answer, they probably will have met someone who does.

- **National Resource Centers**, including

  — The national **Rural Transit Assistance Program (RTAP)**, a technical assistance program of the U.S. Department of Transportation administered by the Community Transportation Association of America, provides publications, a toll-free hotline, and more. Call 800-527-8279. State RTAP programs are administered by state DOTs.

  — The national **Community Transportation Assistance Program (CTAP)**, a technical assistance program of the U.S. Department of Health and Human Services administered by the Community Transportation Association of America, provides publications, a toll-free hotline, and more. Call 800-527-8279.

  — The **Multi-State Technical Assistance Program (MTAP)** of the American Association of State Highway and Transportation Officials links state transit agencies through a variety of services. Call 804-288-0008.

  — The **National Transit Institute (NTI)**, a transit training program of the U.S. Department of Transportation administered by Rutgers University, provides training for transit providers in a large variety of subject areas. Call 908-932-1700.

  — The **Center for Transportation Education & Development of the University of Wisconsin - Milwaukee** provides a

large variety of workshops and training seminars. Call 800-222-3623.

— The **Technology Sharing Program** of the U. S. Department of Transportation is a wonderful source of technical reports and other information. Call 202-366-4208.

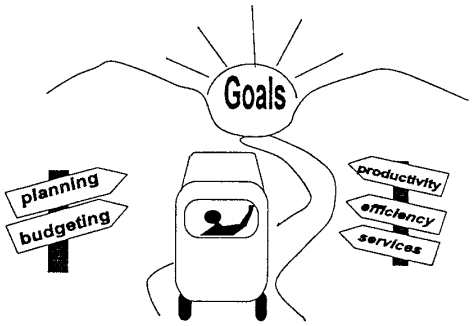
- **Other individuals active in the field.** You will meet other individuals who are also operating rural transportation services at many functions and events, including your **statewide transportation conferences** and **national transportation conferences**, such as the bi-annual Rural Public and Intercity Bus Transportation Conferences that are held around the country, CTAA's annual EXPO and the conventions, workshops, and seminars conducted by the American Public Transit Association (APTA).

- **Planning professionals.** There are public planning resources, such as Councils of Government and Regional Planning Organizations, which may be able to assist you. In addition, there are numerous private organizations, like the three involved in producing this manual, that provide planning, evaluation, research, and consultation services for a living. Specific individuals have had many long years of planning, operating, and reconfiguring local rural public transportation services. You may find the help you need from such organizations.

As you can see, there are many sources of information and support available, and your biggest problem may just be in deciding where to start.

SUMMARY

Did we mention that neither assessing existing rural service-delivery systems nor planning new ones is a cookbook operation? We haven't found any simple abstract formula or one great planning model that will create a uniquely best answer regarding transportation services for a particular rural community. Therefore, there are at least several good answers for each community, and these can be tailored to the specific goals and constraints of the community. Furthermore, some solutions are demonstrably better than others, and some are demonstrably worse. So although we can't offersimple or unique answers, this manual will improve your ability to design and operate rural transportation services that are appropriate for your particular locality.



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Glossary

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GLOSSARY

Advanced Reservation Scheduling

Passengers call ahead and reserve, in advance, a ride for a particular date and time. This is used in demand-responsive transportation systems. Transit systems may set limits on the minimum and maximum advanced reservation times before the requested trip. Advanced reservation of trip requests allows the scheduler/dispatcher to identify ridesharing opportunities and assign rides to vehicles for the most efficient service delivery. A drawback to allowing requests far in advance of the desired trip is that *no-shows* may be more frequent than with *real-time scheduling.*

Arterial Route

A bus route which runs on major arterial streets, out along a straight line and back, often connecting with other routes at a transfer point at one of the ends of the line or in the middle (Figure 1), often in the form of a *radial network.* This route design is used to provide a high frequency of service in a limited geographic area (as opposed to a *loop route* design). Arterial routes are recommended for higher density areas.

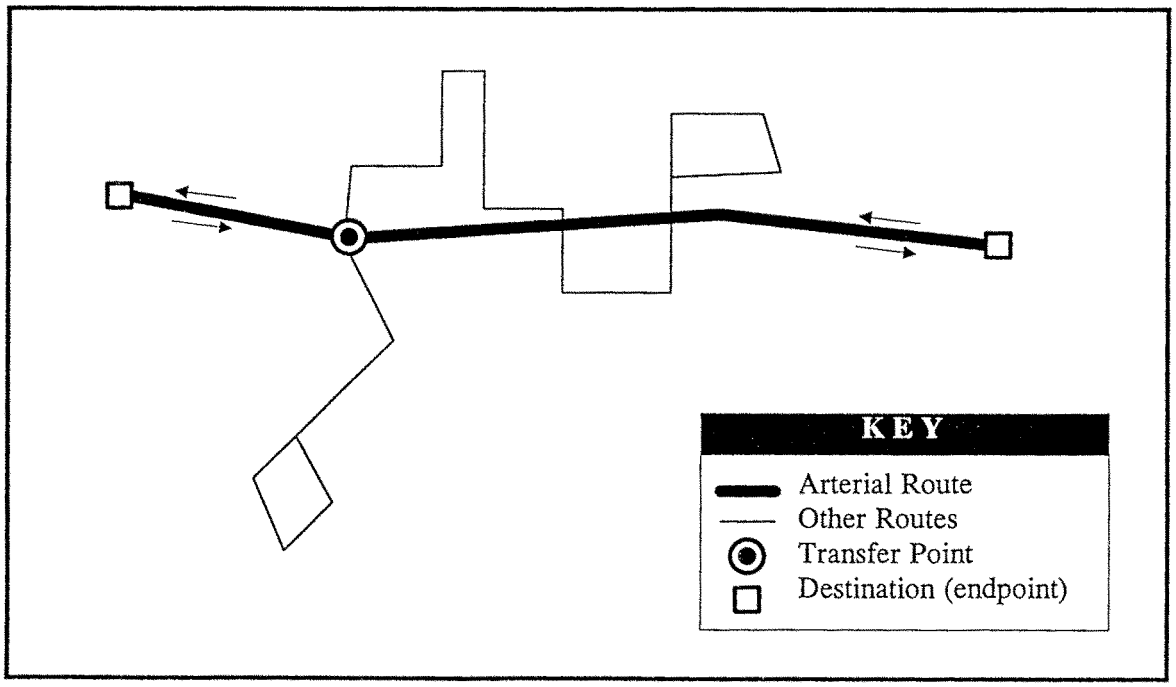

Figure 1: ARTERIAL ROUTE

Brokerage

In general, an institutional structure which functions as an interface between transportation providers and users. More specific roles include:

1. Coordination of transportation services in a defined area. The transportation broker may centralize vehicle dispatching, recordkeeping, vehicle maintenance, and other functions under contractual arrangements with agencies, municipalities, and other organizations. This type of brokerage may be appropriate when full consolidation of services is not the best option.

2. A method of matching travelers with a variety of transportation providers and modes through use of central dispatching and administrative facilities. Volunteer drivers are often coordinated by a broker. A *ridesharing* broker provides assistance in forming pools as well as identifying transit options.

Buspool

A group of people who share the use and cost of bus transportation between designated origins and destinations on a regular basis (for example, daily trips to work). Commuter service is contracted (typically serving a single major destination) in response to commuter demand which cannot be adequately served by regular transit. Passengers typically pay a fixed monthly fare for express home-to-work service. This is related to *charter service, commuter bus*, and *subscription service.*

Carpool

A carpool is a type of transportation arrangement (usually for commuter trips) in which two or more individuals regularly share a trip in an automobile. The driver may be the same for every trip, or may rotate among the riders. Carpools typically provide door-to-door service, change when a rider's travel needs change, and may be arranged on an informal basis or through a *rideshare program* or *brokerage.*

Central Transfer Point

A central meeting place where routes or zonal demand-responsive buses intersect so that passengers may transfer from one vehicle to another (Figure 2). Routes are often timed to facilitate transferring. That is, routes with the same headways are scheduled to arrive at the central transfer point at the same time and depart once passengers have had time to transfer. When all routes arrive and depart at the same time, the system is called a *pulse system.* The central transfer point simplifies transfers when there are many routes (particularly *radial routes*), several different modes, and/or paratransit zones. A downtown retail area is often an appropriate site for a central transfer point, as it is likely to be a popular destination, a place of traffic congestion and limited parking, and a place where riders are likely to feel safe waiting for the next bus. Strategic placement of the transfer point can attract riders to the system and may provide an opportunity for joint marketing promotions with local merchants.

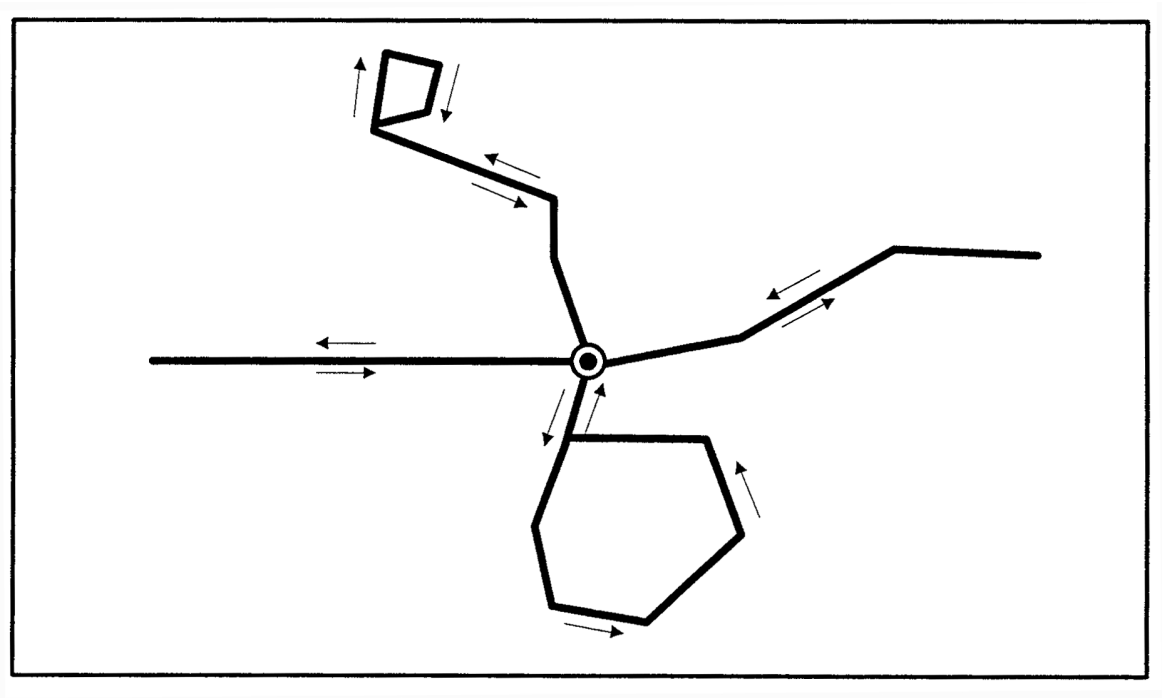

Figure 2: CENTRAL TRANSFER POINT

Charter Service

Transportation service offered to the public on an exclusive and advanced reservation basis (either as individuals or as groups). It is provided with a vehicle that is licensed to render charter service and engaged at a specific price for the trip or period of time, usually on a reservation or contractual basis. Typically charter service is contracted on a one-time or limited basis and is used to provide transportation on sight-seeing tours and to recreational destinations, sometimes on an overnight basis. Over-the-road coaches equipped with baggage compartments and comfortable seats are typically used in charter service. Private operators often depend upon charter service for their livelihood, and thus public transportation operators which receive Federal and other public subsidies may only operate charter services under limited conditions.

Checkpoint Service

This term is commonly used interchangeably with *point deviation service.* Another definition refers to *demand-responsive service* when buses make periodic or scheduled stops at a center of activity such as a shopping center or downtown shopping area. Riders are picked up and taken to their own destinations or to transfer points.

Circulator

A bus which loops around a small geographic area on a high frequency with numerous stops around the loop. It is typically operated in a downtown area or area attracting tourists, where parking is limited, roads are congested, and trip generators are spread around the area. It may be operated all day or only at times of peak demand, such as rush hour or lunch time.

Commuter Bus Service

Commuter bus service is designed to meet the transportation needs of commuters. Typically commuter service is fixed route, fixed schedule, between a residential area and an employment site or center with no stops in between (*express service*). It is usually focused in one direction during the morning peak period, and in the reverse direction during the afternoon peak period. Commuter service may also be provided on a *subscription* basis.

Complementary Paratransit

Demand-responsive service which is operated in addition to fixed route service to accommodate persons who cannot ride the fixed route service because their disability prevents it. Under the Americans with Disabilities Act (ADA), public entities which operate *fixed route service* (excluding *commuter service*) are required to provide complementary paratransit with service characteristics equivalent to the fixed route service. The ADA is very specific in what constitutes equivalent service and what kinds of persons must be provided this service. A plan describing the service which documents the planning process must be submitted to the Federal Transit Administration regional office and updated annually. Many rural operators are not required to provide complementary paratransit service since they typically do not operate pure fixed route service.

Connector Service

Service in which a transfer to or from another transit system or mode is the focal point. An example of this is service provided under the Greyhound Rural Connector program: local transit providers operate service which brings people to and from the Greyhound station. This type of connector service is also known as *feeder service.* Connector service may also connect two different transit systems (such as in two adjacent cities). It is often useful in improving service efficiency and effectiveness when important destinations, such as medical centers, are located beyond the transit system's service area.

Conventional Bus Service

This is a term used to refer to "traditional" fixed route, fixed schedule transit operated using heavy duty buses, typical of an urban system. It is used in contrast to *paratransit* or innovative services. In rural areas, conventional bus service is the most appropriate mode when very specific conditions apply.

Curb-to-Curb Service

A service that picks up and delivers passengers at the curb or roadside, as distinguished from *door-to-door* service. Passenger assistance is not rendered other than for actual boarding and alighting. The passengers are responsible for getting themselves from their homes or other buildings to the curb. Fixed route service is always provided curb-to-curb, while demand responsive service may be provided curb-to-curb or door-to-door. Curb-to-curb is more efficient for the transit system, but provides a higher level of service which may be desirable for passengers with disabilities.

Demand-Responsive Service

Service is activated based upon passenger requests. Usually passengers call the scheduler or dispatcher and requests a ride for a particular date and time. A trip is scheduled for that passenger which may be canceled by the passenger. Usually involves curb-to-curb or door-to-door service. Trips may be scheduled on an advanced reservation basis or in "real-time." Usually smaller vehicles are used to provide demand-responsive service. This type of service usually provides the highest level of service to the passenger but is most expensive for the transit system to operate in terms of cost per trip. However, in rural areas with relatively high populations of elderly persons and persons with disabilities, demand-responsive service is sometimes the most appropriate type of service. Sub-options within this service type are discussed in order of least structured to most structured in terms if routing and scheduling.

Pure Demand-Responsive Service

Drivers pick up and drop off passengers at any point in the service area, according to requests from the dispatcher. In pure demand-responsive systems, the dispatcher combines immediate requests, advanced reservations, and subscription service for the most efficient use of each driver's time (Figure 3).

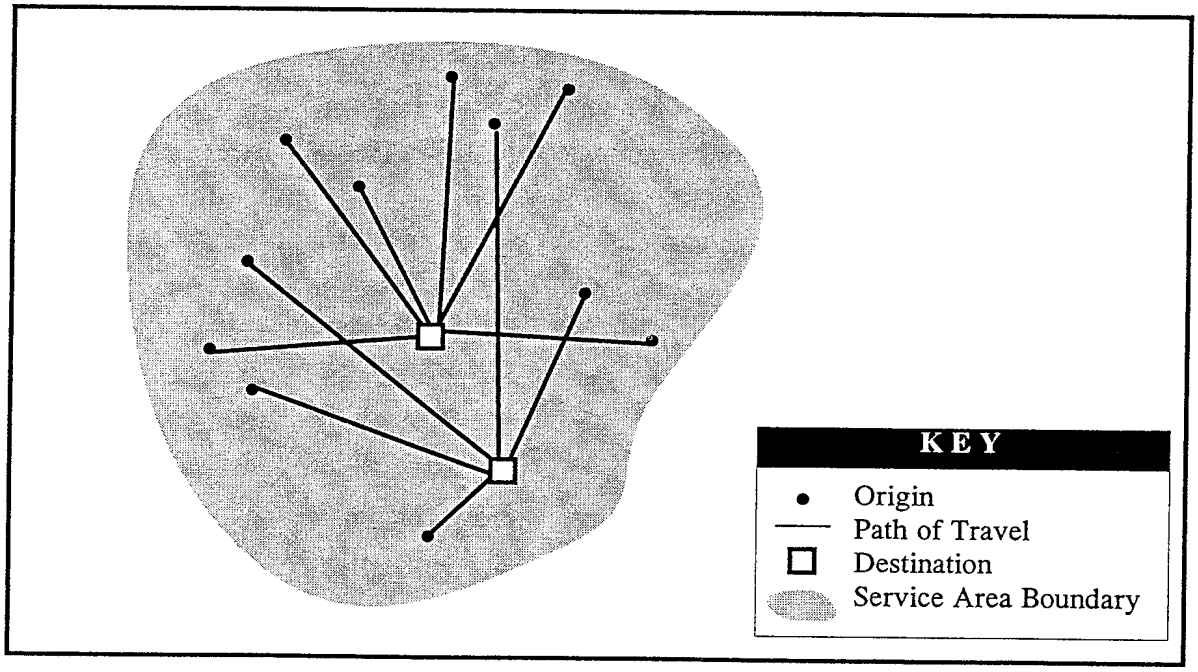

Figure 3: PURE DEMAND-RESPONSIVE SERVICE

Zonal Demand-Responsive Service

The service area is divided into zones. Vehicles pick up and drop off passengers only within the assigned zone (Figure 4). When the drop-off is in another zone, the dispatcher chooses a meeting point at the zone boundary for passenger transfer or a central transfer is used. This system ensures that a vehicle will always be within each zone when rides are requested.

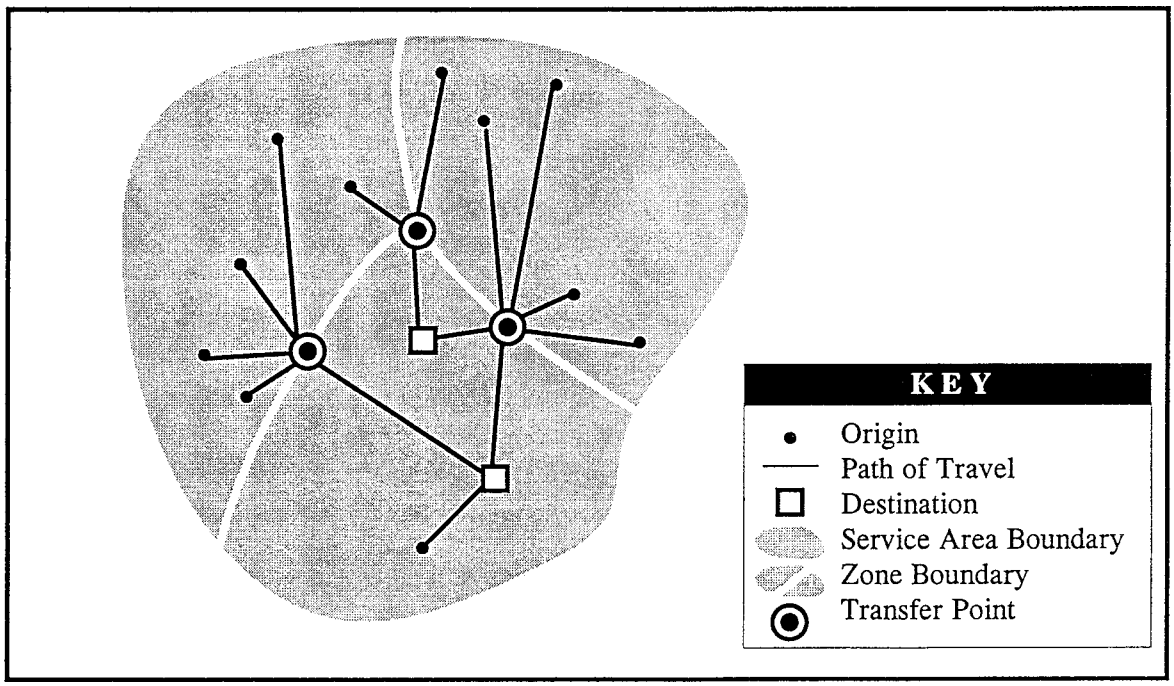

Figure 4: ZONAL DEMAND-RESPONSIVE SERVICE

Flexible Routing and Schedules

Flexible routing and schedules have some characteristics of both fixed route and demand-responsive service. In areas where demand for travel follows certain patterns routinely, but the demand for these patterns is not high enough to warrant fixed route, service options such as *checkpoint service, point deviation, route deviation, service routes* or *subscription service* might be the answer. These are all examples of flexible routing and schedules, and each may help the transit system make its demand-responsive services more efficient while still maintaining much of the flexibility of demand-responsiveness.

Destination

A place at which a passenger ultimately disembarks from a transit vehicle; the point at which a trip terminates. This term typically refers to places outside of a passenger's home, even though these places become *origins* of a return trip which may be destined to the passenger's home.

Dial-A-Ride Service

A name which is commonly used for *demand-responsive service.* This term may be helpful in marketing the service to the community, as the meaning of "dial-a-ride" is more self-evident than "demand-responsive" to someone unfamiliar with transportation terms.

Door-to-Door Service

A service that picks up passengers at the door of their place of origin and delivers them to the door of their destination. The driver pulls the vehicle off the road if possible, and may escort or physically assist the passenger if needed. Door-to-door service provides a higher level of assistance than *curb-to-curb* service, and is typically used for passengers with severe physical disabilities.

Express Bus Service

The characteristics of express bus service include direct service from a single origin to a single destination (or limited numbers of each) with few or no intermediate stops. Typically, express bus service is fixed route/fixed schedule, for longer distance commuter trips. The term may also refer to a bus which makes a limited number of stops while a *local bus* makes many stops along the same route but as a result takes much longer. Express bus service usually uses highways where they are available, not secondary or local roads.

Fare Structure

Fare structure is the basis for determining how fares are charged. Common types of structures are distance-based (the longer the trip is, the higher the fare will be), time-based (higher fares for trips made during *peak hour* service than during the "*off peak*"), quality-based (demand-responsive trips are typically charged a higher fare than fixed route trips), or flat fares (the same fare is charged for all trips). In addition to these three methods, a fare structure may differentiate among passengers based upon age, income, or disability (often lower fares are charged for elderly persons, children, Medicaid recipients, and persons with disabilities). In rural areas, time-based, quality-based, and flat fares are usually less appropriate than distance-based fares since trip lengths tend to be much longer where population densities are lower.

Feeder Service

Local transportation service that provides passengers with connections with a major transportation service. Like *connecter service*, feeder service is service in which a transfer to or from another transit system, such as an intercity bus route, is the focal point or primary destination. An example of this is service provided under the Greyhound Rural Connector program: local transit providers operate service which brings people to and from the Greyhound station.

Fixed-Route

Buses have a prescribed path or route which never varies. The schedule may be fixed or flexible (see *jitney or shuttle service*). Passengers may be required to wait at designated stops, or *flag stops* may be permitted. Usually larger vehicles are used to provide fixed-route service.

Fixed Schedule

Passengers wait at designated bus stops for buses to pick them up at a specific time according to a preestablished schedule. The actual bus route may be fixed or flexible. A flexible route combines fixed schedule stops with demand-responsive stops (see *checkpoint, point deviation*, and *route deviation*).

Flag Stop

1. A stop anywhere along a fixed-route which has not been designated as a regular or fixed stop. The passenger waits along the route and "flags down" the bus as it approaches. Alternately, a passenger on board the bus may request to be dropped off anywhere along the route. The driver makes the decision as to whether or not the requested stop is safe, and may choose an alternate, nearby place to stop if the requested stop is not safe.

2. In an intercity bus system, flag stops are designated fixed stops at which the bus will stop only if someone is waiting or requests to be dropped off there (at other stops, the bus will stop whether or not passengers appear to be waiting).

Flexible Route

Flexible route service follows a direction of travel, but allows for deviation or rerouting along the way to accommodate for specific trip requests. Examples of flexible route systems are *route deviation* and *point deviation.* The schedule may be fixed or flexible.

Group Service

Used most often in *charter* or contracted service, a bus trip is provided to a group of passengers who ride between a single origin and destination. The riders have some demographic variable in common and travel together in the same vehicle. This type of service is commonly used by senior centers and other human service agencies which take their clients on field trips and shopping trips as a group.

Headway

The length of time at a stop between buses following the same route. If buses operating along Route A arrive at Stop 1 at 9:00 a.m., 9:30 a.m., 10:00 a.m., 10:30 a.m. and 11:00 a.m., the transportation system is operating on half-hour headways during the period between 9:00 a.m. and 11:00 a.m. Headways are short if the time between them is short, and long if the time between them is long. When headways are short, the service is said to be operating at a high frequency, whereas if headways are long, service is operating at a low frequency. In rural areas, headways tend to be very long — a week is not uncommon.

Human Service Agency Transportation

Transportation for clients of a specific agency, which may be limited to specified trip purposes. Human service agency trips are often provided under contract to a human service agency, and may be provided exclusively or rideshared with other human service agencies or general public service.

Intercity Bus

Intercity bus service provides long distance service between cities, often as part of a large network of intercity bus operators. Both *express* and *local* bus service may be provided. The Greyhound and Trailways systems are national intercity bus networks.

Jitney Service

Vehicles travel along a fixed-route with no time schedule and passengers are picked up anywhere along the route (*flag stops*). Because there are no schedules, headways are usually five to ten minutes so passengers have only brief waiting periods. Jitney service is most often used in the U.S. to provide *seasonal, tourist, or park-and-ride service.* Jitney service is a more common public transportation mode in other countries where private entrepreneurs are often the providers of service.

Local Bus Service

Local bus service is a term used to describe a route along which many stops are made, allowing flexibility in where passengers may board and depart. It is typically used in contrast to *express bus*, a bus which makes a limited number of stops and is targeted more at long distance riders. Local bus service is important in rural areas unless *feeder* or *connector service* is available to bring people to the station.

Loop Route

Loop routes follow a somewhat circular path and usually have one endpoint at which transfers may be made to other routes (Figure 5). A loop may be one-way or two-way. Loops cover a larger geographic area than *arterial routes* but offer a lower frequency of service. For this reason, loops are often recommended for lower density areas. The exception to this is the downtown *circulator.*

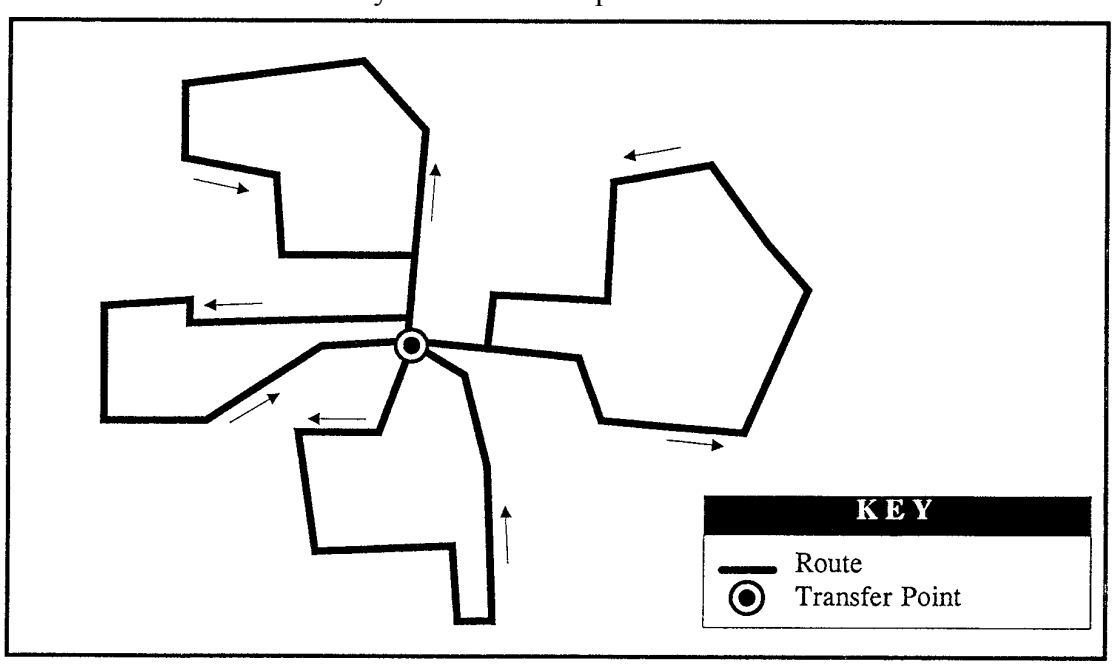

Figure 5: LOOP ROUTES

No-Show

A passenger scheduled for a demand-responsive trip does not appear at the designated pick-up point and time and does not cancel the trip in advance. Frequent no-shows can hurt the efficiency and effectiveness of the service, particularly in rural areas where passengers live in very remote areas which take time to get to and return from the pick-up point.

Origin

A place at which a passenger boards a transit vehicle; the point at which a trip begins. Often this term is used to refer to a passenger's home, even though the home actually becomes the *destination* of a return trip.

Package Delivery Service

Prepaid packages are picked up at a central location or from local businesses and delivered as the driver transports passengers, usually during off-peak hours. This is a service which a rural operator may be able to provide to increase revenue without significantly increasing costs.

Paratransit Service

Paratransit is a broad term which may be used to describe any means of shared-ride transportation other than fixed-route mass transit services. The term paratransit usually indicates that smaller vehicles (less than 25 passengers) are being used. A paratransit service is typically advanced reservation, demand-responsive service provided curb-to-curb or door-to-door. Route deviation and point deviation are also considered paratransit. Paratransit is often more appropriate than fixed-route services in outlying rural areas and in areas with large populations of elderly persons or persons with disabilities. Paratransit services which are provided to accommodate passengers with disabilities who are unable to use fixed-route service, and meet specific service equivalency tests, are called *complementary paratransit services under the terms of the Americans with Disabilities Act.*

Park and Ride

A means to access transit in which patrons drive private automobiles or ride bicycles to a transit station, stop, or carpool/vanpool waiting area and park the vehicle in the area provided for that purpose (e.g., park-and-ride lot). They then ride the transit system or a *parking shuttle*, or take a *carpool* or *vanpool* to their destination. Park and ride service is often provided in urban areas as an alternative to parking downtown where roads are congested and parking spaces are limited and costly. In suburban and rural areas, park and ride service may be used for access to long distance commuter trips. An alternative to park-and-ride is "kiss and ride," in which the transit passenger is dropped off at the transit station by the auto driver, who presumably receives a kiss for these services and then drives on.

Parking Shuttle

A parking shuttle is a *shuttle service* which links a parking lot or lots and a destination or destinations such as a shopping mall, tourist attraction, or medical center.

Peak/Off-Peak

The period during which the maximum amount of travel occurs is called the peak travel period. This is also the period during which the demand for transportation is usually highest. It may be specified as the morning (a.m.) or afternoon or evening (p.m.) peak, which typically falls between 6:30 a.m. to 9:30 a.m. and 3:30 p.m. to 6:30 p.m. on weekdays when commuters are traveling to and from work and school. The actual times vary according to local employer shift times, school hours, and population density. Typically during the peak period in urban transit systems, the maximum number of vehicles are placed in service, *headways* are shorter, and higher fares are charged than during the off peak. In rural areas where the bulk of the ridership may actually not be destined to work sites, this concept may not apply.

Point Deviation

A type of *flexible route* in which fixed scheduled stops (points) are established, but the vehicle may follow any route needed to pick up individuals along the way and make it to the fixed points on schedule (Figure 6). This type of service usually provides access to a broader geographic area than does *fixed-route service*, but is not as flexible in scheduling options as *demand-responsive service.* It is appropriate when riders change from day-to-day, but the same few destinations are consistently in demand. Also sometimes called *checkpoint service.*

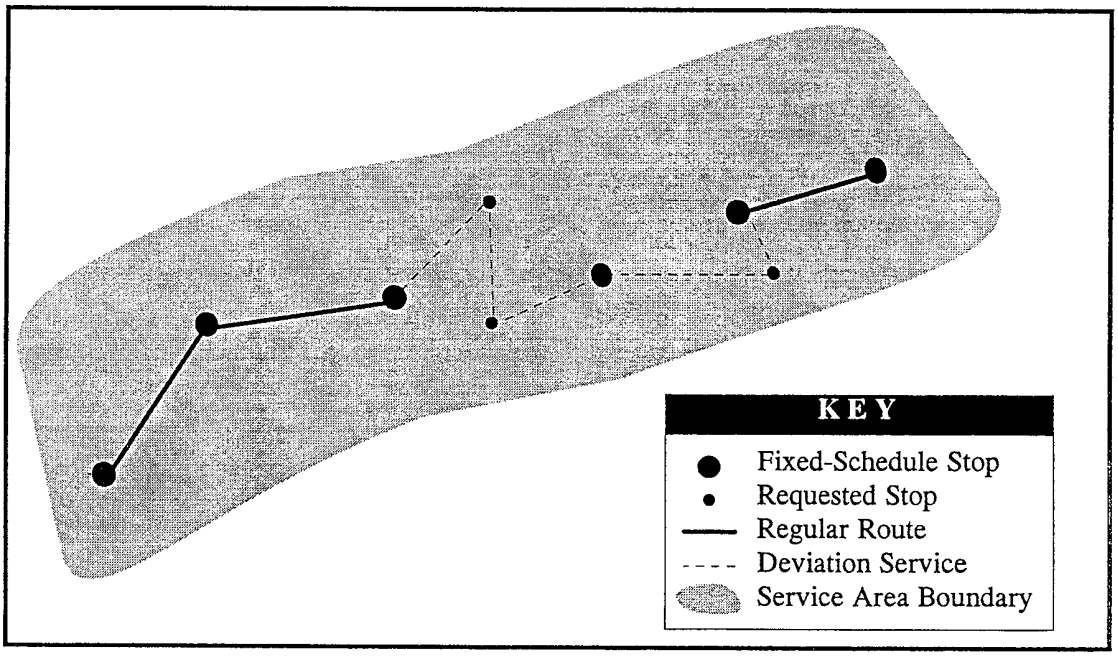

Figure 6: POINT DEVIATION

Postal Bus

Related to a bus providing *package delivery* service, a postal bus delivers passengers and mail together along the same route. This concept is more frequently used in Europe than in the United States. It might be a way of increasing revenue for certain rural transit systems in specific situations.

Pulse System

A fixed-route system (usually involving a radial network) in which all routes arrive at and depart from the *central transfer point* at the same times. This timing facilitates transferring, but necessitates a transfer facility where all buses can simultaneously drop off passengers safely, wait, and passengers can easily and safely get to the bus to which they are transferring. This is not a common system in rural communities where fewer, less frequent routes are operated and capital resources may be spread over a large area.

Radial Network

A route service pattern in which most routes converge into and diverge from a *central transfer point* or hub, like the spokes of a wheel (Figure 7). *Arterial* or *loop routes* may be used. If the routes are timed to arrive and depart at the same time, it is called a *pulse system.*

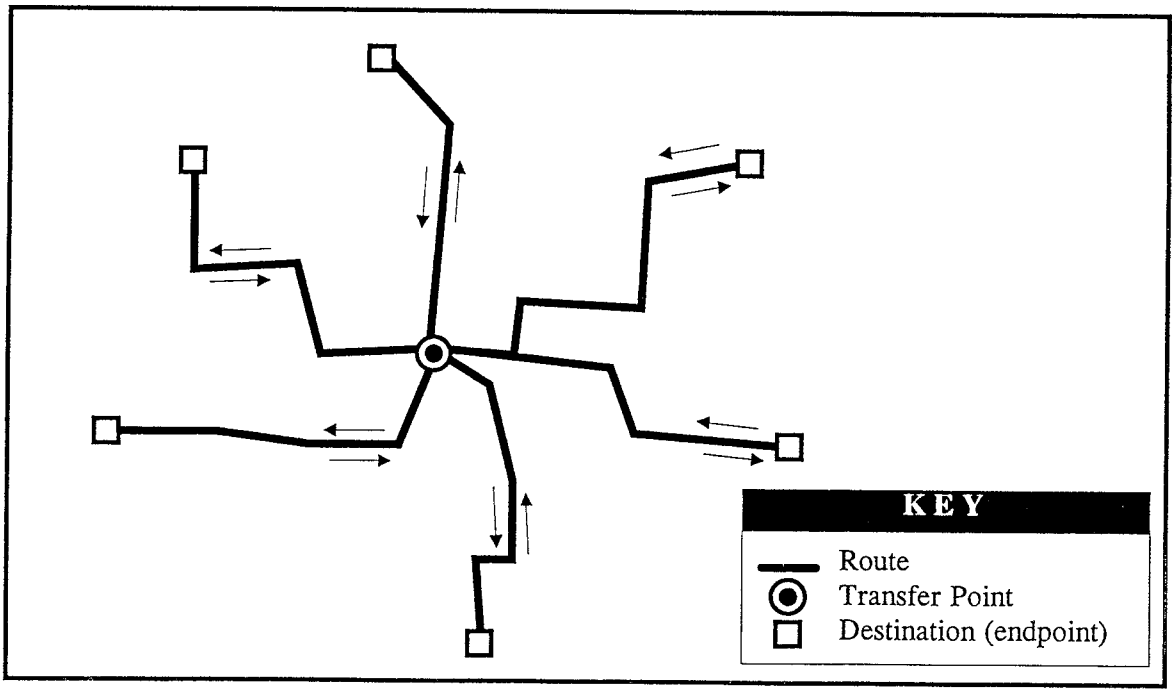

Figure 7: RADIAL NETWORK

Real-Time Scheduling

Passengers call and request demand-responsive trips a very short time before the trip is needed, and the dispatcher is responsible for assigning vehicles and drivers to meet their requests. This type of scheduling is most convenient for passengers, but most costly for a transit system to implement as a large fleet of vehicles and drivers is needed to ensure all trip requests are met. This type of scheduling is most frequently used by *taxi* services.

Rideshare/Ridematch Program

A rideshare program facilitates the formation of carpools and vanpools, usually for work trips. A database is maintained of the ride times, origins, destinations, and driver/rider preferences of users and potential users, and those requesting to join an existing pool or looking for riders are matched by program staff with other appropriate persons. In rural areas, a rideshare program is often used to coordinate Medicaid or volunteer transportation.

Ridesharing

Ridesharing is the simultaneous use of a vehicle by two or more persons.

Route Deviation Service

Buses travel along a prescribed route at scheduled times and maintained scheduled or unscheduled checkpoint stops. The vehicle may leave and return to the route to pick up requests for demand-responsive trips near the route (Figure 8). Passengers may call in advance for route deviation, or may access the system at predetermined route stops. The limited geographic area within which the vehicle may travel off the route is known as the *route deviation corridor.* This type of *flexible routing* essentially meets *demand-responsive* service requests within a *fixed-route operating mode* and is often the best option for higher density rural areas where travel patterns are consistent, but isolated riders cannot get to the route because they can't walk the distance needed or they use a wheelchair and there are no sidewalks.

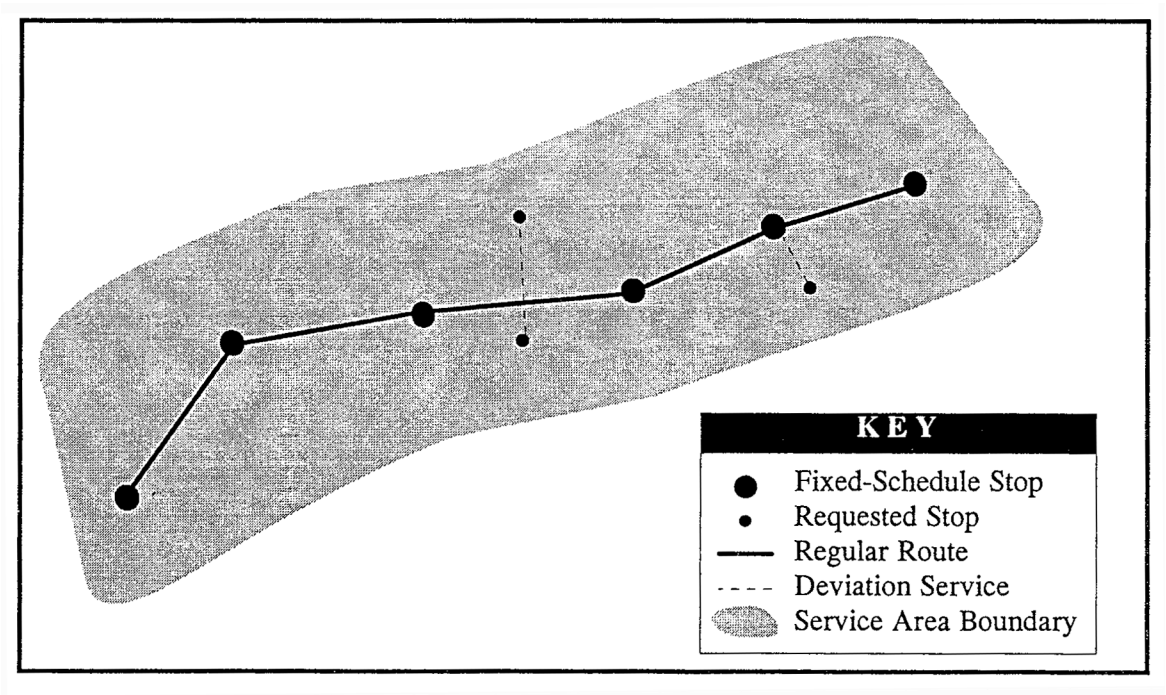

Figure 8: ROUTE DEVIATION

Service Route

Service routes are routes which are tailored to meet the needs of a specific market segment (such as elderly or disabled passengers) in a community, often evolving out of a pattern of demand-responsive travel within a community. Characteristics of a service route include stops at high-density residential complexes or group homes, shopping areas, medical facilities, and destinations specific to the target population such as senior centers or sheltered work sites. Stops are usually positioned near an accessible entrance of a building instead of on the street, and the ride times are typically longer than on a "conventional" fixed-route covering the same general area. They may be operated instead of, or in conjunction with, a "conventional" route in the same area (Figure 9). Vehicles tend to be small and accessible to persons with disabilities, and drivers usually offer a relatively high level of personal assistance. Service routes are used widely in Europe and are gaining greater popularity in the United States since the passage of the Americans with Disabilities Act.

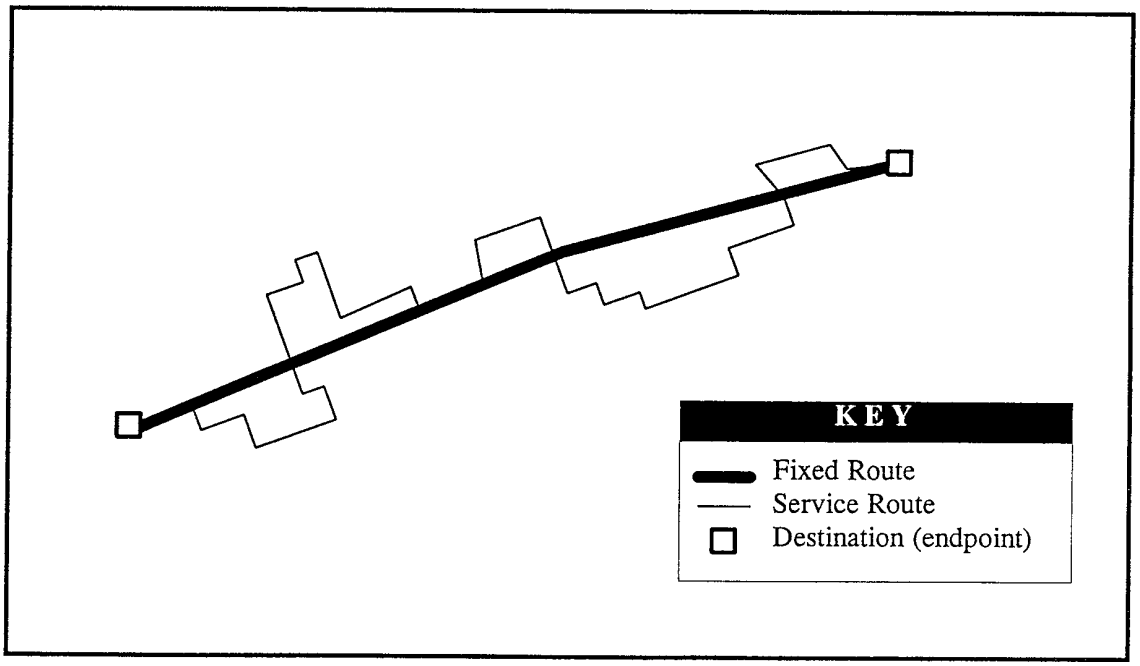

Figure 9: SERVICE ROUTE

Shared Ride Taxi

A shared ride taxi service provides taxi transportation in which more than one passenger is in the vehicle at the same time, usually at a reduced rate for each of the passengers. Shared ride taxi service is a way of using taxicabs for paratransit, and can increase a transit system's productivity (the number of passenger trips made per vehicle service hour).

Shuttle

Shuttle service refers to fixed-route service which connects only a small number of fixed stops and operates at a high frequency (or short *headways*). The vehicle follows a repetitive back-and-forth route. This type of service is related to *circulator* service, but connotes a more linear route structure. A *parking shuttle* is an example of use which could apply to rural areas which have a seasonal tourist attraction.

Special Event Service

Buses are provided for special events in the community. Special bus runs may be arranged for trade shows, sports events, schools, tourist attractions, or shopping promotions. Longer term service may be provided for seasonal needs at entertainment centers or fairs. Such service may be initiated by the sponsor of the event or the transit system as a marketing tool.

Subscription Service

When a passenger (or group of passengers) requests a repetitive ride (such as a daily or weekly service on an ongoing basis), trips are often scheduled on a subscription or "standing order" basis. The passenger makes a single initial trip request, and the transit system automatically schedules them for their trip(s) each day or week. This type of service is frequently used in transporting human service agency clients to regular agency programs.

Taxi

Demand-responsive public transportation on an exclusive basis, in a vehicle licensed to render that service, usually operated by a private for-profit company. Fares are usually charged on a per-mile or per hour (or both) basis on top of a base fare charged for all trips. Passengers may call the dispatcher to request a trip (*real-time scheduling*) or hail a passing unoccupied taxi (usually only in urban areas).

Trip Generator

A place which generates a demand for frequent travel is called a trip generator. Trip generators may be origins or destinations. For example, a high-density residential area generates a need for all kinds of trips outside of the residential area into commercial areas, a medical center generates trips for medical purposes, and a downtown area may generate trips for retail, recreational or personal business purposes.

User-Side Subsidy

A transportation funding structure in which qualified users (usually economically disadvantaged persons) are able to purchase vouchers for transportation services at a portion of their worth. The users then may use the vouchers to purchase transportation from any participating provider; the vouchers are redeemed by the provider at full value and the provider is reimbursed by the funding agency for the full value.

Vanpool

An organized ridesharing arrangement in which a number of people travel together on a regular basis in a van. The van may be company owned, individually owned, leased, or owned by a third party. Expenses are shared, and there is usually a regular driver who is not paid for driving the vehicle, but is allowed reasonable personal use of the vehicle on evenings and weekends. In terms of service design, a vanpool is basically a *carpool* that uses a vehicle larger than a car. In rural areas, vanpools can be an important form of employment transportation where densities aren't high enough to justify commuter bus service.

Volunteer Network

A volunteer network matches requests for transportation with a volunteer driver who is typically reimbursed on a per-mile basis for providing the trip. Persons requesting service call the network; the network calls the driver and schedules the trip. Volunteer networks are frequently used in rural areas where resources are scarce, persons needing transportation may live in remote areas, and a sense of community is not uncommon.

Zone

A defined geographic area. Zones are used in demand-responsive service for dispatching purposes and in fixed-route and demand-responsive service for fare determination. In *zonal demand-responsive service*, each vehicle travels only within a particular zone. Trips which originate in one zone and end in another involve a transfer at the zone boundary or a central transfer point. In a *zonal fare structure*, the service area is divided into zones, and the fare is determined according to the number of zones traveled (the higher the number of zones, the higher the fare). This is a method of charging a distance-based fare. Zones can assume a number of different forms depending on the route design, including concentric circles, key stops along a route, a grid system, or a hybrid of these (Figure 10).

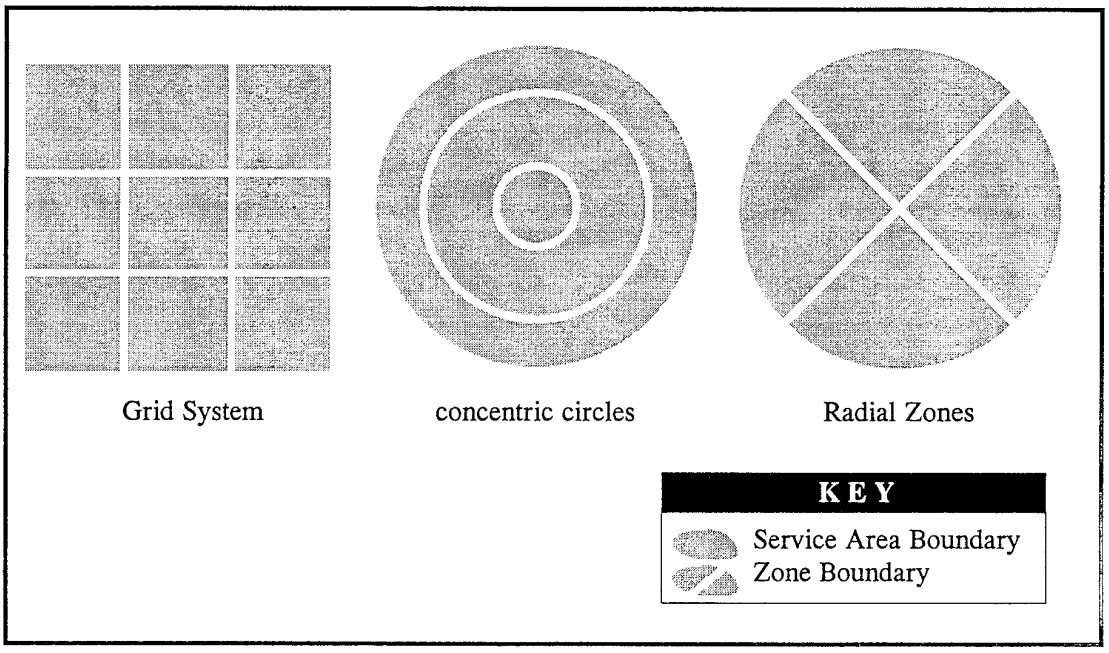

Figure 10: EXAMPLES OF ZONE SYSTEMS

Some of the definitions were compiled from the following sources:

Jon E. Burkhardt, S.F. Knapp, H. Worthington, and P. Schauer, Managing Rural and Small Urban Public Transportation Programs: Instructor's Guide. Prepared by Ecosometrics, Incorporated for the Public Transportation Division, Office of Highway Planning, Federal Highway Administration, U.S. Department of Transportation, April 1981.

COMSIS Corporation, Guidebook for Planning Small Urban and Rural Transportation Programs, Volume 1. Prepared for the New Mexico State Highway and Transportation Department, Transportation Programs Division. U.S. Department of Transportation Report DOT-T-91-07, June 1990, pp. V.2-V.5.

Benita H. Gray, *ed.*, Urban Public Transportation Glossary. Prepared by the Transportation Research Board, National Research Council, 1989.

Michigan Department of Transportation, Michigan Small Bus Training Program. 1987, pp 49-53.

Multisystems, Inc., Paratransit for the Work Trip: Commuter Ridesharing. A Report in the Series Paratransit: Options for the Future. Prepared for the Office of Policy Research, Urban Mass Transportation Administration. U.S. Department of Transportation Report DOT-I-82-16, January 1982, pp. 79-81.

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Annotated Bibliography

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RURAL TRANSIT SERVICE DELIVERY OPTIONS
SELECTED ANNOTATED BIBLIOGRAPHY

DESCRIPTIONS OF RURAL TRANSIT PROJECTS

Beadle, Charles R. and Sheldon M. Edner, "Transportation on Indian Reservations," ***The Eighth National Conference on Rural Public Transportation.*** Final Report prepared by Center for Urban Studies, Portland State University, for the Office of Technical Assistance and Safety, Urban Mass Transportation Administration. U.S. Department of Transportation Report DOT-T-88-16, August 1988, pp. 133-136.

Summaries of the presentations of representatives of four Indian Reservations (in Arizona, Montana, and Washington) which operate transportation systems are written in this resource, along with national summary information presented by the moderator. Some operational details are included, and changes which have been made to make the services more effective for the service areas are discussed.

Burkhardt, Jon E., Armando M. Lago, et. al., ***A Study of the Transportation Problems of the Rural Poor.*** Resource Management Corporation. Prepared for Office of Program Development, Office of Economic Opportunity, January 1972.

This report describes potential transportation options in five rural regions with large concentrations of persons in poverty. Study areas included multi-county regions in Arizona, Minnesota, Missouri, North Carolina, and South Carolina. Surveys of rural residents were conducted and transportation alternatives for each region were examined in detail.

Carter-Goble Associates, Inc., ***Rural Management Assistance Project: Paratransit Case Studies.*** Prepared for the Pennsylvania Department of Transportation, Bureau of Public Transit and Goods Movement Systems. U.S. Department of Transportation Report DOT-I-83-22, January 1981.

This resources presents detailed reports of four systems operating in rural Pennsylvania. For each system, the following aspects are addressed: how and why the project started, initial operations, evolution to present operations, and a summary of the findings.

Crain, John, ***Rivertran Rural Transportation Demonstration - Fayette, Mississippi.*** Prepared by Crain & Associates for the U.S. Department of Transportation, Urban Mass Transportation Administration, Office of management Research and Transit Services. U.S. Department of Transportation Report UMTA-MS-06-0004-85-1, July 1985.

This resource thoroughly documents the creation and evolution of the Rivertran Rural Demonstration Project from February 1982 to January 1985. The Project is evaluated and transferability to similar areas is assessed positively. The system, which was implemented on a relatively large scale, was reduced or otherwise altered considerably during the demonstration period. Performance indicators were developed and used in a route-by-route performance analysis to determine where effectiveness was lowest in determining service changes.

Fravel, Frederic D., E.R. Hayes, and K.I. Hosen, *Intercity Bus Feeder Project Program Analysis.* Prepared by Ecosometrics, Incorporated for the Community Transportation Association of America. U.S. Department of Transportation Report DOT-T-91-03, September 1990.

This resource evaluates the first three years of the Greyhound Rural Connection Program. Summary information is provided about 74 individual transit operators which were surveyed for this study (pp. 41-65). Detailed case studies were made of the Capital Area Rural Transportation System (CARTS) in central Texas, JAUNT in Charlottesville, Virginia, Jackson Transit Authority in Jackson, Michigan, and Berrien Bus in Benton Harbor, Michigan (pp. 66-71, 77-84, and Appendix C).

The Institute for Urban Transportation, Indiana University, *Transit Works: 10 Rural Case Studies.* Prepared for the Indiana Department of Transportation, Division of Public Transportation. U.S. Department of Transportation Report DOT-I-83-13, June 1982.

This document presents case studies of four city systems, five county or regional systems, and one state system that serve rural areas. The systems are located in Delaware, Illinois, Iowa, Minnesota, Missouri, North Carolina, and Virginia. The service area, history, operations, marketing, management and organization, revenues and expenses, and future outlook is provided for each system, and information about all ten systems is summarized.

Mergel, Joseph, *Small City Transit — Merrill, Wisconsin: Point Deviation Service in a Rural Community.* Prepared by the U.S. Department of Transportation, Transportation Systems Center. U.S. Department of Transportation Report UMTA-MA-06-0049-76-11, April 1975, reprinted May 1976.

This report is part of a series of 13 reports on small city transit. Merrill, Wisconsin's service was innovative in its point deviation service design. A detailed case study is developed, including a description of the rural community, its public transportation history, the implementation of the point-deviation service, and an evaluation. Demographic and service statistics are provided.

The Office of Policy and Plans Development, Office of the Secretary of Transportation, U.S. Department of Transportation, *Rural Transit Operations and Management: A Report on an Investigation of Several Rural Transit Projects.* 1973.

This resource addresses general considerations and conclusions about the planning, financing, institutional structuring, and vehicle selection and maintenance of rural transit operations. Descriptions are provided on 15 rural transit projects in Illinois, Florida, Louisiana, Maryland, New Jersey, North Carolina, Oregon, Pennsylvania, Vermont, and West Virginia, stemming from a wide range of institutional frameworks and service designs. Changes in service delivery relating to demand and resources are described.

SERVICE ALTERNATIVES AND EVALUATION TECHNIQUES

Burkhardt, Jon E., et. al., *Comprehensive Financial Management Guidelines for Rural and Small Urban Public Transportation Providers.* Prepared by Ecosometrics, Incorporated for the North Carolina Department of Transportation and the American Association of State Highway and Transportation Officials, Inc., September 1992.

This manual updates and substantially expands work done by the Transportation Accounting Consortium in 1986 in its *Model Accounting System for Rural and Specialized Providers.* Specifically designed to address the concerns and operating environments of rural public transportation providers, it shows how financial management can be used to enable rural transportation providers to better meet their goals and objectives. The manual is structured around seven financial functions and techniques, and includes sections on financial planning, cash management, monitoring and analysis, accounting fundamentals, cost allocation procedures, and cost analysis. The sections on monitoring and analysis, performance evaluation, and cost analysis should be particularly useful to the users of this manual.

COMSIS Corporation, *Guidebook for Planning Small Urban and Rural Transportation Programs, Volume 1.* Prepared for the New Mexico State Highway and Transportation Department, Transportation programs Division. U.S. Department of Transportation Report DOT-T-91-07, June 1990.

This guidebook provides planning assistance on all aspects of small urban and rural transportation systems. Chapter V introduces and defines a number of service alternatives and coordination approaches. Recommendations for appropriate systems in different communities are provided.

Fleishman, Daniel and Imogene Burns, "Can the Postal Bus Play a Role in Providing Rural Transportation?," Rural Public Transportation: Fifth National Conference Proceedings. *Transportation Research Record 831*, 1981, pp. 90-97.

This article reviews the postal bus operations in Europe and the United States, summarizes the findings of previous studies, and discusses the operational feasibility of this concept in the U.S. Regulatory issues are also discussed.

Governor's Task Force on Rural Transportation, *Rural Transportation in Pennsylvania: Problems and Prospects.* Harrisburg, May 15, 1974.

This was one of the first studies authorized by a state executive to examine rural transportation problems and alternative solutions. A variety of service designs were examined and cost estimates were prepared. Alternative administrative and funding structures were examined. A key recommendation was that the state government assume the leadership for resolving the problems identified.

Hood, Dr. Thomas C. and Linda S. Geiss, *The Volunteer Transportation Program: Some Suggestions and Cautions in the Use of Volunteers as Drivers, Escorts and Other Transportation Workers.* Prepared by the Transportation Center, University of Tennessee, for the Bureau of Mass Transit, Tennessee Department of Transportation, April 1980 (Revised April 1982).

This resource discusses the roles volunteers can play in providing transportation service for agency clients, including receptionist/schedulers, drivers, and escorts. Organizational and operations issues are addressed, although specific service designs are not discussed in detail. A list of further resources is provided.

MacDorman, Littleton, C., *Virginia Public Transportation Performance Evaluation Study.* Prepared for the Virginia Department of Highways and Public Transportation (January 1984).

This report presents findings, conclusions, and recommendations to the Virginia Department of Transportation on data to be reported by transit systems who receive state financial assistance. The data would be stored in an information system and used in annually assessing the trend of individual system performance and recommending areas for state technical assistance.

The study reviewed five other state transit reporting systems and identified strengths and weaknesses. Fifteen Virginia transit systems were reviewed to ascertain the types of financial and non-financial information routinely collected for management and performance purposes. The report documents how sparse the availability of information is maintained by transit systems. Most small urban and rural systems adopt either financial management and reporting procedures of the local govenrment entity or less.

Michigan Department of Transportation, Urban and Public Transportation Division, *Michigan Small Bus Training Program.* 1987.

This manual provides planning assistance on all aspects of small urban and rural transportation systems. Topics covered include system management, operations, grants and contracts, fare management, local funding, preventive maintenance, and personnel management. Chapter III introduces and defines a number of operating alternatives and plans (pp. 49-53). Diagrams illustrate specific types of geographic service designs.

Multisystems, Inc., *Paratransit for the Work Trip: Commuter Ridesharing.* A Report in the Series ***Paratransit: Options for the Future.*** Prepared for the Office of Policy Research, Urban Mass Transportation Administration. U.S. Department of Transportation Report DOT-I-82-16, January 1982.

This resource discusses the role of paratransit service for commuter trips, in retrospect, the state-of-the-art, and future directions. Though not pertaining to rural areas, this resource could be used by rural areas where commuter trips to a nearby urban area are a need. Brief descriptions of case studies are organized according to sponsoring entity (employer, third-party, neighborhood, and early area-wide carpool programs). Service options are defined and a glossary is provided.

Multisystems, Inc., ***Paratransit in Rural Areas.*** A Report in the Series ***Paratransit: Options for the Future.*** Prepared for the Office of Policy Research, Urban Mass Transportation Administration. U.S. Department of Transportation Report DOT-I-82-17, April 1982.

This resource discusses the role of paratransit service in rural transportation, in retrospect, the state-of-the-art, and future directions. Brief descriptions of case studies are organized according to sponsoring entity (social service, state-sponsored, Federally-sponsored, and For-Profit Operator-Sponsored). Crucial factors in developing effective programs are discussed, including the selection of the appropriate type of service. A glossary is provided.

"Paratransit." ***Transportation Research Board Special Report 164,*** National Academy of Sciences, 1976.

This report includes the proceedings of a 1975 conference sponsored by UMTA. It contains several papers which address the conceptual frameworks of paratransit services in an overall context of service delivery modes. Several articles specifically discuss the needs of smaller communities.

Teal, Roger F., G.J. Fielding, G. Guiliano, J.V. Marks, and R.E. Goodhue, ***Shared Ride Taxi Services as Community Public Transit.*** Prepared by the Institute of Transportation Studies, University of California, Irvine, for the University Research and Training Program, Urban Mass Transportation Administration. U.S. Department of Transportation Report DOT-I-81-14, March 1980.

This report looks at shared ride taxi systems, which are are widely used to provide general public demand-responsive transportation in California where they are subsidized. Five case studies were developed, including small town, suburban, and large city systems. Organizational issues are discussed and performance analysis is addressed.