

Bureau of Transportation Statistics Special Report

September 2007

Making Connections: Intermodal Links in the Public Transportation System

by Bruce Goldberg

Since at least 1991, federal transportation policy¹ has sought to encourage intermodal connections – the links that allow passengers to switch from one mode of public transportation to another. The intermodal terminal is a key building block for developing connectivity because travelers can only transfer directly between modes if there is a place to do so. The Bureau of Transportation Statistics (BTS) has developed a new database of passenger terminals and the connecting modes that directly serve them.

¹ These policies are contained in the Intermodal Surface Transportation Equity Act (ISTEA) in 1991; the Transportation Equity Act for the 21st Century (TEA-21) in 1998; and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005.

The first phase of the database is complete and includes information on direct connections available at all intercity rail stations and all airports with scheduled service.

Initial findings for the 48 contiguous states show that:

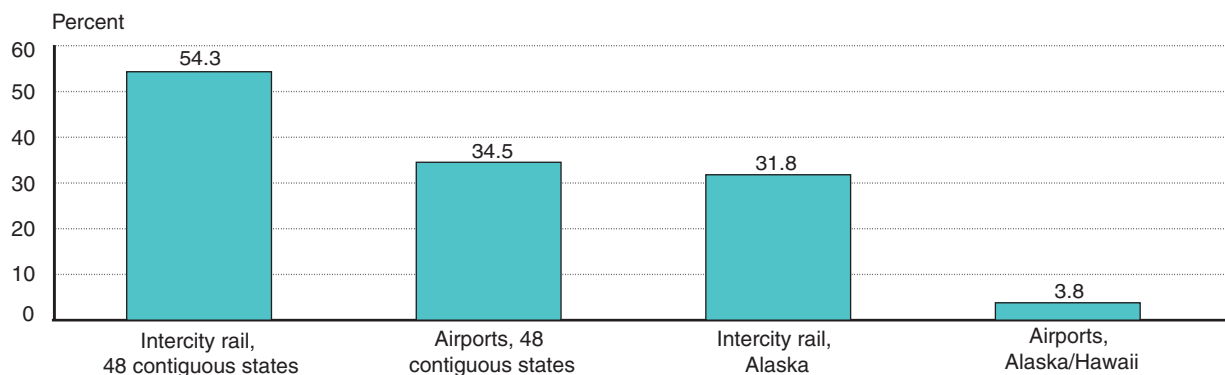
- 54 percent of intercity rail stations have intermodal links,
- 35 percent of airports are served by another scheduled public transportation mode, and
- Transit bus is the most prevalent connecting mode at airports and intercity rail stations.

Figure 1 separately shows the percentage of facilities with connectivity in the

48 contiguous states and in Alaska and Hawaii. Table 1 shows the detailed data for the 48 contiguous states. The degree of connectivity in Alaska and Hawaii, where unique geographic circumstances exist, is much lower than on the mainland. Therefore, the results of those two states are discussed separately in this report.

Although several airports and intercity rail stations are served by multiple connecting modes with scheduled service, the predominant connecting mode is the transit bus (city-wide or metropolitan area buses). Among the 150 airports on the U.S. mainland served by connecting modes, 136 are served by transit bus, and of the 274 mainland rail stations with intermodal connections, 232 are served by transit bus.

Figure 1: Percent of Rail and Airport Facilities with Connectivity to Other Public Transportation Modes



NOTE: Only 46 of the mainland states plus the District of Columbia have intercity rail service; South Dakota and Wyoming are not served. Intercity rail service is the city-to-city service operated by Amtrak and the Alaska Railroad. It does not include metropolitan area commuter trains.

SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Preliminary Intermodal Connectivity Database, July 2007.

Table 1: Terminals with Intermodal Passenger Connections in the 48 Contiguous States

	Total terminals	With connections	Percent	Without connections	Percent
Intercity rail stations	505	274	54.3	231	45.7
Airports	435	150	34.5	285	65.5
Total	940	424	45.1	516	54.9

SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Preliminary Intermodal Connectivity Database, July 2007.

The next most prevalent connecting mode is the intercity bus serving 46 airports.² Intercity buses serve 168 intercity rail stations, with about half of those connections provided by buses operated for Amtrak as “Amtrak Thruway” connections.³ Figure 2 shows the number of airports and intercity rail stations served by each of the connecting modes.

The highest degree of connectivity for intercity rail stations occurs in the northeast and in the west coast states. (see box a).

² For purposes of this analysis, scheduled intercity service is that which links a transportation facility with a city outside of the facility’s Metropolitan Area. Intercity bus also includes scheduled intercity airport shuttle services.

³ Amtrak Thruway connections are buses operated for the sole purpose of providing connections from nonrail cities to Amtrak trains, or are regular intercity buses that serve Amtrak stations on which Amtrak sells tickets for the purpose of making connections to and from its trains.

Intercity rail and commuter trains often run on the same tracks and frequently serve the same stations. This results in 91 intercity rail stations where connections are possible between commuter and intercity trains. The other rail transit modes, heavy rail and light rail, each serve 12 intercity rail stations.⁴

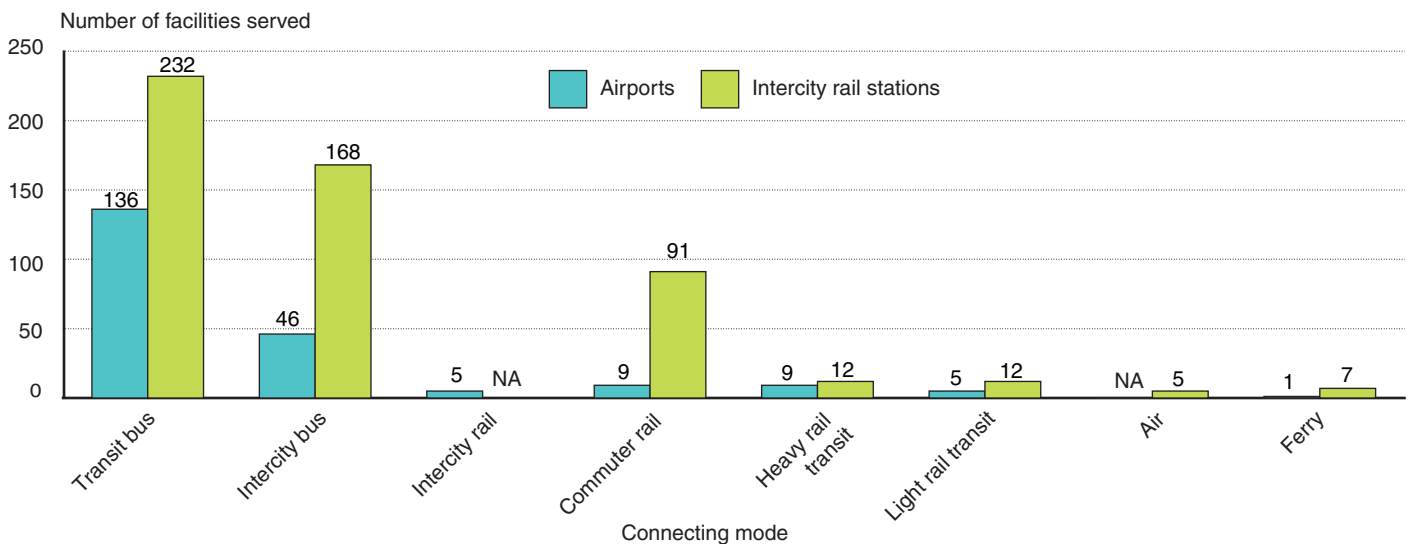
CONNECTIVITY CRITERIA

When two or more modes serve the same facility, and those modes serve the facility during the same part of the day, connectivity clearly exists. However, many situations were found where the facility is served by only one mode, with other modes providing service outside or near the facility. In consultation with other operating administrations at DOT, BTS developed proximity criteria for defining whether reasonable connectivity exists in those situations. The proximity criteria for determining connectivity are:

- the modes serve the same terminal building; or
- the modes serve facilities that are within the same block; or
- the modes serve facilities within a one-block radius and the traveler does not have to cross a major thoroughfare, unprotected intersection, or other physical barrier; or

⁴ Heavy rail is rail transit operating on a separate right-of-way that is not part of the national railroad network, such as the subway systems in New York, Washington, and Chicago. Light rail refers to streetcars or short trains, usually electric powered, which may operate on separate or shared right-of-way, or on city streets.

Figure 2: Number of Airports and Intercity Rail Stations Served by Connecting Modes in the 48 Contiguous States



KEY: NA = not applicable. The number of rail stations served by intercity rail and the number of airports served by air service are not shown since those numbers do not represent intermodal connections.

SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Preliminary Intermodal Connectivity Database, July 2007.

Box A: Connectivity on the Coasts

There are five states (plus the District of Columbia) where all of the intercity rail stations are served by connecting modes, and five more states where over 80 percent of the rail stations offer connectivity. All 11 states lie either in the northeast or along the west coast.

States in which all intercity rail terminals are served by other modes	States with at least 80% of intercity rail terminals served by other modes
Delaware (2 stations)	Massachusetts (91%, 10 of 11 stations)
District of Columbia (1 station)	Washington (88%, 15 of 17 stations)
Maine (4 stations)	California (86%, 61 of 71 stations)
Maryland (6 stations)	Oregon (86%, 6 of 7 stations)
New Jersey (6 stations)	Connecticut (83%, 10 of 12 stations)
Rhode Island (3 stations)	

SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Preliminary Intermodal Connectivity Database, July 2007.

- the modes are located in buildings connected by either an enclosed structure or a conveyance operated by either the facility or one of the carriers involved for the purpose of facilitating a connection; or
- the modes involved advertise a connection as existing, even if the connection falls outside of the other criteria here.

In addition to proximity, BTS established a general criterion covering timing and frequency. Even when two modes are in the same building, the timing of their services may make connectivity very inconvenient despite the close proximity. Rather than define specific “connecting time” criteria that must be met, BTS identified the types of situations where, due to significant scheduling differences, two modes would not be considered to reasonably connect at a facility. BTS did not consider connectivity to exist if a connection cannot be made between the modes in each direction, if travelers are required to wait an extended period during the overnight hours in order to connect between modes, or if days of operation of the two modes do not match up.

AIR-RAIL CONNECTIONS

Nationwide, air and rail are linked at 23 different airports, including five airports served by more than one rail mode. Five airports in the contiguous 48 states and one in Alaska

have connectivity to intercity rail. Another nine airports are served by commuter trains, nine more by heavy rail transit, and five by light rail. Baltimore-Washington Thurgood Marshall Airport (BWI) is the only airport served by more than two rail modes. BWI has light rail service to its main terminal building, and commuter and intercity rail at a station on airport property linked to the terminal by an airport operated shuttle bus. The number of airports served by each of the rail modes is shown in table 2.

Table 2: Airports Served by Rail Modes

	Airports
Intercity rail only	2
Commuter rail only	5
Heavy rail only	7
Light rail only	4
Intercity and commuter rail	2
Intercity and heavy rail	1
Commuter and heavy rail	1
Intercity, commuter, and light rail	1

SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Preliminary Intermodal Connectivity Database, July 2007.

NEAR CONNECTIONS

During data collection, many cases were found where two or more modes were located close to each other, but were too far apart to meet the proximity criteria, or where the scheduling criteria were not met. There were 75 rail stations, 43 mainland airports, and 2 Alaska airports where there is a near connection to transit bus service. In these 120 locations, if a minor deviation to an existing route or schedule were possible, transit connectivity with intercity rail or air might be enhanced.

BTS also found nine intercity rail stations where commuter rail, heavy rail, or light rail were nearby, but not quite close enough to be considered a connection. Data on near connections is included in the connectivity database.

ALASKA AND HAWAII

In Alaska, many communities are served by only air or ferry, and are not connected by road or rail with other communities. Also, there are only a few cities that have transit service. In Hawaii, there is no scheduled intercity bus or rail service, only a few transit systems, and the island nature of the state precludes intercity ground transportation between most major cities. The unique nature of the transportation systems in Alaska and Hawaii offer only limited opportunities for intermodal connectivity. Including these two states in the nationwide totals, especially Alaska, which is home to one-third of all airline-served airports (227 out of 673 nationwide), would yield results that do not accurately reflect the degree of connectivity in states where the majority of modes are widely available. For that reason, Alaska and Hawaii data are presented separately.

Intermodal connectivity is available at about one-third (7 of 22) of the regular stations served by the Alaska Railroad.⁵ In most of the airline-served Alaska towns, no other public transportation modes are available. Therefore, it is not surprising that only 4 percent of Alaska airline airports (7 of 227) have connectivity with other modes. In Hawaii, connectivity is available at only 2 of 11 airports (18 percent). The combined connectivity totals for Alaska and Hawaii are shown in table 3.

Table 3: Terminals with Intermodal Passenger Connections in Alaska and Hawaii

	Total terminals	With connections	Percent	Without connections	Percent
Intercity rail stations	22	7	31.8	15	68.2
Airports	238	9	3.8	229	96.2
Total	260	16	6.2	244	93.8

SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Preliminary Intermodal Connectivity Database, July 2007.

THE DATABASE


The Intermodal Passenger Connectivity Database was developed to provide an inventory of intermodal passenger facilities to use as a baseline for measuring the degree of connectivity in the system, or for measuring future progress. The first phase of the database includes information

⁵ Only regular station stops are included for the Alaska Railroad. Some Alaska Railroad trains will make a “flag stop” anywhere a person stands along the railroad tracks.

on 673 airline airports and 527 intercity rail stations. The downloadable database is available on the BTS website at www.bts.gov.

In addition to quantifying the connecting opportunities in the passenger transportation system, these data will also be useful for planning and policy analysis among both public and private entities in the transportation community. For example, the data may be helpful in identifying where greater attention to connectivity is warranted. This database is also specifically responsive to the BTS Congressional mandate to include information on the location and connectivity of transportation facilities and services in an intermodal transportation database.⁶

The database draws on data available at DOT and data from various public information sources.⁷

When completed the database will be a census of each of the approximately 7,000 terminal facilities for intercity rail and bus, fixed guideway transit, airports, and ferries in the 50 states. It will include information on all scheduled public transportation modes serving each of those terminals. These data will allow detailed analysis of the degree to which the various modes connect, and thus can serve as a way to measure the connectivity offered by the transportation system.⁸ 

⁶ 49 U.S.C.(d)(3)(c)

⁷ BTS used websites of rail, bus, and air carriers; transit agencies; airports; state departments of transportation; and maps and aerial views from various public mapping websites. BTS also used printed public materials such as timetables and brochures, databases of terminal facilities provided by Greyhound, Amtrak, and the Alaska Railroad. In several cases personal communication was used to clarify questions about the various terminal facilities.

⁸ The data for intercity rail and airports were collected during 2006-07, and data collection will be ongoing for the other modes.

About this Report

This article was prepared by Bruce Goldberg, Transportation Specialist, in the Bureau of Transportation Statistics (BTS). BTS is a component of DOT's Research and Innovative Technology Administration.

This Special Report introduces the first phase of the BTS Intermodal Passenger Connectivity Database that is being developed as a nationwide census of passenger terminals and the intermodal services provided at those terminals. It also presents some findings on the degree of connectivity offered by intercity rail stations and airports in the United States.

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Data —

- **Intermodal Passenger Connectivity Database**
- **National Transportation Atlas Database: Intermodal Terminal Facilities**—The freight counterpart to the Intermodal Passenger Connectivity Database.

Publications —

- *Scheduled Intercity Transportation: Rural Service Areas in the United States*
- *Transportation Statistics Annual Report 2006*—The extent and condition of the transportation system.