2. PASSENGER TRANSPORT REAL TIME INFORMATION

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The purpose of this report is to present the current situation with regard to the implementation of a Real Time Information (RTI) system for the Exchange and the wider Christchurch bus system, and to recommend acceptance of a tender for its installation.

OUR FUTURE - OUR CHOICE

The Christchurch Public Passenger Transport Strategy (Our Future - Our Choice) developed by the CCC and EC in 1998 identified the need for significant improvements in the system to "provide a much more convenient, attractive and useful public transport system…". Within the strategy a number of short and long term goals were identified as well as details of a specific programme of improvements to facilitate the achievement of the targets and vision. The key action in relation to this issue is that the Council undertook by 2003 to:

> "*Trial, develop and provide (where appropriate) real time information at bus stops to inform patrons when their next bus will arrive*."

WHAT IS RTI?

RTI is an element of a much broader field entitled Intelligent Transport Systems (ITS). ITS embraces a wide range of transport innovations, mostly derived from existing information and communications technologies. In its various forms, ITS has the potential to deliver significant benefits to the community and the economies of the world.

Essentially ITS are advanced transport systems that apply information, communications and control technologies to help the operation of transport networks. ITS systems generally contain three broad components - sensors, information processing and management, and output devices. These are interconnected through a communications network. Generally ITS can be classified into one of five groups as listed below:

- Area Traffic Control Systems (such as SCATS)
- Advanced Traffic Management Systems (such as the Council's ANTTS and the CCTV Networks)
- Advanced Passenger Transit Systems (such as Real Time Passenger Information and Bus Priority facilities)
- Advance Traveller Information Systems (such as automated incident information systems and route guidance systems)
- Freight Management Systems (such as tracking freight and fleet management systems)

The main components of an RTI system are:

- automatic vehicle location (AVL);
- communications to and from the bus and the bus stop;
- a central processing system (with database and capable of forecasting time to location); and
- output devices (visual and audible).

Public Transport passengers use three types of information: fares, locations (stops and routes), and timing (timetables, arrival times and journey times). Most of this information is fixed in time, but actual service travel timings vary constantly. This variation is a source of great uncertainty for travellers who especially value knowing when a bus will arrive at a stop where they are waiting.

Information systems have been used on rail systems for many years, for both location information ("the next stop is …") and timing ("The next train to … will depart in … minutes"). Unfortunately the quality of information on rail systems has often been poor because of poor rail operations and accurate information for all public transport systems has been limited by the complexity of systems required to provide it.

Major improvements are now possible with the advent of cheap AVL (automatic vehicle location systems) and cheaper high volume communications (trunk radio, dial up telephone and optical fire). RTI systems and practice are continually evolving. While components are available "off the shelf", complete systems have always been adapted for particular locations. The expansion of RTI has considerable potential and is likely to include kiosks at major sites, dial up information and Internet sites.

There are many systems around the world which have been installed, with general success. RTI systems for public passenger transport can be found in Auckland, Brisbane, Strasbourg, Portland, Lund (Sweden), San Francisco, and Seattle.

WHAT ARE THE BENEFITS OF RTI?

Being a high technology facility, with many interesting features and expansion options, RTI is a high profile and attractive product that appeals to a broad range of the public. When introduced well, it can be a popular and well-supported improvement to the public transport system with few antagonists.

The benefits that RTI (and ITS generally) can potentially deliver to the community are significant and include:

- better utilisation of infrastructure and reduced need for infrastructure investment,
- improved traffic flow,
- better and more efficient service from public transport,
- improved co-ordination of transport modes,
- enhanced user safety and security, and
- reduced environmental impact and reduced fuel consumption.

RTI systems are especially valuable for people with disabilities (intellectual, visual and auditory).

ITS is receiving major attention in North America and Europe as well as to a lesser extent in Australia, as a means of improving the efficiency and attractiveness of their transport systems. It is often estimated to have a B/C ratio in the order of 4. It is an area of relatively little overall expertise in New Zealand.

Notwithstanding, the operational aspects of vehicle priority that RTI/ITS could support, there are also major benefits for the planning of these priority measures. Real time information when stored and collected over time provides an invaluable data base for transport planners to use to assist in identifying and targeting where there are problems in the progress of a bus service, such as a regular bottleneck in the road network. This will provide better data, allowing longitudinal analysis of changes over time, and more confidence in the data with a greater volume of data available rather than relying upon specific traffic counts and observations or driver hearsay. It would be possible to also monitor the after effects of projects much more readily and reliably.

With a major focus of many overseas cities to encourage alternatives to the private car, there are several common applications for ITS, including RTI, to improve the efficiency and appeal of Public Transport. Generally these cities would have similar broad policy goals which can be partially addressed with the use of RTI, relating to areas such as the environmental protection, transport mode shift, reduced capital investment, accessibility and quality of life. More specific policies relate to increased public transport patronage, reduced pollution and reduced operating costs.

The key to a successful RTI system and hence maximising the potential for achieving the above objectives, is increased user confidence. During the development of the Joint CCC/EC Public Transport Strategy in 1998, a significant theme that came through from research is that people experience anxiety at most points of a bus journey. RTI when fully developed can significantly reduce the anxiety at several points of a bus journey, hence removing another impediment to people's choice to use buses.

COSTS OF RTI

The cost, whilst not insignificant, is of the order of a small number of major roading intersection improvements. There is also a risk associated with quickly evolving technology. The issue of evolving technology is the same that people are constantly faced with in modern times when looking to purchase a computer – inevitably there are faster and more impressive models available for the same or cheaper price shortly after the purchase is made. The main issue for the Council in this respect is to ensure that the system meets the functional requirements identified for the system.

RELATED POSSIBILITIES

Tied to the implementation of RTI in Christchurch would be the possible introduction of several other elements of what are known as Advanced Passenger Transit Systems. These other elements also add significant benefits to the Public Transport System, to several different interest groups. As there are several different potential beneficiaries, the cost of an initial system could be recouped against several different uses. The other elements which could be introduced at nominal cost include security systems, vehicle management systems (for monitoring engine and other vehicle operating characteristics), integrated ticketing, real time schedule information and management, fleet monitoring of vehicles (for operations management) and bus priority systems.

Public Transport in many places is susceptible to various illegal and socially undesirable activities which, in the past, have been addressed in a variety of ways. ITS/RTI offers the opportunity for improved monitoring of vehicles and facilities to discourage unacceptable behaviour.

This can be achieved by enhanced remote monitoring by camera in real time of situations on moving vehicles, providing driver panic buttons, passenger distress and information buttons and the automatic tracking of vehicles (notifying the operator if a vehicle leaves its designated route).

There has been slow progress developing vehicle priority systems that integrate with area-wide traffic signal control systems. However, it is expected that systems will become increasingly useable and available within the next five years (including interfacing with SCATS). This could also have further spin-off benefits to emergency vehicles.

BUS EXCHANGE

When the proposal for the Bus Exchange was developed and adopted, there was an understanding that the standing time of buses at the bus stops in the Exchange would need minimising. One aspect of achieving this is to provide passengers with real time information regarding when to expect their bus arrival. This allows them to prepare themselves for boarding at the appropriate time, and to minimise the number of passengers waiting at the stops (passengers would be able to spend less waiting time at their stop, reducing the crowding at the stops).

The proposal to move the bus terminus from Cathedral Square is a major change to the system. Changes to a public transport system inevitably cost patronage, at least in the short term and the level of effect reflects the degree of change. An understanding related to removing the buses from Cathedral Square was that users would benefit from this major shift and reorganisation of their bus system, with a significantly improved public transport system. One of the benefits proposed was the introduction of an RTI system.

During discussions on aspects of the development of the Bus Exchange, a number of central city retailers have been given a presentation on RTI. They unanimously endorsed its implementation as soon as possible, and gave positive feedback of their experiences of it in overseas cities. There was even some surprise that Christchurch had not yet pursued it more vigorously.

More recently, with some media attention given to RTI, officers have had approaches from retailers regarding the provision of RTI in their shops. The benefits of providing RTI for their customers were quickly recognised. How this can be achieved will require further work, but is an exciting possibility. In the designing of the Colombo Street component of the Bus Exchange, it has been agreed with Ballantynes to place RTI display screens in their Colombo Street windows if needed.

Interestingly, and separate from the current Council project, a trial RTI system is underway in Christchurch. It is being undertaken in a partnership between RedBus and a local firm, Connexionz. This trial was to begin on Queen's Birthday weekend, and is to operate on the Airport service (a commercial service). No results are yet known regarding this trial, but a close interest in this trial will be maintained over coming weeks.

THE CHRISTCHURCH RTI TENDER

Tenders for an RTI system for Christchurch closed on 3rd May, with five companies submitting bids. The tender detailed a two-stage process with additional optional features.

Stage One consists of sufficient hardware and software to provide RTI at the Exchange stops, namely:

- A bus tracking system for the 210 buses in Christchurch,
- Communications between buses and the control room,
- A central processor,
- RTI signs for the Exchange, and
- Equipment to operate the internal Exchange doors when a bus arrives.

Stage Two consists of additional equipment to implement an RTI system throughout Christchurch, including:

- An enhanced tracking system (if required) to provide sufficient accuracy to be able to locate a bus as it passes through a signalised intersection,
- Selective bus priority at up to 30 signalised intersections,
- RTI information signs at 20 major bus stop locations (shopping malls, hospitals, peripheral terminals etc), and
- 350 minor stop signs that will be located mainly at stops that incorporate a bus shelter.

Stage two can be implemented over a number of years if required.

In addition, tenderers were asked to price the following five optional items:

- On-board bus information signs for all buses (displaying the next stop)
- Driver information signs for all buses (informing drivers whether they are running ahead of or behind schedule)
- Driver Duress facilities for all buses (a 'panic' button for the drivers)
- Internet Information (RTI information on the internet)
- Audio Information for 5 signs (voicing the displays on the signs for visually impaired on request)

An extensive tender evaluation was carried out by staff from both the City and Regional Councils. A Weighted Attributes method was used in conjunction with a Quality Price Trade-Off (QPT) approach. Ongoing maintenance and operational costs were also factored into the evaluation.

A summary of the tenders is as follows:

Stage	Connexionz Bid A	Connexionz Bid B	ABB	BCE	Wireless Data	Serco
Stage 1	$924,380	$884,600	$1,148,959	$1,504,475	$1,458,503	$4,121,696
Stage 2	$3,596,048	$1,632,528	$4,979,997	$5,252,017	$3,474,490	$7,455,994
TOTAL	$4,520,428	$2,517,128	$6,128,956	$6,756,492	$4,932,993	$11,577,690
QPT Score	4951	2200	6616	5773	5109	10777
Optional Items						
Bus Signs	$462,000	$462,000	Not offered	$441,630	$352,000	$850,355
Driver Info	$47,250	$47,250	Not offered	$304,500	$297,450	$377,914
Driver Duress	$31,500	$31,500	Not offered	$49,980	$17,100	0
Internet	$0	$0	$6,900	Not offered	$67,000	$57,614
Audio	$30,000	$30,000	Not offered	Not offered	$10,000	$24,022

Note: Connexionz – Connexionz Ltd
ABB – ABB Industry Pty Ltd
BCE – Brisbane City Enterprises Pty Ltd
Wireless Data – Wireless Data Services Ltd
Serco – Serco Group (NZ) Ltd

The totals shown include full maintenance for the first two years of operation of each stage.

The two most preferred bids were the Connexionz Bids A and B.

The difference between the two Connexionz bids relates to an alternative sign proposal for Stage One and in particular a radically different way of signing the minor stops in Stage Two. Bid A is approximately $40,000 more than Bid B for Stage One and comes about because of a cheaper option for the Stage One signs

In the evaluation process, the evaluation team considered a mix of Bid A Stage One and Bid B Stage Two as providing the best solution. Connexionz has accepted this as being an option. Therefore the recommended option consists of:

Stage One Connexionz Bid A	$924,380
Stage Two Connexionz Bid B	$1,632,528
Total Project Cost	**$2,556,908**

The ongoing operational costs of this RTI proposal would include the elements of CCC staff time (contract administration and system oversight), software and other licences, and maintenance costs. The latter two items would come on stream after the two years covered by the contract requirements.

Ongoing operational costs once Stages One and Two have been completed are in the order of:

CCC staff time	$25,000/yr (0.3 FTE)
Licence fees	$6,350/yr
Sign hardware maintenance	$80,000/yr (based on equivalent maintenance costs for bus infrastructure and traffic signals)
Computer hardware upgrades	$36,000 per 4 yrs

Experience from Auckland and Sydney indicates that there is not a lot vandalism of the bus signs although it is not certain how this will translate to Christchurch. The RTI Functional Specification does require all bus signs to be ‘resistant to vandalism’.

DISCUSSION ON THE PREFERRED TENDER

All but ABB proposed a GPS (Global Positioning System using satellites) for the AVL system, although the BCE tender proposed the use of loop based technology for Stage 1, implementing GPS as part of Stage 2.

The large difference in price between the Connexionz bid B and the other bids is due to their alternative proposal for the minor bus stop signs. This proposal will be explained further at the meeting. The other main difference is in the AVL/Communications equipment. The Connexionz bid proposes an integrated solution that they have developed using a Tait radio, a modem and specialised software that optimises the performance of each component.

Connexionz Ltd is a Christchurch mobile data systems company set up in 1996 by a group of ex-Tait Electronics engineering and marketing personnel. Because the company is relatively new, their track record is limited and it would be fair to say that this will be the first major contract that the company will have secured. Currently, they are about to install a tracking system for Connetics Ltd and they have been awarded a pilot contract to supply equipment in thirty taxis in Argentina with a possible extension to 3,000.

Information from Connexionz accountants (Gilligan Sheppard) indicates that the company is currently valued at approximately $1.7m with arrangement in place to procure an additional $1.2m upon the issue of new shares.

A credit check of the Company has shown no adverse information.

Discussions with the Systems Sales Manager from Tait Communications and the Manager from Microsoft Consulting Services, indicate that the Company has the technical ability to complete this project successfully.

As noted above, Red Bus Ltd, in conjunction with Connexionz, have already begun the operation of a trial RTI system involving the commercially operated Airport to City route. It is expected that the outcome of this trial will be known before the end of June.

PROGRAMME OF WORK

In discussions with Connexionz, they have confirmed that they will be able to complete the installation of Stage One of the RTI system prior to the opening of the Exchange on 4th November 2000. The construction programme is very tight and is reliant on approval being given by the end of June.

Connexionz have indicated that once approval is granted for commencing Stage Two, it should take 7 months to complete the remaining sign installations across the city. The remaining stage two elements of bus priority measures would proceed as projects are identified and approved.

BUDGET PROVISIONS

The current Council budget allocation for RTI implementation is $203,000 capital in the current financial year. There is nothing in the future years at this point. This figure was based upon initial calculations using a simple, basic and modest RTI system utilising the existing ANTTS system (which forms part of the traffic signal system). With further work it became apparent that this was unlikely to be sufficient to provide a system that would be suitable for the City as a whole, incorporating features such as bus priority. Without more detail, it was decided to not seek additional funding until that information was available through a tendering process.

It is now apparent that there will be a budget shortfall of $269,880 as shown below.

Connexionz Bid A for Stage One	$924,380
Current Budget Provisions	$203,000
Proposed Funding from Environment Canterbury for On-Bus Equipment	$451,500
Budget Shortfall	**$269,880**

It must be remembered that apart from providing RTI for the Bus Exchange, Stage One also provides nearly the entire infrastructure necessary for a complete **city-wide** RTI system, excluding the actual bus stop signs. It should also be noted that the above figures do not include any of the optional items listed in the tender summary table. Most of those are "on bus" features and if needed should be the responsibility of Environment Canterbury or the bus operators, however the audio feature (for sight impaired patrons) would be a CCC cost if included. Advice is currently being sought as to the need for such a feature.

CONCLUSION

The implementation of an RTI system for the Christchurch bus system can be seen as a very positive proposition. It will provide a significant, high profile improvement for bus users, indicating the Council's commitment to public passenger transport, whilst being unlikely to create any major adverse reaction from the community.

There has been universal support for the system from all groups presented with the concept to date.

An RTI system needs to be an integral part of the Bus Exchange to ensure that a high level of service is provided to patrons and that the boarding times are minimised.

The Christchurch Public Passenger Transport Strategy (Our Future - Our Choice) developed by the CCC and EC in 1998 identified the need for an RTI system for Christchurch and undertook to implement a system by 2003.

A composite mix of the two tenders from Connexionz Ltd is the preferred tender. It conforms in all respects to the tender documents and the company has stated that they can complete Stage One of the work in time for the opening of the Bus Exchange on 4 November.

It is therefore considered that the Connexionz Bid A, Stage One should be accepted and their Bid B, Stage Two should be considered for approval as the next stage of the system development. This will require the Council to provide additional funding of $269,880 in order for Stage One to proceed. There is currently no funding allocated for the Stage Two expansion of the system to a city-wide basis.

The fact that the preferred supplier is a local firm is a significant achievement and it did not require the implementation of the Council's "preferred local supplier" policy. The firm has demonstrated a high degree of innovation in its proposals within the application of known technologies. Such a significant contract would be a major milestone and success for the company and would assist in supporting the growth of another developing, high technology firm in Christchurch.

Recommendation:

1. That the Council accept the Connexionz proposal stage 1 option A of $924,380 subject to an acceptable outcome of a trial and the provision of $451,500 from Environment Canterbury.

2. That future funding for stage 2, Connexionz Bid B of $1,632,528, be sought in the 2000/01 financial year.

3. That the Committee recommend to the Strategy and Resources Committee that $269,880 be provided for in the 2000/01 budget for stage 1 funding.

4. That the audio feature of $30,000 be included in stage 1 subject to the need being confirmed by consultation with the Disabled Persons Assembly and the Visual Impaired Association.