



IARO report 25.17

The Last Mile: Connecting Stations to Airports



London Luton Airport is planning a people mover from Luton Airport Parkway Station to the Airport

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IARO's mission is to spread world class best practice and good practical ideas among airport rail links world-wide.

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1 Introduction

The purpose of this report is to indicate to IARO members the range of links between airports and rail stations in use at airports around the world, and some planned for the future. This can then be used in the background to any study of options for providing such a link.

It could be argued that the ideal airport rail link is one where the station is an integral part of the airport terminal and therefore that passengers need only walk a short distance. However, there are a number of reasons where such an ideal situation is not possible, including:

- A multi terminal airport may have many terminals which themselves are some distance apart
- The creation of a rail link to an airport may require an unaffordable diversion or spur to an existing rail line.
- A nearby through rail line may have many more services than a dedicated airport spur
- There is insufficient space to locate a station close to the terminal

This report considers connections between stations near to airport terminals, but too far to be considered as a reasonable walking distance. There is no precise definition of a reasonable walking distance and, indeed, the use of travelators (or walkalators) makes longer distances less unreasonable. Certainly, 1 mile (or 1.5 kilometres) would not be reasonable. In terms of the longest distances covered in this report, generally, this is less than 10 km (6 miles), but there are examples of dedicated links to rail stations over longer distances which are marketed as specific links to train stations (eg. London Heathrow Reading/Woking Railair). The report does not include links to city centre rail stations, some of which are used as links to onward longer distance rail services, but are more generally used as the downtown or city centre service. Inevitably, there may be some services which partly meet the criteria and readers are encouraged to provide details to IARO.

The link between the station and the airport terminal may be provided as a fixed link on a track, or by a bus, and all such links are considered in this report. However, people-movers are also often used at airports to connect central terminals to airside gates, and these are not considered in this report. Neither are links to car parks, unless they also serve rail stations.

This report has been prepared using IARO's extensive database and knowledge within IARO, in particular from research by IARO's Policy Advisor, Andrew Sharp. Errors are, however, entirely the responsibility of the author.

The next three chapters look at links between airports and rail stations in three regions: North America, Europe and the Rest of the World. As will be shown, most of the links are in the first two regions, with only a few in the third. For each link, a table provides some basic details before further information is provided in the text. The final chapter analyses some of the data relating to the 50 case studies described, in order to provide some indications of averages, maximums and minimums, as well as information on technologies, operators and benefits.

2 North America

Atlanta

Name	ATL Skytrain
Length	1.5 miles (2.4 km)
Route	Terminal/Rail Station, Rental Car Center, Convention Center)
Journey time	5 minutes Terminal/Rail Station to Convention Center
Speed	40 mph (64 kph)
Frequency	2.5 minutes
Capacity	2x52 passengers per vehicle
Price	Free
Type	Mitubishi Crystal Mover (rubber tyre)
Ridership	10% non transfer air passengers use rail

The main airport landside terminal is served directly by the Gold and Red Lines of the MARTA rail network. However, since 2009, a people mover called the ATL Skytrain has connected this terminal and the rail station to the Georgia International Convention Center, hotels and the rental car center. Potentially this people mover could also connect these facilities to a future high speed rail line being considered for the region. Note that the ATL Skytrain is different from the Plane Train, which is the airside people mover connecting the terminals and the airside concourses. The ATL Skytrain is an example of how a people mover at an airport can be used to connect a number of facilities, including the rail station. Such groupings of facilities are sometimes called the 'Airport City' or 'Aerotropolis'.

Boston

Name	Massport Shuttle 22,33,55, 66 and 88
Length	
Route	22: Station-Terminals A & B, 33: Station-Terminals C & E, 55 and 66: Station-all terminals, All: Station-Rental Car Center (routes vary by time of day)
Journey time	
Speed	
Frequency	Every 5-6 minutes
Capacity	
Fare	Free
Type	Shuttle buses
Ridership	2.3% of air passengers, 11% of employees use rail

The MBTA ('T') station is located on the edge of the Airport, about 1 km from the nearest terminal (of which there are 5). Shuttle buses connect the station to the terminals and other airport facilities. Given the short distances between terminals and the station, bus shuttles provide a more flexible and cost effective service than an automated people mover, but the service may contribute to the low rail mode share (although note also that the Silver Line bus to many city locations is free).



Boston Massport shuttle

Baltimore Washington

Name	a. Shuttle to Airport Station b. WMATA shuttle to Greenbelt on Washington Metro Green Line
Length	a. 1 mile (1.6 km)
Route	
Journey time	b. 30 minutes
Speed	
Frequency	a. Every 6-8 minutes b. Every 40 minutes
Capacity	
Fare	a. Free b. US\$2.50
Type	Bus shuttles
Ridership	Around 4% of air passengers use rail

BWI Airport is directly served by the MTA Light Rail to downtown Baltimore. Bus shuttles from the terminal forecourts provide a service to the Airport Station served by MARC regional trains and Amtrak longer distance trains, and to the more distant Greenbelt Station on the Washington Metro. This is an example of how additional rail routes can be accessed by a bus shuttle. Bus shuttles are more appropriate for services where the frequencies are irregular, as is the case with regional or longer distance trains. The Airport station, also used as a parkway by many commuters, consists of 3 tracks but only 2 platforms which causes operational and passenger service difficulties. Various station and shuttle improvement plans have been considered alongside plans for improving the longer distance services, including a Baltimore-Washington maglev. However, in 2016 the Federal Railroad Administration indicated that its preferred alternative would be to use the existing alignment in the BWI Airport area.

Chicago O'Hare

Name	Airport Transit System
Length	2.7 miles (4.3 km)
Route	Terminal 1-Terminal 2/CTA Station-Terminal 3-Terminal 5-Remote Parking (plus shuttle bus to Metra O'Hare Transfer Station)
Journey time	
Speed	50 mph (80 kph)
Frequency	3.5 minutes, 24 hour service
Capacity	57 passengers per car, 1-3 cars, 2400 persons per hour
Fare	Free
Type	Matra VAL (rubber tyre)
Ridership	5% of air passengers and 19% of employees use rail

The Airport Transit System has been in operation since 1993 and connects all the terminals with the CTA rail station and with each other. A major upgrade programme is under way (2017) including the replacement of the cars with Bombardier Innovia types and an extension to a consolidate rental car center and the Metra station. Given the climate in Chicago, the current and new systems are specified to work in cold and snowy conditions.

Dallas Fort Worth

Name	a. Skylink b. DFW Remote South shuttle plus Terminal Link shuttles
Length	b. 5+ miles (8+ km)
Route	
Journey time	b. 15+10-19 minutes
Speed	
Frequency	a. Every 2 minutes b. Every 15-30 minutes
Capacity	
Fare	Free
Type	a. Bombardier automated people mover b. Bus
Ridership	

DFW airport Terminal A is served directly by the DART Orange and Green Lines. The other terminals can be reached by the Skylink airside people mover system or landside by a bus shuttle network. American Airlines, the largest carrier, operates from most terminals, including Terminal A, so it is possible to check in at Terminal A, closest to the DART station, and travel airside to the other terminals, although an arriving passenger will have to use the landside bus system.

The Trinity Rail Express (TRE) is a commuter rail service that serves both Dallas and Fort Worth. From the CentrePorte/DFW Airport Station a shuttle bus connects with the Remote South Parking Lot, which is also on the Terminal Link shuttle bus route.

The TEX rail system, currently under construction to open in 2018, will include a new station at Terminal B, close to the DART station, and will provide a better service to Fort Worth. As with the Terminal A DART station, it will be possible for most departing passengers to use the Skylink airside people mover to get to the other terminals.

This is an interesting example of a very large airport with multiple terminals a long distance apart, where a single rail station has to be connected to the other terminals. While the airside people mover can be used for most departing air passengers and by staff with airside passes, it cannot be used for arriving passengers who have reclaimed their baggage. There is a landside bus system for such connections. The current arrangements for connecting to the TRE are clearly very difficult, but the TEX rail station from 2018 will enable passengers from Fort Worth to be able to have the same service as DART passengers from Dallas.



Diagram of DFW landside and airside connections between terminals and DART station

Fort Lauderdale

Name	Tri-Rail Shuttle FLA1
Length	
Route	Fort Lauderdale/Hollywood International Airport to 3 airport terminals
Journey time	5-15 minutes
Speed	
Frequency	Every 15 minutes
Capacity	
Fare	Free
Type	Bus
Ridership	

This is a simple circular bus link between the airport's three terminals and the Tri-Rail services from Miami to West Palm Beach. The train services is hourly through the weekday and at weekends with more trains at peak times, and also serves Miami and West Palm Beach Airports.

Los Angeles

Name	Shuttle bus G
Length	
Route	Terminals to Aviation/LAX Station on Metro Rail Green Line
Journey time	
Speed	
Frequency	Every 10-15 minutes
Capacity	
Fare	Free

Type	Bus
Ridership	Less than 1% of air passengers use rail

Currently, the shuttle bus connects to an existing station on the Green Line, but as part of a major upgrade to landside access, an automated people mover system (the Airport Metro Connector) is under construction between the terminals (3 stations), an intermodal transportation facility, rental car facility and a new Aviation/96th Street Station on the Crenshaw/LAX Line (also under construction) of the Metro light rail network. Completion is planned for 2019 for the Crenshaw Line and 2024 for the Airport Metro Connector.

Mexico City

Name	Inter terminal transportation
Length	
Route	Terminal 1 to Terminal 2/Terminal Aérea Metro Station
Journey time	
Speed	
Frequency	
Capacity	
Fare	
Type	Bus
Ridership	

The station on the metro network is at Terminal 2. Terminal 1 is on the other side of the airport and there is an airside people mover, which is available to passengers with a ticket or boarding pass. It is not clear if it is available for arriving passengers.

Miami

Name	MIA Mover
Length	1.25 miles (2 km)
Route	MIA (all terminals) to Miami Intermodal Center (MIC)
Journey time	3 minutes
Speed	40 mph (65 kph)
Frequency	24 hours
Capacity	
Fare	Free
Type	Mitsubishi Crystal Mover
Ridership	Around 1% of air passengers use rail

The MIA Mover connects the terminals with the MIC which includes stations for the Metrorail Orange Line which runs to downtown and the south, and for TriRail commuter services and Amtrak longer distance trains, as well as other public transport, rental car and public car parks. Note that Brightline rail services which are to begin operations in 2017 will operate from downtown Miami, not the Airport MIC station.

Milwaukee

Name	Airport Connection
Length	

Route	Terminals to Airport Rail Station
Journey time	
Speed	
Frequency	
Capacity	
Fare	Free
Type	Bus
Ridership	160,000 passengers used the Airport Station in 2014

The Airport Station is served by Amtrak Hiawatha Line services between Milwaukee and Chicago, of which there are 8 per day in each direction. The Hiawatha Line is an increasingly popular service, taking 1 hour and 15 minutes between Milwaukee and Chicago. The infrequency of Amtrak trains and the range of flights available from Milwaukee Airport make it unlikely to attract many passengers away from Chicago's airports. However, data indicates that 27% of riders are connecting to other transportation options and 33% would have used a different airport if the train had not been available.

Minneapolis

Name	Metro Transit Blue Line
Length	
Route	Terminal 1 - Terminal 2
Journey time	
Speed	55 mph (89 kph)
Frequency	Every 10 minutes, 24 hours
Capacity	66 seated, 120 standing passengers
Fare	Free
Type	Light rail, standard gauge
Ridership	

The Blue Line provides a free transfer service between Terminals 1 and 2 which are separated by a runway. The Blue Line connects the Airport to downtown and the Mall of America.

Montreal Trudeau

Name	STM route 204 Cardinal
Length	
Route	Airport-Dorval Station
Journey time	
Speed	
Frequency	Every 30 minutes
Capacity	
Fare	CAN\$3.25
Type	Bus
Ridership	

VIA Rail trains provide intercity and commuter connections at Dorval Station. The Airport website says that there is a free minibus service in addition to the route 204 bus. A light rail service is planned for the Airport for completion in 2020.

New York JFK

Name	JFK AirTrain
Length	a. 4.8 km b. 5.5 km
Route	a. Jamaica Station-Federal Circle- 6 terminal stations b. Howard Beach-Lefferts Blvd-Federal Circle-6 terminal stations
Journey time	a. 12 minutes b. 10 minutes
Speed	60 mph (97 kph)
Frequency	Every 10 minutes, 24 hours
Capacity	
Fare	US\$5 (free between terminals and to parking lots)
Type	Bombardier Innovia steel wheel standard gauge
Ridership	6.5 million use paid section (12% of air passengers)

JFK AirTrain provides an inter terminal service, a service to the Subway at Howard Beach and to the Subway and Long Island Rail Road at Jamaica, so there are three separate services. A fare (US\$5) is payable at the rail stations (but it is free for rental car and remote car park users). However, this does not seem to deter air passengers, as the rail mode share is high for North America. The name AirTrain is also used for the connection at Newark Airport, and for the planned link at La Guardia. JFK AirTrain is to be upgraded and its capacity increased as part of an major upgrade project for the whole airport.

JFK AirTrain opened in 2003 and the project included some unusual aspects. The very high cost, due to the complexity and length of the route (US\$1.9 billion), resulted in objections from the airlines, but the cost has been met primarily by a Passenger Facility Charge of US\$4.50 on each passenger. One of the reasons for selecting a standard gauge steel wheel system was a desire to enable a 'one-seat-ride' for trains from the Airport to downtown. While the gauge may permit this, there would be many other technical challenges to overcome, plus the issue of running relatively short vehicles over a line with much longer (and therefore higher capacity trains).



JFK AirTrain

New York LaGuardia

Name	Q70 and Q70 Select (LaGuardia Link)
Length	7.2 km (4.5 miles)
Route	Subway station, commuter rail station, 3 terminals
Journey time	15-25 minutes
Speed	
Frequency	Every 10 minutes (peak), 24 hours
Capacity	
Fare	US\$2.75 (free transfers to Subway)
Type	Bus
Ridership	1.4 million (2015)

La Guardia Airport is currently connected to the Long Island Rail Road station at Woodside and the Subway at Jackson Heights by dedicated bus services. As part of the reconstruction of LaGuardia Airport, consideration is being given to a new people mover between the redeveloped airport and Willets Point, which is served by 7 Subway Lines and LIRR trains. The new people mover would cover the 3.2 km (2 miles) in about 4-5 minutes.

New York Newark

Name	EWR AirTrain
Length	4.8 km
Route	8 stations (rail station, 3 terminals, 4 parking lots)
Journey time	10 minutes
Speed	35-43 kph (22-27 mph)
Frequency	Every 3 minutes (peak) 7-15 minutes (off peak), 24 hours/365 days
Capacity	18 x 6 car trains (76 passengers)
Fare	US\$5.50 (free between terminals and to parking lots)
Type	Straddle beam monorail (Von Roll, now Bombardier)
Ridership	4,930 (average day, 2007), 2.5 million passengers use EWR Airport Station

EWR Airtrain began operations in 1996 as an inter terminal people mover and was later extended to the EWR Airport Station. As with JFK Airtrain, the fare is payable only for the rail station users and is paid on entry or exit at the station. The current rolling stock is nearing the end of its service life and consideration is being given by the Port Authority of New York and New Jersey to how it is to be replaced.

Oakland

Name	BART to OAK (formerly Oakland Airport Connector)
Length	5.1 km (3.2 miles)
Route	Coliseum Station to Airport
Journey time	8 minutes
Speed	48 kph (30 mph)
Frequency	Every 6 minutes (day) 20 minutes (late evening)
Capacity	113 passengers per 3 car train
Fare	US\$6 (with integrated fares for BART lines eg. downtown Oakland US\$7.95)
Type	Cable hauled on guideways (Doppelmayr Cable Car)
Ridership	1 million in 2015, average daily 3300, Rail mode share 9.1%

The people mover is operated by the Bay Area Rapid Transit (BART) and, when opened in 2014, replaced a bus connection that took up to 25 minutes. The US\$484 million cost funded by local, state and federal funds plus BART deficit spending is expected to be almost totally recovered through fares. Coliseum Station is served by three BART lines (Orange, Green and Blue). A separate station serves Amtrak trains. The BART to OAK people mover is mostly elevated and is accessed from the rail stations and terminals by escalators and lifts (elevators). The system can be expanded to 4 cars and an intermediate station is safeguarded. Rail mode share has increased since the opening of the new link.

Orlando International

Currently, there are no dedicated links between the Airport and rail stations. However, major developments are under construction and planned which will include people mover links between the Airport and rail stations.

The South Terminal Intermodal Terminal is under construction one mile south of the main airport terminal. The Intermodal Terminal will include a station for the Brightline rail service which will connect the Airport with West Palm Beach, Fort Lauderdale and downtown Miami, planned for opening progressively from 2017 tom 2019. The Intermodal Terminal rail station will also be served by SunRail commuter trains which run through downtown Orlando from Debarry. Northern and southern extensions of this service is planned to be operational by 2018. There are also plans for a light rail line to connect the Intermodal Terminal with nearby destinations along International Drive such as the orange County Convention Center and the Florida Mall.

A new airport terminal, called the South Terminal Complex, is under construction adjacent to the Intermodal Terminal to open in 2019. This will include landside and airside facilities, including car parking, aircraft gates and taxiway connections to the runways.

The South Terminal Intermodal Terminal and South Terminal Complex are to be connected to the main terminal by an automated people mover. The Airport has had people movers for over 35 years connecting the main terminal to four airside concourses and these are being replaced with new Mitsubishi models, which are also planned for the South Terminal/Intermodal Terminal link.



Orlando Airport's Intermodal Terminal, planned to open in 2017

Phoenix

Name	PHX Sky Train
Length	
Route	44th Street/Washington-East Economy Parking-Terminal 4-Terminal 3

Journey time	5 minutes to Terminal 4, 7 minutes to Terminal 3
Speed	37 kph (23 mph)
Frequency	Every 3 minutes (peak), 24 hours
Capacity	3,300 per hour in each direction
Fare	Free
Type	Bombardier Innovia, 2 and 3 car sets
Ridership	Average day 15,940

Phase 1 of the PHX Sky Train opened in 2013 to Terminal 4 and Phase 1a to Terminal 3 (with a footway to Terminal 2) in 2014. A final link to the Rental Car Center is to be completed by 2020. There are self service check in kiosks and some airlines will accept baggage at the 44th Street/Washington Station. The station is served by Valley Metro Light Rail which takes around 17 minutes to Central Station in downtown Phoenix, as well as bus routes.

San Diego

Name	Route 992 Airport Service
Length	5km (3 miles)
Route	Terminal 1-Terminal 2-Broadway/Kettner
Journey time	11-15 minutes
Speed	
Frequency	Every 15 minutes (weekdays) 30 minutes (weekends)
Capacity	
Fare	US\$2.25
Type	Bus
Ridership	

Currently, the 992 Airport Service calls at a stop which is one block from the Santa Fe Depot station which serves Amtrak intercity and Coaster commuter trains. The Airport is undergoing major redevelopment including the creation of transportation facilities on the north side of the airport, connected to the terminals on the south side. Initially these north side facilities are car parks and rental car locations, connected to the terminals by a bus shuttle. However, the north side is adjacent to a rail corridor which includes the San Diego Trolley Green Line light rail and is to be the route used by the California High Speed Rail line, although this part of the route is many years from operation. There are therefore opportunities to create improved rail access through this north side development, but these have not yet been developed.

San Francisco

Name	a. AirTrain b. BART
Length	a. 9.6 km (6 miles) (total 2 lines) b. 2.4 km (1.5 miles)
Route	a. BART station-International Terminal G-Terminal 3-Terminal 2-Terminal 1-International Terminal A-Garage A b. Airport BART station-Millbrae
Journey time	a. 9 minutes to loop b. 4 minutes
Speed	
Frequency	a. Every 2.5 minutes, 24 hours b. Every 30 minutes

Capacity	
Fare	a. Free b. US\$4.40
Type	a. Bombardier Innovia b. Metro train
Ridership	11% air passengers use rail, BART average weekday ridership from Airport 6,788

The main rail service at San Francisco International is the Bay Area Rapid Transit (BART) metro system where the airport station is a terminus on the yellow line. The airport station is within walking distance of some terminals but the AirTrain people mover connects with all terminals and some parking lots. In addition, the BART metro also connects to Millbrae Station, served by Caltrain commuter services. California High Speed Rail services are also planned to call at Millbrae, although the operational date is not yet known.



San Francisco International Airport showing AirTrain route and BART station location (shown as ba)

San Jose

Name	VTA Route 10 Airport Flyer
Length	
Route	Airport terminals-Santa Clara Station-Metro Light Rail Station
Journey time	Airport terminals-Santa Clara Station 11-13 minutes Airport terminals-Metro Light Rail Station 6-8 minutes
Speed	
Frequency	Every 15 minutes
Capacity	
Fare	Free
Type	Bus
Ridership	

Santa Clara Station serves Amtrak, ACE (Altamont Corridor Express) and Caltrain services. Metro Light Rail Station is on the Santa Clara Valley Transportation Authority's (VTA) Light Rail system which serves downtown as well as a number of suburbs and towns in Silicon Valley. The westbound Route 10 service goes to Santa Clara first and then to Metro, while the eastbound service does the loop the other way around. The buses are distinctively branded. There re plans to extend the Bay Area Rapid Transit (BART) Green and Yellow Lines to downtown San Jose and Santa Clara Station.



San Jose VTA Route 10 Airport Flyer in distinctive livery

Seattle

The Link Light Rail station at Seattle Tacoma Airport is about 0.5 km from the terminal, and the walkway is through the parking garage. There have been complaints about the walkway, and there are to be improvements to the weather protection and decor, but the distance is probably at the limit without any assistance, so electric golf carts are available for those who have difficulty walking.

Washington Dulles

Name	Silver Line Express
Length	
Route	Airport-Wiehle/Reston
Journey time	
Speed	
Frequency	Every 15 minutes (peak)
Capacity	
Fare	US\$5
Type	Bus
Ridership	

The Silver Line of the Washington Metro is being extended in stages to the Airport. As of 2017, the terminus is at Wiehle/Reston, about 10 km from the airport and the Sliver Line Express shuttle bus connects this station to the Airport. The Metro extension to the Airport is expected to be completed in 2020.

3 Europe

Birmingham

Name	Air-Rail Link
Length	0.6 km (0.4 miles)
Route	Airport terminal-Birmingham International Station
Journey time	1.5 minutes
Speed	36 kph (22 mph)
Frequency	Every few minutes (day), on demand (off peak), 03.30 to 00.30
Capacity	54 passengers per 2 car train
Fare	Free
Type	Cable hauled double shuttle (DCC Doppelmayr Cable Car)
Ridership	20% of air passengers (2015) and 8% of employees (2014) use rail

The original system linking the airport to the station opened in 1984 using maglev technology. This was replaced initially by a bus shuttle and then in 2003 by the current cable hauled system using the same elevated concrete guideway. As well as connecting to the station, the link also connects the airport to the National Exhibition Centre (NEC), which is adjacent to the station. Birmingham International Station serves local, regional and intercity trains.

A new Birmingham Interchange Station is planned as part of Phase 1 of High Speed 2, a new London-West Midlands line, to open in 2026. The new station will be some 1.2 km to the east of the existing station and will require a new people mover to link it to the NEC, existing station and the airport.

Bologna

Currently, the Aerobus express bus service to the city centre also calls at Bologna Centrale railway station, a distance of about 6 km (4 miles). However, the Marconi Express is under construction, for completion in 2019, to replace the current 20 minute bus journey with a 7 minute people mover trip. The Marconi Express is to be a monorail, manufactured by Intamin, who mainly provide fairground thrill rides, but who have supplied monorails for Moscow and Ashgabat, Turkmenistan.

Bucharest

Name	Transfer microbus
Length	0.9 km
Route	Airport terminal-Airport Station
Journey time	20 minutes
Speed	
Frequency	Hourly
Capacity	
Fare	Included in train fare
Type	Bus
Ridership	

The current bus link connects the airport to a nearby regional rail station but the train frequency is low. Metro Line M6 is being extended to the airport and is expected to be completed by 2020.

Budapest

Name	200E
Length	4 km
Route	Terminal 2-Ferihegy Station-Köbánya-Kispest Metro Station
Journey time	
Speed	
Frequency	Every 5-10 minutes
Capacity	
Fare	300 HUF (with train ticket)
Type	Bus
Ridership	

The current bus link connects the airport's Terminal 2 with a regional rail station next to the old (now closed) Terminal 1 and to the nearest station on the Budapest Metro M3 Line. There are plans for a new line to connect the Metro directly to Terminal 2 and beyond, possibly for completion by 2024, which would replace the bus link.

Cardiff

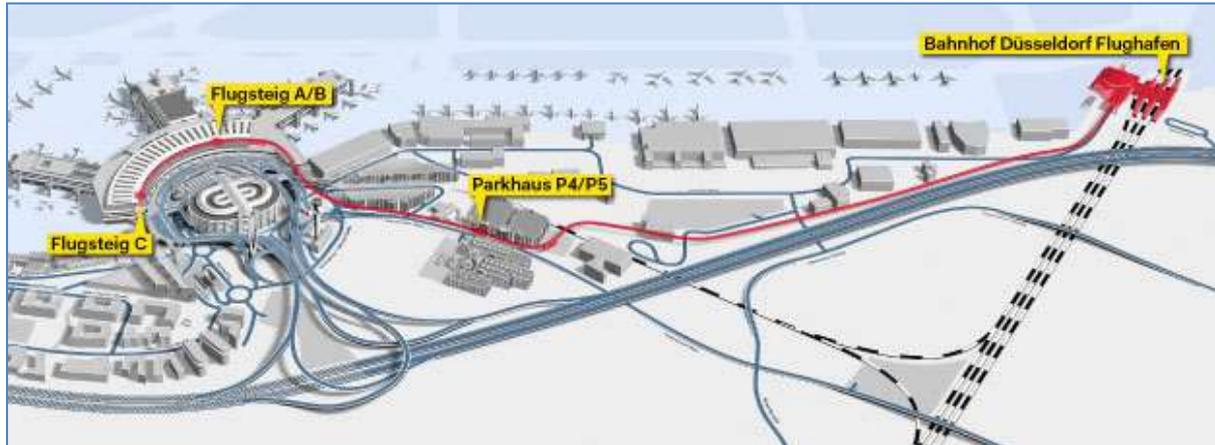
Name	Shuttle
Length	5 km
Route	Airport-Rhoose Cardiff International Airport Station
Journey time	10 minutes
Speed	
Frequency	
Capacity	
Fare	£1
Type	Bus
Ridership	

Rhoose Station opened in 2005 and is served by an hourly suburban train between Cardiff and Bridgend. The shuttle bus connection is timed to meet the trains. However, the shuttle bus appears to be lightly used because the main connection to Cardiff city centre by bus is faster and serves Cardiff Central Station where there is a wider range of rail services. There are also various plans for improving the frequency of trains serving Rhoose and the possibility of new light rail services, but none of these have reached implementation.

Dusseldorf

Name	Sky Train
Length	2.5 km
Route	Terminal C-Terminal A/B-Parkhaus P4/P5-Dusseldorf Flughafen Station
Journey time	6.5 minutes
Speed	50 kph
Frequency	3.5-7 minutes
Capacity	2,000 per hour per direction
Fare	Free to rail ticket holders
Type	Suspended monorail (H-Bahn, Siemens)
Ridership	20.8% air passenger mode share to rail

A station on the S-Bahn S11 line was opened in 1975 at the terminal and is now named as the Airport Terminal Station. In 2000, a new station called Dusseldorf Flughafen opened on the main line, which is served by ICE, regional and other S-Bahn lines. The Sky Train people mover opened in 2002 and connects the main line station with the airport terminals and a car park. Although the technology (suspended monorail) is different, it operates in a similar way to many other automatic people movers.



Route of Dusseldorf Airport Sky Train

Frankfurt

Name	SkyLine
Length	3.8 km
Route	Terminal 1 A/Z(passengers only)-Terminal 1 B/C-Terminal 2D/E
Journey time	2 minutes
Speed	32 mph (52 kph)
Frequency	Every 2-3 minutes
Capacity	120 passengers
Fare	Free
Type	Automated people mover (Bombardier)
Ridership	10 million journeys per year

In many ways, Frankfurt Airport is the epitome of air rail provision, with two stations serving high speed, long distance trains and local S-Bahn services, station check in, integration with flights through joint ticketing, and property development at the station. This has led to Frankfurt having one of the highest rail mode shares in the world, at around 35% of air passengers, and a high absolute number of rail passengers, at around 6.5 million a year. The stations are located next to Terminal 1, so there is a short walk, and Terminal 2 is beyond walking distance, connected by the Sky Line people mover. The Sky Line also acts as an inter-terminal link, including many transfer passengers, of which Frankfurt has a high proportion.

Of particular interest at Frankfurt are the plans for Terminal 3. This is to be located on the south side of the Airport, some 5 km from the stations. The plans for connecting the new terminal to the stations are not finalised, but clearly some form of people mover will be required.

Liverpool

Name	Route 500
Length	2.9 miles (4.6 km)
Route	Airport-Liverpool South Parkway Station
Journey time	11 minutes
Speed	
Frequency	Every 30 minutes
Capacity	
Fare	£2.20
Type	Bus
Ridership	

Liverpool South Parkway Station was opened in 2006 and combined two stations with a bus station. The 500 bus route also serves the city centre, but there is a wide range of rail services from Liverpool South Parkway Station.

London Gatwick

Name	Gatwick Airport Shuttle
Length	0.75 miles (1.21 km)
Route	South Terminal/Rail Station-North Terminal
Journey time	2 minutes
Speed	
Frequency	Every few minutes
Capacity	
Fare	Free
Type	Automated people mover (Bombardier CX-100). Rubber tyred, concrete track
Ridership	37% of air passengers and 11% of airport staff use rail

The Airport rail station is located next to the South Terminal and transfers to the North Terminal are via the inter-terminal shuttle. The rail station has over 900 trains per day including the Gatwick Express, regional and local trains and is the largest airport station in the UK in terms of passenger numbers with over 18 million in 2015/16. Anecdotally, there is no difference in the rail mode share between the North and South Terminal, indicating that the shuttle does not deter North Terminal passengers from using rail, compared with the short walk for South Terminal passengers from the rail station.

London Heathrow

Name	a. 285/490 b. Woking Railair coach c. Reading Railair coach d. Heathrow Connect
Length	a. 4 miles (6 km) b. 13 miles (21 km) c. 27 miles (43 km) d. 1.5 miles (2 km)
Route	a. Airport terminals-Feltham Station b. Woking Station-Airport Terminals c. Reading Station-Airport Terminals d. Terminals 2 and 3-Terminal 4

Journey time	a. 36 minutes b. 50 minutes c. 45 minutes d. 4 minutes
Speed	
Frequency	a. Every 10/12 minutes b. Every 30 minutes c. Every 20 minutes d. Every 15 minutes
Capacity	
Fare	a. UK£1.50 c. UK£10.50 b. UK£17 d. Free
Type	a. Bus b. Coach c. Coach d. Train
Ridership	28% of air passengers and 11% of employees use rail

Heathrow is directly linked by London Underground Piccadilly Line, Heathrow Express and Heathrow Connect rail services. However, there are additional links between the terminals and other rail stations, some of which are marketed as specific rail-air links. The 285/490 bus service links to Feltham Station on the Southwest Trains network. The Woking Railair coach also connects to the Southwest Trains network, but on a main line where there are longer distance connections. The Reading Railair coach connects to the Great Western network and the station is served by a range of regional and long distance trains. The Heathrow Connect service is noted because it provides a connection for Heathrow Express passengers to Terminal 4, as Heathrow Express trains do not serve that terminal. Heathrow has five terminals in three locations, and not every bus or coach serves all three locations. There are also other coach services which call at rail stations on other lines as part of a network of longer distance routes.

There are well advanced plans for a western rail link at Heathrow, and when this is complete it is likely that the Reading Railair coach will cease operating. There are also less certain plans for a southern rail link, but this would probably lead to the end of the Woking coach link.

London Luton

Name	Shuttle
Length	1.5 miles (2.4 km)
Route	Luton Airport Parkway Station-Terminal
Journey time	10 minutes
Speed	
Frequency	Every 10 minutes
Capacity	
Fare	UK£2.10 (free if included in train ticket)
Type	Bus
Ridership	16% of air passengers use rail

Luton Airport Parkway Station is served by local and regional Thameslink services as well as longer distance East Midlands trains. The Airport is planning to replace the bus shuttle with an automated people mover, for completion in 2021

Manchester

Currently, the rail station is linked to the terminals by walkways. However, a new station is to be built on the High Speed 2 line which will be about 1 km from Terminal 2 and 2 km from Terminal 1/3. Consideration is being given to a link, which could be by an extension of the Metrolink light rail which currently terminates at the rail station. As well as linking the terminals to the HS2 station, a Metrolink extension could also serve the proposed Airport City development and be extended further to serve other local areas.

Marseille

Name	Shuttle
Length	
Route	Vitrolles Aeroport Station-Airport
Journey time	5 minutes
Speed	
Frequency	
Capacity	
Fare	Free
Type	Bus
Ridership	

Minsk

Name	Shuttle
Length	500 metres
Route	Nacyjanaŭny aeroport Minsk station-Airport
Journey time	
Speed	
Frequency	
Capacity	
Fare	Included in train fare
Type	Bus
Ridership	

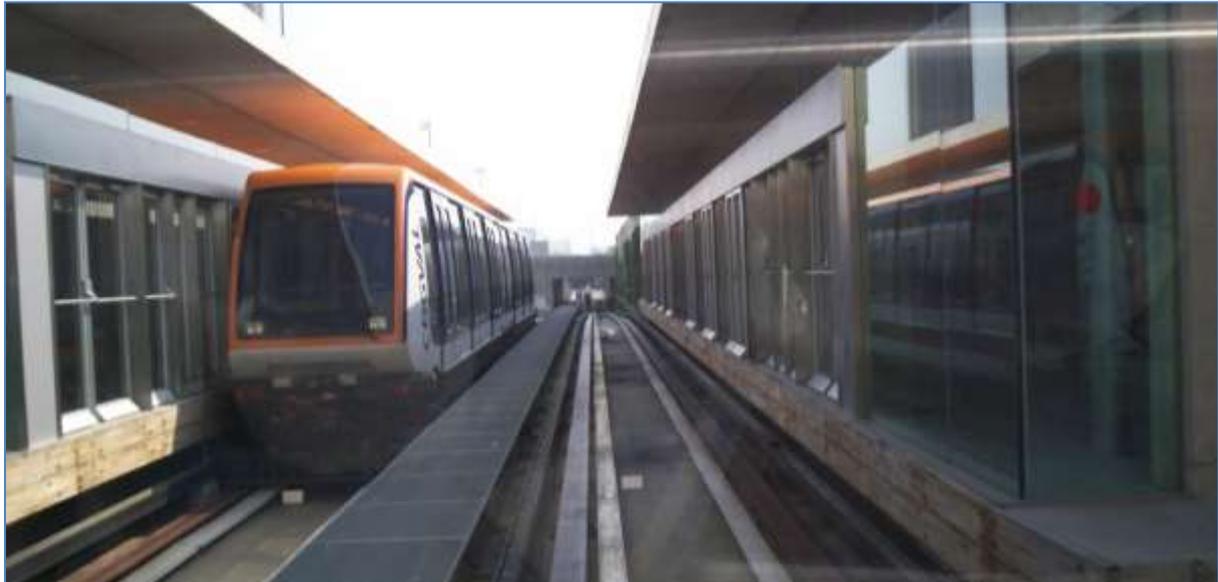
There are five trains per day from the airport rail station to the city centre.

Paris CDG

Name	CDG VAL Line 1
Length	3.5 km (2.2 miles)
Route	Terminal 1-Parking PX-Terminal 3/Roissypole-Parking PX-Terminal 2/Station
Journey time	8 minutes
Speed	
Frequency	24 hours
Capacity	

Fare	Free
Type	Siemens VAL
Ridership	10 million annual passengers. 22% of air passengers and 8% of employees use rail

The CDG VAL system replaced a bus system in 2007, although a previous project to create a people mover system was abandoned after unsuccessful tests. It links to the two main terminals with car parks and Roissypole, which is the location of hotels and offices. The main rail station, which currently serves RER and TGV trains and is also to be the terminus of the planned CDG Express dedicated service, is in Terminal 2. A second rail station for RER services is at Roissypole.



Paris Orly

Name	a. OrlyVAL b. GO C Paris
Length	a. 7.3 km (4.5 miles)
Route	a. Orly Sud-Orly Ouest-Antony RER Line B Station b. Orly Sud-Orly Ouest-Pont de Rungis RER Line C Station
Journey time	a. 8 minutes b. 10 minutes
Speed	
Frequency	a. Every 5 minutes (peak), 7.5 minutes (off peak) b. Every 15 minutes
Capacity	
Fare	a. €9.30 b. €6.25
Type	a. Automated people mover b. Bus
Ridership	a. 2.5 million passengers per year, 13% of air passengers use rail

Paris Orly is connected to two different RER lines, one by a VAL automated people mover and the other by bus.

Warsaw Modlin

Name	Koleje Mazowieckie Shuttle
Length	4 km
Route	Modlin Station-Modlin Airport
Journey time	
Speed	
Frequency	Every 20-30 minutes
Capacity	
Fare	Included in train fare
Type	Bus
Ridership	

Weeze

Name	Shuttle
Length	a. 10 km b. 6 km
Route	a. Airport-Kevelaer Station b. Airport-Weeze Station
Journey time	a. 19 minutes b. 11 minutes
Speed	
Frequency	Hourly
Capacity	Minibus
Fare	a. €5.80 b. €2.70
Type	Bus
Ridership	

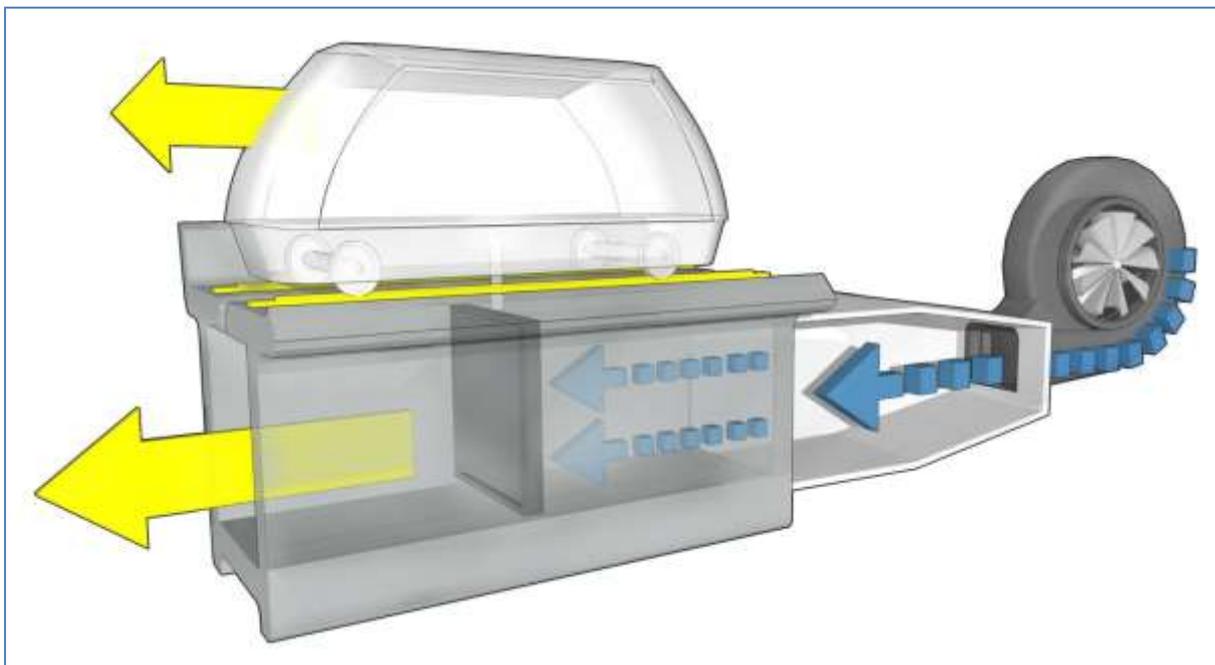
Weeze Airport serves mainly Low Cost Carriers in the Lower Rhine region of Germany, the nearest large city being Dusseldorf, 83 km away, and is close to the Dutch border. Train from Kevelaer and Weeze Stations serve Krefeld and Dusseldorf with connections to the wider rail network.

4 Rest of the World

Porto Alegre, Brazil

Name	Aeromóvel
Length	1.1km
Route	Airport-Port Alegre Metro Station
Journey time	
Speed	65 kph
Frequency	
Capacity	150 passengers per vehicle
Fare	BR Rs 1.70
Type	Pneumatic propelled vehicle on elevated guideway
Ridership	3 million since 2013

The pneumatic propulsion system for this shuttle is claimed to be low cost in comparison with conventional shuttle systems.



Aeromóvel pneumatic propelled shuttle at Port Alegre Airport

Taipei, Taiwan

Name	Shuttle bus
Length	
Route	Terminal 1-Terminal 2-Taoyuan High Speed Rail Station
Journey time	25 minutes
Speed	
Frequency	Every 5-10 minutes
Capacity	
Fare	NT\$30

Type	Bus
Ridership	

Taipei Taoyuan Airport's terminals are served directly by the Taipei MRT (metro) which connects to the city centre with an Airport Express and a commuter service, but the commuter services continues beyond the airport to the Taoyuan High Speed Rail Station. However, in addition to the metro link, there is a dedicated shuttle bus to the Taoyuan HSR station.

Manila Clark, Philippines

Name	Shuttle bus
Length	
Route	Terminal 3-Taft Avenue MRT Station
Journey time	
Speed	
Frequency	
Capacity	
Fare	
Type	Bus
Ridership	

Singapore Changi

Name	a. Changi Airport Skytrain b. MRT
Length	a. 6.4 km (4.0 miles) b. 6.5 km
Route	a. Station B (Terminal 3/MRT Station)-Station C (Terminal 1) and Station D (Terminal 2/MRT Station)-Station E (Terminal 1) b. Terminal 2/3 Station-Tanah Merah MRT Station
Journey time	a. 4 minutes b.
Speed	a. 50 kph (31 mph)
Frequency	a. Every 2 minutes b. Every 7-9 minutes (peak), every 12 minutes (off peak)
Capacity	a. 8 seated, 107 standing per car
Fare	a. Free b. Sin\$ 1.16
Type	a. Automated people mover (Mitsubishi Crystal Mover) b. Metro
Ridership	

The Singapore MRT (metro) East-West Line serves Changi Airport with a station at Terminals 2/3. Access to Terminal 1 is by the public part of the Skytrain system (there is also an airside part). It is also possible to walk between the MRT Station and Terminal 1, taking around 5 minutes and, at the time of publication of this report, this is the only method of accessing Terminal 1 from the MRT station due to redevelopment.

The Airport branch of the East-West Line is a spur off the more heavily used Pasir Ris branch and the Airport branch provides a shuttle service to Tanah Merah Station, where passengers change for a city centre train.

Nairobi, Kenya

Name	Bus shuttle
Length	3 km
Route	Airport-Syokimau Station
Journey time	
Speed	
Frequency	
Capacity	
Fare	
Type	Bus
Ridership	

Syokimau Station has a limited train service to central Nairobi

5 Analysis and conclusions

Introduction

In this final section, the 50 case studies of links from airports to rail stations are analysed in terms of their region, length, journey time and speed, frequency, technology, purpose and fare, branding and operator. Finally, the benefits of different types of links are considered, before reviewing a number of future projects where the relative merits and benefits of different types of link may be relevant.

Region

Of the 50 links described in this report, 24 are in North America, 20 in Europe and 6 in the rest of the world, as shown in the table below.

	North America	Europe	Rest of the world
Bus	13	13	3
Automated people mover	9	6	2
Heavy/light rail	2	1	1
Total	24	20	6

It is possible that this table is incomplete, in that there may be many more 'last mile' links to rail stations in the Rest of the World which are not known. However, many airports in the Rest of the World region, for example in Asia, have direct rail links to the Airport (for example, IARO report 17.13, published in 2013, listed 18 airports with direct rail links in Asia) where there is little or no need for a 'last mile' link. It is also possible that airports in other regions have such links which are not known. However, there appear to be more such links in North America and Europe, with bus the most common type. The most automated systems are in North America, where there are fewer rail stations at airports and where, at the larger airports, the system often also provides an inter terminal or car park service.

Length

Where data is available, the average length of bus shuttle is 7.4 km while it is just over 4 km for people movers. The bus shuttle data includes the 21 and 43 km for the two Heathrow Railair links and if these two are excluded the average is virtually the same as for people movers. The longest people mover is the 9.6 km JFK AirTrain and the shortest is the 0.6 km Birmingham Air-Rail link.

Journey time and speed

The average journey time for people movers is 6 minutes, with a minimum of 2 minutes and a maximum of 12 minutes. The average bus journey time is 20 minutes and, even if the two longer distance Heathrow Railair links are excluded, the average is still over 16 minutes.

Very limited data is available for the speed of bus links, but of course this is likely to be limited by the need to use non dedicated roads which can have very slow average speeds around airport terminal areas. The average speed of people mover systems is 58 kph, with the highest speeds on the New York JFK AirTrain, at 97 kph.

Frequency

The average frequency of people movers is every 6 minutes, ranging from every 2 minutes (Singapore Changi) to every 30 minutes (San Francisco BART to Millbrae). Buses are less frequent, on average every 21 minutes, ranging from 5-6 minutes (Boston) to 60 minutes (Weeze).

Technology

The two main technology categories are bus and people mover. Buses are mostly powered by diesel engines, but there is increasing use of hybrid or battery technology. In terms of size, buses can vary from a small minibus to a large, articulated bus with space for 100 plus passengers. Longer distance routes, such as the Heathrow Railair services, use coach types whereas shorter distances are usually provided with low floor buses with standing as well as seats. All types must be capable of accommodating baggage.

There is a range of technologies used for people movers. Steel wheel on standard gauge steel rail is used in the New York JFK AirTrain system, although this is driverless, automatically operated, segregated and does not merge with other heavy rail networks. Rubber tyred vehicles on concrete or flat steel tracks are probably the most common type of automated system in use, such as at Atlanta, Miami, London Gatwick and Paris Orly. Similar technologies are often used for the airside links between the main terminal and the satellites or midfield concourses and are therefore familiar to airport operators and customers. Monorails are in limited use, the two examples being New York EWR AirTrain, which is a saddle beam type, and Dusseldorf, which is a suspended monorail. There are two examples of cable hauled systems, at Oakland and Birmingham and the unique example of the pneumatic powered Aeromovel at Port Alegre. The main manufacturers are Siemens and Bombardier, with some having been installed by other firms and have subsequently been acquired. The cable hauled systems are provided by Doppelmayr.

A third more limited technology category is heavy rail which may be part of a conventionally signalled network system (Heathrow Connect, San Francisco BART, Singapore Changi MRT)).

Purpose

Some of the links connect only the airport and the rail station, while other serve other places, such as car parks, convention centres or office complexes, or as an inter terminal link.

Some examples of dedicated links just serving a rail station are as follows:

- Baltimore Shuttle to Airport Station (bus)
- La Guardia Q70 (bus)
- Oakland BART to OAK (people mover)
- Washington Dulles Silver Line Express (bus)
- Birmingham Air-Rail Link (people mover)
- Cardiff Shuttle (bus)
- London Heathrow Reading Railair (bus)
- London Luton Shuttle (bus)
- Paris OrlyVAL (people mover)
- Taipei Shuttle bus (bus)
- Singapore Changi MRT (train)

While the majority of these dedicated rail station links are provided by bus, a few are automated people movers or a train shuttle. A bus connection would generally be expected to have a much

lower capital cost, but operating costs may be higher than a people mover system if a more than one or two vehicles (and therefore drivers) are required, for example for very high flows or for longer distances. Where data is available, most of the dedicated bus links have relatively low ridership. The exceptions are the London Heathrow and London Luton links. The London Heathrow Railair links are relatively long distance (21 and 43 km respectively) and charge high fares (UK£10.50 and UK£17 respectively), yet carry significant numbers to their respective rail stations, and are believed to be profitable without subsidy. Where data is available, the people mover systems also carry much larger numbers than the bus links

The train link at Singapore Changi arose because the original direct service, which was on one branch of the line, was found to be carrying fewer passengers than the other branch, and so the airport branch was reduced to a shuttle to enable more capacity to be provided on the busier branch.

Multi-purpose links may provide an inter terminal service, or access to other parts of the airport, as well as the rail station. Examples of this include:

- Atlanta ATL Skytrain (people mover to rail station, rental car center and convention center)
- Boston Massport Shuttle (bus between terminals, rental car center and rail station)
- Chicago O'Hare Airport Transit System (people mover between terminals, rail station and car parks)
- Miami MIA Mover (people mover to Miami Intermodal Center)
- Ney York JFK AirTrain (people mover between terminals, rail stations and car parks)
- Frankfurt SkyLine (people mover between terminals and rail station)
- Taipei Shuttle bus (bus between terminals and rail station)

Almost all of the multi-purpose links are people movers, often because separate bus services are easily provided for inter terminal or car park transfers. If the link has several purposes and therefore a higher ridership, it is more likely to justify the higher costs compared with bus links.

There are some examples where the inter terminal service is airside, and is available to departing passengers who check in at a terminal next to the rail station, but who depart from another terminal (eg. Dallas Fort Worth, Mexico City). Whilst this combines functions, it is not usually available for arriving passengers because security considerations prohibit the mixing of arriving and departing passengers airside.

Fare

Fares have been converted to Euro at an exchange rate current in March 2017. The majority of people movers are free to use, but eight of the 20 considered charge a fare. The most expensive is the Paris OrlyVAL at €9.30, the cheapest Porto Alegre at €0.50. In some cases, the fare can be combined with the onward rail journey and the combined fare is discounted (eg. for the Paris OrlyVAL). More of the bus shuttles charge a fare, although the average is only €2.40, and again some fares can be combined with onward rail tickets.

An analysis of fares could also lead to a consideration of the funding and financing of the links. This report does not consider this matter in detail, except to note that most of the people movers are funded by the airport operator and, where fares are charged, this helps to recover the costs. If a fare is not charged, the costs must be covered by other revenues, for example from rents, concessions or car parking. The investment in the New York JFK AirTrain was partly covered by the Passenger Facility Charge (PFC), a federally mandated charge which airports can use for such investments. At the time of the investment, the airline users of JFK objected to the use of this revenue stream as it included investments outside the airport boundary, but this objection was not accepted by the

courts. Nevertheless, there is often a discussion to be had with the airport's airline customers as to how such links should be funded, based on an appreciation of who benefits.

Branding

A number of the links brand the link with some combination of the words air/sky/train/rail while others rely on the more generic 'shuttle' particularly for the bus services. Some examples of the branding are shown below:



The word 'shuttle' is often used in North America as a generic term for vehicles used to transport passengers to hotels, rental car areas and even to the city centre, so care has to be taken to explain that it is a shuttle to a train station. Similarly, the word 'transit' is sometimes used to describe an automated people mover, so there is a need to add that it is a transit to a station.

Sometimes the vehicle may be branded to the operator, or even used as a mobile advertising hoarding, and used to advertise some relevant product (eg. an airline).

Operators

In most of the examples in this report, the link is operated by the airport operator. In a few cases, the link is operated by the train operator, such as the Washington Dulles WMATA shuttle to Greenbelt Station. In some cases, in particular for the bus shuttles, the operator is a contractor to the airport or train company. The London Heathrow Woking RailAir link is the only one operated independently of both the airport and the train operator, by coach operator National Express.

Benefits

Investing in and operating a link between an airport and a rail station may be expensive and the business and wider cases must be considered.

The first set of benefits to be considered are monetary. To offset the costs, a fare may be charged which may cover the operating costs, and make a contribution to the return on the capital. Costs may also be saved, for example by replacing a set of bus operations with a single automated system. Train operators may be able to justify subsidising a link if they can show a discernible increase in revenue by attracting more passengers to their service, and airport operators may be able to make a similar case if more passengers are attracted to the airport because it is more accessible. However, some of these wider monetary benefits are difficult to be certain about compared with the more straightforward revenue and cost numbers.

Making an airport or a rail service more attractive often includes improving customer service, and it is undoubtedly the case that automated people movers are seen as superior in terms of customer service compared with buses. This is probably because the people mover usually has level boarding, making luggage handling easier, is faster and weather protected, although there may be fewer seats and less visible staff. Buses and coaches, however comfortable once on board, almost always involve waiting at an outside bus stop, and boarding and alighting with baggage can be challenging.

Buses and coaches use the airport road system which is often congested, complex and slow moving. An automated people mover uses its own dedicated right of way, often elevated which does not contribute to congestion on the airport roads.

Automated people movers are usually electrically powered, and can thus claim environmental benefits in terms of carbon emission and local air quality. It is possible for shuttle buses to be powered by cleaner diesel or hybrid engines, or by batteries, although the latter are not yet in common use. Many airports also strive to achieve higher public transport mode share targets and links to rail services, be they by bus or people mover, contribute significantly to those achievements.

Future projects

This report includes a few examples where links between rail stations and airport terminals are being considered, planned, and even constructed, for example:

- Los Angeles Airport Metro Connector (under construction)
- New York La Guardia AirTrain (planned)
- Orlando Intermodal Terminal (under construction)
- Birmingham Gateway HS2 Station (being considered)
- Frankfurt Terminal 3 (planned)
- London Luton (planned)
- Manchester Airport HS2 Station (being considered)

Other airports are also considering whether to replace shuttle buses with automated people movers, to extend a link to a new terminal, or to introduce a new link to a rail station. There are therefore many opportunities for IARO members to benefit from a thorough understanding of how each location and circumstance can best be served, and the following issues should be on any check list for such studies:

- Forecasts of likely passenger flows
- Destinations to be served (terminals, rail stations, car parks, rental car locations)
- Technology options
- Customer service considerations
- Road congestion
- Environmental benefits
- Fares

- Costs and revenues

It is sometime difficult to justify the expenditure when a bus or coach link is replaced by a more expensive people mover, because the marginal increase in use may not be very large. This issue can also arise when bus and people mover options are compared, if the difference in forecast usage is not as great as the difference in costs. However, while bus and coach links are appropriate for lower usage situations, or when building up a rail share, there comes a point when the complexity and cost of operating a network of bus shuttles is overtaken by the simplicity and wider benefits of a people mover system.

IARO's Air/Rail conferences, workshops and reports

Copies of the published reports of the earlier workshops and other research reports are available price £250 (free to IARO members). See www.iaro.com/publications.htm. Papers presented at more recent workshops are available on CD-ROM at the same price.

Conferences and workshops

Workshops are very focused, dealing in detail with a restricted number of key issues, and complement the regular Air Rail Conferences. Workshops and conferences (with site visits) have been held as follows.

- 1993 - Zürich
- 1994 - Paris
- 1996 - London (Heathrow Express, Stansted Express)
- 1997 - Oslo (Airport Express Train)
- 1998 - Hong Kong (Airport Express Line)
 - Frankfurt (with the AIRail station and the Cargo Sprinter)
- 1999 - Workshop 1: Berlin (the Schönefeld link)
 - Copenhagen (the Øresund Link)
- 2000 - Workshop 2: Milan (Malpensa Express)
 - Paris (plans for CDG Express)
 - Washington (Baltimore-Washington International Airport)
- 2001 - Zürich airport: Air rail links - improving the partnership
 - Workshop 3: Madrid (and its airport rail links)
 - London Heathrow (Heathrow Express)
- 2002 - Workshop 4: Amsterdam, for railways serving airports but not as their main job - "Help - there's an airport on my railway".
 - New York (the Airtrain projects)
- 2003 - Workshop 5: Barcelona. Today's design and funding issues for airport railways
 - Frankfurt (The AIRail project)
 - Workshop 6: Newark. Practical air rail intermodality
- 2004 - Workshop 7: Oslo. Leisure passengers – a market for airport railways.
- 2004 - Brussels (Thalys:Air France code-share)
- 2005 - Chicago (Chicago's future in an era of successful air-rail intermodality)
 - Shanghai study tour
 - Workshop 8: Edinburgh. Security on airport railways.
- 2006 - Workshop 9: Baltimore (BWI). Security on airport railways.
 - Regional meeting 1: Stockholm
 - Workshop 10: Marketing and ticketing innovations (e-air-rail) Düsseldorf
 - Regional meeting 2: Kuala Lumpur
- 2007 - Los Angeles: Air/Rail East/West
 - Baltimore: The seamless journey
 - Vienna (Wien): Communications
- 2008 - October - London Gatwick. One-day conference on ticketing
- 2009 - June - Hamburg, with site visit to the new S-Bahn
 - October - Vancouver: light rail to airports
- 2010 - October - Lyon, with a site visit to the LesLYS express tram to the city
 - November/December - Far East study tour (with AREMA)
- 2011 - October - Venice

- 2012 - September - Berlin
- 2013 - July - Birmingham (high speed rail)
- September - Gatwick (Branding)
- 2014 - April - Dallas, Texas, (Airport stations)
- June - Brussels (EU matters)
- September - Stockholm (Which type of air rail link?)
- November - London (Planning air rail links)
- 2015 - April - Manchester (Airport City rail links)
- June - Milan (Extending rail links at expanding airports)
- October - Washington (Air-Rail Links: What works in North America)
- 2016 - June - Cranfield University, UK (Air-Rail Links: Who are our customers?)
- September - Lyon (Trams and light rail connections)
- November - New York (Making New York's airports world class)
- 2017 - May (planned) - London Heathrow (What do good air-rail services look like?)
- September (planned) - Milan
- November (planned) - Frankfurt

Details are available from IARO, or on www.iaro.com: you can sign up for details of future events in different parts of the world on www.iaro.com/events.htm. Future plans are, of course, subject to change.

Reports

The following reports are available free of charge to members. Most can be downloaded directly by clicking on the link and entering your Login and password. Reports not available for download can be obtained by contacting the IARO office.

24.16 Opportunities for Airport Rail Links

[15.11 \(updated 2016\) A guide to IARO's database and statistics](#)

23.15 Extending your rail link at a growing airport

[22.15 Fares on Airport Rail Links](#)

[21.15 Airport Rail Links in the Planning Stage](#)

[20.14 Airport Rail Stations](#)

[19.13 Improvements to access to airports under the TEN-T programme](#)

[18.13 Air-Rail Forecasting](#)

[17.13 A worldwide review of Air-Rail](#)

[16.13 Light rail to airports](#)

[15.12 Heathwick](#)

[14.10 What happens to mode share when trains start running to airports?](#)

[13.10 Can the Hong Kong-Shenzhen inter-airport high speed rail link work?](#)

[12.09 High speed rail to Heathrow](#)

[11.08. Case studies in cooperation between air and high speed rail](#)

[10.07 Off Airport check-in](#)

[9.06 Security on Airport Railways](#)

[8.03 The role of the Airport Express](#)

[7.03 Workshop, Barcelona, June 2003. Today's design and funding issues for airport railways.](#)

[6.02 Workshop, Amsterdam, June 2002. Help – there's an airport on my railway.](#)

[5.02 Workshop, Madrid, June 2001. Stress free journeys – The role of human resources and how IT can help](#)

[4.01 Air rail links – improving the partnership. Report of the seminar held at Zurich Airport on 23rd February 2001.](#)

[3.01. Report of the baggage task group](#)

[2.00 Workshop, Milan 12/14 April 2000. Stress free journeys – baggage and interchange and the role of rail in air cargo](#)

1.99 Workshop, Berlin 27/28 April 1999. Integrated ticketing, Peripheral airport gateway hubs, the start-up experience