

PROPOSAL FOR INTEGRATED TICKETING IN THE GREATER DUBLIN AREA

REPORT OF INTEGRATED TICKETING COMMITTEE

EXECUTIVE SUMMARY

1. Background

A Committee chaired by the Department of Public Enterprise was set up to progress the objective of achieving Integrated Fares and Ticketing Systems for the Greater Dublin Area. CIE, Bus Atha Cliath, Iarnrod Eireann, the Light Rail Project Office and the Dublin Transportation Office were also represented on the Committee.

The Committee consulted with international independent transportation experts, MVA Consultancy, and also visited some European locations that demonstrated a best practice approach to the issue of fares and ticketing integration.

2. Objectives

The objective of the committee was, on the basis of the DTI Strategy and taking account of an MVA consultancy study previously carried out for CIE1[1], the MVA study, to prepare proposals for an integrated fares and ticket system which encourages the best use of a network of routes and facilitates people who have to make more than one trip to complete their journey. The system should enable a person to buy a single ticket for a full journey and allow them to transfer from one bus to another or from bus to rail (DART/Suburban rail; LRT) within a specific period of time. The recommended system should not in itself become a barrier to entry to the public transport market in Dublin.

3. What is an Integrated Fares and Ticketing System?

An *integrated fare* is the fare charged for an amount of travel between two points in a public transport system, irrespective of the number of modes/services and operators involved in making the journey. An *integrated ticket* is a contract between the passenger and the network supplier for the travel undertaken between those two points in a network, regardless of how many operators provide the modes and services used. Thus while passengers move around the

system, the revenue from the sales of their tickets can be divided between operators in a fair and efficient way.

The essence of integration is the seamless movement of people through the public transport network, and the apportionment of the revenues earned from that movement to the operators of the services that make up the network.

4. Fares Structure

The Committee, on the basis of the MVA Study cited above, narrowed the possibilities for introducing Integrated Fares and Ticketing in Dublin to two practical possibilities, i.e.

- an adaptation of the existing fares structures to offer rebates to those passengers interchanging between routes and services, **or**
- a zonal fares structure.

These are now briefly described.

Rebated Fares

Currently, passengers are charged for public transport travel on the basis of distance travelled. On trips where more than one 'leg' is required to complete it, the traveller repeatedly pays an 'entry' charge for every 'leg', regardless of whether it is a second or third leg of the same overall journey. However, in the rebate system, a proportion of the fare is rebated, or not charged to the passenger, on second and subsequent "entries". The system requires a ticketing medium, which can accommodate an electronic log of movements both to 'rebate' the boarding charge to the passenger and to divide the fare between the operators of the different modes/services used. Some examples are:

- Fixed rebate, say 40p

For two 'leg' journey, rebated fare = sum of single fares less 40p

For three 'leg' journey, rebated fare = sum of single fares less 80p

- Variable rebate, say 15%

The rebated fare is the sum of single fares less 15%

Zonal Fares

The city would be divided into a number of zones. Fares are calculated on the basis of the number of zone boundaries crossed during the trip. Thus the fare

between two points in the city is the same no matter what combinations of services are used to make the trip, or how many miles are travelled in the public transport network to get there.

The Committee recommends that a rebated fares structure be implemented.

The main reasons for this choice include,

- existing fares structures will continue – no confusion for the majority of customers,
- it will be easier to incorporate additional operators,
- zonal fares traditionally require large subvention **or** substantial increases for large proportion of passengers,
- difficulty in drawing zonal boundaries

5. Ticketing systems

Both Bus Atha Cliath and Dublin suburban rail operate an automatic ticket validation for customers using prepaid and transfer tickets. This has many benefits in terms of revenue protection and the ability to stream cash and pre-paid tickets passengers separately, therefore improving boarding times and reducing bus dwell times at stops. Each of the main ticketing media

- Paper tickets,
- Magnetic tickets, and
- Smart cards

was considered in the context of choosing a ticketing medium.

The Committee recommends that the proposed rebated fares system should be operated by a contactless smart card ticketing system. The fares structure should be independent of the technology deployed, to allow for possible future changes in fares structures in a multi-operator environment.

The main reasons for this choice are

- Paper tickets are not suitable for automatic validation,

- Magnetic tickets are not as secure as smart cards, particularly for stored value,
- Smart card can hold a stored value and prepaid tickets,
- Smart card can electronically link journeys so that customers can avail of rebates and volume discounts,
- Contactless smart cards have very fast transaction times, allowing more efficient boarding,
- Smart cards offer valuable information both for network management and development and revenue apportionment purposes.
- smart cards enable transport operators to more accurately carry out market research,
- smart cards can be linked to personal accounts in financial institutions,
- smart cards can be linked to other transport applications e.g. parking, and wider still to other applications in society.

Paper tickets will be retained by Bus Atha Cliath and magnetically encoded tickets will be retained by suburban rail for customers purchasing single (and return for rail) tickets and who do not wish to make an interchange.

6. How the System will work

The customer obtains a smart card in one of the many retail outlets around the city. S/he can store either electronic funds or one of a variety of multi-trip tickets electronically on the smart card, or even connect it to a personal account in a financial institution.

Buses

On entering the bus, the amount of travel is deducted from the card's value by **either** the driver pressing a button to select the fare, **or** by automatically validating the card in the smart card reader in the doorway. Note, that since the smart card is contactless, the machine can 'read' the card while it passes by without physically inserting it. If the passenger changes to another bus or a train to reach his/her final destination, the card is read at the interchange point, and further appropriate deductions made in the knowledge of the travel already consumed. At this stage Dublin Bus do not envisage exit validation on bus but the design of the system should not rule out this possibility at a future stage.

Rail

If the customer wants to make a rail/bus trip, starting at the rail end, the ticket barrier at the entrance to the suburban rail station can 'see' the card as it passes by and deducts the maximum fare chargeable from it. The passenger travels on the train, and leaves through an exit gate at the destination station. The smart card reader in the exit gate 'reads' the ticket on the way through, and if the fare for that trip is less than that originally charged on entry, adds back the difference. On entering the bus, the smart card reader can see that the card has already made a train trip, and deducts the appropriate bus fare.

Light Rail

Luas ticketing system will be influenced by the fact that there will be no barriers and no driver/passenger interaction. At this stage it is envisaged that there will be entry/exit charging as on suburban rail. Validation will take place at the tram stop as distinct from on-tram.

Revenue

A revenue collection and revenue apportionment "agency" will appropriately apportion the revenue from each fare to each operator involved in carrying passengers for portions of their journeys, on the basis of agreed apportionment rules.

7. Capital Costs

Capital costs for the recommended system (for Bus Atha Cliath and suburban rail) relate to the purchase of new ticketing equipment, mainly smart card readers and smart card validators, and the supporting computer systems. (Capital costs for LUAS ticketing equipment are included in the LUAS development capital cost.) It is proposed that suburban rail should become a closed system that will require entry **and** exit validation. This will necessitate some civil engineering works at stations. The costs are estimated at £24.920 m as follows

	£m
Dublin Suburban rail	15.832
Bus Atha Cliath	8.090
Initial supply of smart cards	<u>0.998</u>

The Committee recommends that the capital costs of the project should be the subject of further discussion between the Department and CIE having regard to overall discussions on the implementation programme for the investment strategy set out in the National Development Plan. The Committee notes that the National Development Plan makes provision for expenditure of £50M on integration over the period 2000-2006, although the DTO Dublin transportation Blueprint 2000-2006 earmarked just £12M of this specifically towards integrated ticketing. In addition, **the possibility of securing EU funding, in particular, should be explored given the emphasis placed by the EU Commission on the introduction of integrated ticketing.**

8. Revenue Support

The implementation of the rebated fares system, in removing a penalty that customers at present pay when making interchange journeys, is likely to result in a loss of revenue for the operating companies. This was recognised by MVA Consultants in their 1997 and 1999 studies, when they estimated that while the introduction of integrated fares on the basis of a rebate system could increase the number of passengers by about 2%, it would nevertheless produce a fall in revenue of about 6% or £5 million. The revenue loss to the operators would, however, be clearly dependent on the level of rebate offered, the type of rebate that is applied, and the extent of usage of the rebate as distinct from passengers loading differing forms of prepaid tickets.

The Committee recommends that the revenue loss resulting from the introduction of a rebate for multi-leg journeys should, subject to agreement on the amount, be met by way of subsidy/subvention. A formal means of monitoring the impact of introducing integrated ticketing should be agreed between the parties. It is anticipated that this requirement will dissipate over time with the advent of a multi-operator environment, bidding procedures for public transport contracts and clear revenue apportionment rules.

Current levels of discounts, range of prepaid tickets and ticket distribution network results in only 20 per cent of revenue coming from prepaid tickets. It is the view of the Committee that, if the system-wide benefits of integrated ticketing using smart card technology are to be fully exploited, the take-up of smart card usage should exceed 80% at minimum. It is clear that significant incentives must accompany the introduction of the new ticketing systems to achieve the desired market penetration of smart cards. Incentives to customers will normally mean revenue foregone to operators. [By way of illustration, for example, the Committee has estimated that a switchover to an 80%/20% pre-paid to cash ratio

would, **in the existing system**, result in revenue foregone of approx. £7m p.a. (using 1999 patronage, fares scales and prices).] This revenue loss could be mitigated by operating cost savings in running more time-efficient networks and in reduced cash-handling charges, although these effects have not been quantified, and are only achievable over time. The Committee feels that the introduction of the smart card technology will permit unique marketing initiatives in terms of range of tickets and distribution. However there will also be a need for an initiative with respect to the levels of discount.

The Committee recommends that a marketing budget of £10 million should be made available to encourage customers to switch from cash to smart card. The budget should have a limited lifespan, should be included as part of the capital cost, and the appropriate proportion commensurate with network involvement be made available to all operators, whether public or private. Furthermore, the Committee recommend that the introduction of integrated ticketing should coincide with an increase in the approved level of the single cash-based fares, as an effort to effect the switchover to smart card while limiting the revenue impact.

9. Timescales

The Committee recognises that implementation through the different modes and operators of the recommended system of integrated ticketing is unlikely to be before end 2002.

Bus Atha Cliath has done some preparatory work in relation to the installation of a new ticketing system, as its current machinery is life expired. Subject to acceptance of the main Committee finding – i.e. a rebated fare structure supported by a contactless smart card - it is expected that the phased implementation of the new system could be as follows:

- Bus Atha Cliath – 2002.
- Suburban rail – 2003
- Luas – start 2003.
- Mainline Rail/ Bus Eireann – 2003+
- Other transport operators – as they enter the market after 2003. Any new entrants in the interim should be clearly advised of the nature of the system being developed and that there will be a requirement for them to participate. Every opportunity should be afforded to such operators in the development stage to be consulted in relation to the design of the system.

10. Further work

The Committee also recommends that work continue in a number of key areas including

- Oversee the development of specifications by Bus Atha Cliath and other operators for the recommended system;
 - Examine further the question of exit validation on bus from the point of view of feasibility, costs and benefits;
 - Determine how to manage the different start-up dates for different modes and operators within the metropolitan area;
 - Identify issues in relation to the extension of the system to the hinterland and beyond to the national transport system;
 - Further pursue, in conjunction with other public transport developments, the outstanding issues in relation to funding;
 - Assess the reaction by interested parties to the report.
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- Determine the manner in which institutional issues relating to revenue collection and revenue apportionment roles etc. should be pursued.

1. BACKGROUND

1.1 Current Government Policy

Current Government policy in relation to fares and ticketing is broadly based on the findings of the Dublin Transportation Initiative (DTI) Final Report (May 1994). This report emphasised the importance of fares and ticketing in the formulation of transport policy and recommended that an integrated fares and ticketing structure be introduced as a matter of priority.

In particular the DTI understood integrated ticketing to mean “an integrated fares and ticketing structure”. This is a system which “enable(s) a person to buy a single ticket for a full journey and allow him/her to transfer from one bus to another or from bus to DART / train within a specific period of time.²[2]” **The DTI recognised that an integrated fares and ticketing system “could have revenue and subvention implications for the transport operators which will have to be fully assessed before implementation”.**

This policy has been reinforced recently in

- The National Development Plan 2000-2006 (Nov. 1999), where it is noted that EU funding for public transport development in the Greater Dublin Area (GDA) is likely to be conditional on the introduction of integrated ticketing.
 - The DTO Dublin Transportation Blueprint 2000-2006, which also recommended the allocation of £11m for ticketing projects within the CIE Group operating companies
 - The Government approved a fares increase for the CIE Group effective from January 2000 with a proviso that “integrated ticketing should be introduced as quickly as possible during 2000”.

1.2 DTO Strategy to 2016

The strategy recommended by the DTI in 1994 is now being updated by the DTO, to extend transportation planning for the Greater Dublin Area to the year 2016. The Update is being formulated in the context of a strategic land-use plan for the region.

The Strategic Planning Guidelines for the Greater Dublin Area (GDA) predicted that the population of the Greater Dublin Area would grow from an actual base of 1.4 million in 1996 to 1.65 million in 2011 (18%). This projection for 2011 has since been revised upwards to 1.76 million (26%). The revised growth figures for the number of households are 446,251 (actual 1996) to 705,800 (projected 2011). DTO is currently preparing a transportation strategy for the year 2016 not

only to accommodate the additional travel that will flow from the surges in population, household formation and employment, but is also intended to raise the market share of travel on public transport networks. The GDA has been divided into two areas:

- the Metropolitan Area which consists of the existing built-up area of Dublin and its immediate environs, and
- the Hinterland Area, in which a series of growth centres will develop in a self-sustaining way, will require transport links to various locations in the Metropolitan Area.

The Strategy will offer public transport networks of services that will be based on the concept of interchange at multi-modal transport nodes at intervals throughout the city-region. **It is integral to the success of this strategy that penalties associated with interchanging within the public transport network be reduced. Integrated ticketing is critical to the success of this style of network design.**

1.3 Integrated Ticketing Committee

A Committee, chaired by the Department and representing the Dublin Transportation Office and CIE was formed, with a remit to progress proposals for integrated ticketing. The establishment of the committee also reflected the Department of Public Enterprise's commitment to progress the issue of integrated ticketing which was given to Monitoring Committee of the Operational Programme for Transport (OPTrans) by the Department of Public Enterprise in July 1998.

The Committee built on earlier work undertaken by MVA, international transportation consultants (on behalf of CIE) and also retained MVA for professional advice and guidance. The members of the Committee and the Terms of Reference are attached at Appendices I and II respectively.

1.4 Need for and Objectives of Integrated Ticketing

The DTI started from a very simplistic premise of 'one ticket per trip'. The Committee's view is that, any study of integrated ticketing must embrace the wider issues relating to ticketing. It is felt that the ticketing systems on all modes in the public transport networks require significant upgrading and overhauling to match the investments and improvements on other aspects of the service. Thus the Committee has identified the following reasons as justifying the introduction of a fully integrated fares and ticketing system should be operated in the Greater Dublin Area:

- to reduce the inconvenience of interchange for passengers who have to make multi-leg journeys, in a public transport network where interchange is predicted to dramatically increase;

- minimise changes in fares for the bulk of passengers who don't interchange;
- reduce queuing, complexity and inconvenience for passengers when moving around the network;
- to improve management information on travel patterns and improve operator responsiveness to changes in the market;
- to radically increase the proportion of passengers paying for travel off-vehicle;
- to achieve a significant swing towards pre-paid ticket use. This will have the additional benefit of reducing the time spent at stopping points for all on-street modes. This will improve end-to-end journey times for passengers, and give public transport users a comparatively better door-to-door journey time than by other modes;
 - to reduce the market share of cash usage, to reduce cash-handling costs and improve staff security without penalising the passenger;
 - to grow the market for public transport through the use of pricing strategies;
 - to permit a fair and efficient allocation of revenues earned between operators of different modes, or different services within modes, in the network;
 - to reinforce the overall objective of achieving an integrated multi-mode transport system (including parking, park and ride, etc.);
 - to meet EU funding requirements in relation to transport strategies;
 - to become an important feature in marketing the integrated public transport service as a network; and
 - protect the revenue - fairly, consistently and with minimum intrusion on passenger mobility.

At a macro level investment in integrated ticketing is a necessary complementary development to the large-scale investments in public transport in the Dublin area generally. The EU also promotes it.

1.5 Fares and Ticketing in Dublin at present

Public Transport Services in the Greater Dublin Area (GDA) are largely provided by the CIE Group of Companies, incorporating Dublin Bus, Bus Éireann and Iarnród Éireann. These are augmented by a limited number of services provided by private operators. In transportation terms CIE divides the greater Dublin area into

- the short hop zone – includes all of Bus Atha Cliath’s network and suburban rail services bounded by stations at Balbriggan, Maynooth, Celbridge/Hazelhatch and Kilcoole, including DART.
- Medium/long/giant hop zones – incorporates the short hop zone and includes Bus Eireann and outer rail services.

The current exercise is mainly concerned with integrated ticketing in the short hop zone but does not preclude the extension of integrated ticketing on a wider scale.

Dublin Bus and Bus Eireann operate a stage carriage fares structure. Fares on Iarnrod Eireann are based on origin-destination, with groupings of stations.

There is at present a broad range of integrated commuter tickets available to customers in the greater Dublin area -

regular commuters may use the hop family of magnetic tickets, which range from short hop, medium hop, long hop and giant hop and which cover the full DTO area. These tickets are valid for fixed weeks and calendar months and there is a student version for some of them. They allow unlimited travel and are used primarily by customers who wish to use at least two of Iarnrod Eireann, Bus Eireann and Bus Atha Cliath services.

each company also has own single mode tickets for commuters.

each company has single tickets, paper tickets for Bus Atha Cliath and Bus Eireann, magnetic card tickets for rail.

There is limited integration of single tickets –

Iarnrod Eireann is fully integrated, one ticket is issued for any given origin/destination station pair, regardless of the number of interchanges made.

Dublin Bus has a Transfer 90 ticket which offers bus to bus interchange when the second journey is commenced within 90 minutes of the start of the first journey.

This is a magnetic card ticket, which can only be bought from a ticket agency.

Bus Eireann has the facility for through booking a customer from one service to another.

for designated DART Feeder Buses, a single ticket can be purchased on the bus or at a rail station, which will allow bus/rail interchange. (There is an operational difficulty here in that a paper ticket is issued on the bus, and this cannot be automatically validated for entry to the rail network.)

The current division between cash fares (i.e. single journeys on bus, single and return on suburban rail) and prepaid tickets is given in Table 1.

Table 1: Distribution of revenue by cash and prepaid (1999)

	Bus only	Rail only	Bus/rail	Total
	£m	£m	£m	£m

Cash	73.5	11.9	Nil	85.4
Prepaid	13.6	5.4	4.1	23.1
Total	87.1	17.3	4.1	108.5

In percentage terms 79 per cent (= 85.4/108.5) of revenue (excluding concessionary travel) is attributable to cash.

2 OPTIONS

2.1 Fare Structure Options

Previous work by MVA Consultancy identified two fare structures which could provide a basis for integrated ticketing in Dublin,

- a rebate fares structure, or
- a zonal based structure.

These are described in section 2.1.1 and 2.1.2 and the main characteristics of each are summarised in Table 2.

Table 2: Characteristics of Zonal and Rebated Fares Structures

Characteristic	Rebated	Zonal
Basis of charging	Distance travelled on network	Number of geographical zone boundaries crossed.
Change to existing fares?	Affects only those with multi-leg journeys.	All; some positively, some negatively, depending on zone definition
Scale of change to fare structure	Minor	Major
Ticketing system required	Requires an electronic log of prior movements by passengers, most securely on smart card	Any ticketing medium permitted
Potential to premium price travel	High; by time-of-day by service by mode	None
Passenger information requirements	Moderate	Large-scale; especially at start of system operation
Knowledge of fare before boarding	Depends on service	Can be determined in advance from information

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2.1.1 Rebate Fare Structure

The current system charges for distance travelled by the passenger. On trips where more than one leg is travelled to complete the trip, the passenger repeatedly pays the basic charge for the particular journey in question, regardless of whether it is a second or third leg of a multi-leg journey. However, in the rebate system, a proportion of the fare is rebated, or not charged to the passenger, on second and subsequent “entries”. It therefore encourages the passenger to make better use of a network of services by optimising his/her travel pattern. The rebate system is a means of joining the differing fares structures of different operators and services together, and asks the passenger to “pay as you go”.

For example there could be a fixed rebate of 40p say. The rebated fare for a customer making a two-leg journey would be the sum of the individual fares less 40p. the customer making a three-leg journey would pay the sum of the three fares less 80p.

Alternatively there could, for example, be a percentage rebate, say 15 per cent. The customer would pay the sum of the individual fares less 15 per cent.

A key requirement for implementing a rebated fare structure is the availability of a ticketing system that logs the passenger’s prior travel movements. Knowledge of prior travel is essential in determining the rebate. Such a system can be account based and/or stored value. Stored value is the equivalent of a cash value stored in electronic form on a card or in a back office account. Typically the cardholder pays cash (to a ticket agent) at a point of sale and has the balance stored on the card incremented by that amount. The stored value is decremented when the cardholder pays for the service. This could be paying for a journey or a season ticket/pass. The amount deducted is determined at the time of the transaction.

2.1.2 Zonal Fare Structure

Worldwide, people prefer a Zonal fares structure. It is attractive to the user due to its simplicity, comprehensibility and accessibility. People know before the start of the trip how much they will have to pay. A zonal fares structure is based on the topography of the city, and the fare between two points in a city is always the same, no matter how many routes or services are taken to get there.

The introduction of a zonal based system would entail a new fares structure. The city would be divided into a number of zones. Fares are calculated on the basis of the number of zone boundaries crossed during the trip, but also including trips wholly within a zone. This fares structure relies heavily on passenger information systems, to let the passenger know

- what zones s/he’s in now, and

- what zone s/he wants to go to.

By way of illustration a relatively simple example of possible zonal boundaries in Dublin could be the canals, Liffey and the M50 and existing 'short hop' boundary as follows:

CC = Canal cordon, area defined by the canals/North Circular Road and the sea,

M50N = Area bounded by canal north of Liffey and M50,

M50S = Area bounded by canal south of Liffey and M50,

SHN = Area bounded by short hop outer boundary and M50, north of Liffey, and

SHS = Area bounded by short hop outer boundary and M50, south of Liffey.

[Note: Short Hop Zone is described in Section 1.5 above]

The accompanying adult single fare structure might be.

	CC	M50N	M50S	SHN	SHS
CC	60p	90p	90p	120p	120p
M50N	90p	60p	120p	90p	120p
M50S	90p	120p	60p	90p	90p
SHN	120p	90p	90p	60p	120p
SHS	120p	120p	90p	120p	60p

This is a relatively coarse concentric fare structure. It is also very different to the current structure, so that there would be winners and losers in any movement to zonal fares. In particular there is a zonal boundary problem in that for example a customer making a very short trip over the canal is charged a two-zone fare while a customer using a peripheral bus route over a much longer distance might only be charged a one-zone fare. The solution to this equity issue is to design a more complex zonal pattern. However, this is where a zonal fare system would lose its primary feature of simplicity. The general public may not easily understand such a set of zones and a large scale and continuous information campaign would be necessary.

Typically zonal fare schemes have poor fare box recovery. A survey of European cities, all of which operate flat or zonal fare systems, indicates that, with one exception, state/city support ranges from 30 to 75 per cent of operating costs. This is a due to a combination of low fares, scope for fraud (though this is related to the level of checking), and the coarseness of the zonal structure. See Section 3.4.

2.2 Ticketing Medium Options

In addition to the fares structure there is a question of which ticketing medium to use. The possibilities are:

- Paper,
- Magnetic,
- Smart card.

The criteria in choosing a ticketing system are

- *Robustness* - the ability to physically withstand the operating environments of bus and rail networks,
- *Transaction speeds* - the speed at which passengers can validate tickets and get in and get out of the bus and rail networks,
- *Functionality* - ability to operate the recommended fares structure and product pricing system,
- *Information storage capability* - ability to log journey details, for subsequent analysis of trip patterns, apportionment of revenue between operators, and market research,
- *Security* – the ability for third parties to read and alter the information held on the ticket, and
- *Revenue protection*.

The Committee examined the main types of tickets, e.g. paper tickets, magnetically encoded cards and contact/contactless stored value smart cards.

Table 3: Characteristics of Ticketing systems

Characteristic	Paper	Magnetic cards	Smart cards
Machine validation possible	No	Yes	Yes
Basis for revenue apportionment	Expensive surveys	Analysis of trip data collected	Analysis of trip data collected
Fares structures possible	Cannot enable rebated fares structure	Will enable any fares structure	Will enable any fares structure

2.2.1 Ticketing Medium - Paper

The Committee decided not to pursue paper-based ticketing systems for *transfer* ticketing on the following basis:

- Not possible automatically to validate – because not machine readable
- not robust,
- Incompatible with revenue protection objectives of operators,
- Incompatible with proposed entry and exit arrangements to suburban rail systems, again driven by revenue protection objectives of operators,
- Lack of management information trail on trip patterns in the market;
- Incompatible with multi-operator revenue apportionment objectives.

2.2.2 Ticketing Medium - Magnetic

The Committee also decided not to recommend magnetic cards as a suitable medium for stored value or account based transactions. This is primarily because of the availability of the smart card. The magnetic medium is inferior to smart card in the following respects,

- Magnetic tickets can be easily damaged
- Limitation on the amount of data that can be held on magnetic stripe,
- slower speed of transaction
- Lack of security, in that a third party can easily read the data.

Suburban rail will continue to use magnetic tickets for single and return tickets (not stored value), which will not be integrated tickets.

2.2.3 Ticketing Medium - Smart card

The **smart card** is a relatively new concept in public transport. It is a credit card sized plastic card with an embedded electronic chip. The chip can store significantly more data than magnetic stripe cards and offers greater security. The improved data and security capability afford the possibility of offering greater variety and flexibility in ticketing. The card is more resilient than magnetic stripe tickets currently in use and can remain in use for a number of years.

A contactless smart card does not need to be inserted in a card reader for a transaction to take place (unlike magnetic stripe cards). The card communicates

with the card reader by way of radio transmission using an antenna embedded in the card. Transactions typically take less than half a second and the card can be read at a distance of 10cm from the reader.

Smart cards are now being used as the preferred technology for stored value by a number of operators. Smart cards for public transport also offer opportunities for synergies with other applications in the public and private sector.

2.3 Ticketing Medium related to Fare Structure

The rebate fares structure **requires** the electronic tracking of journeys. It has already been argued in sections 2.2.2 and 2.2.3 that contactless smart card technology is the most desirable medium to meet this requirement.

Zonal fare structure, on the other hand, does not require such electronic tracking. Many European cities using a zonal fare structure adopt a paper based ticketing medium. This has been ruled out by the committee because of the poor fare box return, non-suitability of paper tickets for transfer (section 2.2.1), and lack of management information.

The use of magnetic tickets was also considered by the committee as a medium for allowing transfer between services. However in order to get the full benefit of the simplicity of the zonal fare structure this would require bus drivers to issue magnetic tickets on a large scale on the bus. This is not usual practice in urban transport. It creates security issues with cash handling, which it is desired to reduce, and is expensive as the cost of the tickets would form a dis-proportionate element of the fare collected.

2.4 Preferred Option - Rebate and Smart Card

The Committee considered at some length, and with the assistance of MVA Consultancy, the relative merits of the rebated and the zonal fares structures. Key decision making issues were

Customer Needs

- no cash handling,
- flexibility of ticketing – e.g. can buy 5 day ticket and nominate which days s/he wants to use,
- speed of boarding – faster transaction times
- ergonomics – no need to insert card, just pass over the reader, benefits for all passengers, including people with disability and the mobility impaired,
- not changing the fare scales radically – limited scope for confusion,
- distribution – currently sale of limited range of prepaid tickets is confined to 250 retail agents and rail stations

Operator Needs

- each operator responsible for its own fares and ticketing for tickets not requiring transfer to another operator,
- shorter bus dwell times at stops, thus improving overall journey times,
- security, management, revenue allocation is good
- allows differential pricing of travel e.g. Xpresso, Nitelink
- discounts can be offered
- new entrants can have their own fare structure

Policy/Strategic Needs

- Ease of entry for other operators – new entrants can have their own fare structure
- Fare-box support – distance based fares require less revenue support than zonal fare.

The Committee recommends that a rebated fares system be introduced in Dublin using contactless smart card technology. The fares structure should be independent of the technology deployed, to allow for possible future changes in fares structures in a multi-operator environment.

2.5 Description of Preferred Option

The basic principle of the system is that the smart card will facilitate the payment of fares and enable rebates for customers who interchange during the course of a journey. The level of rebate may be a fixed amount at each interchange regardless of the modes of travel being used or the level of fare being charged by the second operator. The card is re-loadable or account based, could store both money and/or discounted tickets on it, and could in the future be developed for multi-functional purposes.

2.5.1 Smart Cards

Card types

It is envisaged that there could be four main categories of card (this would not preclude the development of further variations)

- **Personalised with photo ID.** These cards will be used for categories of customers whose travel entitlements are non transferable. The photo ID will ensure visual verification of the cardholder's right to use the card. Such cards will be issued to senior citizens, social welfare recipients and students. These cards will be reloadable/rechargeable or account based.
- **Personalised without photo ID.** Cards will be personalised with the cardholder's name. Such cards will offer customer benefits such as loyalty bonuses or discounts and a blacklisting/cancelling facility for lost or stolen cards. Such cards are not transferable. These cards will be reloadable/rechargeable or account based.
- **Anonymous.** Such cards will not be personalised to individuals. They will be transferable and will not offer any of the customer benefits of the personalised card. These cards will be reloadable/rechargeable or account based.
- **Disposable.** This is a low cost card. This category of card will not be personalised. It will be transferable amongst users. It will not offer any of the benefits of personalised cards. This card will be sold/distributed with some preset value or tickets preloaded. It will not be reloadable/rechargeable. Once all initial value/tickets are consumed it will be discarded. This could be particularly suited to the tourist sector.

Card availability

- **Personalised with photo ID.** These cards will be issued by bodies outside the CIE Group e.g. the Dept of Social Community and Family Affairs, USIT. It is proposed that the cards that these bodies would normally issue will in future contain the electronic chip that enables them to be used on public transport.
- **Personalised without photo ID.** These cards may be issued by the transport operators, for example CIE, and will be available to all customers. A personalisation bureau service will be required to print cardholders' names on the cards. A card distribution/collection service will be required.
- **Anonymous.** These cards will be available through all distribution channels. As no personalisation is required these can be distributed freely and used in all promotional activities.

- **Disposable.** Availability will be as per the 'Anonymous' card above.

It is recognized that these examples are based on the types of product currently marketed by the CIE operating companies and that other variations may well be developed to further exploit the capabilities of the technology.

Value loading

Cards (other than the disposable cards) will initially have no value. The OAP and social welfare cards will be preloaded with data pertaining to the free travel schemes. It is envisaged that customers will add value to the stored value 'purse' at a large number of reloading devices located in ticket agents (currently 250 in the Dublin area), suburban rail stations, LUAS stops, on street vending machines and other outlets. Customers will pay for reloading with cash or credit/debit card etc. as appropriate in each location. **Other methods of loading e.g. stored value accounts could also be explored.**

Card use

The method of using the smart card may vary from operator to operator. One scenario is as follows:

Bus Atha Cliath: The customer can purchase a ticket for a single journey and have the value deducted from the stored value. The value will be adjusted for any rebates or discounts to which the customer is entitled. The 'ticket' is stored electronically on the card. This transaction involves the customer placing the card on the ticket machine and the driver pressing a button to select the fare.

Alternatively, the customer may purchase a season ticket (1, 3, 5 day for example) in the same way as a single ticket is purchased above. The season ticket is stored on the card. It is subsequently validated on each use by the customer presenting the card to a validator on the right hand boarding queue.

Suburban Rail: The rail stations will have entry and exit validators connected to gates. The principle of operation will be the deduction of a fare from the stored value by reference to the origin and destination of the customer and any rebates or discounts that apply. One option being considered is that on entering the system, the maximum fare is deducted from the card and a refund is given on exit if applicable. This would eliminate the scope for underpayment by placing the onus on the passenger to validate on exit.

Luas: The principle of operation of the system on Luas could be similar to that on Suburban Rail, the main difference being that there will be no gates. It is

intended at this stage that all reloading/validation equipment will be off-vehicle at the stop. The stops will be equipped with separate entry and exit validators.

2.5.2 Gating of Suburban Rail

It is envisaged that there will be a change in how the passenger will pay for Suburban rail travel. The maximum fare could be deducted on entry at the origin station and an adjustment made at the destination station to reflect the actual fare.

There is an issue, however, of how exit charging should relate to exit validation. For example it might be possible to locate smart card readers on platforms, separate from exit so that a customer, who wants to get an amount credited back to their card would go to the smart card reader before going to exit. Thus there would be two exit disciplines. Customers with smart cards would need to go to the reader first and then exit, while other customers would exit directly without validation. This causes two problems. Firstly it facilitates over-riding by customers with magnetic tickets and secondly it creates an immediate disincentive for customers to switch to smart cards. **Exit validation is recommended though it is acknowledged that it adds about £9M to the estimated capital cost.**

The alternative to exit charging is to have self-selection of the fare by the customer at the entry turnstile. This would cause delays and confusion and would allow unreasonable possibilities for the passenger to over-ride. A second alternative to exit charging is to have a flat fare deduction on entry to the rail network but this would be a radical departure from the current graduated fare structure and, for reasons argued elsewhere in this Report in relation to flat or zonal based fares structure, is not recommended at this point.

2.6 Ticketing Equipment Requirement for Preferred Option

The basic equipment requirements to support smart card technology and the rebated fares structure comprise the following:

Bus Atha Cliath will have on each bus

- An electronic ticketing machine (ETM) that will issue paper tickets to cash customers who don't intend to transfer,
- A smart card reader (SCR) attached to the ETM for stored value deductions that involve the driver.

- A smart card reader on the right hand boarding stream for passengers who only need to validate their ticket (similar to the magnetic card reader at present).

While exit validation will be an integral part of rail operations, Dublin Bus do not currently intend to operate exit validation on bus. The system should, however, be designed so as not to preclude exit validation on the bus system at any future stage.

Suburban Rail will have at each station

- Magnetic card tickets for single (and return) tickets, sold at booking offices and/or vending machines for passengers who will complete their journey within the rail system,
- Magnetic card validators which will allow those passengers to get in and out through station barriers,
- Smart card readers for activating the same barriers,
- Stand alone smart card readers, in the event of equipment failure at the exit turnstiles.

Luas ticketing system will be influenced by the fact that there will be no barriers and no driver/passenger interaction. At this stage it is envisaged that there will be entry/exit charging as on suburban rail. The ticketing requirements at each light rail stop are

- Vending machines for ticket issue,
- Smart card readers for entry and exit validation.

In addition there will be point of sale machines located in retail agents and perhaps with vending machines where customers can put value (cash or via bank card) on their smart card. There will also be back office computer systems.

3. FARES AND TICKETING IN OTHER EUROPEAN CITIES

The committee made site visits to Tampere in Finland, as an example of a European city successfully operating a smart card ticketing system; and to London where the Prestige project, currently underway will involve the use of smart cards. The Committee also visited Toulouse in France. A survey of the relationships between fare structures and integration in European cities is presented in section 3.3.

3.1 Tampere, Finland

Tampere is a city north of Helsinki. It has population of about 190,000 persons, and there are about 150,000 smart cards. Finland is a pioneer in the development of smart cards. Key features of the fares and ticketing systems are summarised below.

Cash Fare – single journey ticket

A flat cash fare is applied 10 FIM, 5 FIM for children under 12. (IR£1 = 8FIM Finnish Mark). Passenger boards bus, pays driver, change given if appropriate, paper ticket issued with time of boarding recorded on ticket. The ticket is valid for one hour and the expiry time is in large print on the ticket. Transfer journeys are free within this time period. The passenger is really buying an hour's travel rather than a single journey. When making a transfer within the hour the passenger shows the paper ticket to the driver of the second bus and the driver records the journey by depressing a button on the ETM.

Smart cards

Customers who wish to use smart cards must pay a 40 FIM deposit, which is refundable if/when the customer returns the smart card. With 150,000 smart cards this creates a sizeable cash flow benefit to the transport operator. The smart card can be used in one of two ways, as a stored value ticket or as a season ticket.

Stored Value:

The fare charged depends on the balance on the smart card after loading it with cash. The fares charged are

	The balance after loading	
	under 200 FIM	200 FIM or more
Adults	6.70	5.60
OAPs (0900 to 1400)	3.40	2.80

War veterans (0900 to 1400)	nil	nil
Young people (12-19 year olds)	5.60	4.20
Students (20-29 years)	5.60	4.20
Children (under 12 years)	3.40	2.80

Thus for example an adult who loaded more than 200 FIM (about £25) on his/her smart card would automatically pay 5.60 FIM for a single ticket. These fares are valid for one hour's travel also and offer considerable discounts on the cash fare of 10 FIM for adults and 5 FIM for children.

Prepaid Tickets

The smart cards can also be used as season tickets. In effect the customer buys a pre-paid ticket, valid for a fixed time period/a set number of journeys, and this ticket is loaded on to the smart card. The ticket types include

- Adult 30 day (230 FIM), adult 90 day (610 FIM), adult 180 day (1,140 FIM)
- Young people 30 day (175 FIM), children 30 day (115 FIM), student 30 day (175 FIM)
- Commuter ticket valid for 30 days or 50 journeys whichever comes first = 190 FIM

Ticketing Equipment

The driver has an electronic ticketing machine (ETM) for issuing the on-bus paper tickets. There are three types of smart cards - two contactless and one contact. The reason for the two types of contactless cards is that the transport company changed suppliers. The earlier cards must be placed on the smart card reader (SCR) while the later cards must be passed close to the reader. The important part of the smart card is the integrated chip and this can be placed in a watch for example and Swatch watches with embedded chips are also available. The contact cards, which must be inserted in a slot, relate to nationwide system for regional tickets. They are also used for the tourist tickets that are of lower value and where the cost of a contactless card could not be justified.

There are three lights on the smart card reader - green is for correct, yellow warns of low remaining balance or imminent expiry, and red is for invalid ticket, where the customer must pay the cash fare. If there is equipment failure the customer travels free.

Integration of services

The city bus operator, Tampere City Transport which has 165 buses, manages the fares structure and ticketing system. There are a number (4 to 5) of other bus operators with routes which extend outside the city area and which are part of the city transport network when operating in the city. The total number of buses, including private operators is 300. The smart card ticketing arrangement applies to all vehicles marked with Joint Transport label. There are no rail services included in the network.

Subsidy

The overall cost per passenger journey is 6.75 FIM of which only 4.36 FIM is recovered in fares. There is local government **subsidy of one third**. It is clear that the system works very well – 95 per cent of transport is ticketed using smart cards. The operators are pleased with it - quick boarding etc. There is exact management information and transparent revenue allocations.

3.2 London

There are many similarities between Dublin and London, regarding the mix of modes and how they are ticketed.

Network

The public transport network in London that is covered by integrated ticketing consists of the following systems:

- London Underground,
- Buses in the greater London area, which display the London Transport logo,
- Docklands light railway, and
- most National Railways (formerly British Rail) services within the Greater London Area.

Both the Underground and the bus network are under the control of London Transport. The bus network is tendered out to a number of operators. The primary concern of the committee was to understand how both London Underground and London Transport buses are ticketed under the umbrella of London Transport.

Fares structure

A zonal fares structure is used. Zone 1 is in the centre and the other zones are based on concentric circles radiating outwards. There are six rail zones and four bus zones. In general the rail and bus zones agree, with bus zone 4 equivalent to rail zones 4, 5 and 6. Fares are flat depending on the number of zones involved.

Cash fare - single journey ticket

The single ticket regime is similar to Dublin. Rail tickets are magnetic and bus tickets are paper and there *is no single transferable ticket to cover bus-bus interchange or bus-underground interchange.*

- **Underground:** Single fares depend on the number of zones. Zone 1 is premium priced and child fares are less than half the adult rate. Day return fares are twice the single fare. A single adult fare in zone 1 is £1.40, and £0.90 in any of the other zones. It is possible to buy a 'carnet' of 10 zone 1 single tickets for £10. All tickets are magnetic.
- **Bus:** Single fares are based on the number of zones, with a premium on zone 1. The adult single fare within zone 1 is £1.20. This is the maximum fare and allows the passenger to travel to any other zone in London. Similarly a passenger in zone 2 pays £0.90 and this is valid from zone 2 outwards i.e. to zone 3 or 4. Fares for zones 3 and 4 are £0.80. In effect three fares cover the full bus network. Child fares are £0.40, but not valid between 2200 and 0430. There are also special short journey fares of £0.70 and £0.60 depending on the zones. Paper tickets are issued on the bus by the driver or conductor as appropriate. Since the committee's visit to London, the fares structure for bus travel has been reduced to two zones.

Travelcard

The main commuter ticket is the Travelcard. The Travelcard was introduced in 1983. It is similar to the Hop Zone bus/rail ticket that was introduced in Dublin prior to this. Apart from the higher levels of discount offered in London the higher use of the Travelcard in London as opposed to the short hop bus/rail ticket in Dublin is related to the configuration of the networks. In London the bus and rail

networks are more inter-connected particularly in the city centre etc. The rail network in Dublin is still 'corridor based'.

In addition to the travelcard, which is valid on the Underground, London Transport buses, Docklands Light Railway and National Railways (within Greater London), there are other time based tickets such as London Transport (LT) cards and bus only cards which serve different market segments. These cards require photo ID and cannot be bought on the bus. There is a network of retail agents similar to Dublin. It is noticeable that there is no rambler type rail only commuter ticket - season tickets (week, month, annual) are available for some shorter journeys between specific underground stations. Some examples follow.

One Day Tickets - Adult				
	Network	Time	Coverage	Price
Travelcard	Underground,	after 09.30	zones 1&2	£3.80
	LT Buses.		zones 1,2,3 & 4	£4.00
	Docklands LR,		zones 1,2,3,4,5 &6	£4.50
	National Railways		zones 2,3,4,5 & 6	£3.30
LT Card	Underground,	all day	zones 1&2	£4.80
	LT Buses,		zones 1,2,3 & 4	£6.00
	Docklands LR,		zones 1,2,3,4,5 &6	£7.50
One Day Bus	LT Buses	all day	zones 2, 3 & 4	£2.20
			zones 1,2,3 & 4	£2.80

Travelcard Adult Weekly		Outside			
		Zone 1			
Zone 1	£14.30		One zone	2,3,4,5 or 6	£8.00
Zone 1 & 2	£17.60		Two zones	2&3, 3&4, 4&5,	£11.50
				5&6	£10.60

Zone 1,2 & 3	£21.50		Three zones	2,3&4, 4,5&6	3,4&5,	£15.70
Zone 1,2,3 & 4	£26.70		Four zones	2,3,4&5, 3,4,5&6		£19.80
Zone 1,2,3,4 & 5	£32.00		Five zones	2,3,4,5&6		£22.00
Zone 1,2,3,4,5 & 6	£34.90					

Bus only tickets					
	<i>Weekly</i>		<i>Monthly</i>		<i>Annual</i>
	Adult	Child	Adult	Child	Adult
One zone					
2, 3 or 4 Three zones	£7.00	N/A	£26.90	N/A	£280
2, 3 and 4 Four zones	£9.20	N/A	£35.40	N/A	£368
1,2,3 and 4	£12.50	£4.00	£48.00	£15.40	£500

Statistics

Some usage statistics for London are given in Table 4. It can be seen from this Table that

- Approximately one quarter of journeys are cash transactions,
- Revenue from cash sales gives the highest revenue yield, average fares of £1.50 on the underground and 67p on the bus.
- There is a sizeable market for bus only commuter tickets
- There are considerable discounts for commuter tickets. For example average yields per journey to the bus company of 38.1p (period Travelcard), 37.2p (one day Travelcard) and 32.2p (one day bus pass) are less than the yield from concessionary travel (i.e. senior citizens) of 39.9p and considerably less than the cash yield of 67.3p per journey.

- London buses carry one and a half times the number of underground journeys, underground journeys are nearly twice as long but the yield to both operators per km is similar – 13.9p to Underground and 13.3p to London Bus.

Table 4: Revenue and passenger journeys, London 1997/98

Year 1997/8	Revenue		Passenger Journeys		Revenue per passenger journey	
	Undgrnd	Bus	Undgrnd	Bus	Undgrnd	Bus
	%	%	%	%	pence	pence
Ordinary	33	39	24	26	150.8	67.3
Period Travelcard	42	18	44	21	102.0	38.1
One Day Travelcard	23	6	29	7	85.5	37.2
Period bus pass		14		18		36.1
One day bus pass		5		7		32.2
Concessionary	2	19	3	21	80.7	39.9
	100	100	100	100	108.2	45.3
	£900M	£578M	832M	1,277M		
Average jy. in Kms					7.8	3.4
Revenue per Km					13.9	13.3

London Prestige

London Transport is now developing a new more sophisticated bus and Underground revenue collection system that could be extended to other transport-related services in the London area.

Known as the LT Prestige project, this development is being taken forward under the UK Government's Private Finance Initiative (PFI), which was launched in **1992** to attract private sector investment in public sector projects. It is intended that **by 2002**, passengers using London Transport's services will have a state of the art ticketing system, including smart cards.

London Transport's objectives for the LT Prestige project are

- to improve information about passengers and their travel patterns;
- to reduce opportunities for fraud; and

- to offer greater flexibility for adapting or introducing fares and ticketing policies (for example, in differential charging at different times of the day).

In addition, new ticket products such as Stored Value Ticketing (SVT) will provide a convenient alternative for passengers currently paying cash, although cash sales will still be possible.

On London Underground, all stations are being fitted with gates and/or validators; all ticket office machines will be replaced with faster, more efficient tills that will allow an additional range of payment methods; upgraded passenger operated ticket machines will offer touch-screen and multilingual features. Over 6 000 one-person-operated buses running on London Transport Buses contract routes have been fitted with new electronic ticket machines.

3.3 Toulouse

Members of the Committee also visited Toulouse in France.

The population of the core municipality is around 400,000 and the population of the greater Toulouse Area is around 700,000. SMTC is the regulatory body with responsibility for the provision of public transport. SEMVAT is the public transport operator and has a 5-year contract with the SMTC.

The public transport network consists

- Buses: There are 56 bus lines, operating 14m vehicle kms per annum on a network of 2,500 stops. 466 vehicles are required in the peak, which are operated from two depots.
- Metro: Line A: Jolimont – Basso - 10 km long. There are 15 stops. The service is operated by 29 x 2 car sets, out of 1 depot. Line B is scheduled to begin operations in 2008. There is a longer-term plan to construct a Line C.
- Outer suburban SNCF services: These are departmental suburban rail services operated by SNCF on a section of the Bordeaux – Paris - Narbonne network.
- Park and Ride: There are 4 major interchanges at Park and Ride sites, with associated network of feeder buses. Cars enter without paying, but cannot exit without producing a valid ticket that has been used on bus/metro. Otherwise, the driver has to pay for daylong parking to exit.

The fare system is zonal with two zones. Zone 1 is about 15-20 km diameter, and zone 2 = 40-50 km diameter. Travel in zone 1 costs 7.5 FF per trip; 10 - journey tickets cost 64FF, a 12-journey variant (all travel in the same week) costs 46.5FF. Travel involving two zones = 9FF per trip, 70FF and 50FF respectively for 10-journey and 12-journey variants.

There is a common ticketing between bus/car/rail/metro using magnetic stripe cards. Red tickets are transferable, Grey tickets are season tickets and require ID, while White tickets are used for concessionary (senior citizen travel). Ticket

sales are achieved through six SEMVAT ticket shops, automatic vending machines, and retail agents. There is little on-street vandalism of equipment.

The market share in the conurbation is car - 60%, metro/bus – 14%, walking - 20% and cycle - 6%. Within Metro/bus the usage is bus only – 46%, metro-only - 30% and bus/metro 24%.

Annual turnover is 550 M FF of which half is recovered through the fare box. Local and payroll taxes (an employer with over 10 employees located near a metro pays a transport tax of 1.75 per cent of payroll costs) also account for the other 50 per cent of the operational cost of public transport.

3.4 Survey of European Cities

There is empirical evidence from public transport undertakings in Europe that suggests a link between the type of fares structure and the ticketing medium used to implement it, the proportions of cash and off-vehicle ticket sales, and the level of state/city support of the undertakings. A critical determinant of cost coverage by revenue is the fare structure and levels. Obviously, if the fare is zero, the subsidy is 100%.

A postal survey of a sample of major European cities was carried out in 1994 by Bus Atha Cliath. The key findings are summarised in Table 5.

The survey shows that

- **Flat fares**, i.e. one fare for all journey lengths, or **zonal fares predominate**. So, across many cities, a passenger may travel 1 mile or 7 miles, and pay the same fare. It may be policy to set the fare levels to attract and retain the short-journey traveller. In that case, travel is discounted to the long-journey traveller. The coarser the fare structure, i.e. the way travel is charged for, the easier it is to understand and access. The corollary is that the operator is more likely to undersell travel, and thus not cover costs with revenue.
- Very high proportions of passengers use 'pre-paid' or tickets purchased off-vehicle.
- This market share for pre-paid tickets was achieved by radically discounting pre-paid fares relative to price for the same trip bought on the bus with cash, typically discount rates of 50% were reported. **Thus high pre-paid ticket penetration of the market is achieved at a cost of 'revenue foregone' to the operator.**
- Some undertakings do not allow ticket purchase on-vehicle, i.e. if you have not already pre-purchased a ticket to travel, you don't travel.

- With one exception, the levels of state/city support for the operation is high (ranging from 35% of operating costs to 70%).
- Most checking of tickets, as a result of the high level of pre-paid tickets, is done by visual inspection rather than by automatic means.

Table 5: Relationship between subsidy and ticketing systems in major European cities, Survey 1994

City	Pop *	Modes	Passgr jnys per year	% subsid y	% single	% multi-journey	% pass holder
Antwerp	0.5M	bus/tram	51M	69	13	39	48
Brussels	1.1M	bus/tram/ metro	196M	65	10	90	Flat 1hr with tra
Copenhagen	1.7M	bus/rail	176M	46	12	41	47
Helsinki	0.5M	bus/tram/ metro	185M	55	?	?	?
Paris	2.1M	bus/metro/ rail	2402M	53	33	?	>55
Marseille	0.9M	bus/tram/ metro	165M	41	?	?	?
Lyon	1.2M	bus/metro	217M	49			
Berlin	3.4M	bus/tram/ metro	865M	61	11	12	76
Koln	1.0M	bus/tram	332M	47	?	?	?
Frankfurt	0.6M	bus/tram/ metro	236M	44	?	?	?
Dusseldorf	0.6M	bus/tram/ LRT	187M	61	15	15	70
Bologna	0.4M	bus	134M	64	?	?	?
Milan	1.5M	bus/tram/ metro	884M	71	?	?	?
Rome	2.8M	bus/tram	817M	87	?	?	71
Amsterdam	0.7M	bus/metro /tram	220M	77	?	?	?
The Hague	0.5M	bus/tram	105M	70	?	?	?
Barcelona	1.7M	bus/metro	480M	57	28	?	?
Madrid	3.1M	bus/metro	500M	30	7	93	flat
Seville	0.7M	bus/rail	79M	36	15	?	?
Basle	0.2M	bus/tram	130M	15			?
Zurich	0.4M	bus/tram/rail	260M	32		?	?

* Urban population, excluding suburbs

3.5 Smart Cards in other European cities

A number of European (capital) cities are currently planning or in some cases actually implementing smart card based ticketing systems.

London

Currently in the second year of a four year implementation phase, this project called "Prestige", will deliver a contactless smart card ticketing system for all modes of public transport in London by end 2002. The project, which took six years to plan, will result in new smart card reading equipment being installed on all bus services contracted to London Transport, on all underground stations (vending machines, booking office devices, turnstiles) and on suburban rail stations in the London area. The system will offer, for the first time, through ticketing between bus and rail. A central computer system is being developed to apportion revenues amongst operators based on actual recorded usage of services.

Paris

Similar to the London project, the Paris system aims to be operational by end 2002. Again all buses, metro stations and suburban (RER) rail stations will be equipped with smart card reading devices. This project is being driven by RATP, which still owns and operates all of the public transport services in the Paris region.

Copenhagen

The public transport authority for Copenhagen, HT, set up a project in 1995 to develop a smart card ticketing system covering all modes of public transport in the Copenhagen area. It aimed to have a system operational by 2000. Currently all bus operations in Copenhagen are operated by private contractors. Recently the scope of the project was extended to accommodate the national rail system. This has resulted in the project being extended by another two years.

Berlin

The public transport operator, BVG, has recently completed a trial involving 27,000 contactless smart cards used on selected bus, tram, s-bahn and u-bahn services. It intends to draw on this experience to finalise the specifications for a tender to be launched before the end of 2000. This tender will be for a smart card system covering all modes of transport in the Berlin region.

Rome

ATAC, operator of bus and tram services in Rome, signed a contract in 1999 for the installation of smart card ticketing system on 5,000 buses as well as trams

and trains in Rome and in Lazio province. ATAC plan to launch the system in 2000.

4. FINANCIAL ISSUES

4.1 Capital costs

The capital costs associated with introducing the preferred ticketing system, including smart cards are summarized in Table 6. The capital estimates are based on unit costings where possible. It is very difficult to estimate with accuracy the cost of items relating to computer software. The costs in Table 6 should be regarded as indicative. More final costings will be available when the system is specified and competitive tendering occurs.

Ticketing costs for Luas are excluded as it is assumed that these costs will be included with the Luas project costs. There are no costs included for Iarnród Éireann outside of the Dublin suburban network, for Bus Éireann or for other operators, as these will occur at a later stage.

The following abbreviations are used in the table

ETM = Electronic ticketing machine

SCR = Smart card reader

POS = Point of sale

MIS = Management information system

BOM = Booking office machine

SDC = Station data concentrator

TVM = Ticket Vending Machine.

It can be seen from the table that capital costs are of the order of £25 M. These costs should be seen in the light of the scale of the new system – all of Bus Átha Cliath's fleet will be equipped with new ticketing machines and the suburban rail will be a closed network. Capital funding for the project should be the subject of further discussion between the Department and the Company having regard to overall discussions on the implementation programme for the investment strategy set out in the National Development Plan. The possibility of securing EU funding, in particular, should be explored given the emphasis placed by the EU Commission on the introduction of integrated ticketing. The Committee notes that the National Development Plan makes provision for expenditure of £50M on integration over the period 2000-2006, although the DTO Dublin transportation Blueprint 2000-2006 earmarked just £12M of this specifically towards integrated ticketing.

The capital costs identified clearly relate to the CIE Operating Companies. No attempt has been made to quantify the cost for private bus operators, which will be an emerging factor in the context of the Dublin bus market. The Committee merely notes that the issue of capital funding for such private operators, in particular those licensed and operating by the time an integrated ticketing system has been developed, will have to be addressed.

Table 6: Capital cost of rebate ticketing equipment

	Quantity	Unit Cost	Total
SUBURBAN RAIL		£	£000
Smart card			
SCR's for all turnstiles	600	1,500	900
Installation of SCR's	600	2,000	1,200
Software reconfiguration	600	2,000	1,200
Central software modification	1	750,000	750
BOM	60	3,500	210
Hand held inspection devices	30	250	8
POS devices	30	2,000	60
POS software	1	100,000	100
Exit validation			
Additional turnstiles	230	11,000	2,530
Structural alterations for extra turnstiles (per station)	45	50,000	2,250
Magnetic validators for new turnstiles	450	5,000	2,250
Magnetic validators for exit side of existing turnstiles	75	5,000	375
Modify control of turnstiles from SDC (per station)	35	2,000	70
Control points for stations with new turnstiles	15	10,000	150
BUS ATHA CLIATH			
On-bus – ETM with integrated SCR	1,375	1,500	2,063
On-bus – standalone SCR	1,375	500	688
On-bus – installation costs	1,300	250	325
On-bus – memory modules	2,500	200	500
Bus depot – data collection devices	25	1,500	38
Bus depot – network computer MIS	1	250,000	250
Hand held inspection devices	100	250	25
POS devices	250	2,000	500
POS software	1	100,000	100
On-Street TVM	25	50,000	1,250
Central clearing system	1	750,000	750
Initial purchase of smart cards	250,000	3	750
TOTALS (including VAT 21%, 12.5% on civil works, and 10% contingency)			
DUBLIN SUBURBAN RAIL			15,832
BUS ATHA CLIATH			8090
Initial supply of smart cards			998
TOTAL			24920

4.2 Revenue Implications

There are two revenue issues – relating to the cost of reducing the cost of an interchange trip to the passenger via the rebate and a need for greater discounts to effect the switchover to the use of smart card..

4.2.1 Cost of Rebate

The DTI strategy and the DTO Dublin Transportation Blueprint 2000-2006 both accepted that the introduction of integrated ticketing could have revenue implications. At its simplest level the rebate system being recommended in this Report means that passengers who now pay two full fares to make a journey by bus and DART would no longer do so - they would receive a rebate on the second or subsequent legs of a multi-leg journey. A key feature of the rebate system is that the existing fare structures can continue. If one is to assume that existing fare levels continue then it is clear that **the vast majority of customers will either see no change in fares or have a fare reduction.**

MVA consultants has estimated that a rebate of about 50p would result in a revenue loss of about 6% or £5 million per annum on the existing cash income of approximately £85 million between Bus Atha Cliath and Suburban rail. It is accepted by the Committee that, in a status quo situation, the introduction of rebated fares will result in a direct loss of revenue to the **operating companies**, since it will reduce the revenue per passenger journey without reducing the cost per passenger journey. **The amount of revenue loss is, however, clearly dependent on the level of rebate and the type of rebate that is applied. It is also clearly dependent on the extent of usage of the rebated fare as distinct from passengers loading differing forms of prepaid tickets.** CIE has indicated that it is not in a position to fund any reduction in farebox from its own resources. This issue will need to be addressed in more detail in discussions between CIE and the Department of Public Enterprise. The Committee is aware that the Department is undertaking a consultancy in relation to identifying the costs and revenue implications for Dublin Bus in the context of the provision of additional buses in 1999 and under the current National Development Plan.

The Committee recommends that, in recognition that the rebate fares system will lead to a level of revenue loss, the level of such loss should be recompensed by way of increased subsidy/subvention from the Exchequer. The level of this subsidy/subvention can only be determined with experience of the manner in which the market will evolve, including quantification of savings made as a direct result of the introduction of the new technology. A formal means of monitoring the impact of introducing integrated ticketing should be agreed between the parties. It is anticipated that this requirement will dissipate

over time with the advent of a multi-operator environment, bidding procedures for public transport contracts and clear revenue apportionment rules.

4.2.2 Switching from Cash to Smartcard

Table 7 below sets out the existing revenue and yield per passenger journey on the basis of cash based adult fares and prepaid fares. It can be seen that cash revenue on bus and suburban rail in the Dublin area amounts to 84% of adult revenue and 82% of passenger journeys.

Table 7: Analysis of adults fares in the Dublin Area, revenue and yields

ADULTS		Revenue	Yield per passenger journey	Estimated passenger journeys
		£m		million
Bus only	Cash	68.1	83p	82.0
Bus only	Prepaid – 2 Easy	2.5	79p	3.2
Bus only	Prepaid - Other	7.1	73p	9.8
Rail only	Cash	11.3	105p	10.8
Rail only	Prepaid – 10 journey	3.1	98p	3.2
Rail only	Prepaid – Other	1.4	1.12	1.2
Bus/rail	Prepaid – Short Hop	1.2	67p	1.8
Total	Cash	79.4	86p	92.8
Total	Prepaid	15.3	75p	19.2
		94.7		112.0

Taking the figures shown in Table 7, and assuming a switchover to 80% prepaid, this would mean a revenue dilution of the order of £7 million, as per Table 8.

Note: This is purely an illustration of how a substantial switchover to prepaids based on existing average yields and existing passenger journeys, could affect revenue. It is acknowledged as simplistic, but is useful for illustration purposes as to the impact of a discount to a much larger percentage of the commuting public.

Table 8: Illustration of impact on current revenues from adult fares in the event of a switch to Prepaid Tickets.

ADULTS	Revenue £million	Yield per Journey	Pass. Journeys (millions)	Percent of market
Total Cash	19.52	86p	22.7	20%
Total Prepaid	67.95	75p	90.6	80%
Total Revenue	87.47	77p	113.3	100%
Difference (Table 6)	- 7.23			

The reasons for the low take up of prepaid tickets have already been discussed earlier in the Report. While such a switchover would clearly have major implications for the revenue base of the CIE Group and its operating companies, it is clear that, up to now, the clear majority of the travelling public does not perceive any clear benefit, on an individual basis, in opting for prepaids. The question therefore to be addressed is how, in introducing smart cards, one goes about effecting the cultural change required and how this will impact on costs and revenues.

The perception of poor value in currently discounted fares has to be addressed. This would form part of a wider marketing and distribution campaign, which would also address other existing constraints such as availability, limited range of prepaids etc. The Committee offers the following possibilities for such a campaign:

- Availability of free smart cards (once-off capital cost of c. £1 million);
- Initial stored value, say £5, installed on all free smart cards (capital cost of c. £1.25 million)
- A recognisable and meaningful discount relative to the cash based fare;
- A sustained advertising campaign through the media, on bus/rail, on-street etc;

The Committee notes that MVA in their 1997 study emphasised that integrated ticketing projects “cannot be contemplated unless there is an acceptance politically of the need to rebalance the farescale at the time integrated fares are introduced”. Ultimately a regulator will have to balance the level of subsidy available with the relevant level of pricing freedom afforded to the transport operators, coupled of necessity with the need to address wider public transport objectives.

The Committee believes that the marketing of the new smart card must involve an incentive to take up. This can be achieved in alternative ways, for example:

- Existing cash fare levels can be discounted for smart card users subject to appropriate recompense to the operator by way of subsidy/subvention/service contract etc;
- A fixed subsidy may be applied within which the operators may budget discounts to effect the switchover;
- A fixed marketing budget (to include an element of discount) for a limited period could be approved as part of the overall capital project;

- An increased cash-based fare could be established on the introduction of the integrated ticketing system. This would reduce or negate the need for a discount, since existing fare levels could effectively act as the discounted levels and the new increased cash based fares would act as an incentive for the consumer to avail of the smart card. This option would also serve to diminish or eliminate revenue loss issues. Persons wishing to remain as cash paying customers would in effect be paying a premium for the privilege. Any possibility of negative publicity could be eliminated by the free provision of smart cards.

The Committee believe that the impact of introducing integrated ticketing per se cannot be considered in isolation. It has to be borne in mind that the primary purpose is to effect a change in the market whereby the substantial majority (80%+) would use a smart card for travel purposes. Smart card use would, in itself, need to offer a meaningful benefit, relative to paying cash, to effect the switchover. Use of the smart card would then depend on the customers' choice between loading cash and availing of the lower fare plus rebate, or availing of other fare types on the lines of, say, existing prepaids or others that may be developed. There would clearly be interaction between the different levels of take-up and the relative impacts on revenue i.e. it should be remembered that a higher loading of prepaid ticket type will reduce the revenue impact of the rebate fare per se.

Much also will depend on the future development of the public transport system and in particular the bus market in the short term. The bus fleet, the bus network and the number of operators participating in the network will change quite radically in the short term and it should be remembered that integrated ticketing will take over two years to develop on the basis recommended. Also the impact on the individual operating companies in terms of consumer choice of modes and voluntary or enforced interchange would have to be separated out from the CIE Group impact e.g. possible private operation of LUAS, franchising of bus routes, proposed privatisation of Dublin Bus. Additionally, other benefits such as reductions in underpayment/fraud, potential savings on security, cash-handling, banking etc. will only crystallise with experience of operation of the system.

As an illustration of this the recently completed Bus Network Strategy Appraisal (Table 7.9. – page 49) estimated that, with its Preferred Strategy, the Dublin Bus deficit would grow to £37.9 million in 2006 from an estimated £20.5 million in 2000 and an actual deficit in 1999 of £10.2. This estimate is based on a strategy that recommends an increase in fleet from 985 to 1,539 buses, an average bus speed of 13 km/hour, certain levels of productivity per bus in terms of km/bus per year, an assumed network mileage, and the introduction of integrated ticketing.

The Committee considers that the impact on costs and revenues needs to be considered further. To attempt to do a study on integrated ticketing per se in isolation would be meaningless in view of the issues raised above. In the short to medium term integrated ticketing will be a requirement for all operators bidding to enter the public transport system and, as such, tenders for franchises or

licences will be founded on that premise. Also as soon as a substantial changeover to smart card has been effected, the cultural change will have been effected and the need for ongoing marketing of a similar intensity will diminish.

For these reasons the Committee recommends that a marketing budget of £10 million should be made available as part of the overall capital budget for the project. This would allow for some of the ideas already mentioned such as the once-off free issue of smart cards, once-off free loading of cash start-up, an element of discounting etc. **Furthermore the Committee recommends that the introduction of smart card ticketing should coincide with an increase on the approved level of single cash-based fares.** This would not be an attempt to generate additional revenue but an attempt to encourage the changeover while limiting the revenue loss potential. In effect, rather than discounting downward to create a meaningful difference between the cash-based single fare and the levels available through smart card use, the cost of fares for cash based travel should be revised upwards. The impact on passengers changing to smart card would be nil or minimal, the revenue base would be protected, the ongoing revenue loss issue could be largely removed, the operating companies would secure more flexibility in innovation within the established ceilings of the cash based fare. The only loser in all this would be those passengers who choose to resist change and continue to pay cash directly. It could be argued that they would in effect be paying a premium for the privilege and associated costs to the operator, and, of course, it should be emphasised they would have a cheaper alternative at no additional cost. In this context the easy availability of the smart card and the ability to load relatively small levels of cash are essential to ensure that no sections of the community are marginalized or discriminated against by having to pay increased fares.

5. ADDITIONAL ISSUES

5.1 Accessibility

The Committee notes the Government's commitment under the National Development Plan to improve accessibility for mobility impaired and disabled people. **Any system of integrated ticketing must respect this broader policy objective.** The introduction of smart card as the ticketing medium should prove of benefit in this regard. The deployment of entry and exit turnstiles at all suburban rail stations should take accessibility needs into account.

5.2 Public Private Partnerships

The Committee acknowledges the Government's interest in Public Private Partnerships but does not see it as part of the remit of the Committee to make recommendations in this regard.

5.3 Extension to Hinterland Area

The main body of work of the Committee was confined to the short hop zone – see definition in Section 1.5. It is recommended that the smart card should be extended to the hinterland area and beyond at later dates. In the interim CIE will give a commitment to continue with existing range of inter-modal tickets (i.e. medium/ long and giant hop). These are tickets for regular commuters. It is intended that Bus Eireann should actively participate in the Committee's further work (see Section 5.8) as well as bringing on board issues relating to the extension of the system on a nationwide basis.

5.4 Phasing

Subject to immediate decision for the CIE Group to proceed with the project and to the availability of funding, the order of introduction of smart card technology is likely to be

- Bus Atha Cliath – early 2003.
- Suburban rail – 2003
- Luas – start 2003.
- Mainline Rail/ Bus Eireann – 2003+
- Other transport operators – as they enter the market after 2003. Any new entrants in the interim should be clearly advised of the nature of the system being developed and that there will be a requirement for them to participate. Every opportunity should be afforded to such operators in the development stage to be appraised of the design of the system.

The Committee is mindful of the Government's wish that integrated ticketing be introduced during 2000. While the recommended system of integrated ticketing will have a lead in time of approximately 27 months the Committee notes that

- Dublin Bus is formulating a panel of equipment suppliers/system integrators who could supply a new ticketing system
- A consortium of consultants has been retained to assist in formulating an independent and expert functional specification for a smart card ticketing system. The consultants' terms of reference include advice on
 - production of common specifications and protocols
 - sales and distribution
 - phasing of project implementation
 - other card schemes
 - revenue apportionment.

This consultancy project is being funded under the Technical Assistance Programme of the Operational Programme for Transport 1994-1999. It is expected to be completed by end September 2000.

Further progress is wholly dependent on Government adoption of the recommendations in this report.

In the interim Bus Atha Cliath has continued to examine the possible introduction of a broader range of prepaid tickets that would effectively offer a limited form of integrated travel. An example of this is the introduction of the 3-day Rambler ticket in 1999, offering unlimited travel on the bus network for that period. This has proved successful and in May 2000 a 5-day version was introduced. Bus Atha Cliath is also exploring the possibility of developing bus/rail versions of these tickets.

5.5 Institutional Issues

The Committee notes the recent review of the Dublin bus market and the recommendations in relation to the manner in which competition should be introduced in to that market. This may, it is understood, lead to a radical change in the way in which public transport in the Greater Dublin Area is both regulated and funded, and, in the longer term, may address the funding issues discussed above in a more structured manner.

5.6 Cash Based Fares

One specific remit of the Committee was to devise an integrated ticketing system which would enable a person to buy a single ticket for a full journey and allow them to transfer from one bus to another or from bus to rail.

The system as envisaged will accommodate this type of journey provided the customer has a smart card, which will be easily available. It will not however be possible with a paper ticket.

The rebate system does not allow through ticketing for the cash customer.

The major reason for this is the nature of the modes involved. Suburban rail needs automatic ticketing (at present magnetic, in the future also smart card), and it is not feasible for bus drivers to issue magnetic tickets.

The introduction of the single transferable cash ticket in Dublin would involve a change in approach to one or all of the following:

- Visual inspection of tickets by bus drivers (scope for fraud, increased loading times, lack of control – no record of transfer kept, allocation of revenue between operators);
- Visual inspection of tickets by rail staff (all of the above plus abandonment of gated system);
- Change in fare structure – either towards flat fare (zonal) with boundary problems, revenue loss to company etc. or complicated system where

driver must calculate fare (large amount of cash on bus, very slow boarding times).

One of the aims of the new ticketing system will be to reduce the number of cash paying customers, and the recommendations in Section 4 are geared towards this, but it is accepted that such a market will not cease to exist totally.

5.7 Regulation/Allocation of Revenue

A key concern of all the operators in an integrated fares and ticketing system will be to ensure that they are paid for actual usage of their own services. This will require the determination of a formula that reflects actual use of services on a day-by-day basis. The question arises as to who should be the authority responsible for apportionment of revenue. This would be a relatively simple issue if operations were to be confined to the CIE Group.

One of the key elements identified for designing an integrated fares and ticketing system is that it must be capable of being extended to other future potential operators. Luas has already been identified as one such operator, while it has also been announced that Dublin Bus will be privatised. It needs to be stressed that, if integration and integrated ticketing is to achieve its goal, it is critical that all operators should participate.

The possibility of CIE being responsible for the "clearing house" function in the short term could be examined. However, this position is unlikely to be sustainable in the longer term and consideration will have to be given to the establishment of a body, independent of the operators, which will administer this function. Potential future operators in the system are unlikely to be satisfied with any one particular operator overseeing a "clearing-house" or management function for an integrated ticketing system. The system will generate considerable information in relation to route profitability, patronage, passenger movement patterns, revenues/costs etc. Such information should clearly be available to any Regulator with responsibility for planning the public transport network. Clearly all information relevant to its own operations should also be available to the service providers. Issues relating to transparency, competition and confidentiality will need to be carefully thought through.

5.8 Further Work

This report recommends the introduction of a rebated fares system supported by contactless smart card technology. There were a number of issues, particularly in relation to funding which require further discussion. There are also technical issues in relation to the installation of the new equipment. The Committee is of the view that it should continue to meet to:

- Oversee the development of specifications by Bus Atha Cliath and other operators for the recommended system;
 - Examine further the question of exit validation on bus from the point of view of feasibility, costs and benefits;
 - Determine how to manage the different start-up dates for different modes and operators within the metropolitan area;
 - Identify issues in relation to the extension of the system to the hinterland and beyond to the national transport system;
 - Further pursue, in conjunction with other public transport developments, the outstanding issues in relation to funding;
 - Assess the reaction by interested parties to the report.
-
- Determine the manner in which institutional issues relating to revenue collection and revenue apportionment roles etc. should be pursued.

6. RECOMMENDATIONS

6.1 Recommendations

The key recommendations of the Committee are:

- Integrated ticketing should be introduced by way of a rebated fares structure using smart card technology;
 - The capital costs are estimated at approx. £25.5 million. This does not include costs for Iarnrod Eireann outside the Dublin suburban network, for Bus Eireann or for possible private operators;
 - The introduction of rebated fares per se will, it is estimated, entail revenue dilution of the order of £5 million per annum to the CIE Group. This is dependent on the level of rebate however, i.e. the system could be introduced with zero rebate, therefore not entailing revenue dilution. Any loss should be met by increased subvention.
-
- To effect the switchover to smart card by a large majority of passengers will require an intensive marketing and distribution campaign, with

associated costs. A capital budget of £10 million is proposed for this purpose. This cost could however be contained by an increase in the approved level of the single cash-based fares, as an effort to effect the switchover to smart card, thereby reducing the level of discount required to effect the change.

- Further work needs to be carried out in order to determine the revenue impacts of the new system, taking into account possible savings arising directly from the introduction of integrated ticketing, but also the dynamics of the changing public transport environment. It is anticipated that this requirement will dissipate over time with the advent of a multi-operator environment, bidding procedures for public transport contracts and clear revenue apportionment rules.
- Further work needs to be done by the Committee to progress and oversee the development of the system in the changing public transport environment.

6.2 Benefits of new system

This new system will be state-of-the-art. Smart card will be the preferred ticketing medium in projects currently underway in Berlin, Copenhagen, London, Paris and Rome. The proposed system will deliver the following benefits:

- Seamless movement of customers through the public transport network. Ticketing will be both flexible and convenient and will greatly reduce the perceived barrier to travel that traditional ticketing systems present to new users;
- Reduced fares for customers who make multi-‘leg’ trips, the number of which will increase as Dublin increases in size and the public transport system in complexity. This reduces the inconvenience of interchanging for travellers, and has a downstream benefit of allowing operators to better match supply of service to demand, since there is no inherent penalty to passengers in offering a mesh of interconnecting services;
- No radical fare changes for customers who make single-‘leg’ trips, who will remain a large proportion of the total market;
- Customer convenience in having one ticket, which may, over time, expand to include other functions and uses. The smart card will operate as a stored value card or be account based. Suburban rail customers will never have to queue at stations ticket booths again, the card will be

decremented in the entry gate and unused travel will be added back to the ticket on exit. Regular rail travellers can buy a pre-paid ticket and avail of discounts;

- Significantly expanded distribution networks for pre-paid tickets. For example, customers can purchase pre-paid tickets on the bus, so bus drivers effectively become part of the pre-paid ticket distribution network;
 - Increased flexibility of pre-paid tickets, exploiting the smart card technology to its maximum and effectively customising tickets to customers. A new range of prepaid tickets will be available offering validity for numbers of days e.g. 1, 3 or 5 day tickets. Days need not be consecutive;
- Over time, a significant swing to pre-paid tickets. This will reduce time spent boarding passengers at bus stops, will speed up journey times (of particular importance for high frequency Q.B.C. routes), and will therefore add to the quality package that is public transport. Delays at suburban rail stations ticket booths will be practically eliminated;
- Over time, a significant swing away from cash usage and single tickets. This will improve staff security and reduce operator costs, as well as reducing public disaffection with the “exact fare” operation;
- Overall, a predicted growth in patronage as a result of the introduction of a simpler, seamless method of payment for travel.

Appendix I

Membership of Integrated Ticketing Committee

Department of Public Enterprise

Mr Dave O'Donoghue, Chairperson,
Public Transport (Planning) Division

(from September 1999)

Mr James Caffrey
Public Transport (Planning) Division

Mr John Fearon Public Transport (CIE Regulatory Affairs &
Investment) Division
(Chairperson to September 1999)

Ms Mairead Broderick Public Transport (CIE Regulatory Affairs &
Investment) Division
(Secretary to February 2000)

CIE Group

Mr Michael Reidy
Manager, Programmes & Projects

Mr Gerry Keane
Group Marketing

Bus Atha Cliath

Mr Paddy Doherty
Business Development Manager

Mr Brendan Flynn
Technology Development Manager

Iarnrod Eireann

Mr Michael Murphy

Manager, Suburban Rail

Mr Joe Beardmore
Suburban Rail

Marketing Manager,

Light Rail Office

Mr Ger Hannon

Dublin Transportation Office

Ms Marian Wilson
Senior Transportation Planner

APPENDIX II Committee on Integrated Ticketing

Terms of Reference

The objective of the committee will be, on the basis of the DTI Strategy and taking account of the MVA study, to prepare as soon as possible and in any event by 31 December 1999, proposals for an integrated fares and ticket system which encourages the best use of a network of routes and facilitates people who have to make more than one trip to complete their journey. The system should enable a person to buy a single ticket for a full journey and allow them to transfer from one bus to another or from bus to rail (DART/Suburban rail; LRT) within a specific period of time.

In doing so the Committee should have regard to:

the provision of comprehensive and consistent information that enables passengers to make use of the total network.

associated route network rationalisation/development to meet the existing and potential travel needs as effectively as possible using all modes of public transport.

the efficacy of the ticketing system so as to minimise the potential for passenger fraud and fares evasion while introducing more efficient and flexible ticketing arrangements.

the costs and benefits to both the operating companies and the travelling public of the recommended proposals.

an appropriate fares system and structure

The Committee should provide progress reports to the Monitoring Committee for the Operational Programme for Transport.

Dave O'Donoghue

James Caffrey

Michael Reidy

Gerry Keane

Paddy Doherty

Brendan Flynn

Michael Murphy

Joe Beardmore

Ger Hannon

Marian Wilson

Dated September 2000.

