

# Profiling Australia's interstate passenger train, coach and ferry services

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## Abstract

Interstate surface public transport services receive limited public policy and research attention. Yet if these services are to be upgraded in future, for example through high speed rail or medium speed ('fast' or 'faster' rail), a clearer picture of the pattern and performance of these services can be of benefit. This paper identifies 26 interstate (strictly, inter-jurisdictional) surface public transport corridors. It further identifies 35 'through', 'connecting' and other active routes, which may be intrastate as well as interstate, operating in these corridors. The paper then profiles 45 scheduled services in three modes on these routes – train, coach and combined train and coach – and including a single ferry route between Melbourne (VIC) and Devonport (TAS). Interstate tourism experience train services, such as the Sydney-Adelaide-Perth *Indian Pacific* train, are excluded. The service indicators examined, on the basis primarily of publicly available data, are: route (road) distance; the number of return services per week; the number of intermediate stops per 100 kilometres; the average end to end service speed; the average fare per 100 kilometres; and patronage, the latter to the extent of available information. The paper concludes with a commentary on the information presented and outlines areas for further research.

## 1 Introduction

Aside from possible introduction of high speed rail in the longer term (AECOM et al 2013), Australia's existing interstate surface public transport (i.e. train, coach and ferry) services receive limited public policy and research attention.<sup>1</sup> Yet high speed rail would likely involve a transformational upgrade to these services, over the affected routes. Moreover, medium speed, 'fast' or 'faster' rail services have recently been proposed for routes within 400 kilometres or less of Sydney, Melbourne and Brisbane (Andrews 2018, McCormack and Tudge 2019, Transport for NSW 2018). All of these routes follow part of the length of an interstate road corridor, if not also an interstate rail corridor. While intrastate train services to regional centres such as Newcastle (NSW) and Traralgon (VIC) have larger passenger markets and higher frequencies (and shorter routes) than the majority of interstate train and coach services, it may nevertheless be helpful to profile existing interstate surface public transport services and their service metrics. The profile can inform development of future upgrade

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<sup>1</sup> One exception, at a Commonwealth level, is subsidy policy for vehicle accompanied passenger sea ferry travel between Melbourne (VIC) and Devonport (TAS) under the Bass Strait Passenger Vehicle Equalisation Scheme (BITRE 2018a).

priorities. It may also aid consideration of issues involved in managing interfaces between new ‘step change’ services and the existing surface public transport network.

Michell, Martin and Laird (2014) is a precursor of this paper in providing, inter alia, a high level analysis of the level of capability of Australia’s existing longer distance passenger railways. Other relevant recent research includes a study of regional rail upgrades in Australia and internationally using existing infrastructure (BITRE 2014) and the BITRE-Australasian Railway Association *Trainline* series, which includes annual performance information on Australian non-urban passenger rail services (BITRE 2018).

The paper begins by discussing the roles of the various longer distance public transport modes, including, for contextual reasons, aviation and the respective mode shares. It then defines the term ‘interstate corridor’, as applied in the paper, identifying 26 such corridors and providing information on their length and population characteristics. There are further preliminaries in delineating different types of corridor service and listing the active routes in the corridors – which may be intrastate as well as interstate – 35 in total, in the modes of train, coach and combined train and coach, with ferry included in relation to Tasmania. Forty-five ‘route by mode’ services in the corridors are then profiled by: distance; the number of return services per week; the number of intermediate stops per 100 kilometres; the average end to end speed of service; the average fare per 100 kilometres; and patronage, the latter to the extent of available information. See Annex Table 1 for a single summary of the data presented in the paper.

The research was undertaken in August and September 2018, using publicly available timetables and booking system information.<sup>2</sup> Given this timing, the profile does not allow for any seasonal variation in services. Greyhound Australia, Australia’s largest coach service operator, was consulted in September 2018. There was also consultation with officials in jurisdictions, including a patronage data request, in relation to this paper and for a parallel policy-oriented paper over an extended period between mid 2017 and early 2019.<sup>3</sup>

## 2 Distance and the public transport modes

### 2.1 Roles

As in the urban context, longer distance public transport modes both compete with and complement each other, as they also do with the private car. Train, coach and air modes differ on many dimensions, notably in relation to: speed and the distances over which they are generally most competitive; capacity to adjust to markets of different size; ability to serve intermediate points along a route; service features including schedule reliability and ride quality; and the cost of service, with implications for the income group and age group profiles and, to some extent, trip purpose profiles of passengers.

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<sup>2</sup> Operator booking systems used include NSW TrainLink (Transport NSW), V/Line (Public Transport Victoria), QueenslandRail, Crisps Coaches, Greyhound Australia, Murrays Coaches, Premier Motor Services, Premier Stateliner and other coach companies servicing individual routes in scope.

<sup>3</sup> In addition, the author is grateful to the following individuals for helpful discussions and comments: John Austen, John Hearsch, Associate Professor Philip Laird, Dr Anthony Ockwell and Bernard Shepherd. Responsibility for the content, including any views expressed, is the author’s alone.

Firstly, train and/or coach services around the world generally have a large, if not dominant presence in the public transport market at distances of, say, up to 400 km. Air transport, as the mode capable of the fastest speeds, will generally have an overwhelming market share at distances of over 1,000 km. High speed rail extends the range of train competitiveness to at least 500 km and to substantially longer distances in the presence of either a string of large cities along a route, as in Japan or substantial air traffic congestion and low high speed rail pricing, as in China (OECD/ITF 2014, p. 36 and 153).

Secondly, while all modes have some capacity to adjust to prevailing market size through use of lower capacity or higher capacity equipment, air transport may cater most effectively to the smallest markets. In regional and remote Australia, short air routes, i.e. of up to 200 km, comprise the largest of all route distance categories (BITRE 2012, p. 46), due to an ability to service the country's many 'thin' routes, through use of smaller aircraft and with limited fixed infrastructure requirements (that might otherwise raise the cost of service to commercially unviable levels). Conversely, while its largest markets are urban and regional rather than longer distance ones, rail typically has the capability to increase the length and/or frequency of trains to accommodate large markets.

Thirdly, the train and coach modes each differ from aviation in routinely providing intermediate stops along a route, so that passengers throughout the length of a route may, at least in principle, receive similarly accessible service.<sup>4</sup> In contrast, absence of a need for linear infrastructure translates to a strength for aviation, as for sea transport, in circumstances where road and rail services become suspended, due to flooding or other natural phenomena.

Fourthly, operating on dedicated infrastructure with fully managed access, trains are, in principle, the best performing mode in terms of schedule reliability, where, in contrast, coaches and aircraft are subject to somewhat 'uncontrolled' road congestion and airspace congestion respectively. Modes also differ on other service dimensions, for example ride quality (generally higher on trains than coaches), check-in requirements (more time required in aviation than train or coach) and access to entertainment (greater on larger aircraft than on smaller aircraft and on other modes).

Finally, train and coach fares are typically comparable to the low-cost air fares that are available between many capital cities in Australia and on routes that service major tourism centres. Train and coach fares are typically pitched below air fares on regional routes, where low cost air services may not be available. As a consequence, train and coach travel, on the available, if dated, data, exceeds air travel for persons with the lowest incomes, while air travel is more prevalent than train and coach travel at higher incomes (Bureau of Transport and Regional Economics 2003, pp. 99-100). Age group profiles similarly differ, with train and coach travel exceeding air travel for the 15 to 24 and 65 plus age groups, while the opposite applies for the intermediate age groups (ibid, pp. 101-102). And where, in non-metropolitan Australia, 40 per cent of air trips are for business purposes, less than 20 per cent of train and coach trips are for this purpose (ibid, p. 118).

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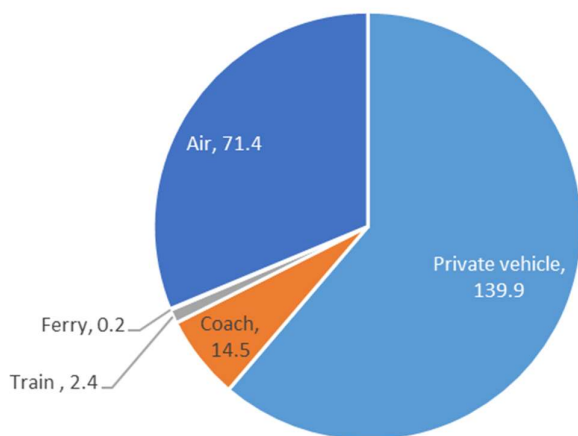
<sup>4</sup> 'Milk run' air routes, as with the twice weekly service, involving seven intermediate stops between Brisbane and Mount Isa (1,828 km), are an aviation exception (Pfleger 2016).

## 2.2 Mode shares

Under a passenger-kilometre metric, train, coach and ferry comprise less than 20 per cent of the total Australian non-urban (i.e. including both interstate and local or shorter distance) public transport market. The air transport share is greater than 80 per cent. In 2015-16,<sup>5</sup> the three surface modes totalled 17.1 billion passenger kilometres (bpkm), with coach much the largest of the three, compared with 71.4 bpkm of air transport.

The train, coach and ferry shares together reduce to less than 10 per cent on an 'all non-urban transport' basis, when the dominant private vehicle share (139.9 bpkm, 61 per cent) is factored in (Figure 1). Interstate public transport patronage is discussed further in Section 4.6.

**Figure 2: Non-urban travel by mode, billion passenger kilometres, 2015-16**



Private vehicle includes light commercial vehicle, truck and motorcycle.

Source: BITRE 2018a, 2018c Tables 3.1 and 3.3i and author analysis

## 3 Corridors, routes, services and operators

### 3.1 Identifying corridors

Corridors are 'linear' routings, albeit with wide tolerances, between locations. For the purposes of the paper, interstate surface public transport corridors cover the following types:

- Corridors connect capital cities in adjoining jurisdictions and also in non-adjoining jurisdictions where either the route is shorter than the route between the two adjoining jurisdictions, or there are established surface public transport services between the two cities<sup>6</sup>

<sup>5</sup> This is the most recent year for which all relevant data items are available.

<sup>6</sup> There is one instance only of each of these two non-adjoining situations: the route between Sydney (NSW) and Adelaide (SA) via Mildura (VIC) is shorter than the 'adjoining jurisdiction' route via Broken

- Corridors connect non-capital city end locations in adjoining jurisdictions, where, as with inter-capital corridors, they connect numbers of cities, towns and regions along the way: these corridors may also include one capital city, for example, as between Melbourne (VIC) and Griffith (NSW)
- Corridors, in remoter regions, materially reduce the surface transport travel distance via the relevant inter-capital or other corridors: for example, the Broome (WA) to Alice Springs (NT) via Halls Creek corridor, which involves a saving of 1,000 km between central Australia and north-western Australia, compared with other routes
- ‘Within jurisdiction’ corridors connect the end points of two or more inter-jurisdictional corridors, for example, the Brisbane-Cairns (via Townsville) corridor in QLD, which connects at one end to NSW and at (or near) the other end to NT, thereby ensuring a nationally continuous set of inter-jurisdictional corridors.

For clarity, corridors as defined above need not necessarily have existing scheduled surface public transport service, for all or even part of their length. Two corridors, Cairns to Alice Springs (via Winton) and Broome to Alice Springs have no existing service. Relevant corridors also exclude cross-jurisdictional linkages in continuous or almost continuous urban areas (e.g. Albury-Wodonga, Canberra-Queanbeyan). A total of 26 corridors are listed in Table 1.

**Table 1: Interstate surface public transport corridors**

Jurisdiction pair	Corridor no	Interstate corridor (via)	Road length km (1)
<b>NSW-QLD</b>	1	Sydney-Brisbane (Coffs Harbour)	920
	2	Sydney-Brisbane (Armidale)	937
	3	Narromine-Brisbane (Toowoomba) <i>Inland Rail</i>	877
<b>NSW-SA</b>	4	Sydney-Adelaide (Broken Hill)	1,658
	5	Sydney-Adelaide (Mildura)	1,012
<b>NSW-ACT</b>	6	Sydney-Canberra	286
	7	Wollongong-Canberra	244
	8	Batemans Bay-Canberra	149
<b>VIC-NSW</b>	9	Melbourne-Sydney (Albury)	878
	10	Melbourne-Sydney (Narooma)	1,041
	11	Melbourne-Griffith	430
	12	Melbourne-Narromine <i>Inland Rail</i>	810
<b>VIC-SA</b>	13	Melbourne-Adelaide (Horsham)	727
	14	Melbourne-Adelaide (Mount Gambier)	858
<b>VIC-ACT</b>	15	Melbourne-Canberra (Wodonga)	664
	16	Melbourne-Canberra (Bairnsdale)	736
<b>VIC-TAS</b>	17	Melbourne-Hobart (Devonport)	729

Hill and there are significant surface public transport services between Melbourne (VIC) and Canberra (ACT).

Jurisdiction pair	Corridor no	Interstate corridor (via)	Road length km (1)
<b>QLD-NT</b>	18	Rockhampton-Darwin (Longreach)	2,935
	19	Brisbane-Cairns (Townsville) (2)	1,681
	20	Townsville-Tennant Creek	1,565
	21	Cairns-Alice Springs (Winton)	2,117
<b>SA-NT</b>	22	Adelaide-Darwin	3,029
<b>SA-WA</b>	23	Adelaide-Perth	2,693
<b>WA-NT</b>	24	Perth-Darwin (Broome)	4,111
	25	Perth-Alice Springs (Kalgoorlie)	2,493
	26	Broome-Alice Springs (Halls Creek)	1,736

(1) Corridor length or distance in this and subsequent tables is measured by road (and sea and road in the case of the Melbourne-Hobart corridor).

(2) Intrastate corridor that connects two interstate ones.

The average length of the identified inter-jurisdictional corridors is 1,402 km (median 929 km). Six corridors exceed 2,000 km in length, with the longest, Perth to Darwin, more than 4,000 km. Conversely, three corridors, Sydney to Canberra, Wollongong to Canberra and Batemans Bay to Canberra are less than 300 km in length (Table 1 and Figure 3).

Figure 3: Interstate surface public transport corridors, Australia



Note: Corridor end locations are named while intermediate locations in parentheses in Table 1 are unnamed and marked by a smaller dot. Corridor delineations approximate road routings.

### 3.2 Corridor populations

On average, there are 4.5 urban centres and localities, with a population of 200 or more persons, per 100 kilometres, along the 26 interstate corridors (Table 2). Also on average, 19 per cent of the urban centres and localities along each corridor have populations of 10,000 persons or more.

Table 2: Urban centres and localities along interstate surface public transport corridors (1)

Jurisdiction pair	Corridor no	Corridor (via)	Urban centres & localities 200 persons or more per 100 km	% urban centres & localities 10,000 persons or more
NSW-QLD	1	Sydney-Brisbane (Coffs Harbour)	5.6	27%
	2	Sydney-Brisbane (Armidale)	4.0	30%
	3	Narromine-Brisbane (Toowoomba)	3.4	7%
NSW-SA	4	Sydney-Adelaide (Broken Hill)	1.9	23%
	5	Sydney-Adelaide (Mildura VIC)	1.7	13%

Jurisdiction pair	Corridor no	Corridor (via)	Urban centres & localities 200 persons or more per 100 km	% urban centres & localities 10,000 persons or more
NSW-ACT	6	Sydney-Canberra	9.8	29%
	7	Batemans Bay-Canberra	12.1	17%
	8	Wollongong-Canberra	7.4	28%
VIC-NSW	9	Melbourne-Sydney (Albury)	8.9	17%
	10	Melbourne-Sydney (Narooma)	6.7	19%
	11	Melbourne-Griffith	7.7	9%
VIC-SA	12	Melbourne-Narromine	6.8	11%
	13	Melbourne-Adelaide (Horsham)	5.1	24%
	14	Melbourne-Adelaide (Mt Gambier)	5.8	18%
VIC-ACT	15	Melbourne-Canberra (Wodonga)	8.4	11%
	16	Melbourne-Canberra (Bairnsdale)	6.0	18%
VIC-TAS	17	Melbourne-Hobart (Devonport)	5.5	15%
QLD-NT	18	Rockhampton-Darwin (Longreach)	1.0	20%
	19	Brisbane-Cairns (Townsville)*	3.5	24%
	20	Townsville-Tennant Creek	0.6	22%
SA-NT	21	Cairns-Alice Springs (Winton)	0.8	12%
	22	Adelaide-Darwin	1.0	21%
SA-WA	23	Adelaide-Perth	1.3	17%
WA-NT	24	Perth-Darwin (Broome)	0.8	16%
	25	Perth-Alice Springs (Kalgoorlie)	0.8	16%
	26	Broome-Alice Springs (Halls Creek)	0.5	22%
AVERAGE			4.5	19%
MEDIAN			4.5	18%

(1) Urban centres and localities are located up to 70 km from a nearest railway station or coach stop, or interstate road where there is no public transport.

Source: ABS 2017 and author analysis

Five corridors exceed the average on both of these indicators. These are: Sydney-Brisbane (via Coffs Harbour, i.e. coastal route); Sydney-Canberra, Wollongong-Canberra, Melbourne-Sydney (via Narooma, i.e. coastal route) and Melbourne-Adelaide (via Horsham, i.e. inland route). Conversely, nine corridors are below the average on each indicator: these are Rockhampton-Darwin (via Longreach); Townsville-Tennant Creek; Cairns-Alice Springs, Adelaide-Perth, Perth-Darwin and Perth-Alice Springs.

### 3.3 Types of corridor service

Corridor service is determined by the prevailing pattern of surface public transport in the corridor and falls into the following types:

- ‘Through’ service, such as provided by the NSW TrainLink Sydney to Brisbane train service, takes in the full length of the relevant corridor
- ‘Connecting’ service involves integrated public transport connections that service the full corridor: an example is TT-Line’s Spirit of Tasmania sea ferry



between Melbourne and Devonport which connects directly with Tassielink and Redline coach services to Hobart

- ‘Non-connecting’ service also covers the full corridor, but with a lengthy (e.g. overnight) waiting period between two or more individual services: to illustrate, to travel by surface public transport from Sydney to Brisbane via Armidale involves taking a daily NSW Trains train that arrives at Armidale, NSW at 5.35pm and then catching a Crisps Coaches coach to Brisbane at 7.35am on one of three days a week
- ‘Part corridor’ service covers part of the corridor only, with the remainder of the corridor unserved: for example, the Perth-Alice Springs corridor includes a Transwa train service from Perth to Kalgoorlie, covering 24 per cent of the corridor distance, with no service between Kalgoorlie and Alice Springs
- ‘Unserved’ corridors have no public transport service: for example, the Broome to Alice Springs via Halls Creek corridor, with much of the Halls Creek-Alice Springs (Tanami Road) section comprising unsealed if not unformed road (Infrastructure Australia 2018, p.118).

Of the 26 corridors, ten have through service and four have connecting service. There are seven non-connecting corridors, three are partially served and two are unserved (Table 3).

**Table 3: Corridor service types, routes, modes and operators**

Jurisdiction pair	Corridor no	Corridor service type	Route (via)	Mode(s)	Operator(s)
NSW-QLD	1	Through	Sydney-Brisbane (Coffs Harbour)	Train, coach	NSW TrainLink, Greyhound Australia, Premier Motor Services
	2	Non-connecting	Sydney-Armidale	Train	NSW TrainLink
			Armidale-Brisbane	Coach	Crisps Coaches
	3	Part corridor	Narromine-Moree	Nil	NA
Moree-Toowoomba			Coach	Crisps Coaches	
NSW-SA	4	Non-connecting (1)	Sydney-Broken Hill (1)	Train, Train & coach (1)	NSW TrainLink
			Broken Hill-Adelaide	Coach	Buses R Us
	5	Non-connecting	Sydney-Mildura (VIC)	Train & coach	NSW TrainLink
			Mildura (VIC)-Adelaide	Coach	Tambray Coaches
NSW-ACT	6	Through	Sydney-Canberra	Train, coach	NSW TrainLink, Greyhound Australia, Murrays Coaches
	7	Connecting	Wollongong-Canberra	Train & coach, coach	NSW TrainLink, Murrays Coaches

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Jurisdiction pair	Corridor no	Corridor service type	Route (via)	Mode(s)	Operator(s)
	8	Through	Batemans Bay- Canberra	Coach	Murrays Coaches
<b>VIC-NSW</b>	9	Through	Melbourne-Sydney (Albury)	Train, coach	NSW TrainLink, Greyhound Australia
	10	Non- connecting	Melbourne- Narooma	Train & coach	V/Line
			Narooma-Sydney	Coach	Premier Motor Services
	11	Through	Melbourne-Griffith	Train & coach	NSW TrainLink
	12	Connecting	Melbourne- Narromine	Train & coach	NSW TrainLink
<b>VIC-SA</b>	13	Through	Melbourne-Adelaide (Horsham)	Train, train & coach, coach	Great Southern Rail, V/Line, Firefly
	14	Non- connecting	Melbourne-Mount Gambier	Train & coach	V/Line
			Mount Gambier- Adelaide	Coach	Premier Stateliner
<b>VIC-ACT</b>	15	Through	Melbourne- Canberra (Wodonga)	Train & coach, coach	V/Line, Greyhound Australia
	16	Through	Melbourne- Canberra (Bairnsdale)	Train & coach	V/Line
<b>VIC-TAS</b>	17	Connecting	Melbourne- Devonport	Ferry	TT-Line
			Devonport-Hobart	Coach	Tassielink, Redline Coaches
<b>QLD-NT</b>	18	Non- connecting	Rockhampton- Longreach	Train, coach	QueenslandRail, Greyhound Australia
			Longreach-Mount Isa (2)	Coach	Bus Queensland
<b>QLD-NT</b>	19	Through	Brisbane-Cairns (Townsville)	Train, coach	QueenslandRail, Greyhound Australia, Premier Motor Services
	20	Through	Townsville-Tennant Creek	Coach	Greyhound Australia
	21	Unserved	Cairns-Alice Springs (Winton)	Nil	NA
<b>SA-NT</b>	22	Connecting (3)	Adelaide-Alice Springs	Coach	Greyhound Australia
			Alice Springs- Darwin	Coach	Greyhound Australia
<b>SA-WA</b>	23	Part corridor (3)	Adelaide-Ceduna	Coach	Premier Stateliner
			Ceduna-Kalgoorlie	Nil	NA
			Kalgoorlie-Perth	Train	Transwa

Jurisdiction pair	Corridor no	Corridor service type	Route (via)	Mode(s)	Operator(s)
WA-NT	24	Non-connecting	Perth-Broome	Coach	Integrity Coach Lines
			Broome-Darwin	Coach	Greyhound Australia
WA-NT	25	Part corridor (4)	Kalgoorlie-Alice Springs	Nil	NA
WA-NT	26	Unserved	Broome-Alice Springs (Halls Creek)	Nil	NA

(1) There is a slight difference in routes of the different modes, with the train service via Parkes and the combined train and coach service via Dubbo.

(2) The Mount Isa-Tennant Creek and Tennant Creek-Darwin routes are as per the Townsville-Tennant Creek and Alice Springs-Darwin routes respectively.

(3) The corridor also has (through) tourism experience train service.

(4) The Perth-Kalgoorlie route is as per the Adelaide-Perth corridor.

### 3.4 Routes, modes and services

In addition to types of corridor service, Table 3 includes routes by mode in each corridor, together with relevant operators (Section 3.5).

A route, by definition for the purposes of this paper, has existing scheduled surface public transport service, where that service may or may not extend to the full length of the corridor. Australia’s two dedicated interstate tourism experience trains, the Sydney-Adelaide-Perth *Indian Pacific* and the Adelaide-Alice Springs-Darwin *Ghan*, are excluded from the list of routes. These services differ from conventional public transport services in the attribute package that they offer: extended stops for tourism experience purposes; no pick-up or set-down of passengers at intermediate points along the route; and inclusion of accommodation and meals in the cost of the fare.<sup>7</sup>

A total of 35 routes are identified (Table 3). Part corridor routes are included only for corridors where there is no full corridor service, for example, Adelaide-Ceduna (Adelaide-Perth corridor), with no service between Ceduna and Kalgoorlie, a distance of 1,386 km. Routes which service part of a corridor, where full service exists, whether through, connecting or non-connecting, are not included. While there are several such ‘regional’ routes near major cities, for example, Sydney-Newcastle (Sydney-Brisbane corridor), or Melbourne-Ballarat (Melbourne-Adelaide corridor), there are also longer routes in this category, such as Adelaide-Port Augusta (Adelaide-Darwin corridor) and Townsville-Mount Isa (Townsville-Tennant Creek corridor).

Routes may have services in one or more surface public transport modes. Together with the sea link between the mainland and Tasmania (connecting ferry and coach

<sup>7</sup> Great Southern Rail’s Melbourne-Adelaide *Overland* service, while connecting with the Sydney-Adelaide-Perth *Indian Pacific* train, involves no tourism experience stops and is competitively priced with air services on the route (and above V/Line fares, see Section 4.5). It is included as a service mode on the route. It is also noted that: Canberra-Sydney coach services have no intermediate stops (other than Sydney Airport), but are otherwise consistent with the scheduled public transport norm; and while accommodation-inclusive fare options are available on the Melbourne-Devonport *Spirit of Tasmania* ferry service, seat only fares are also available.

route between Melbourne and Hobart), the modes are train, coach and combined train and coach.

Combined train and coach services extend public transport services to locations not on the rail network, for example, the service between Melbourne (VIC) and Narooma (NSW), with train transport between Melbourne and Bairnsdale and coach service from Bairnsdale to Narooma.

In total, there are 45 'services by mode' on the various routes. Coach is the most prevalent of the modes, with 24 services. Ten routes feature train services, another 10 have combined train and coach services and there is one ferry route. Almost three quarters (26) of the routes are single mode, while eight have two modes: Sydney-Brisbane, Toowoomba-Brisbane, Melbourne-Sydney, Sydney-Canberra, Wollongong-Canberra, Melbourne-Canberra, Rockhampton-Longreach and Brisbane-Cairns. Melbourne-Adelaide has all three modes.

### **3.5 Operators**

Four state government-owned entities provide train services on the identified routes: NSW Trains, V/Line, QR and Transwa. NSW Trains and V/Line also provide combined train and coach services on some routes and Transwa runs a coach service between Perth and Esperance. Connecting ferry and coach services between Melbourne and Hobart are provided by Tasmanian Government-owned TT-Line and Tassielink, together with a further, privately owned coach service, Redline. Other coach services are provided by numerous private companies, with Greyhound Australia operating in all jurisdictions except Tasmania (Table 3). Almost three quarters (26) of the routes have a single operator, by definition in a single mode.

## **4 Service profile**

### **4.1 Route length**

Route lengths are calculated with reference to the corresponding road infrastructure distance. In reality, train route distances may be longer than coach route distances, due to winding sections of track (Laird 2016), or other factors. For example, at 960 km, the Melbourne to Sydney train distance is 82 km longer than the corresponding coach distance. However, road distances are more available for use than some rail distances and they also provide the more appropriate customer service benchmark.

The average length of the 35 routes is 777 km (median 664 km). Of the six longest corridors (Section 3.1), none have through service and only one, Adelaide-Darwin, has a connecting service (at Alice Springs). Route lengths range from 125 km for Toowoomba-Brisbane (served by both coach and train), on the NSW-QLD Inland Rail corridor between Narromine and Brisbane, to 2,240 km for Perth-Broome, with coach service (Figure 3).

**Figure 4: Route length (road), by corridor jurisdiction pair, km**

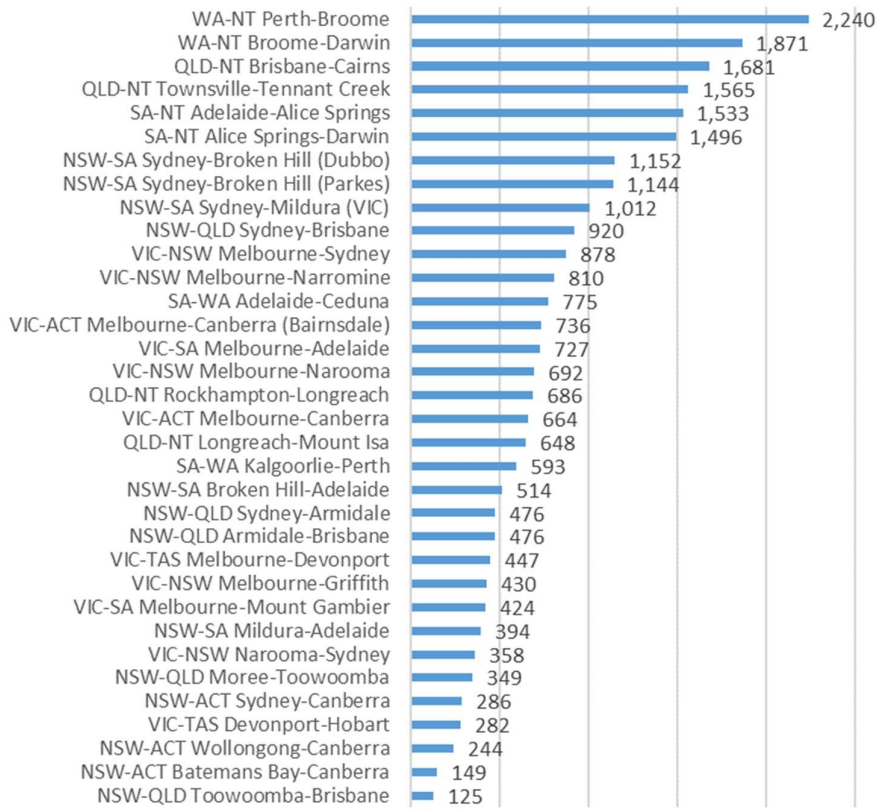
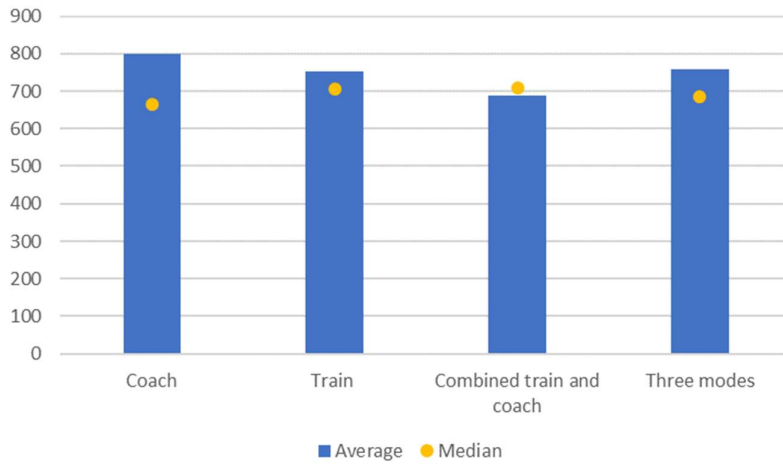


Figure 5 shows average route length separately for coach, train and combined train and coach services (see Table 3 for route by mode details). While the coach route average is marginally the longest (804 km) of the three modes, the median coach route (656 km) is the shortest. These two statistics are indicative of the flexibility of coach transport, accommodating both short distance and very long distance routes.

**Figure 5: Route length by mode, km**

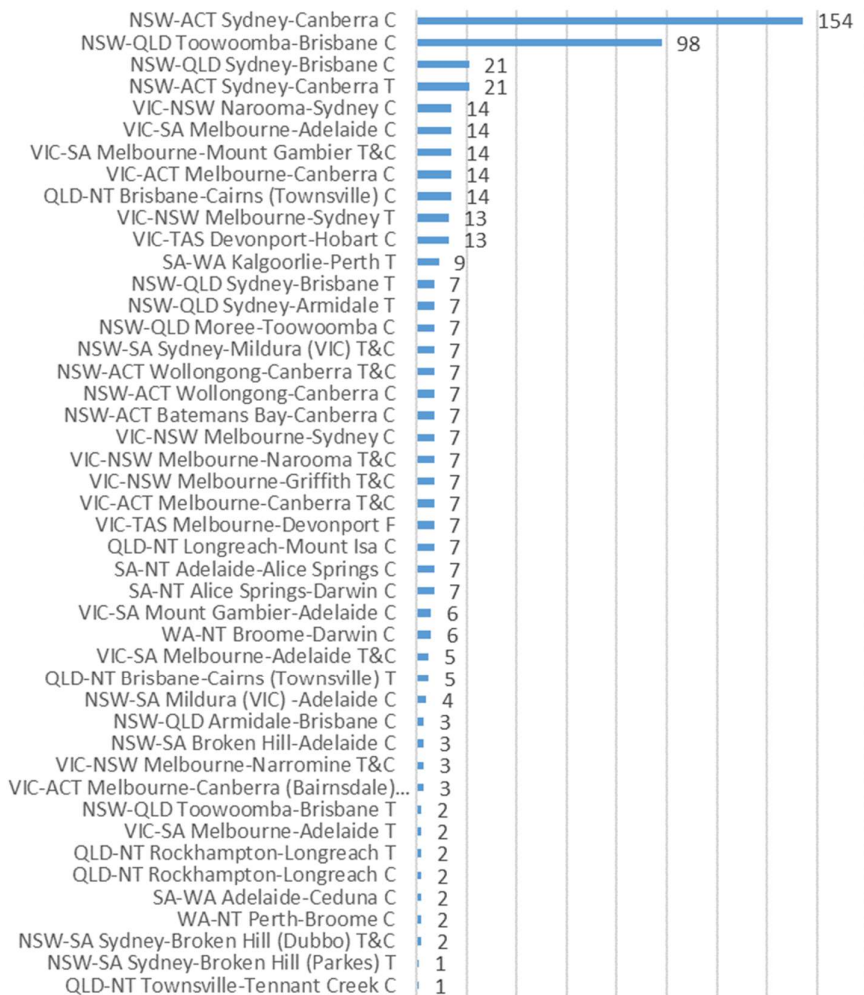


## 4.2 Service frequency

Return frequency ranges from one per week (Townsville to Tennant Creek coach service, distance 1,565 km and Sydney to Broken Hill train service, distance 1,144 km) to 154 per week (Sydney to Canberra coach service, distance 286 km). With a median number of seven per week, more than two thirds (33) of the 45 services operate at daily frequency or less. In contrast, Sydney to Canberra coach and train services operate between the two most closely located capital cities. The Sydney to Canberra corridor is the nation’s sixteenth largest air passenger route (BITRE 2018, p. 3), and, without low cost air services, also has a sizeable end to end surface public transport market.

There is limited negative correlation (-0.25) between frequency and route length.<sup>8</sup> This may reflect an impact of remoteness in limiting market size and reducing the opportunity for higher service frequencies.

**Figure 6: Return frequency per week, all routes by corridor jurisdiction pair and mode**

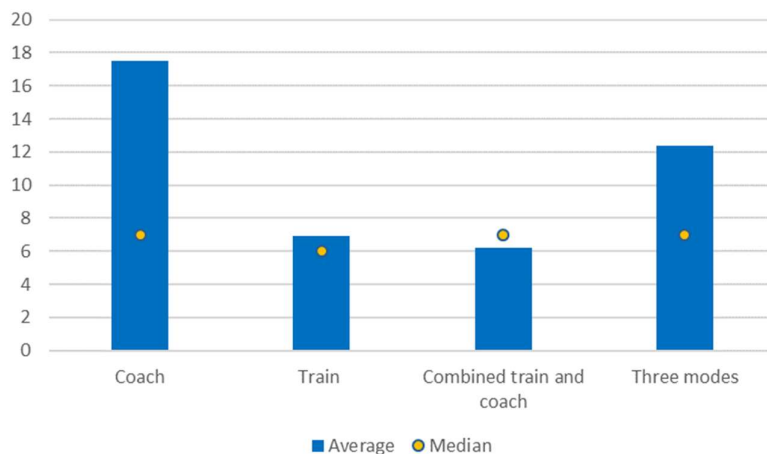


C Coach T Train T&C Combined train and coach F Ferry

<sup>8</sup> All correlation coefficients are shown in Annex Table 2.

The large difference between the average number of weekly coach services, compared to the other two modes (18, contrasting with 7 for train and 6 for train and coach, Figure 7) is due to the impact of the high volume Canberra-Sydney and Toowoomba-Brisbane coach services. The latter involves a long distance peri-urban commuter route, one that lacks a commuter train service.<sup>9</sup> The median number of both coach and combined train and coach services per week is seven, indicating daily services and is six for train. The combined train and coach services median exceeds the average, due to the effect of the Melbourne-Mount Gambier route (14 services per week).

**Figure 7: Return frequency per week by mode, average and median**



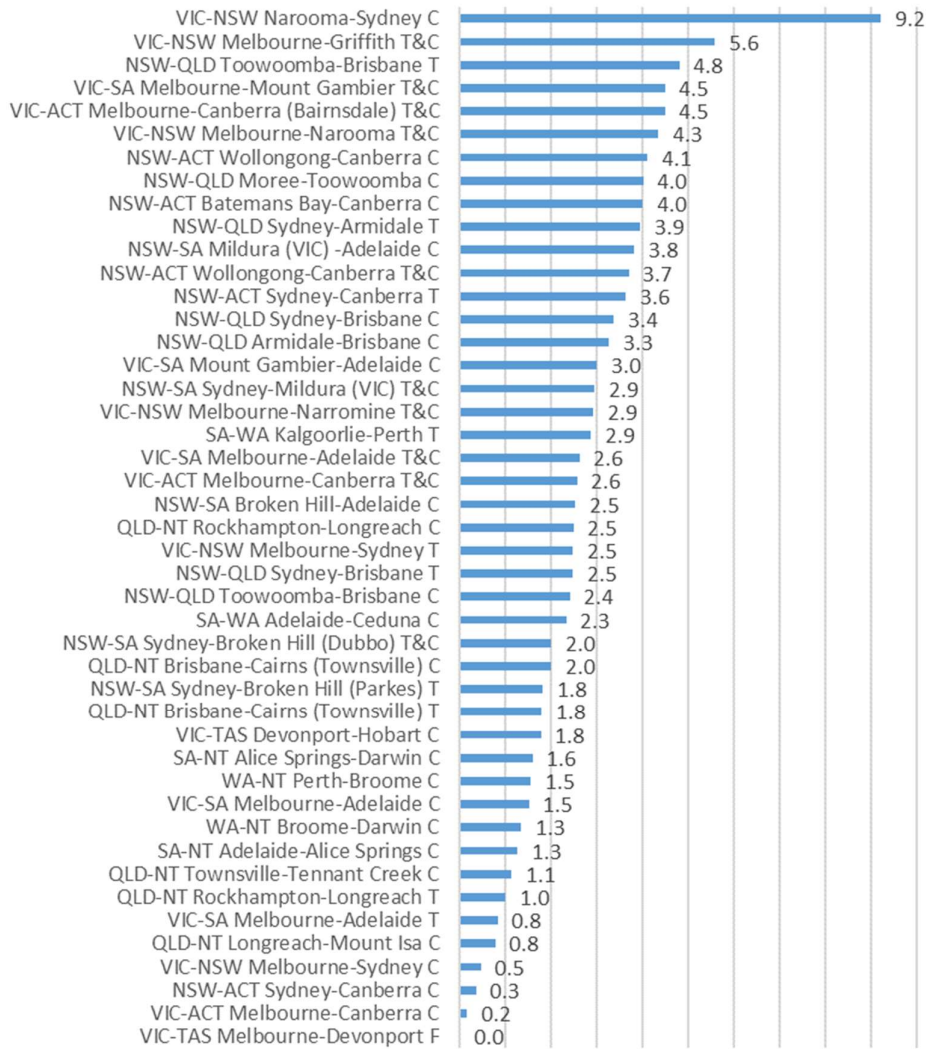
### 4.3 Intermediate stops

The number of intermediate stops ranges from 9.2 per 100 km (Narooma to Sydney coach service) to zero per 100 km (Melbourne-Devonport ferry service), with an average of 2.7 (median 2.5) stops per 100 km. Of the ten routes with the highest rate of intermediate stopping, five (including Narooma-Sydney) are coastal or part-coastal routes. This reflects the comparatively large number of coastal cities and towns along the NSW, VIC and SA coasts.

The number of intermediate stops per 100 km is negatively correlated with route length (-0.41). Similarly to service frequency, this may be explained by the effect of remoteness on distance between population centres.

<sup>9</sup> The Toowoomba-Brisbane train route (Narromine-Brisbane corridor) is part of the longer distance Brisbane to Charleville *Westlander* twice weekly train service and does not meet commuter or other daily return travel needs.

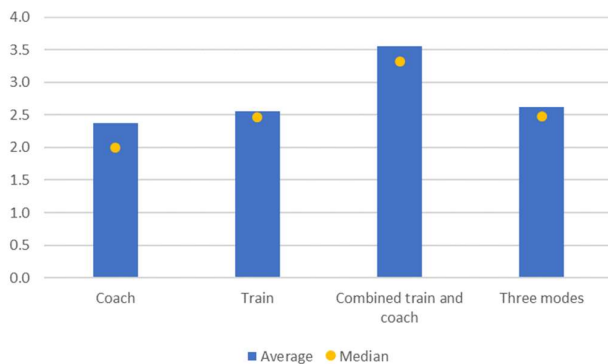
**Figure 8: Intermediate stops per 100 km, all routes by corridor jurisdiction pair and mode**



C Coach T Train T&C Combined train and coach F Ferry

At 3.6 stops per 100 km, combined train and coach routes have a higher number of intermediate stops than either of the other two modes (Figure 9). Three of the nine routes are coastal or partly coastal routes.

**Figure 9: Intermediate stops per 100 km by mode, average and median**

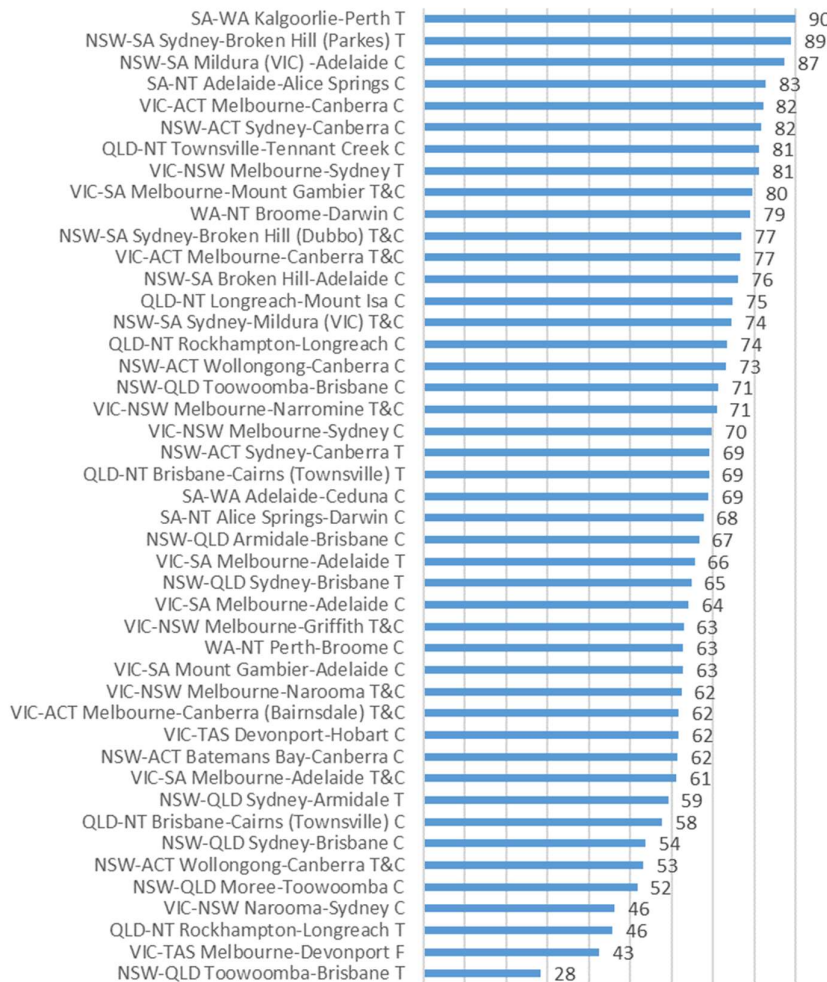




### 4.4 End to end speeds

The end to end speed of a service is calculated with reference to the timetabled departure time at one end of the route, the timetabled arrival time at the other end and the road infrastructure distance (see also Section 4.1). As shown in Figure 10, the spread of end to end speeds is from 28 kph (Toowoomba-Brisbane train) to 90 kph (Kalgoorlie-Perth train). The Kalgoorlie-Perth service was for many years the fastest rail route in Australia, following construction of a standard gauge line in the 1960s.<sup>10</sup> The second fastest route is the (weekly) train service between Sydney and Broken Hill (89 kph).<sup>11</sup>

**Figure 10: End to end speeds, kph, all routes by corridor jurisdiction pair and mode**



C Coach T Train T&C Combined train and coach F Ferry

<sup>10</sup> Analysis undertaken for this paper suggests that the fastest route in Australia is now Melbourne-Ballarat, with many trains operating at an average end to end speed of 96 kph.

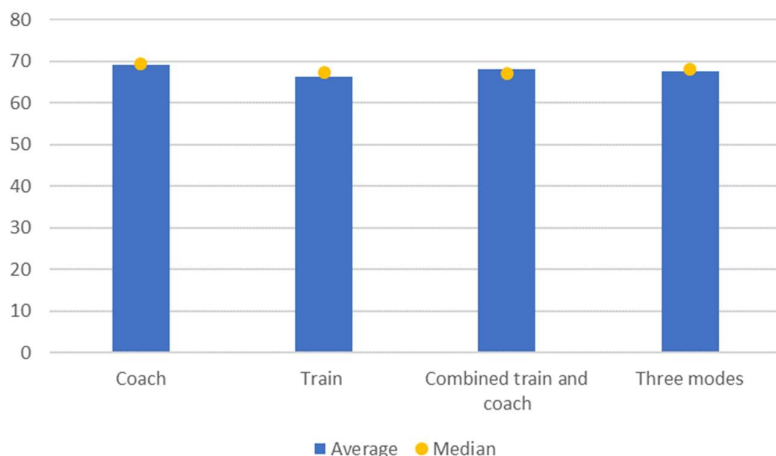
<sup>11</sup> The actual end to end speed for the Melbourne-Sydney train service is also 89 kph. The service’s rail track length is 82 km longer than the corresponding road length that is used in this paper for both modes (Section 4.1).

The average end to end speed for all routes is 68 kph (median 69 kph).

End to end speeds are slightly negatively correlated (-0.33) with the number of intermediate stops per 100 km.

Overall, coach services and combined train and coach services (averages 69 and 68 kph respectively) have a very slight edge in terms of speed over train services (average 66 kph). See Figure 11.

**Figure 11: End to end route speeds by mode, kph, average and median**



## 4.5 Fares

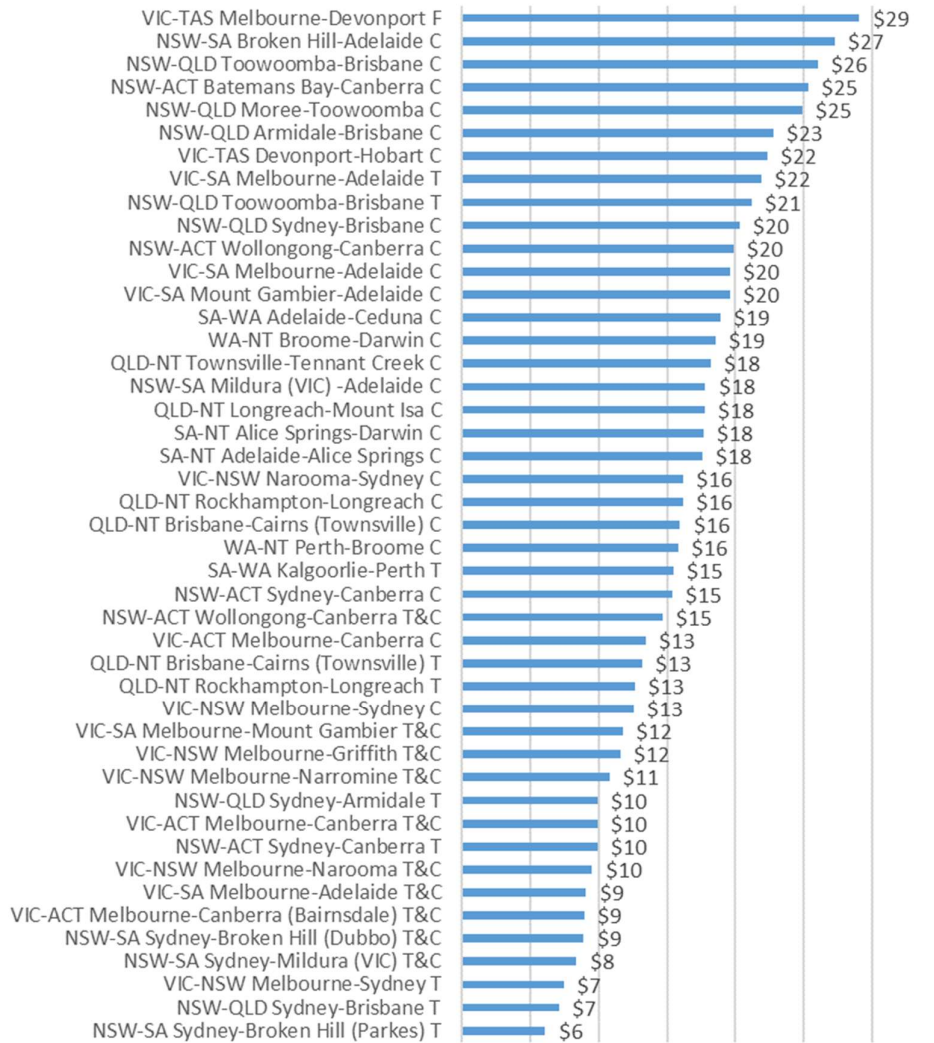
Based on the least expensive, changeable,<sup>12</sup> non-concession, adult one-way fares offered by operators, fares per 100 km range from \$6.05 (Sydney to Broken Hill train) to \$29.02 (Melbourne to Devonport ferry).<sup>13</sup> The average fare charged, again excluding tourism experience train routes, is \$16.14 (median \$16.06) per 100 km (Figure 12).

Fares are slightly negatively correlated (-0.30) with end to end speeds, which is contrary to intuition. While NSW TrainLink fares are lower than those of other operators, the Sydney-Broken Hill (via Parkes) and Melbourne-Sydney train services have the second and eighth fastest speeds respectively. Conversely, the Melbourne-Devonport ferry and Toowoomba-Brisbane train exhibit the highest and ninth highest fares, with the second lowest and lowest speeds respectively.

<sup>12</sup> Fares selected are generally changeable for a fee and not refundable, except in those instances where fully flexible fares are the only available option.

<sup>13</sup> The Melbourne-Devonport ferry fare is higher at \$40.03 per 100 km.

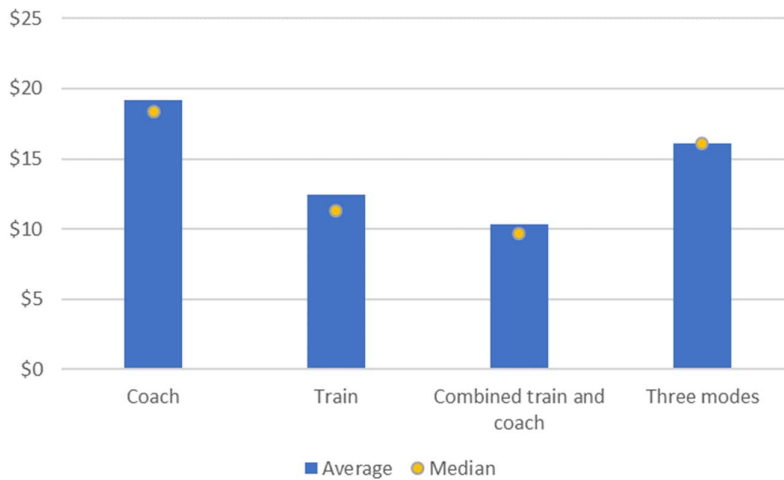
**Figure 12: Fare per 100 km, all routes by corridor jurisdiction pair and mode**



C Coach T Train T&C Combined train and coach F Ferry

At \$19.16 per 100 km, the average coach fare is the highest of the three modes, while the average combined train and coach fare (\$10.35 per 100 km) is the lowest. All combined train and coach routes in scope are operated by either NSW Trains or V/Line, whose fares are lower than those of other operators, for both combined train and coach and train modes.

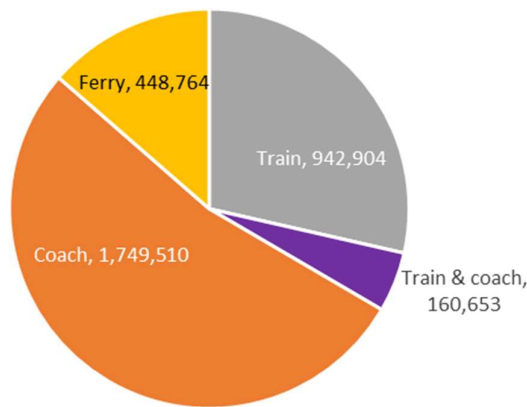
**Figure 13: Fare per 100 km by mode, average and median**



## 4.6 Patronage

Across the 45 interstate surface public transport routes in the four modes (including ferry), coach patronage is estimated, on the basis of service frequencies and other parameters,<sup>14</sup> at 53 per cent (1.7 million) of a total 3.3 million trips in 2017-18. Train patronage makes up 29 per cent, ferry 14 per cent and combined train and coach five per cent (Figure 14).<sup>15</sup>

**Figure 14: Estimated interstate corridor surface public transport trips, 45 route by mode services, 2017-18**



Source: Bavas 2016, Boisvert 2018, Department of State Growth 2018, Public Transport Authority 2018, Transport for NSW 2018a, TT-Line 2018 and author analysis

<sup>14</sup> Coach patronage is estimated on the basis of service frequencies, an average coach seating capacity of 55 persons and a (notionally commercially viable) average load factor of 73 per cent (40 passengers per service).

<sup>15</sup> Train patronage is based on data provided by Transport for NSW (2018a) and other sources, while train and coach patronage is a mix of actual data and estimation and ferry patronage is sourced from TT-Line 2018.

The Sydney-Canberra and Toowoomba-Brisbane coach routes are estimated to be the two largest surface public transport routes of the 45 routes in scope, at in excess of 750,000 passengers<sup>16</sup> and 500,000 passengers respectively per year. In the case of the Sydney-Canberra route, it is likely that the coach mode share exceeds 40 per cent, in a short route context where the air service barely offers a time advantage.

In third place and the largest route for which patronage data are available, is the Melbourne-Devonport ferry service, at 448,764 passengers (TT-Line 2018).

There are five train routes with patronage in excess of 100,000 passengers per year: Melbourne-Sydney via Albury (370,732), Sydney-Brisbane via Coffs Harbour (351,770), Sydney-Canberra (218,683), Sydney-Armidale (112,822) and Brisbane-Cairns (112,460).<sup>17</sup> See Annex Table 1 for patronage data on other routes, as available.

Factoring in air transport, for comparative purposes, the four modes comprise around six per cent of estimated total interstate passenger trips, with air transport at 94 per cent and totalling 49.3 million interstate trips.<sup>18</sup>

## 5 Commentary

Surface public transport routes in the interstate corridors identified in this paper are long (average 755 km) and the corridors themselves are even longer (average 1,402 km). At least 70 per cent of the urban centres and localities along the corridors have populations of less than 10,000 persons. This is a challenging environment for passenger rail and coach transport and a natural fit, at least for end to end travel where the largest markets are located, for aviation.

Coach is the most prevalent and most heavily patronised interstate surface public transport mode, operating in its own right on 24 routes, while there are comparable train services on 10 routes. Subject to road conditions (i.e. adequate, well-maintained infrastructure, low congestion, absence of flooding), coach services are able to adjust to almost any route distance and location. Tourism experience trains aside, coach services provide the sole surface public transport links for NT, through the Adelaide-Alice Springs-Darwin, Townsville-Tennant Creek and Perth-Broome-Darwin routes.<sup>19</sup>

Low service frequency, with a median level of less than one per day, is consistent with lengthy route distance. The stand-out exceptions, Sydney-Canberra and Toowoomba-Brisbane involve, respectively, two closely located capital cities and a peri-urban commuter and other travel route without a frequent passenger rail service.

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<sup>16</sup> The Productivity Commission (2019) notes bus capacity of up to 3,000 seats per day on this route, above airline capacity. This would translate to around 1.1 million seats per year.

<sup>17</sup> Brisbane-Cairns patronage is for 2015-16 (Bavas 2016). On an overall national basis, setting aside the interstate corridor perspective and definitions adopted in this paper (sections 3.3 and 3.4), a number of near capital city passenger train routes, including those to Newcastle and Wollongong/Bomaderry from Sydney and to Geelong, Bendigo, Ballarat, Traralgon and Seymour from Melbourne have annual patronage in the millions of passengers (Transport for NSW 2019, V/Line 2018).

<sup>18</sup> BITRE personal communication, 8 May 2019.

<sup>19</sup> There are no east-west surface public transport links with WA. On the 2,600 km Adelaide-Perth route, there is no coach service over the nearly 1,400 km between Ceduna (SA) and Kalgoorlie (WA).

The extent of intermediate stopping in all three modes (average of 2.7 stops per 100 kilometres) confirms a point of difference between surface public transport services on the one hand and aviation services on the other (Section 2.1). Moreover, above average rates of intermediate stopping are evident on coastal routes in south-eastern Australia and on some inland routes in country NSW, VIC and SA, reflecting relatively denser patterns of population settlement in these areas.

The coach mode's small route speed advantage (3 kph on average over train) may be indicative of relative infrastructure capability and level of service. Coach services benefit from relatively low road delay and congestion, at least in the non-urban context. Rail services generally lack the infrastructure standard that would permit speeds above those available on the road system, as are achieved in many overseas rail systems (BITRE 2014, Laird 2018). However, train service routes have the two fastest travel times (Perth-Kalgoorlie, Sydney-Broken Hill), due to the effect of straight, modernised rail infrastructure on these lines.

Coach fares (average \$19.16 per 100 km) are more than 50 per cent higher than train fares (average \$12.47 per 100 km) and exceed combined train and coach fares (average \$10.35 per 100 km) by an even greater margin. In light of government subsidies in place for train and combined train and coach services (Bavas 2016, NSW Trains 2018, Volume 2, p. 5), it is likely that policy factors, rather than underlying mode economics, explain the contrast. While certain coach services also receive government subsidy, coach fares are largely set in the private market and, by inference, are cost-related.

The surface transport modes' small share of passenger trips on interstate routes, estimated at five per cent, is consistent with slow speeds and low frequencies of passenger trains in particular, as well as the relatively small number of passenger train routes. It stands in contrast to Europe, where rail is characterised as highly competitive with air on many routes (The Economist 2019).

## 6 Further research

Since surface public transport services mostly accommodate trips of varying lengths, information on the patronage density of different route sections would add usefully to the service profile presented here. Together with filling gaps in and complementing the aggregate patronage information available through operators in different modes, a national passenger travel survey could be an appropriate and efficient means to supply this information. It would also overcome jurisdictional differences in data definitions, applicable geographies and coverage, all of which hamper analysis in this area.

The costs of interstate surface public transport services merit separate study, extending the analysis of fare levels provided in this paper.

Comparison of Australia's interstate surface public transport profile with the interstate or longer distance surface public transport profile of other countries may throw light on the extent to which Australia's service profile reflects situational factors, as distinct from policy-related ones. Situational factors comprise: physical geography (size and overall accessibility by different transport modes); human geography (i.e. population, its density and distribution); and socio-economic factors (e.g. GDP per capita). Policy-related factors may include the responsibilities of different spheres of government, under the constitution and by convention and relative preferences for private and public transport travel.

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**Annex Table 1: Interstate routes by mode, operators and service indicators**

No (1)	Interstate corridor (via)	Route (via)	Route length (road km)	Mode	Operator(s)	Return frequency pw	Intermediate stops per 100 km	End to end speed kph (2)	Fare \$ per 100 km (3)	Patronage 2017-18
1	NSW-QLD Sydney-Brisbane (Coffs Harbour)	Sydney-Brisbane	920	Train	NSW TrainLink	7	2.5	65	7.08	351,770
		Sydney-Brisbane	920	Coach	Greyhound Australia, Premier Motor Services	21	3.4	54	20.32	
2	NSW-QLD Sydney-Brisbane (Armidale)	Sydney-Armidale	476	Train	NSW TrainLink	7	3.9	59	9.95	112,822
		Armidale-Brisbane	476	Coach	Crisps Coaches	3	3.3	67	22.77	
3	NSW-QLD Narromine-Brisbane (Toowoomba) Inland Rail	Moree-Toowoomba	349	Coach	Crisps Coaches	7	4.0	52	24.91	3,677 (4)
		Toowoomba-Brisbane	125	Train	QueenslandRail	2	4.8	28	21.18	
		Toowoomba-Brisbane	125	Coach	Greyhound Australia, Murrays Coaches	98	2.4	71	26.02	
4	NSW-SA Sydney-Adelaide (Broken Hill)	Sydney-Broken Hill (Parkes)	1,144	Train	NSW TrainLink	1	1.8	89	6.05	9,190
		Sydney-Broken Hill (Dubbo)	1,152	Train and coach	NSW TrainLink	2	2.0	77	8.88	
		Broken Hill-Adelaide	514	Coach	Buses R Us	3	2.5	76	27.23	
5	NSW-SA Sydney-Adelaide (Mildura VIC)	Sydney-Mildura	1,012	Train and coach	NSW TrainLink	7	2.9	74	8.37	6,889
		Mildura-Adelaide	394	Coach	Tambray Coaches	4	3.8	87	17.79	
6	NSW-ACT Sydney-Canberra	Sydney-Canberra	286	Train	NSW TrainLink	21	3.6	69	9.88	218,683
		Sydney-Canberra	286	Coach	Greyhound Australia, Murrays Coaches	154	0.0	82	15.38	
7	NSW-ACT Wollongong-Canberra	Wollongong-Canberra	244	Train and coach	NSW TrainLink	7	3.7	53	14.67	9,573
		Wollongong-Canberra	244	Coach	Murrays Coaches	7	4.1	73	19.84	
8	NSW-ACT Batemans Bay-Canberra	Batemans Bay-Canberra	149	Coach	Murrays Coaches	7	4.0	62	25.29	
9	VIC-NSW Melbourne-Sydney (Albury)	Melbourne-Sydney	878	Train	NSW TrainLink	13	2.5	81	7.42	370,732
		Melbourne-Sydney	878	Coach	Greyhound Australia	7	0.5	70	12.53	

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No (1)	Interstate corridor (via)	Route (via)	Route length (road km)	Mode	Operator(s)	Return frequency pw	Intermediate stops per 100 km	End to end speed kph (2)	Fare \$ per 100 km (3)	Patronage 2017-18
10	VIC-NSW Melbourne-Sydney (Narooma)	Melbourne-Narooma	692	Train and coach	V/Line	7	4.3	62	9.51	
		Narooma-Sydney	358	Coach	Premier Motor Services	14	9.2	46	16.20	
11	VIC-NSW Melbourne-Griffith	Melbourne-Griffith	430	Train and coach	V/Line	7	5.6	63	12	
12	VIC-NSW Melbourne-Narromine Inland Rail	Melbourne-Narromine	810	Train and coach	NSW TrainLink	3	2.9	71	10.79	
13	VIC-SA Melbourne-Adelaide (Horsham)	Melbourne-Adelaide	727	Train	Great Southern Rail	2	2.6 (4)	66	21.87	17,000
		Melbourne-Adelaide	727	Train and coach	V/Line	5	2.6	61	9.05	
		Melbourne-Adelaide	727	Coach	Firefly	14	1.5	64	19.63	
14	VIC-SA Melbourne-Adelaide (Mount Gambier)	Melbourne-Mount Gambier	424	Train and coach	V/Line	14	4.5	80	11.76	
		Mount Gambier-Adelaide	434	Coach	Premier Staterliner	6	3.0	63	19.63	
15	VIC-ACT Melbourne-Canberra (Wodonga)	Melbourne-Canberra	664	Train and coach	V/Line	7	2.6	77	9.91	
		Melbourne-Canberra	664	Coach	Greyhound Australia	14	0.2	82	13.40	
16	VIC-ACT Melbourne-Canberra (Bairnsdale)	Melbourne-Canberra (Bairnsdale)	736	Train and coach	V/Line	3	4.5	62	8.94	
17	VIC-TAS Melbourne-Hobart (Devonport)	Melbourne-Devonport	447	Ferry	TT-Line	7	0.0	43	40.03	448,764
		Devonport-Hobart	282	Coach	Tassielink, Redline	13	1.8	62	22.36	102,150
18	QLD-NT Rockhampton-Darwin (Longreach)	Rockhampton-Longreach	686	Train	QueenslandRail	2	1.0	46	12.67	12,189 (6)
		Rockhampton-Longreach	686	Coach	Greyhound Australia	2	2.5	74	16.17	
		Longreach-Mount Isa	648	Coach	Bus Queensland	7	0.8	75	17.75	
19	QLD-NT Brisbane-Cairns (Townsville) (7)	Brisbane-Cairns	1,681	Train	QueenslandRail	5	1.8	69	13.15	112,460 (6)
		Brisbane-Cairns	1,681	Coach	Greyhound Australia, Premier Motor Services	14	2.0	58	15.95	
20	QLD-NT Townsville-Tennant Creek	Townsville-Tennant Creek	1,565	Coach	Greyhound Australia	1	1.1	81	18.21	

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No (1)	Interstate corridor (via)	Route (via)	Route length (road km)	Mode	Operator(s)	Return frequency pw	Intermediate stops per 100 km	End to end speed kph (2)	Fare \$ per 100 km (3)	Patronage 2017-18
22	SA-NT Adelaide-Darwin	Adelaide-Alice Springs	1,533	Coach	Greyhound Australia	7	1.3	83	17.55	
		Alice Springs-Darwin	1,496	Coach	Greyhound Australia	7	1.6	68	17.64	
23	SA-WA Adelaide-Perth	Adelaide-Ceduna	775	Coach	Premier Stateliner	2	2.3	69	18.91	
		Kalgoorlie-Perth	593	Train	Transwa	9	2.9	90	15.48	86,151
24	WA-NT Perth-Darwin (Broome)	Perth Broome	2,240	Coach	Integrity Coach Lines	2	1.5	63	15.85	
		Broome-Darwin	1,871	Coach	Greyhound Australia	6	1.3	79	18.52	
	ADDITIONAL	Sydney-Adelaide (Broken Hill)	1,658			1	0.0	68	62.67	
		Adelaide-Perth	2,693	Train (tourism experience)	Great Southern Rail	1	0.0	65	76.45	
		Adelaide-Darwin	3,029			2	0.0	62	93.70	
	AVERAGE (8)		755			12.5	2.7	68	16.14	
	MEDIAN (8)		675			7.0	2.5	69	16.06	
<p>(1) Excludes two unserved corridors, 21 Cairns-Alice Springs (Winton) and 26 Broome-Alice Springs (Halls Creek). The Perth-Kalgoorlie route (corridor 25) is shown against corridor 23 in the reverse direction.</p> <p>(2) Calculated on the basis of end to end road distances and timetable transit times, August-September 2018</p> <p>(3) Least cost flexible one-way non-concession fares, as applicable, August-September 2018</p> <p>(4) Melbourne-Adelaide direction only, with 0.3 stops per 100 km (two stops) in the Adelaide-Melbourne direction</p> <p>(5) Coach patronage (Dubbo-Broken Hill) only</p> <p>(6) 2015-16 data</p> <p>(7) Intrastate corridor that connects interstate ones</p> <p>(8) Excludes three interstate tourism experience trains (see 'Additional')</p>										

**Annex Table 2: Correlations between service indicators**

	Return frequency	Intermediate stops per 100 km	End to end speeds	Fare per 100 km
Route length	-0.25	-0.41	0.25	-0.24
Return frequency		-0.15	0.15	-0.11
Intermediate stops per 100 km			-0.33	-0.11
End to end speeds				-0.30