

## Submission: I.P.A.R.T. Review of Fares for Metropolitan and Outer Metropolitan Bus Services from January 2010

Submitted by: Robert Williams

Date: June 2009

### Purpose

This document is an individual submission to the review of fares for metropolitan and outer metropolitan bus services from January 2010. The main proposals are:

- Adopt a uniform unit of distance such as Metres; if Sections are retained define them as a uniform number of Metres and measure from boarding point to alighting point
- Increase the granularity of fares to avoid large increments
- Calculate distance travelled based on point-to-point, or shortest path, rather than the path of the bus, which often includes circuitous detours

These points relate primarily to issues 18, 19, and 20 of Transport - Issues Paper (May 2009)

### References

Transport - Issues Paper (May 2009)

<http://www.ipart.nsw.gov.au/files/Review%20of%20fares%20for%20metropolitan%20and%20outer%20metropolitan%20bus%20services%20from%20January%202010%20-%20Issues%20Paper%20-%20WEBSITE%20DOCUMENT.PDF>

Ministry of Transport Bus Planning Glossary of Terms

<http://www.transport.nsw.gov.au/abouttrans/planners-bus-dictionary.pdf>

Sydney Buses: Calculating Sections

<http://www.sydneybuses.info/tickets/bus-only-tickets/calculating-sections.htm>

### Background

The current method of fare determination, based on Sections, has changed little in decades. It predates electronic fare systems and carries over features that were necessary in a time when drivers (or conductors) issued tickets. The units of distance, Sections, are approximately a mile in length (~1.6 Km) but rather than being of uniform length are aligned to easily memorable milestones, and can vary between 1.3 Km and 1.9 Km (or more in some cases). Distance-based tickets are charged in multiples of Sections (e.g. 1-2, 3-5, etc.) thus at the thresholds a small additional distance results in a significant cost increase.

In combination such factors can result in significant inequities in fares charged to passengers, for example a 1.4 Km journey that straddles a 1.3 Km section could be charged as a three section fare, whereas a 3.7 Km trip that straddles only one Section Point would be charged at 2 sections. If operators are able to influence the location of Section Points it would be rational for them to aim to gain advantage from such anomalies (for example by locating shorter Sections where they carry most passengers).

It is clearly difficult for passengers to understand the basis of the calculation of fares; some might reasonably question whether such variability in the cost of a vital service, and lack of transparency in how it is calculated, should even be legal.

### Principles

The proposals are based on the assumption that any new system of bus fare determination should have the following characteristics:

- Fairness: similar cost for similar travel - the objective of *fare harmonisation*

- Comprehensibility: the method of fare determination should be easily understood by passengers
- Ease of implementation: the fare structure should be suited to electronic systems
- Flexibility: the ability to support a wide range of ticket types and be tailored to individual passenger needs
- Incentives for passengers: encourage the use of public transport
- Incentives for operators: rewards for operators are aligned with Government objectives

## Value to Passengers

In addition to cost the main factors that are likely to affect a passenger’s decision to use any mode of transport are:

- The point-to-point speed of travel, taking into account the full journey including waiting time and interval between services
- Predictability of service (on-time running consistency)
- The environment in which the travel occurs, taking into account the full journey including walking and waiting (e.g. comfort, crowding, safety)

## Current Problems

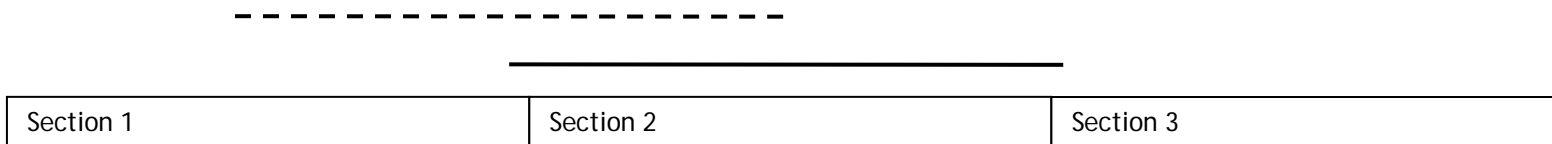
The current system of determining bus fares is inconsistent between operators (e.g. in the positioning of section points relative to bus stops) and very difficult for passenger to understand. Anomalies between fares can be very significant, particularly over short distances.

Causes of inequity in fare charges include the following:

### Method of Counting Sections

Passengers are charged for the number of Sections they enter, so depending on the location of boarding and alighting, relative to the Section Points, journeys of the same length may incur different charges. In the following figure the dashed line and the solid line are the same length, yet the dashed line straddles only two sections (adult fare: \$1.90) whereas the solid line straddles three (adult fare: \$3.20).

It would not be acceptable to sell petrol on this basis, such that you may receive just over one litre but be charged for three, so why is it permitted for public transport?



**Figure 1, Counting Sections**

The effect of charging for partial sections is that customers may be charged for between zero and two sections more than their journey, on average one extra section; this is not apparent to customers. To make this more transparent to customers the current fare section bands should be described as: 0-1, 2-4, 5-8, 9-14, 15+. Thus a passenger who knows that a section is 1.6 Km long, who is planning a journey of 3.2 Km would correctly deduce that the charge is likely to fall into the second fare band (adult fare: \$3.20).

### Variable Length Sections

Since Sections are not of uniform length similar journeys may incur different charges. The following figure is similar to Figure 1, but Section 2 is longer thus the journey represented by the solid line straddles only 2 Sections

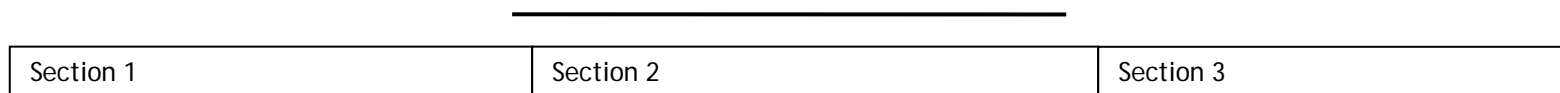


Figure 2, Variable Sections

### Lack of Granularity in Fare Increments

Ticket prices do not vary smoothly with distance, thus at Section boundaries there is a sudden jump in cost. In Figure 3 the journey represented by the solid line is only slightly longer than that represented by the dashed line, but enters a third section and thus the next fare band (adult \$3.20 rather than \$1.90).

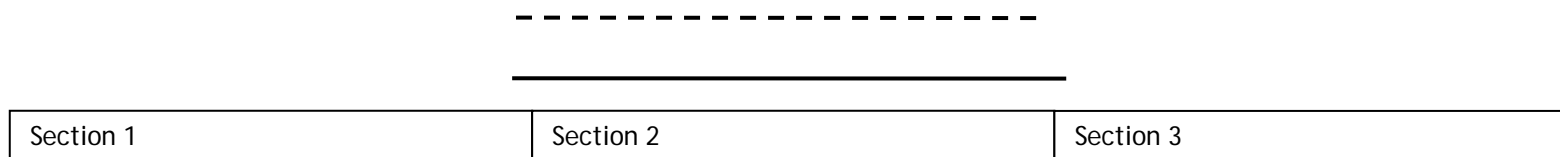


Figure 3, Fare Jump at Section Group Boundary

### Indirect Routes

Buses often travel very indirect routes, either due to obstacles, or to provide greater accessibility for other passengers. Passengers whose journeys are extended in this way are not only inconvenienced by the additional travel time but are also charged a premium. This creates a double disincentive to using the service.

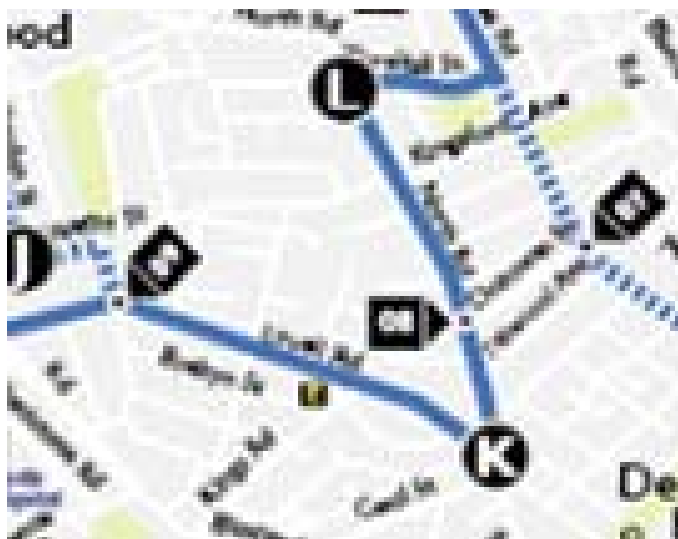


Figure 4, Indirect Route

### Comment

Assuming that electronic ticketing is likely to be introduced in the relatively near future it makes sense to design future fare structures to suit the capabilities of this environment, rather than around current, or historical, constraints. I assume that a future electronic ticketing system will have the following capabilities:

- For buses to store or access information about the route and the location of stops along the route
- To determine the location at which passengers board and alight
- To determine the distance between boarding and alighting points, either point-to-point (best) or shortest path according to the street network, or actually travelled (worst). Note: to avoid minor variations the distance could be measured between the nearest stops on the current route.
- To tickets to hold attributes about passengers, and their entitlements, e.g. adult / child, pensioner / concession status, student travel entitlements
- To debit the cardholder account by the amount calculated at the time of travel
- To make adjustments (especially credits) to the cardholder account after the time of travel, e.g. based on volume of travel, or to refund secondary flag-fall charges - providing incentives to register for electronic ticketing. Thus the savings of weekly, monthly, annual and other periodic tickets could be replicated, with the added benefit that customers would not need to know what their travel frequency will be in advance.

In this environment an electronic ticket is like an all-zones pass that allows the holder to travel anywhere on the network, being charged only for travel in excess of free travel entitlements, with retrospective volume discounts. It is not necessary for the passenger, the driver, or anyone else to know exactly what a given trip will cost in advance (but if required simple applications could be developed to make this possible, for example accessed by the internet or via mobile devices). What is more important is the ability to provide transparency in the method used to calculate fares and eliminating anomalies that may make one journey cost significantly more or less than another.

### Fare Calculation

The anomalies above could be eliminated if fares were calculated using a simple formula, possibly consisting of a flag-fall and a per-kilometre cost, and possibly capped. Figure 5 compares the cost per kilometre (between 2 and 20 kilometres) of the current system with those of a simple formula (in this case \$2 + \$0.15 per Kilometre). The

chart shows costs for minimum (1.3 Km), average (1.6 Km), and maximum (1.9 Km) sections, which highlights the high variability that occurs, particularly within short trips - even ignoring the effect of charging for partial sections (an average offset of one section).

The exact formula could be tailored according to government objectives and based on detailed analysis of factors affecting passenger behaviour.

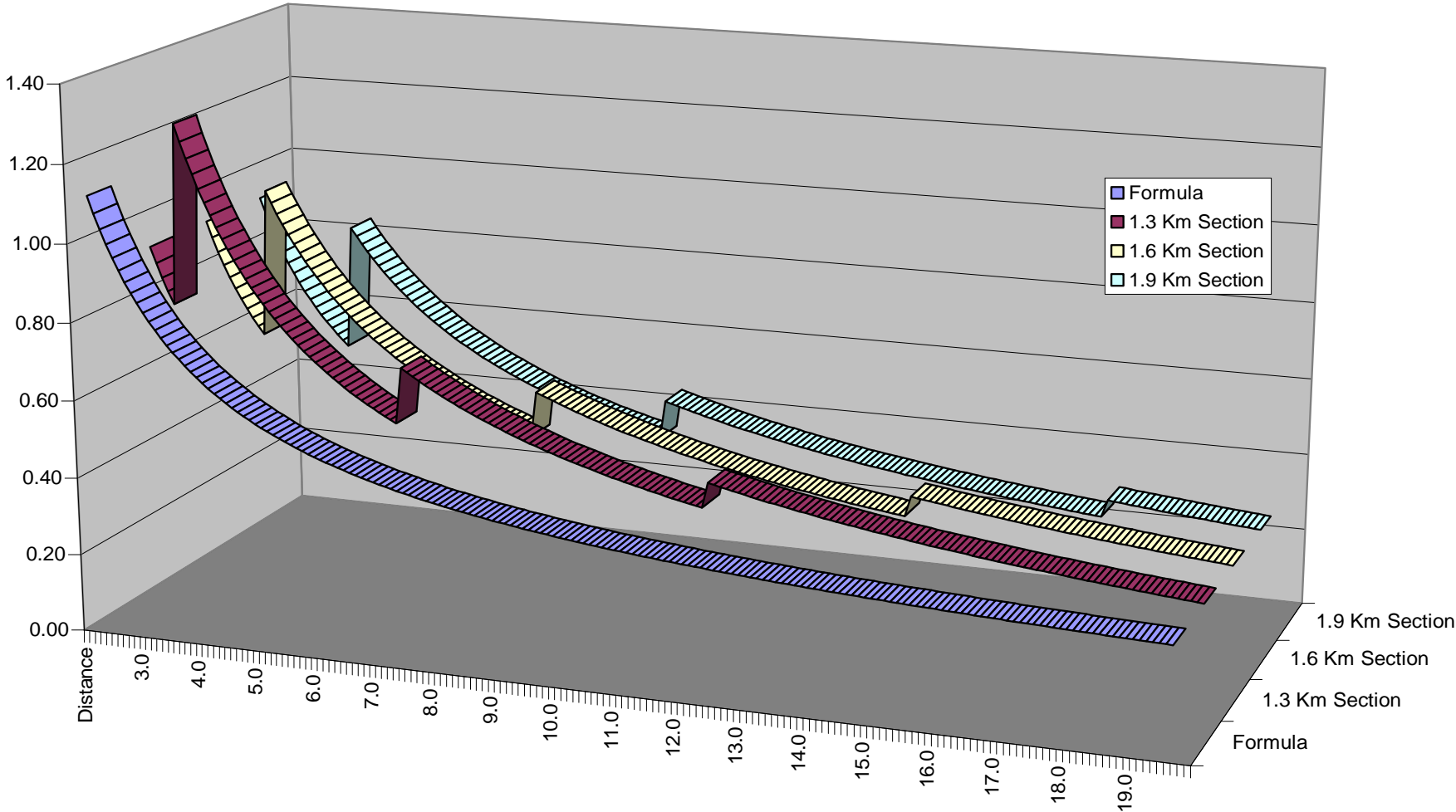


Figure 5, Cost per Kilometre Comparison of Formula and Sections

## Summary Response by Issue

Issue	Comment
18	Yes, the effect is to avoid longer fares becoming prohibitively expensive. It also creates a disincentive to use public transport for very short distances, encouraging people to walk when possible and thus reducing crowding on transport within cities.
19	Assuming that the vast majority of passengers make no more than two journeys per day (e.g. to work and back) a simple rule that could be applied (with electronic ticketing) would be to charge no more than two flag-falls per day.
20	No, for all the reasons given above. Distances should be expressed in Kilometres not 'Sections'. For electronic tickets there is no need for granularity in distance, charges could be calculated down to the metre. For pre-paid tickets granularity below one kilometre may not be practical; route maps could be marked with kilometre bands as an aid to knowing the distance of individual trips. Distance should be measured from boarding point to alighting point - ideally, in a straight line. If the current aggregations of sections are to be preserved for any length of time, they should be correctly labelled 0-1, 2-4, 5-8, 9-14, 15+.