

Improving accessibility in growing Australian cities

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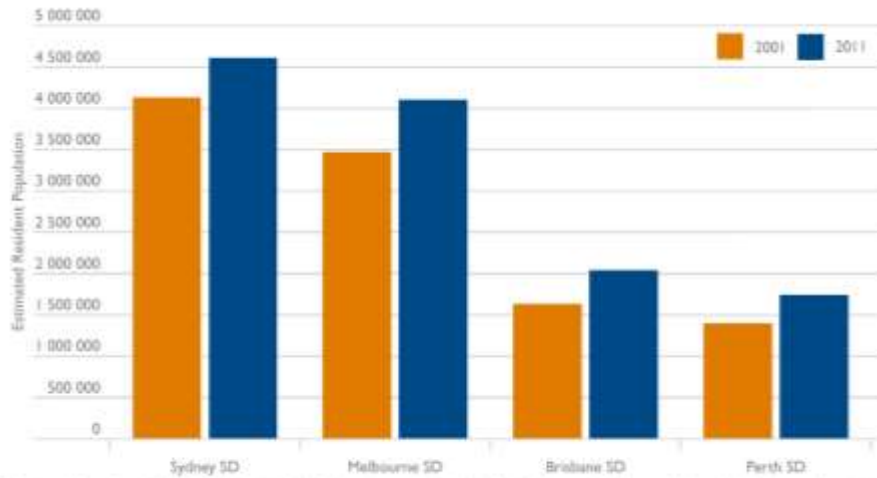
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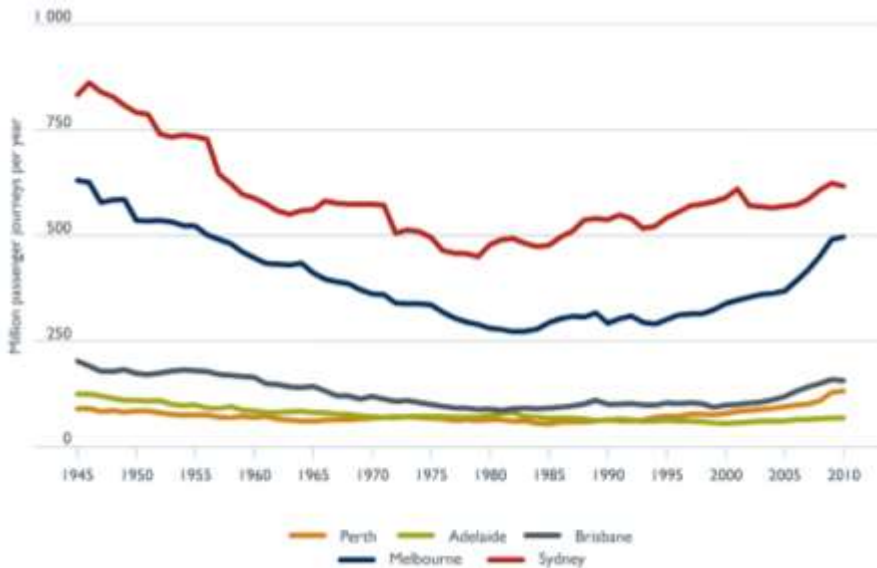
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Growing cities and public transport usage



Note: Based on 2006 ASGC Statistical Division boundaries, which differ from 2011 boundaries for Brisbane. Population estimates for 2007 to 2011 remain preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 - Estimated Resident Population data for SLAs (July 2012 and July 2007 releases).



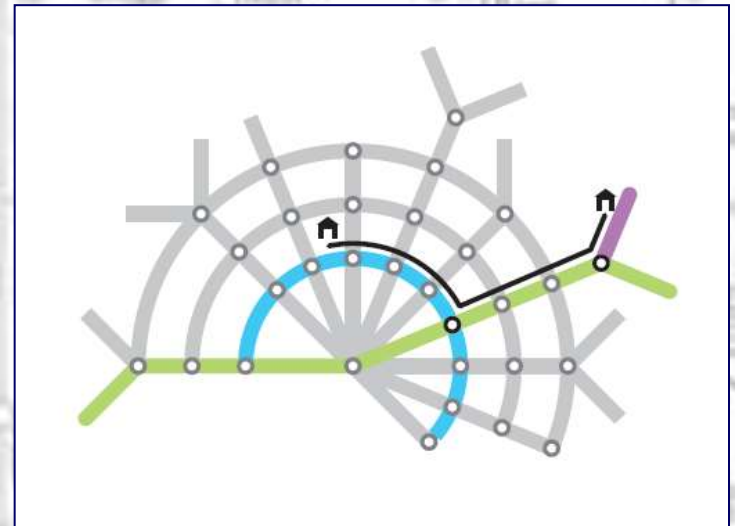
Can Australian cities remain functional while sustaining concurrent trends of growing public transport usage and ongoing land use intensification in transit-served areas, and what additional measures are required to facilitate this?

Graph source: BITRE

Spatial Network Analysis for Multimodal Urban Transport Systems (SNAMUTS)

- **Purpose:** To assess and quantify how transport networks, in terms of geographical configuration and service levels, perform in their urban context (distribution of land use activities).
- SNAMUTS was inspired by the **Space Syntax** approach (Hillier and Hanson, 1984), and the **Multiple Centrality Analysis** tool (Porta, Crucitti and Latora, 2006)
- SNAMUTS is a **supply-side tool**: it does not provide predictions about usage or capacity levels. Rather it asks: **What is the role of the public transport system in facilitating movement and activity across a city region?**

The Network Effect



Create a 'network effect' by

- local optimisation to routes,
- good interchange facilities,
- high and standardised service frequencies,
- timetable coordination and
- the presence of orbital/cross-suburban routes to maximise market penetration for public transport.

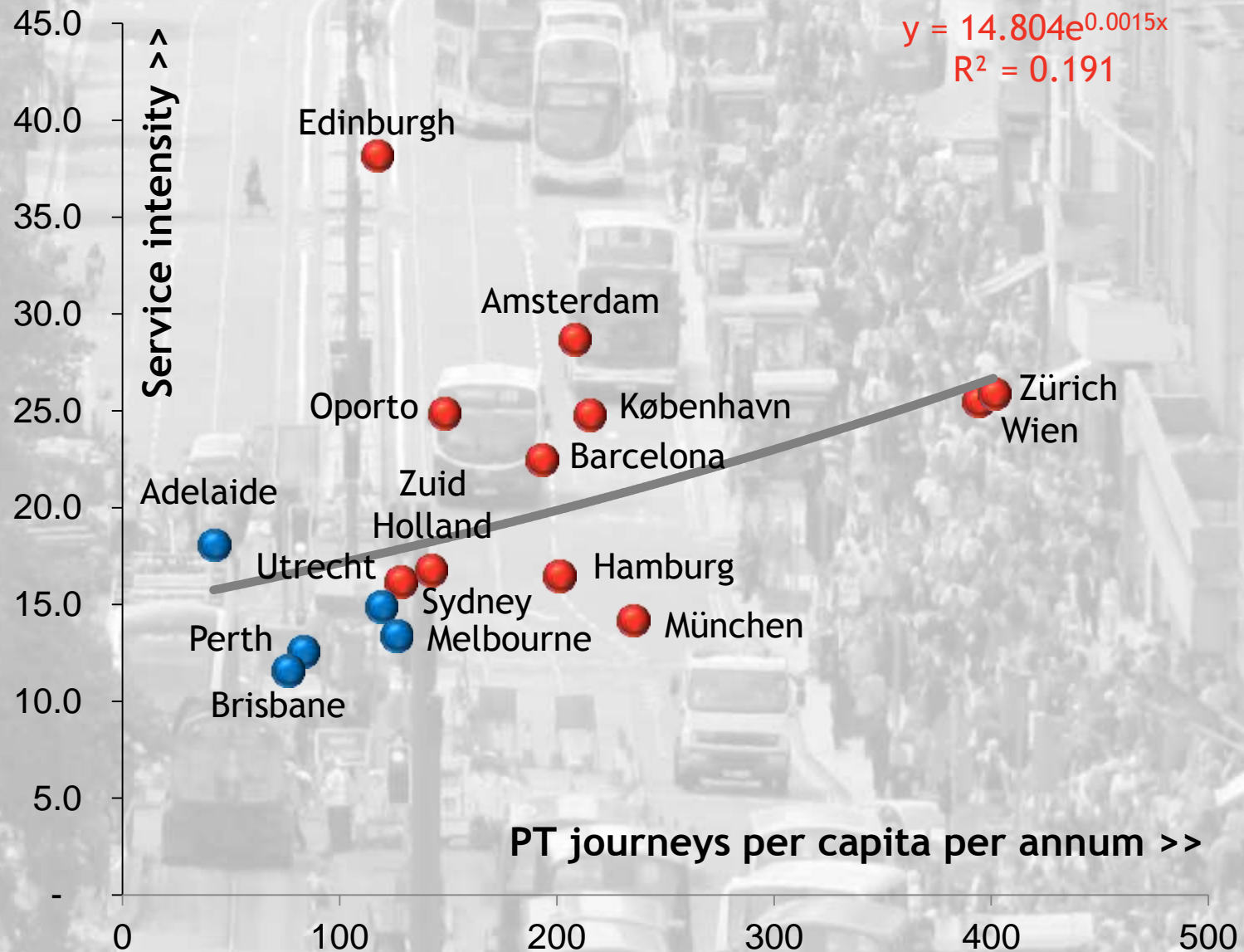
Map Sources: www.railpage.com.au, www.hitrans.org

Service intensity

- Number of vehicles in simultaneous revenue service at the SNAMUTS minimum standard during the weekday inter-peak period per 100,000 metropolitan residents in Australian and European cities
- Not total number of vehicles required by operator
- Propensity of public transport agencies and operators to provide resources to run the system and its efficiency
- Also increases where settlement areas are dispersed or separated by geographical barriers
- High service intensity scores are therefore not necessarily indicative of better service, but may be indicative of the level of resources stakeholders within a city-region are politically and economically prepared to mobilise and allocate to public transport operation

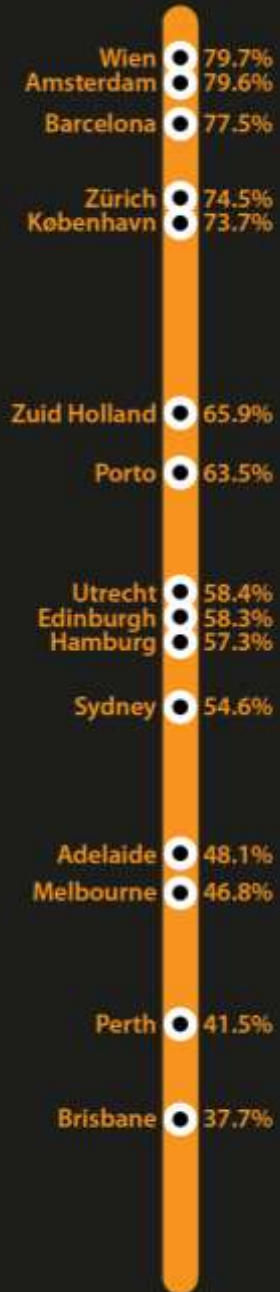


Public transport usage and service intensity

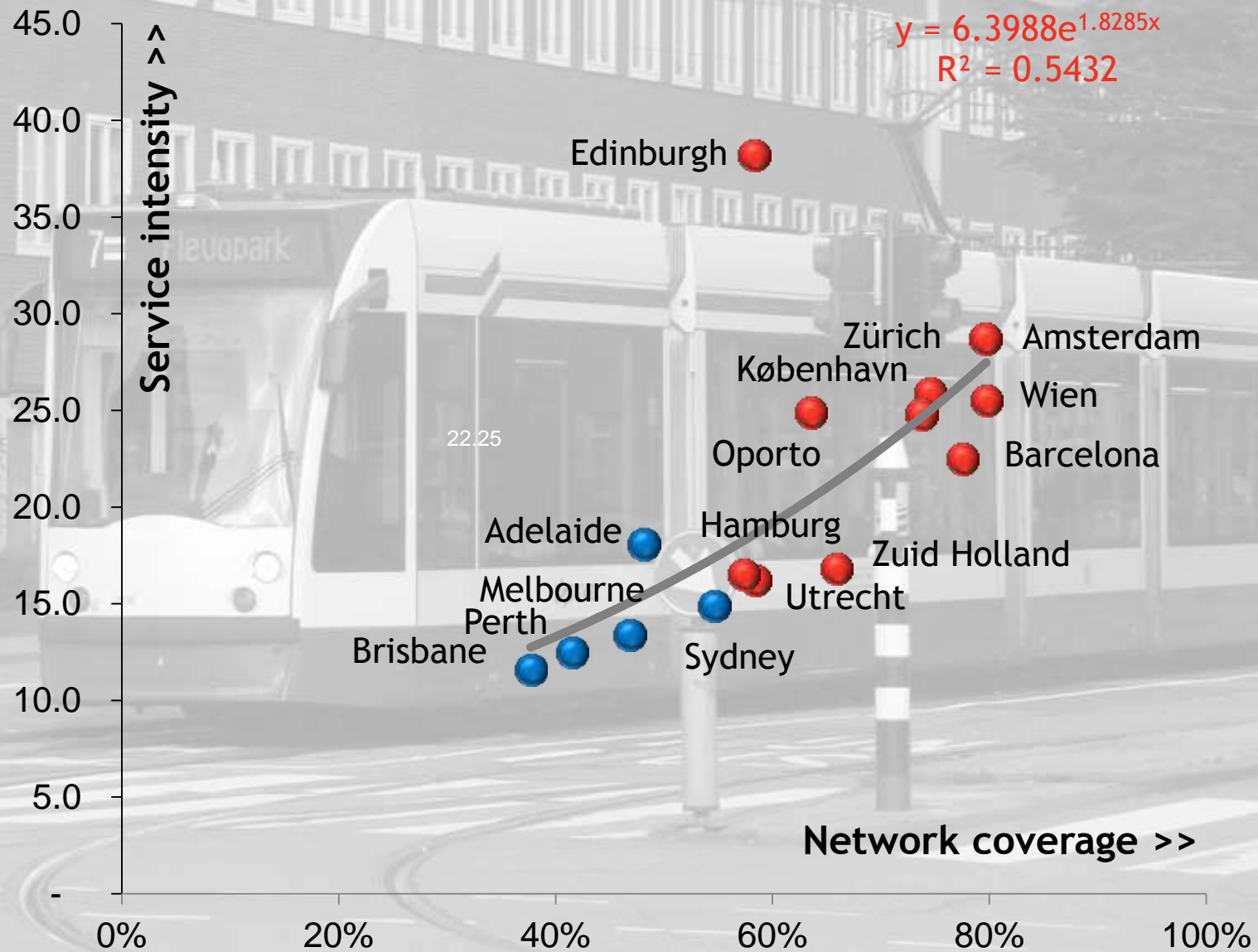


Network coverage

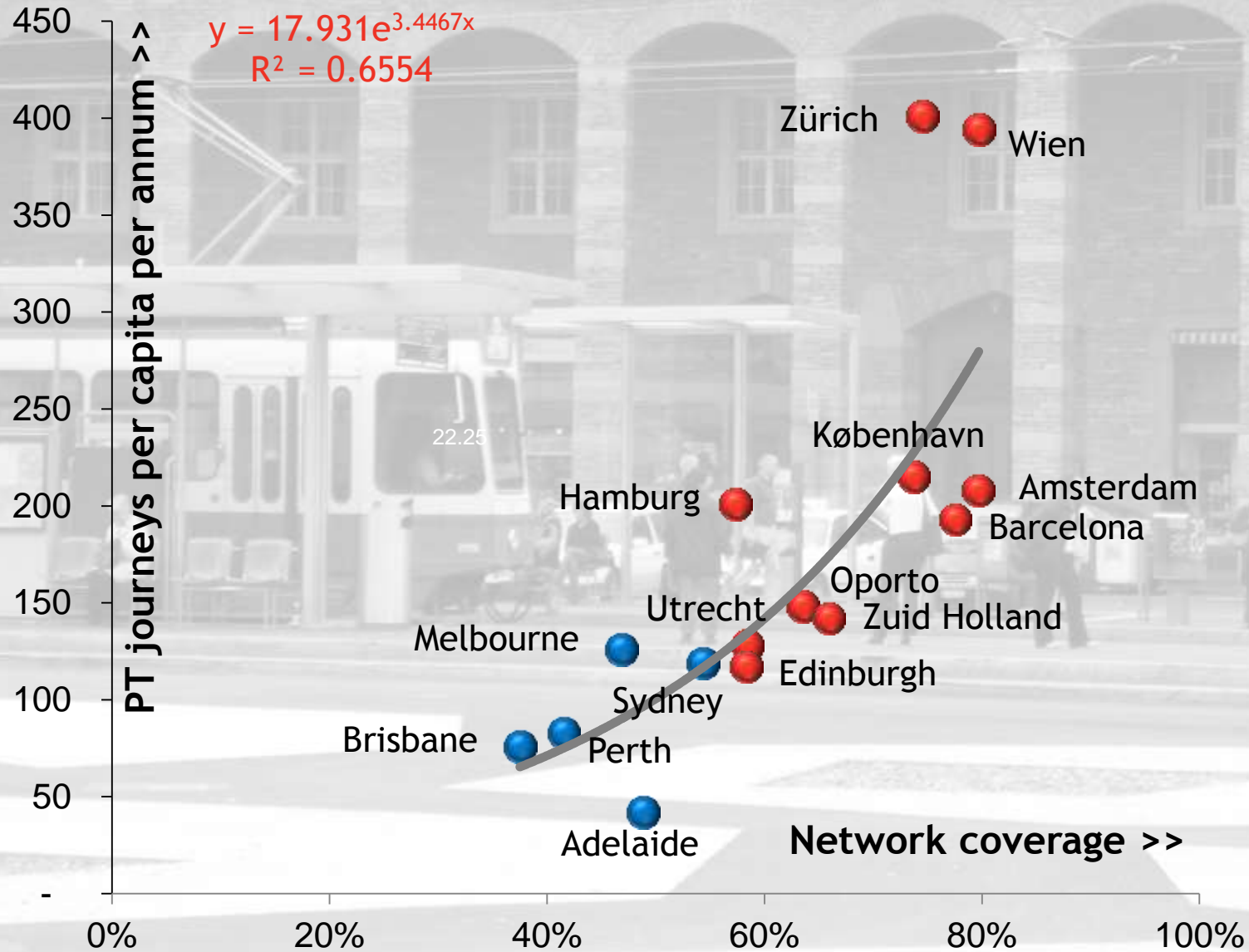
- Percentage of all metropolitan residents and jobs within walking distance of public transport services at the SNAMUTS minimum standard in Australian and European cities
- Measures the dedication of public transport authorities governments to supply a good standard of accessibility to as many of their citizens as possible



Network coverage and service intensity



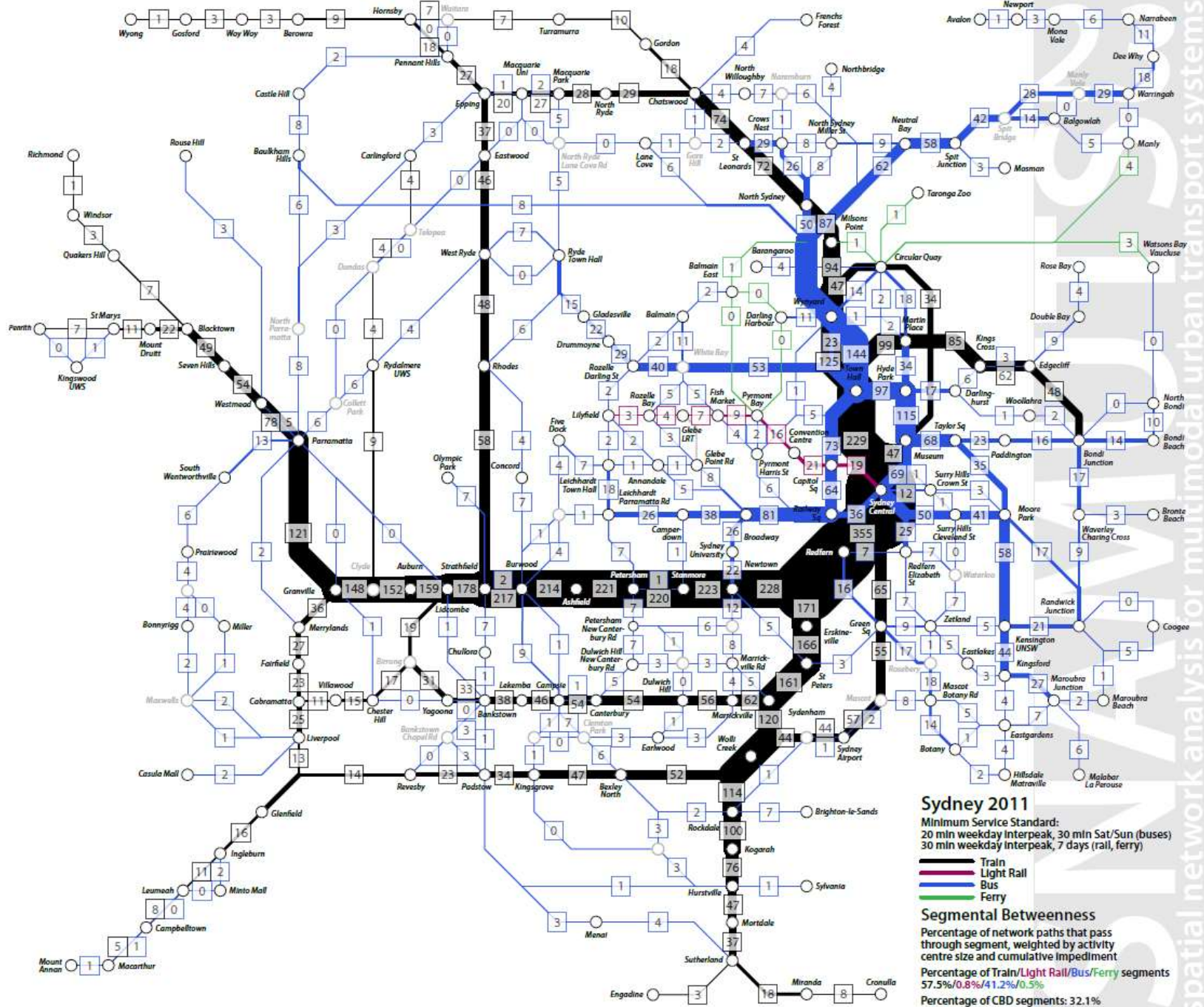
Public transport usage and network coverage



Network stress (1)

- Based on the segmental betweenness index, which determines the spatial distribution of travel opportunities across the network generated by the location and concentration of land use activities, the configuration of the network and the levels of service offered
- Ratio of the segmental betweenness index with the actual quantitative ability of the public transport service to move passengers along each segment, determined by the service frequency and the size of the vehicles used





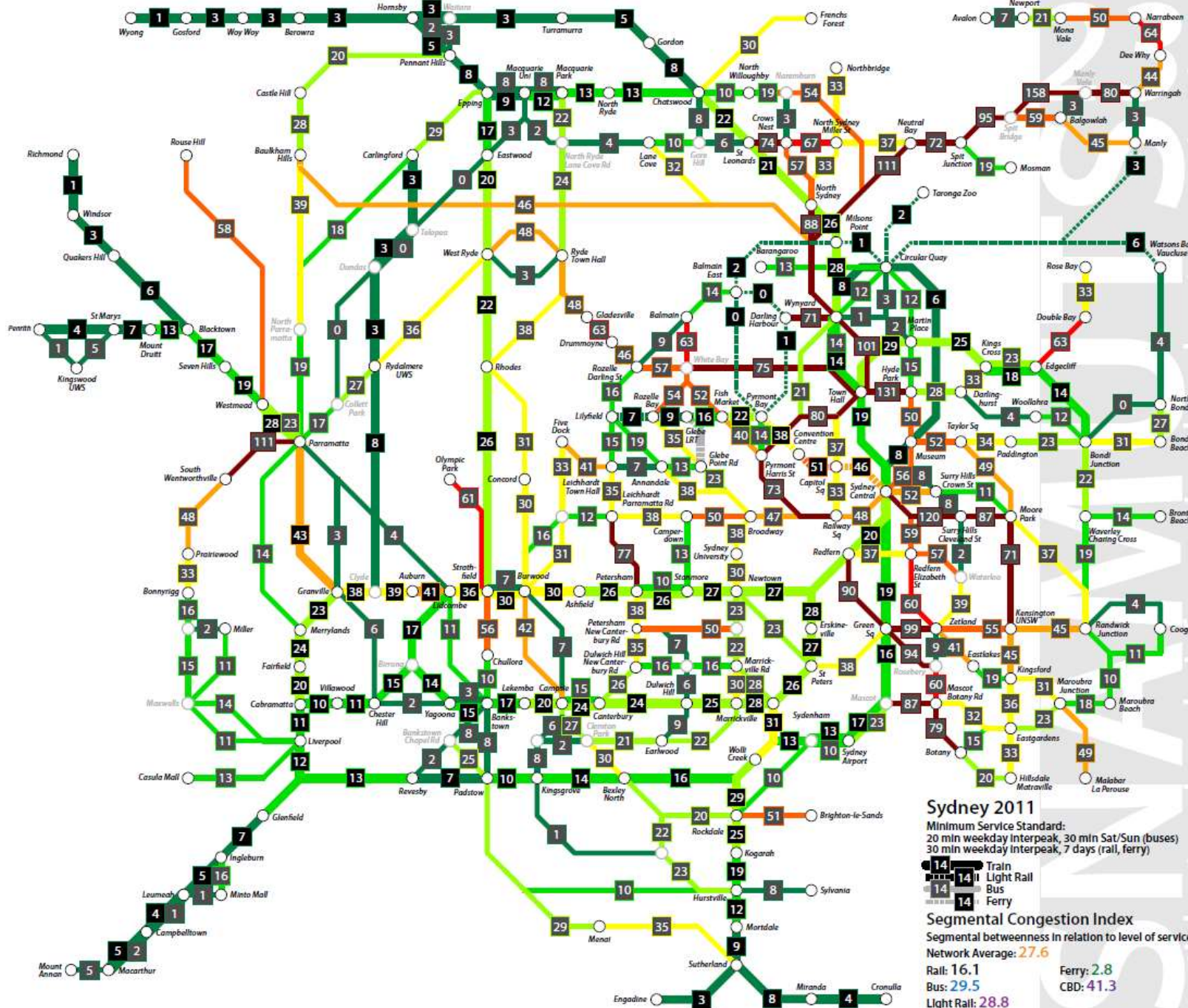
Sydney 2011
 Minimum Service Standard:
 20 min weekday interpeak, 30 min Sat/Sun (buses)
 30 min weekday interpeak, 7 days (rail, ferry)

█ Train
█ Light Rail
█ Bus
█ Ferry

Segmental Betweenness
 Percentage of network paths that pass through segment, weighted by activity centre size and cumulative Impediment

Percentage of Train/Light Rail/Bus/Ferry segments
 57.5%/0.8%/41.2%/0.5%

Percentage of CBD segments: 32.1%

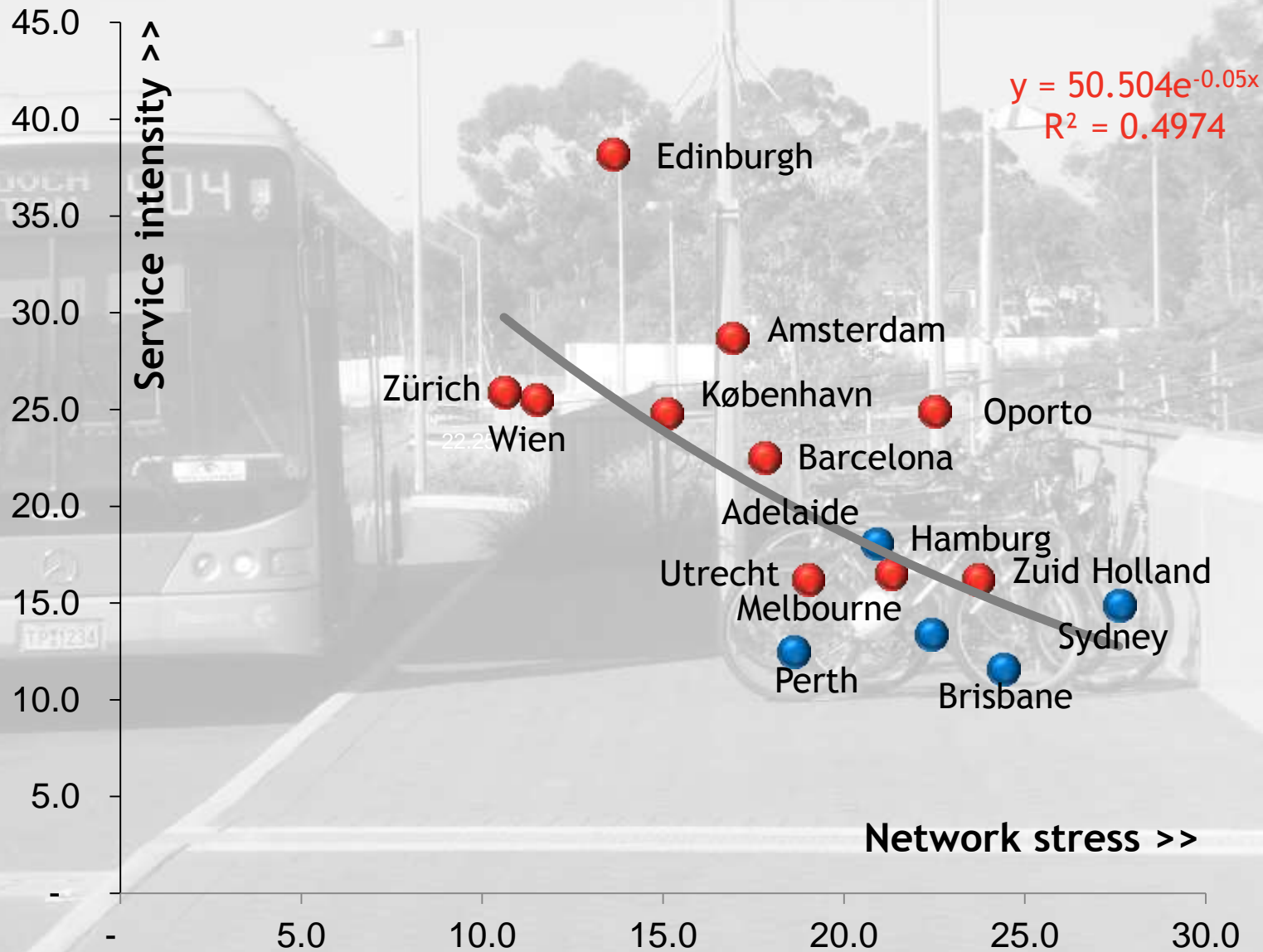


Network stress (2)

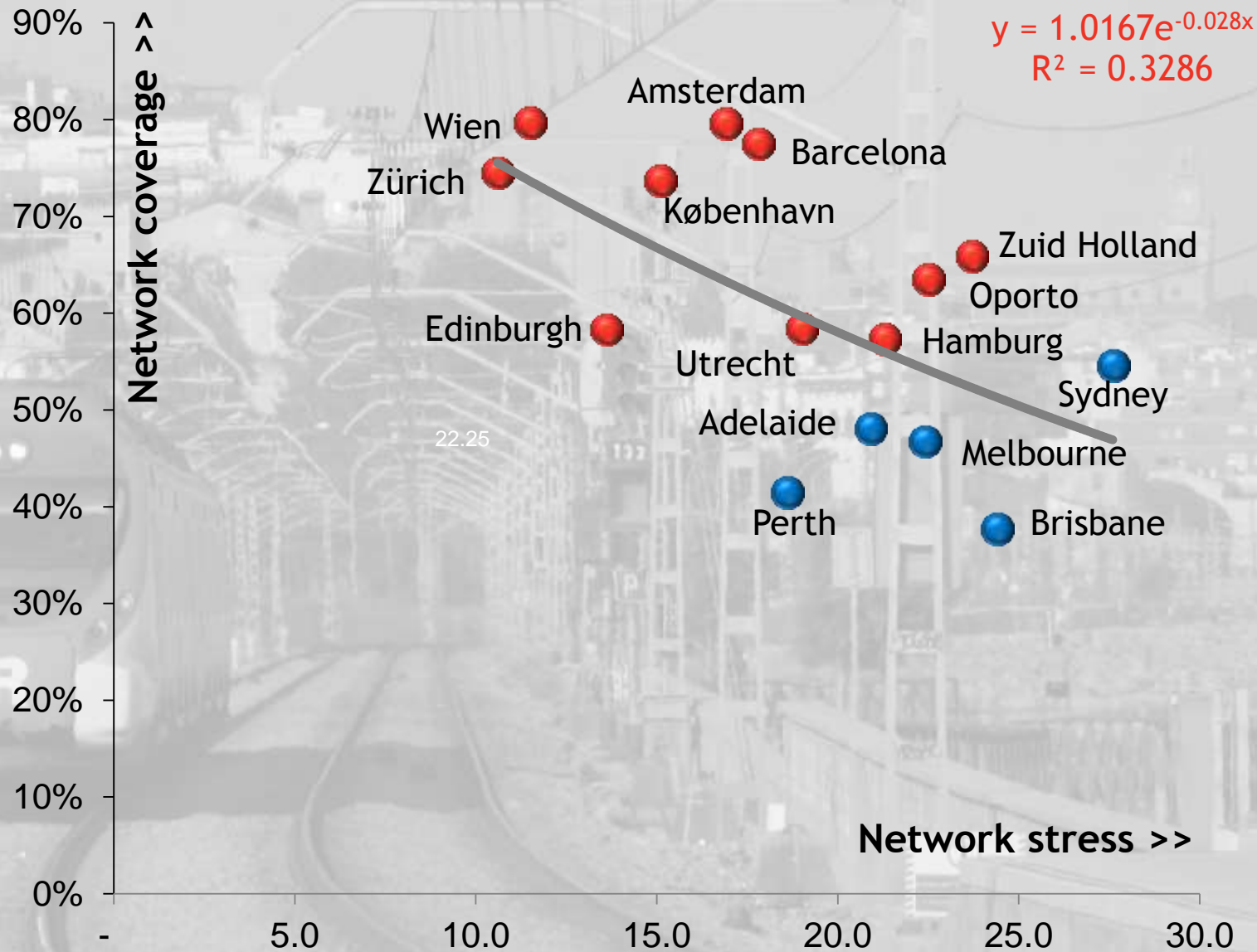
- Highlights where in the network the concentration of travel opportunities appears to outstrip, match or remain below the carrying capacity offered by the transport mode(s) and service levels on each route segment assessed
- Doesn't necessarily match overcrowding, as travel will be influenced by competitiveness of other modes and routes, and the legibility of the network
- People may also decide to travel to less convenient destinations, travel via less convenient routes or forego travel altogether



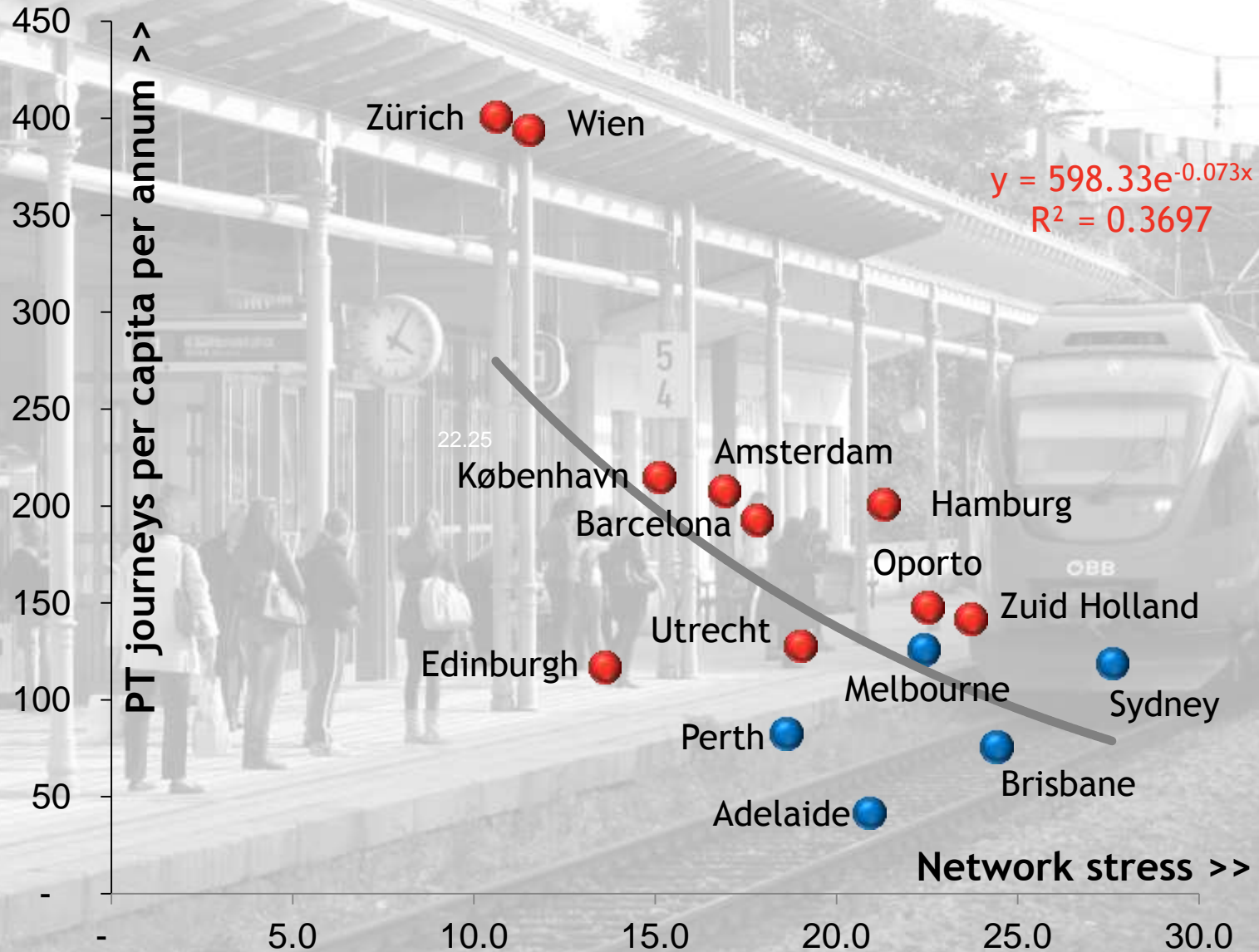
Service intensity and network stress



Network coverage and network stress



Public transport usage and network stress



Lessons for Australian cities (1)

- Adelaide has the highest service intensity per capita in Australia: is this more because of generous service provision (GO Zone program) or more because of bus congestion in the central area (second highest CBD network stress after Sydney)?
- Sydney has the broadest network coverage in Australia: is this because of a long-standing strategy for land use intensification around rail stations? 'European' urban densities in the inner area? Greater geographical constraints for outer urban expansion than in other Australian cities?
- Perth and Melbourne have the lowest central area network stress figures in Australia: is this because both cities make the most of their mix of transport modes? Perth by a skillful division of transport tasks between rail and bus, Melbourne by relying on trams more than buses for inner urban surface transport?

Lessons for Australian cities (2)

- If Australian cities wish to boost their public transport patronage further (beyond the rate of population growth), they will need to expand the geographical spread of their public transport networks as well as improve their capacity and performance, particularly in congestion-prone inner areas.
- These twin goals are not policy alternatives, as in: either improve public transport in the growth areas or fix the congestion problems in inner areas. Both strategies are mutually supportive and depend on one another.
- To achieve levels of public transport usage approaching those of better-performing European cities, network and service configuration need to align more closely to the travel opportunities generated by the land use-transport system (SNAMUTS betweenness index)

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