

A new approach to ticketing

Making paying for public transport easy and attractive



DETAILED BUSINESS CASE

ITERATION 3

Based on BAFO from Preferred Supplier

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Executive Summary

A compelling case for change

Increasing the use of travel by public transport will help shape a more accessible, safe and sustainable transport system

The National Ticketing Solution (NTS) is an enabler for change. A flexible, modern ticketing system will make it easier for people to pay for public transport anywhere in the country and make it easier to support national concessions such as SuperGold and Community Connect. Increased access and convenience will encourage more people to use public transport more often, and ultimately contribute to reducing New Zealand's carbon emissions and improving safety and congestion on our roads. Public Transport Authorities (PTAs) will gain a digitally-enabled system with more choice, transparency and simplicity. Deeper understanding of customer journeys will mean improved network operations and fleet management and better targeted investment.

The NTS is a collaboration between PTAs and Waka Kotahi. PTAs comprise Auckland Transport, Greater Wellington Regional Council, Environment Canterbury and the Regional Consortium (comprising the smaller regional councils across New Zealand).

Unlike the stored value cards of current ticketing, modern ticketing solutions use existing contactless debit or credit cards as 'tokens'

Customers will be able to pay using their own contactless bank-issued debit or credit card (or virtual card on a mobile device). Tagging onto a service as people do today is their 'authority to travel', replacing a ticket. Software in the back office will aggregate each customer's journeys over a travel day, calculate the lowest fare, and charge the card overnight.

Because fares are applied after travel, corrections can be made before the customer is charged, such as where there are disruptions, delays or other account adjustments. Similarly, customers can access their account and make corrections such as when they have forgotten to tag-off.

Those without a debit or credit card, including children, will be provided a pre-paid Transit Card much like they use today, but where deductions for travel will be done in the back-office against their account. Use of cash on-board buses, trains and ferries will be at the discretion of each PTA.

Right now we have an opportunity to align investment nationally in a proven, world-class, public transport ticketing system

Current systems are sub-optimal because they are not integrated, some are antiquated or at the end of their technological or economic life and some are interim or need substantial change. In all cases, customers must pay before travelling, which ties up millions of dollars on prepaid smart cards or passes. Most systems cannot support complex capping or multiple concessions. Nor can they provide comprehensive, uniform data about how customers travel across New Zealand. As such current ticketing and payment systems nationally present barriers to people using public transport. National transit policies such as the proposed Community Connect card (being trialled in Auckland) cannot be implemented without a national, account-based payment system. Similarly, point-to-point transport payment systems such as park and ride, road tolling and congestion charging cannot be readily implemented without an account-based payment system.

All current ticketing contracts end within the next five years. National ticketing has been considered for more than ten years, and systems and contracts have been intentionally aligned to enable the NTS to be fully in place by the end of 2026.

Participating PTAs have strong relationships and are working together for better outcomes. This is important because New Zealand cities are small by global standards and most lack the scale to afford

a modern ticketing solution. Customers are using contactless debit and credit cards for retail payments and expect the same for public transport. Investment in digital systems is required to meet current and future customer and business needs but implementation takes time, so we need to get started.

Improved outcomes for New Zealand are at the heart of the NTS

A modern ticketing and payments solution supports a range of outcomes.

Improved customer experience – convenience, ease of use, integration, and lowest fare guarantee, remove immediate barriers to using public transport. There is no need to buy, carry and top up a transit card or find cash, no queuing to get tickets or prepaying to travel. People can use the same card or device on any bus, train or ferry across the country and, with daily or weekly fare capping, are charged the lowest possible fare.

Supports mode shift – people can simply tag onto a bus, train or ferry using bank-issued cards or mobile devices they already have. This reduces barriers to using public transport, particularly for new and infrequent users and visitors. Providing easier ways to pay and the ability to easily change fares to drive demand works alongside other investment activity to support mode shift and reduce emissions.

Better insight and flexibility – better data about public transport usage enables continual improvements to network design, scheduling and fares, and provides more flexibility to act on insight to support easy, cost-effective changes to public transport networks and services. Better data helps support regional fare policies and makes it easier to apply local and national concessions, supports easier inter-regional travel for customers and easier revenue allocation for PTAs, e.g. Te Huia Auckland/Hamilton train.

Value for money – collective buying of hardware for New Zealand supports flexibility of the bus fleet between regions and equalises ticketing capability across the country for the benefit of all New Zealanders. Costs of fare collection, which includes reducing fare evasion, can be managed on a New Zealand-wide basis.

Digitally-enabled system – makes it easier to integrate with new digital technologies, can be integrated with existing systems where sensible, and potentially integrated with third parties to provide wider services.

Supports health and safety – supports rapid change during disruption (e.g. Covid-19) such as providing a level of contact tracing for registered customers and facilitating the elimination of cash. Not having cash on-board helps to reduce the spread of viruses and supports the safety of drivers, allowing them to better focus on those with additional needs.

Contributes to national and regional policies – these include the Government Policy Statement on Land Transport, New Zealand Disability Strategy, Emission Reduction Plan, New Zealand Digital Strategy, and regional public transport plans.

Options are limited

There are few alternative options

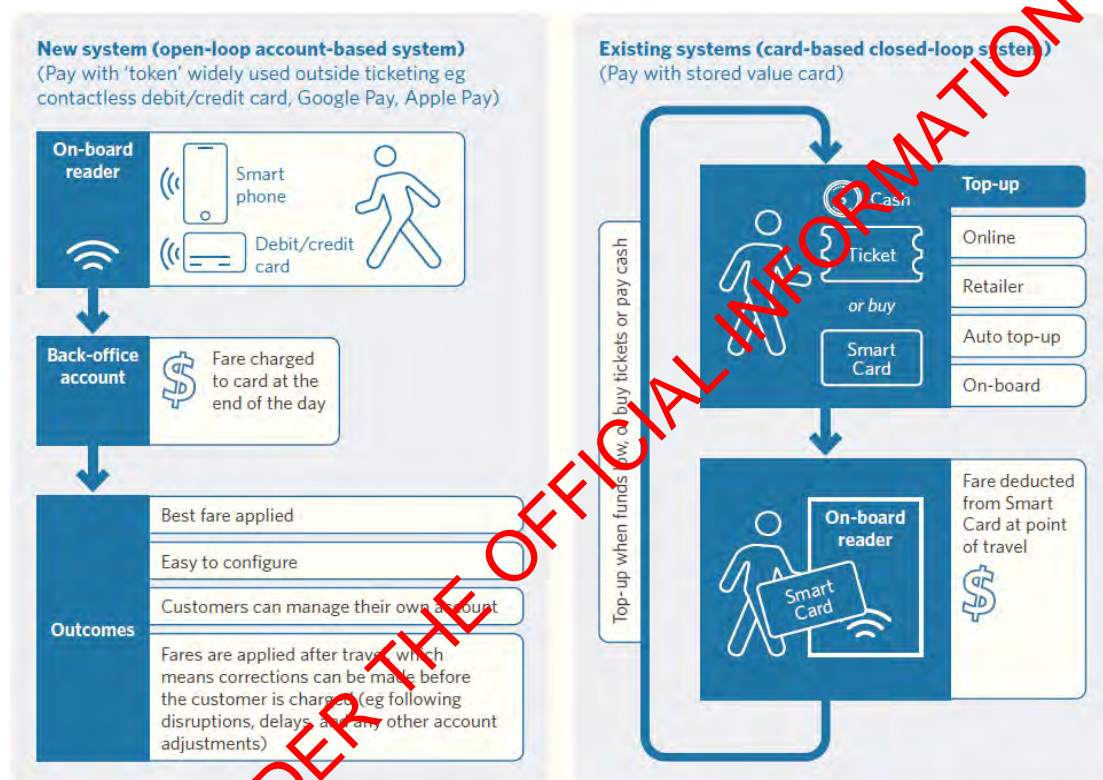
Options considered ranged from free public transport (implying no ticketing), upgrading existing systems, or procuring either new regional solutions or a single, national, solution. Of these, a single, national solution best achieves the benefits of investment.

The realistic alternative is a “Do Minimum Plus” scenario. This is the alternative path most likely to be taken by PTAs if the NTS does not proceed and provides the most accurate estimate of alternative costs and benefits. Under this option, AT would continue with HOP and upgrade to account-based

and open-loop capability; GW would implement Snapper on rail (currently being trialled), introduce integrated ticketing, and develop account-based and open-loop capability; ECan would join RC and introduce the Bee Card with the addition of mobile payments; and the Bee Card system would continue to end-of-life.

The NTS comprises a single, national procurement for a national account-based and open-loop solution implemented on a staged basis starting with ECan, followed by GW, AT and RC. The difference between an open-loop account-based system and a closed-loop card-based system is illustrated below.

Figure 1 Differences between an open and closed loop system



We are procuring a single ticketing solution for public transport (bus, rail, and ferry) trips across New Zealand

The NTS components being purchased are summarised below.

Figure 2 Components of the NTS

	Software licences and support to access electronic ticketing software from a global ticketing solution provider.
	Integration with a variety of financial service providers, including a Merchant Acquirer, Transit Card Programme Manager and Retail Network Manager to support Transit Card issue and top-up.
	Customer facing hardware in the form of gate-lines, validators, inspection devices, bus driver consoles ("front office").
	A supplier-operated central back office to collect taps, construct journeys, charge customers, and provide information.



Interfaces and processes to support regional operations.

Delivery will require:

- a shared services operation within Waka Kotahi to manage all contractual relationships between Waka Kotahi and each supplier, and between Waka Kotahi and each participating PTA (underpinned by a Participation Agreement)
- consistency of public transport data collection across New Zealand
- systems to support a consistent public transport payment experience across the country

The NTS opens up new functionality not available in today's systems or under most of the other options

Under the Do Minimum Plus counterfactual, functionality will be more limited than the NTS:

- Only Aucklanders benefit from full account-based, contactless functionality in the Do minimum Plus, although this is also a possibility for Wellington if planned development by Snapper proceeds
- GW will extend Snapper to rail, currently limited to 'basic' contactless closed loop functions, but open-loop capability is planned
- ECan may join the Bee Card system (or similar) and offer mobile payments
- Regional Consortium will maintain the existing features and functionality of the Bee Card system until it is next re-procured
- Do Minimum Plus means three separate ticketing systems for NZ: Auckland, Wellington, and the rest of NZ (assuming ECan joins the Bee Card system).

Figure 3 Comparison of the NTS and Do Minimum Plus alternative reveals the key advantages of the NTS.

Features available across New Zealand	NTS	Do Minimum Plus	'Do minimum' comments
Payment by contactless debit/credit card or token	✓	-	Only AT will have full featured contactless; GW plans to develop the functionality
Payment from mobile device	✓	-	AT and GW customers using contactless can use a mobile device to tap in/out
Pay after travel	✓	-	AT and GW customers using contactless can pay after travel
Correct journeys before being charged	✓	✗	AT and GW may have this feature for contactless card users, not existing users
Offer national concessions	✓	✗	National concessions would need to be configured in all three systems
Consistent national data around PT travel	✓	✗	At least three sources of travel data

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The NTS opens opportunities for national initiatives and innovation

The NTS opens up possible opportunities to integrate with other transport areas. For example, the NTS could:

- Support a wider Transport Broker model with a core customer focus
- Support a wider Mobility as a Service deployment
- Link payments for first and last mile trips into wider journeys
- Incentivise mode shift through linking fares pricing to future congestion charging regimes
- Offer more dynamic fares than today to balance public transport capacity and service

Benefits and costs

The wider benefits of an account-based solution are significant

Significant benefits accrue to customers and business operations, and for government policy development and delivery. These are summarised below.

Figure 4 Key benefits of an account-based solution

Customer benefits	Operational benefits	Government and regional policy benefits
<ul style="list-style-type: none"> • Convenience • Payment choice • Lowest fare guarantee • Nationally consistent customer experience • Better information • Improved accessibility both local and visitors • Patronage growth and flow on effects through mode shift 	<ul style="list-style-type: none"> • Detailed travel data including start and end points of journeys, transfers and journey patterns • Ability to quickly introduce/change fare products and policies • Reduce cash on board • Revenue protection • Easier adoption of new technologies 	<ul style="list-style-type: none"> • Simplified deployment of government policy – supporting national concessions • Significant improvements in data collection and information • Ability to quickly implement changes • Support for national emergencies • Enables seamless transition for other transport operators • National efficiency with one development path

The NTS cost is similar to the estimated “Do Minimum Plus” alternative

The Do minimum Plus counterfactual would result in three separate ticketing systems offering different functionality across New Zealand at broadly the same operating cost. Re-procurement of existing systems will cost more in the future, and each PTA will likely need to undertake a full re-procurement, which makes an integrated, national procurement approach more cost-effective.

The NTS provides greater functionality, wider benefits and a national approach for little additional cost. Steady-state operating costs of the NTS at 2029/30 are estimated to be about \$10 million more than the Do Minimum Plus counterfactual – \$70 million and \$60 million (non-discounted) respectively.

Comparison of the whole of life costs on a present value basis is summarised below. This shows that net present costs over 15 years for the NTS are \$163 million more than the Do Minimum Plus option. The higher costs reflect the share services function and transition costs that are not required under the regional Do Minimum Plus option.

Figure 5 Comparison of estimated present values of costs and benefits of the NTS and Do Minimum Plus counterfactual

Present values at 4% over 15 years	Do Minimum Plus \$millions	NTS \$millions	Additional NTS costs and benefits \$millions
Benefits:			
• AT	116.7	233.4	126.7
• GW	-14.5	77.9	92.4
• ECAN	-	8.7	8.7
• RC	-	6.4	6.4
Total present value of benefits	102.2	326.3	224.1
Costs:			
• AT			
• GW			
• ECAN			
• RC			
• National			
Total present value of costs	758.0	1,145.5	-387.5
Total NPV (cost) at 4% over 15 years	-655.8	819.2	-163.4
BCR			0.6

The NTS will provide value for money

While the NTS could cost as much as 25% more than systems do today, it will bring significant customer and business benefits and increased utility to all New Zealand. Nationally-consistent new ways to pay will enable national policy initiatives and provide opportunities for future innovation, not possible with any other alternative.

Value for money can be measured in many ways:

Economy – the NTS will provide ticketing services to all New Zealand regions; many do not have the scale for this today.

Efficiency – a shared service function, Transport Ticketing and Payments (TTP) operated within Waka Kotahi, will enable a consistent and efficient use of resources across New Zealand.

Effectiveness – delivery from a central core using a proven global solution enhances the way customers pay for public transport.




Equity – the same system across New Zealand, with new features to improve accessibility and access for all.

Financial projections and funding

Funding is proposed to be met through the National Land Transport Fund (NLTF)

Subject to prioritisation and approval from the Waka Kotahi Board, proposed funding of the NTS would see capital and operating costs fully funded from the National Land Transport Fund and the remaining local PTA costs funded at their normal funding assistance rates (FAR).

Figure 6 Proposed funding allocation for the NTS

Cost type	Cost description	Funding from NLTF
 Capital	Includes software and licences, equipment (both back office and front office), compliance and certification, design build & test, Merchant Acquirer setup, Transit Card Programme Manager setup, Retail Manager setup, and TTP setup.	100%
 Operating	Includes Ticketing Provider costs, Merchant Acquirer costs, Programme Manager costs, Retail Network costs, TTP support costs.	100%
 Other	Includes transition costs, phase out of existing systems, local networks, local participant ticketing solution costs.	Normal FAR (51% assumed at this point)

This is a different funding model to the usual Waka Kotahi co-funding approach because it will:

- simplify the commercial relationship between Waka Kotahi and the PTAs
- enable the PTAs to receive full fare revenue while centralising revenue collection and all operating costs, including bank fees, through TTP
- avoid duplication of investment
- enable more efficient hardware purchasing so hardware can be moved between regions easily
- control ticketing costs nationally and strengthen bargaining power.

Contractual arrangements and implementation

Delivery of the NTS will be governed by a participant group and managed through TTP

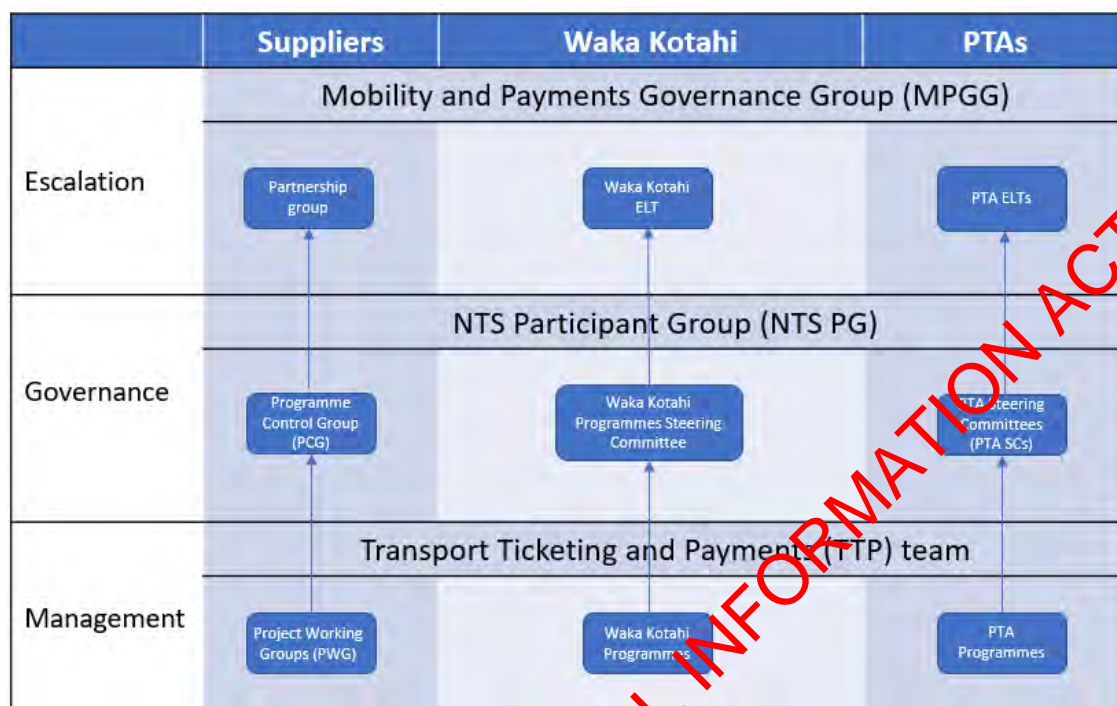
TTP is being established and will operate as the shared service organisation - the 'glue' connecting ticketing suppliers to regional PTAs.

The governance structure is illustrated below and comprises:

- an NTS Participant Group made up from senior leaders from each NTS participant.
- the Mobility Payments Governance Group (MPGG) is the CEs of NTS participants.

The TTP team will be accountable to the NTS Participant Group for delivery. The management of shared services is a critical function within the NTS. This means identifying key roles and implementation arrangements will be essential to ensure the preferred option can be introduced efficiently and with minimum disruption in each region, and to ensure benefits are realised and risks managed.

Figure 7 NTS governance structure and relationships



A work plan has been prepared that sets out the processes and responsibilities for establishment. At a high level, this includes the following:

- 1) Establish TTP as a business unit within Waka Kotahi. TTP will provide the shared services functions of the NTS and stand up the capability - realisation, resourcing, facilities, systems, etc.
- 2) National ticketing solution design including:
 - build and implementation of core ticketing platform
 - Financial Services - Merchant Acquirer establishment
 - Financial Services - Program Manager establishment
 - Financial Services - Retailer Network Manager establishment
 - Program Office (for planning and oversight of the multi-year transition program)
- 3) ECan Bus Solution Implementation – supplier side
- 4) ECan Bus Solution Implementation – ECan side
- 5) GW Rail Solution Implementation – supplier side
- 6) GW Rail Solution Implementation – GW side
- 7) Repeats per 6 and 7 above for GW Bus and then each PTA for each specific implementation project

PTAs will need to determine the most cost-effective, practical, transition technology option in conjunction with TTP and the ticketing service provider, including possible infrastructure re-use.

Planning for change management, benefits realisation and risk management will be led by TTP and require the involvement of all parties.

Implementation and transition to business as usual will involve two phases

Phase 1 – Establishment involves establishing the NTS Service, TTP, and the on-boarding transition process.

Phase 2 – On-boarding involves transitioning each of the PTAs on a staged basis.

Business as usual will involve activities such as system/services support, and support for software releases and improvements.

Contract arrangements involve four activity streams with completion targeted for end Q2 2022

Contracting arrangements are expected to be completed in early 2022, with the provisional go-live date for each participant as follows:

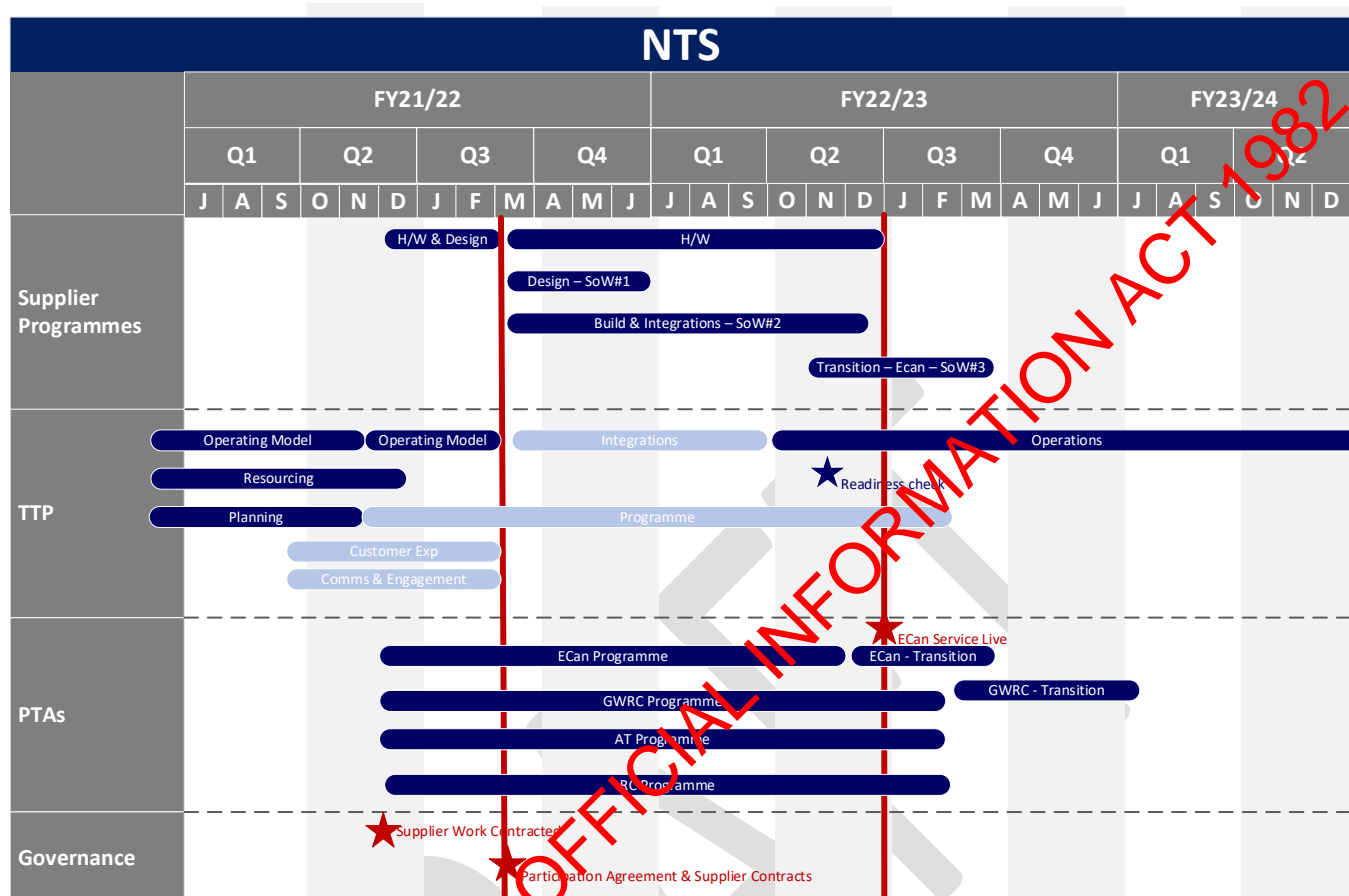
- ECan July 2023
- GW March 2024
- AT November 2024
- RC February 2025

Implementation would involve four activity streams:

- (i) supplier programmes workstream
- (ii) TTP workstream
- (iii) PTA workstream
- (iv) Governance workstream.

The high-level plan is summarised below.

Figure 8 Indicative timeframes for the four implementation activity streams



Risks can be mitigated through strong governance and project management

Large projects and multiple parties always pose risks. Strong NTS governance and management arrangements are vital for effective risk mitigation. Clarity about which party is best able to manage each risk is an important principle in risk mitigation.

There are four key risk areas:

Customer and reputational risk

- Risk of poor transition experience
- Failure of system or breach of security/privacy

Strong systems and controls including cyber security measure and effective public communications will be critical in in mitigating customer risks.

Participant risks

- Lack of political will and capability to collectively deliver for NZ
- Misalignment and timing of contracts and regional plans
- Slow collective decision making
- Limited capability and capacity to deliver

Agreed governance arrangements, including at Chief Executive level, Participation Agreements, and strong co-operation will be important mitigation factors.

Supplier risks

- Technology tie in for 15 years
- Capability to deliver over a long-time horizon

The supplier is very experience having implementing account-based, open-loop ticketing and payment solutions for more than 10 years including London, New York, Sydney and South East Queensland (Brisbane).

Funding risks

- Unaffordability, inability to agree funding arrangements and delays in meeting planned transition staging timeframes.

Participation agreements between Waka Kotahi and PTAs will clarify funding, roles and responsibilities.

We are confident of success

Account-based contactless ticketing has been operating in London since 2012, with many other large international cities adopting the approach or in the process of doing so.

- Choosing a proven solution deployed in other locations minimises the technology risk.
- Appointing a global supplier with many successful deployments minimises the implementation risk.
- PTAs are already providing ticketing in various forms today, and leveraging existing expertise and developing a strong internal capability within Waka Kotahi minimises the ongoing operational risk.
- Strong regional and central government partnerships ensure the necessary co-operation to make things happen for New Zealand.
- Phasing deployments starting with ECan through to GW, RC and AT manages the complexity and embeds learning along the way.

INTRODUCTION AND BACKGROUND



Introduction and background

Purpose of the business case

This Detailed Business Case sets out the case for investment in a next generation, single, national, public transport ticketing and payment solution that will transform the customer experience and create a flexible, modern, fit-for-purpose system.

The NTS will provide improved digital capabilities to meet the needs of Greater Wellington Regional Council (GW), Auckland Transport (AT), Environment Canterbury (ECan), and the Regional Consortium (RC)¹. A national public transport payment system could support other government transport initiatives such as SuperGold, a proposed Community Connect card (being trialled in Auckland) and Total Mobility, and, potentially, future point-to-point transport initiatives that require an account-based payments system such as park-and-ride, road tolling, and congestion charging.

A digitally-enabled system will provide a deeper understanding about customer journeys and support better evidence-based decision making for investments. Optimising public transport services, along with an improved customer experience, will create more flexible and attractive public transport networks to support mode shift.

Preparation in parallel with procurement

The development of the detailed business case is being prepared in a series of iterations in parallel with, and informed by, the procurement process. A national ticketing solution is rare – the Netherlands, for example, has a national approach but a very different public transport system that operates nationally and regionally; and, while there are a variety of examples of modern account-based, open-loop public transport ticketing solutions elsewhere in the world, none match New Zealand's requirements, although the required features can be seen in the ticketing solutions in several major cities.

Therefore, the approach taken by the National Ticketing Programme was to refine the solution through the procurement process, which, in turn, informed this business case with more robust information from the market than could be obtained from other jurisdictions.

This non-standard business case approach in parallel with procurement has several advantages:

- Ensures global market information is obtained for a solution that has not been previously delivered in New Zealand.
- Demonstrates the strength of interest and capability from the market to supply a solution in New Zealand.
- Reduces timeframes compared with sequential waterfall approaches, which is particularly important for ECan to replace its end-of-life system, devices and equipment, and to replace GW's paper tickets on trains.
- Robust cost benefit analysis could not be prepared without the detailed market information obtained through procurement.

Procurement has involved a Market Sounding, Registration of Interest (ROI), Request for Proposal (RFP), and a best and final offer (BAFO) process for the ticketing solution, alongside a Request for Tender (RFT) process to secure the related financial services. This is explained in the Commercial Case.

¹ The Regional Consortium is a consortium of all of the other regions around New Zealand that provide public transport, and comprises Northland Regional Council; Waikato Regional Council; Bay of Plenty Regional Council; Taranaki Regional Council; Hawkes Bay Regional Council; Horizons Regional Council (Manawatu-Whanganui); Nelson City Council; Otago Regional Council; and Invercargill City Council.

This document is the third iteration of the detailed business case, and is based on the information received through the best and final offer (BAFO) stage of the procurement process.

Best practice guidance

This business case follows best practise as set out in the Better Business Case (BBC) five case model introduced by The Treasury and adopted by all government agencies, and the Investment Decision-Making Framework and business case guidance issued by Waka Kotahi for preparation of business cases that require funding from the National Land Transport Fund. The decision-making processes and gateways for the NTS project are tailored to meet the needs of Regional Council participants as Public Transport Authorities, and Waka Kotahi.

The five-case model has the following structure:

- The **strategic case** ascertains that the investment proposal is supported by a compelling case for change. It confirms the proposal's strategic context and fit.
- The **economic case** seeks to optimise value for money. The preferred option and implementation scenarios are identified from a 'long list' of alternatives.
- The **financial case** confirms that the investment is affordable and can be funded.
- The **commercial case** tests market interest in supplying a single solution to meet New Zealand's needs both nationally and regionally.
- The **management case** tests that the project is achievable in terms of risks and availability of resources.

Intended Audience

The audience for this document is the PTAs and government agencies participating in the NTS solution, namely:

Greater Wellington Regional Council (GW)

Auckland Transport (AT)

Environment Canterbury (ECan)

Regional Consortium (RC)

Waka Kotahi NZTA (Waka Kotahi).

Background

Since the mid 2000s, Waka Kotahi has co-invested National Land Transport Fund (NLTF) monies in the procurement and implementation of electronic ticketing systems for public transport. As a result, Auckland Transport, Environment Canterbury and Greater Wellington Regional Council procured and implemented electronic ticketing systems.

In late 2013, a consortium of nine councils known as the Regional Consortium (RC) began working together to procure a shared ticketing system to support the delivery of integrated ticketing and fares in each of their regions. To support this joined-up investment and procurement approach, and support a nationally coordinated approach to regional ticketing systems, the Waka Kotahi Board agreed² in 2015 to a targeted enhanced funding assistance rate (FAR) of 65% to meet the capital costs of a shared ticketing system. This was conditional on the RC working collaboratively with Auckland

² Refer to Waka Kotahi NZTA Board minutes 30 October 2015.

Transport (AT), Greater Wellington Regional Council (GW), and Environment Canterbury (ECAN) on a nationally coordinated approach to ticketing services. In January 2016, Waka Kotahi, AT, GW, ECAN, and the RC agreed to establish a National Ticketing Programme (NTP) to provide the governance support for the development of the NTS.

The NTP is founded on the premise that a New Zealand-wide approach to transport ticketing, achieved through the co-ordinated participation of all regions, will deliver best value for money from national and regional investment at an acceptable level of risk to all parties, a consistent customer experience across all regions, and improve public transport attractiveness. This is expected to be achieved through economies of scale, avoiding duplication of investment, and providing a modern, high quality ticketing and payment solution unlikely to be affordable and manageable on a regional basis.

The NTP acknowledged that the investment and procurement cycles of regional councils (as PTAs) for the replacement or acquisition of ticketing solutions were not aligned, and that PTA requirements (particularly in terms of fares and fare products) were not consistently defined. Fully aligning investment and procurement cycles was not a practical proposition; rather, the NTP participants required a solution where features could be flexibly deployed to enable participating PTAs to tailor their customer offerings, and allow the implementation process to be practically phased. To support this process, interim solutions were implemented for RC (Regional Integrated Ticketing Solution - RITS) and GW (Snapper).

A multi-party funding agreement consistent with Waka Kotahi's funding approval was agreed through the NTP in late 2016 whereby GW would lead the work jointly funded with Waka Kotahi while the RC procured and implemented RITS, an interim, closed loop solution, to better align procurement cycles until the national ticketing solution could be procured and implemented.

Project NEXT was established in April 2018 as a project under the NTP to deliver the procurement phase of this next generation ticketing solution and the related financial services for AT, GW, ECan, and RC.

Baseline Requirements

In developing the NTP strategy for which the National Ticketing Solution represents the primary deliverable, there are a number of baseline requirements which are taken as a given for the purposes of this Detailed Business Case. These are:

- A collaborative approach will be taken between the participating authorities.
- There will be a single procurement for the participating authorities.
- The procurement will source a 'solution' not a system.
- Commonality of the outcomes required and alignment of operational processes creates the opportunity to deliver a new, centralised capability.
- Investment cycles for ticketing systems across transport authorities have been aligned by way of interim solutions and approaches where required.



A COMPELLING CASE FOR CHANGE

Strategic Case – the case for change

Key Messages

Current ticketing and payment systems vary considerably in capability and customer experience region-by-region across New Zealand, and present barriers to people using public transport.

There is no consistent approach; for example, Auckland Transport's (AT) HOP system provides integrated electronic ticketing while Wellington's rail network still uses paper tickets. Existing ticketing systems provide little economy of scale and, in some cases (such as Wellington rail), lack the rich data required to fully optimise networks and guide targeted investment.

Regional councils (as PTAs) are at different stages of investment and interim bus ticketing solutions have been put in place to better align investment across regions in expectation that a national solution will be introduced. The first priorities for the NTS are ECan and GW.

Closed loop systems with stored value cards have been superseded by account-based ticketing solutions that provide wider accessibility for users, more flexibility for both customers and operators, significantly better data for efficient network management, and provide a digitally-enabled system that can accommodate future technology developments. Such systems are operating or being implemented in many large international cities.

People want to easily pay for public transport, like they pay for other goods and services and expect digital payment channels to help streamline their journeys.

70% - 80% of customer have the technology and can be convinced to use a contactless debit/credit card or virtual card on a mobile device.

A single, national, solution that is account-based, open loop, and multi-tenanted aligns with the Government Policy Statement on Land Transport, the New Zealand Disability Strategy, and Regional Public Transport Plans, and would enable deployment of government policy initiatives such as the Community Connect card.

Purpose of the Strategic Case

This Strategic Case sets out the case for change to a single, national public transport ticketing and payment solution for New Zealand.

It describes the investment logic in the context of:

- the New Zealand regional public transport landscape including fit with the national and regional direction for public transport
- international experience
- key strategic risks and mitigations.

National ticketing landscape

National ticketing participants and their current ticketing systems

Current ticketing and payment systems in New Zealand are a mix of paper tickets with cash on-board, and smartcard automated fare collection systems that are closed-loop and card centric, i.e. based on proprietary transit cards (smart cards) which store information on the card and are only valid in their regional transit environment.

a) Auckland Transport (AT)

AT HOP is New Zealand's largest public transport smart card ticketing system and covers bus, train and ferry services. This card-based, tag-on/tag-off, closed loop ticketing system was implemented in 2012/13 and is the only scheme in New Zealand that provides integrated journeys across buses, trains and ferries, allowing both purse and period-based fare products. AT HOP is supplied by Thales/Octopus, and has had an extensive development path. Prior to completion of the extended contract in 2026, AT will join the NTS in a transition that is expected to involve parallel operation of both solutions for a limited period.

b) Greater Wellington Regional Council (GW)

Ticketing for GW's bus network is provided by Snapper Services Ltd, under an interim arrangement supporting PTOM contracting agreements and zone-based fares. Snapper is a card-based tag-on/tag-off closed loop ticketing system providing both purse and period-based fare products.

Ticketing for GW's rail network has remained essentially unchanged for many decades. Often described as Victorian-era, customers use period or multi-trip tickets purchased at stations or retail outlets, or pay cash on board trains to ticketing staff.

An in-house ticketing management system is in use. GW urgently requires a single, multi-modal integrated fares and ticketing solution, with rail being the most pressing need. It is currently trialling Snapper on rail.

c) Environment Canterbury (ECan)

ECan's bus network uses a smartcard-based ticketing system supplied by INIT, implemented in 2010. This is a tag-on only system, providing a purse capability for fare payment. It supports a 3-zone fare structure and in-zone bus-to-bus and bus-to-ferry transfers through the use of paper ticket receipts. The solution is at end-of-life and urgently needs replacement with a single, multi-modal integrated fares and ticketing solution at the earliest possible date.

d) Regional Consortium (RC)

The Regional Consortium has completed a phased transition to a collectively-procured interim bus ticketing solution, which replaced obsolete systems and supports PTOM contracting agreements. The Regional Interim Ticketing Solution (RITS) is a card-based, tag-on/tag-off

closed loop ticketing system provided by INIT and implemented across the nine participating regional authorities during 2018 – 2020. It is contracted to be in place for a term of three years from completion of implementation, with provision for two possible extensions of one year, with transition to the national ticketing solution on or before the contract term expires.

e) Waka Kotahi New Zealand Transport Agency (Waka Kotahi)

Waka Kotahi's strategy aims to support and enhance the use of public transport, walking and cycling. In delivering the strategy, Waka Kotahi's objectives are to achieve best value for money in NLTF expenditure (s.25 LTMA), optimisation of investment nationally, and optimisation of existing investment.

Waka Kotahi is guided by the Government Policy Statement on Land Transport 2021 which prioritises safety, better travel options, improving freight connections and climate change. To deliver these priorities, Waka Kotahi has made key strategic investment shifts including a modal shift in urban areas from roads to public transport and active modes.

Patronage and Scale of Operations

Based on data for the year ended 30 June 2020, more than 135 million passenger trips were taken on public transport throughout New Zealand. This is down from 168 million trips in 2018/19 because of Covid – a drop of 20% across all regions.

Auckland accounts for about 60% of all public transport trips and fleet size in New Zealand. For the rest of New Zealand, Wellington accounts for 24% of the passenger trips, Canterbury about 8% and the other regions (Regional Consortium) about 9%. The scale of operation of public transport is summarised in Table 1 and Table 2 below.

Table 1 Patronage

Authority	Patronage ³ (Million passenger trips)						Trips per capita pa	Farebox Revenue 2021/21
	2019/20		2020/21		2021/22 Projection			
AT	82.3	59%	64.0	53%	86.9	58%	63	\$176.6m
GW	33.0	24%	33.1	27%	34.2	23%	76	\$103.6m
ECan	11.2	8%	10.4	9%	13.1	9%	23	\$22.3m
RC	12.3	9%	11.1	20%	14.3	10%	9	\$23.4m
Total	138.8	100%	120.9	100%	148.5	100%	38	\$325.9m

Table 2 Scale of operations

Authority	Bus Fleet		Bus Operators		Bus routes	Rail Stations		Ferry Terminals	
AT	1,340	50%	11	27%	197	40	45%	14	64%
GW	466	20%	4	10%	106	48	55%	4	18%
ECan	305	10%	3	8%	67	0	0%	2	9%
RC	489	20%	22	55%	294	0	0%	2	9%
Total	2,600	100%	40	100%	664	88	100%	22	100%

³ Data sourced from Regional Councils and Waka Kotahi

The smaller regions comprising the Regional Consortium individually lack the scale of public transport services that would justify the cost of a modern, integrated ticketing solution typically being implemented in large cities globally. The following table illustrates this lack of scale by setting out population, patronage, and trips per capita per annum. These regions typically have population spread across a city and several smaller towns, adding to the difficulty of providing cost effective public transport services.

Table 3 Illustration of the small scale of regional operations

Region	Population	Patronage	Trips per capita pa	Farebox revenue
Northland	91,230	329,242	3.6	\$0.6m
Waikato	458,202	4,085,467	8.9	\$6.4m
Bay of Plenty	308,499	2,688,602	8.7	\$4.4m
Hawkes Bay	170,448	645,297	3.8	\$1.3m
Taranaki	118,215	649,874	5.5	\$1.2m
Horizons	238,797	1,282,198	5.4	\$1.6m
Nelson	53,082	420,690	7.9	\$0.8m
Otago	177,219	4,013,504	22.6	\$6.8m
Invercargill	54,873	182,627	3.3	\$0.3m
Total	1,670,565	17,297,501	8.6	\$23.4m

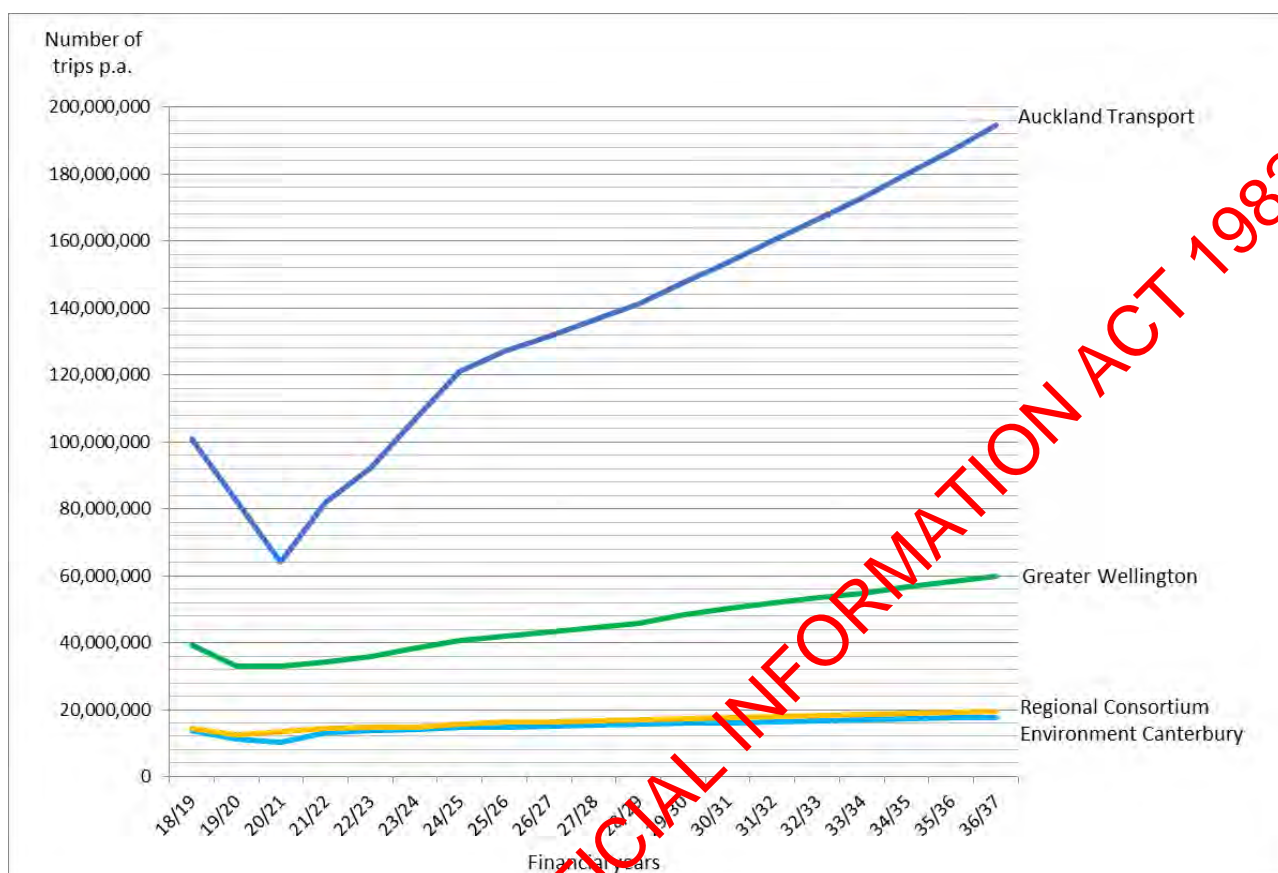
In comparison, in South East Queensland, there is a single PTA, TransLink, which operates an account-based, open-loop solution for Brisbane and the regional towns across a similar geographic spread to New Zealand. Brisbane has patronage of 188.5 million trips per annum across bus rail, light rail and ferries with 52 trips per capita.

Projected growth – patronage forecasts

While the reduced patronage impact of Covid-19 is expected to continue well into 2021/22, it is not expected to materially impact total patronage projections over the longer term, with patronage growth reaching pre-Covid projections by 2026/27. Projected growth post-Covid is illustrated in Figure 2.

The combined annual public transport patronage for Auckland is forecast to grow significantly with a predicted 16% recovery in 2022/23, a further 13% in 2023/25, with average ongoing growth of about 4% annually. For the other regions, recovery is starting in 2021/22 with a predicted 6% – 7% recovery continuing in 2022/23, with predicted annual growth thereafter of about 3 – 4% annually.

Figure 9 Public Transport patronage forecast by region



Source: PTAs and Waka Kotahi

Common challenges and the need for investment

The participating PTAs face some common challenges that a national ticketing solution is expected to address:

Misalignment of procurement cycles – To align procurement cycles, interim solutions for GW and RC have been implemented to allow time for a national solution to be procured and implemented. AT's contract for its HOP integrated ticketing solution runs to 2021 and will be extended through to 2026.

Transitioning to a national solution – Requires consideration of each PTAs current operations, any specific regional requirements, and the extent to which any existing capability can be re-used. For example, this could include re-using hardware such as gatelines at Auckland stations but replacing card reader devices on buses.

Bus only vs. mixed modes – Auckland and Wellington have bus, rail and ferry services requiring integrated ticketing while the other participating PTAs are limited to buses, and may require less sophistication for managing fare structures from the ticketing solution.

Scale for procurement and operation – Auckland aside, individual regions lack sufficient scale to support an integrated fares and ticketing solution on a standalone basis (as Table 3 indicates). At a national level, New Zealand's scale is equivalent to that of a city such as Sydney or Melbourne, but with significantly more complexity due to the individual requirements of each region.

Inadequate data – PTAs require the richer data provided by modern account-based ticketing systems to better optimise network design, scheduling and fares policy. Richer data enables

improved quantification of passenger flows and travel behaviour, better estimation and management of demand, and supports operators to optimise their fleets and become more cost effective. At a national level, access to rich data supports strategic planning, transport demand modelling, and government transport policy development. For example, National transit policies such as the proposed Community Connect card (being trialled in Auckland) cannot be implemented without a national, account-based payment system.

Revenue protection – The introduction of PTOM and gross contracts shifts the responsibility for fare revenue to both the PTAs (regional councils) and the bus, rail and ferry operators because the financial incentive mechanism is intended to share changes in fare revenue. Combined with the introduction of a national ticketing solution, processes for effective deterrence and enforcement of fare evasion will need to change. All PTOM contracts include measures to minimise fare evasion. Such measures reflect the actions expected of both parties and the circumstances and risks in the region. Access to the data from the NTS will substantially improve the ability to address these points.

Systems need replacement – All regional public transport ticketing and payment systems require replacement over the next five years. Both ECan and GW Rail require replacement systems urgently. Interim solutions have been implemented for the Regional Consortium and GW buses to align investment cycles until a national solution can be implemented. AT's contract for its HOP integrated ticketing solution has been extended to 2025/26 by which time a new system will need to be implemented.

Defining the problems and the benefits of investment

Investment Logic Map (ILM)

Facilitated investment logic workshops were held in July and August 2016 attended by senior managers from Waka Kotahi, AT, GW, ECan and RC – the participants of the National Ticketing Programme.

These workshops developed the investment logic maps by identifying and agreeing:

- the key problems with current public transport ticketing across the regions
- the key benefits of investment to resolve these problems
- the strategic responses required to achieve the benefits
- the KPIs to measure achievement.

The agreed ILM sets the direction for the type of solution required.

Problem definition

Three key problems were identified from continuing with the current regional approach. These are described below. The Investment Logic Map (ILM) and discussion is set out in Appendix 1.

Problem 1
45%

Outdated fare collection systems are a significant barrier to adopting modern fare policy and customer-centric business models

Current fare payment systems are a mix of cash and stored value smart cards (i.e. closed loop transit payment cards) that:

- lack the convenience customers expect from modern banking and retail payment systems
- require labour intensive revenue management, incur high operating costs, and struggle to support sophisticated fare structures.

Customers experienced with modern banking systems expect ease of use and convenience, are familiar with mobile banking and using bank-issued cards with NFC (such as Visa payWave) for retail payments, and have similar expectations for public transport.

Without such capability, it remains difficult to provide a high quality user experience that can attract people away from use of private vehicles, increase patronage, and reduce the current reliance on subsidies.

The COVID-19 pandemic has identified the need for NFC card and token-based electronic access to public transport services to provide a level of contact tracing for users of public transport, and to eliminate cash to help avoid virus transmission. This further reinforces user expectations for payment with existing bank-issued cards.

Problem 2 35%	Lack of journey information is sustaining suboptimal transport networks
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While some systems such as AT HOP provide rich information, some PTAs currently lack sufficient journey information to effectively target customer segments and optimise public transport services. This lack of information may include:

- Where passengers get on and off a service (trip information)
- What services passengers connect with (journey information)
- What type of passengers use a service – school student, tertiary student, on-peak commuter, off-peak commuter, elderly, disabled, etc.
- When these passengers travel.

This lack of information means some PTAs cannot refine the delivery of public transport services across their regions such as network design and improvements and more efficient fleet management, cannot support cross-regional integrated fares and ticketing, nor make sound social policy decisions about funding support for the aged, disabled, students, etc. As a result, public transport networks remain suboptimal.

Problem 3 20%	Disparate needs, priorities and investments are inhibiting the timely delivery of integrated ticketing
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It is hard to deliver efficient customer-centric public transport across 12 regions (and multiple ticketing systems).

Regions have significant demographic and geographic size differences, and differing modes (bus, train, and ferry), policies and systems, differing levels of process maturity, capability and capacity, differing levels of complexity for integrating legacy systems with any new proposed solution, and differing investment lifecycles.

Apart from Auckland, PTAs lack the scale advantages and investment capability of major international cities to independently procure, implement and operate a cost-effective integrated ticketing system. Also, this smaller regional scale does not present a commercially attractive opportunity for suppliers to deliver an affordable modern ticketing solution.

Multiple investors and decision-making complexity are barriers to timely delivery of a best value for money, single, integrated ticketing solution for all.

Benefit identification

Four key benefits were identified from a national approach to resolving these key problems. Refer to Appendix A for a more detailed discussion of these benefits.

Benefit 1 35%	Enhanced customer experience that substantially reduces the barriers to travel
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A national ticketing solution would provide all customers with a consistent and reliable ticketing experience throughout New Zealand that is easy to access, intuitive, efficient and convenient to use. As such, a modern national solution would:

- Provide universal access to public transport where customers can take public transport anywhere in New Zealand and be charged and pay in the same way.
- Make adoption easy as there would be no need to purchase a card or top up before travelling.
- Guarantee each customer the lowest price for all travel undertaken each day..
- Increase payment choice by using a contactless debit or credit card or a digital contactless (virtual) card on a mobile device.
- Enable customer self-service benefits from managing their own and their family's transport accounts anywhere in New Zealand including tracking spend and correcting their journeys if they forget to tag-off.
- Provide customers with better information and let customers control the information they receive.
- Achieve better customer service.

Benefit 2 30%	An affordable and efficient public transport network that delivers operational efficiencies and strategic information
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For PTAs, a modern, national solution will provide operational efficiencies, including:

- New features and functions that would provide a material change in functionality for a marginal increase in investment. For example, an account-based solution would allow PTAs to more easily and cost-effectively make changes to their fares policy, including special fares for specific events or price adjustments for service delays and disruptions,
- Enhanced data that is complete, accurate and consistent would improve reporting, support refinement of network design and operations including fleet management, and help inform strategic and operational decision-making,
- More streamlined revenue collection and improved revenue protection, especially where there are ungated stations.
- Improved resource efficiency through easier and less resource intensive management of the ticketing system with resources able to be shared and/or redeployed in different ways.

- Integration with third parties to provide wider services such as apps to plan, book and pay for a journey or manage park and ride services.

For government, a modern, national solution would:

- Enable easier implementation, monitoring and review of national policies such as SuperGold.
- Improve procurement and contracting efficiency when compared with several regional solutions.
- Enable New Zealand-wide collateral and branding which should reduce costs.

Benefit 3 20%	Efficient, least cost, regional and national investment
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Investment in a modern, single, national ticketing solution would achieve value-for-money for ratepayers, taxpayers and users into the future by providing increased convenience, access and a guaranteed lowest fare price for customers while supporting improved public transport operations, including enabling shared services and minimising duplication, and supporting regional and national policy initiatives.

Such investment would establish the base for future development and innovation because it could potentially enable transport accounts for all transport payments. This could include future payment integration with third party transport providers and potentially payment for services such as park and ride, road tolls, and congestion charges.

Benefit 4 10%	Improved public and government confidence in ticketing investment
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A modern, national solution would reduce barriers to using public transport and make it a more attractive travel choice because of the convenience and ease of access without the need for a transit card, topping up or carrying cash. Reducing barriers to access should result in improved customer satisfaction and better balanced and informed public discussion about achieving mode shift.

Enabling mode shift plans, such as Let's Get Wellington Moving (LGWM) and the Auckland Transport Alignment Project (ATAP), and achieving mode shift targets would require increased patronage, reduced private vehicle journeys, reduced congestion, and a subsequent contribution towards climate change targets through decarbonisation of the transport network.

By providing the means to implement central or local government policies, an accounts-based payment system would enable targeted deployment of new social policy initiatives like the Community Connect card.

Three strategic responses

The ILM workshops identified three strategic responses to deliver these benefits of investment.

1. **Expand innovation opportunities and capabilities** to create more flexible public transport networks attractive to every New Zealander.
2. **Wider adoption of integrated contemporary technology** to provide fit for purpose information that enables evidence-based decision making.

3. **Improve governance robustness and decision making 'stickability'** that achieves national consistency and regional flexibility and a best value for money solution, by collectively agreeing and making sound, long-lasting decisions.

Meeting these strategic responses will lead to:

- A consistent, high-quality customer experience for all elements of ticketing
- Quality ticketing data to make better decisions relating to public transport strategy and investment at both a national and regional level
- Best value-for-money taxpayer investment in regional ticketing system(s), i.e. by minimising duplication and enabling PTAs to share services and cost effectively accommodate changes
- Appropriately managed taxpayer investment risks (i.e. ensuring procurement, implementation and operation of the ticketing solution meets statutory, regulatory and industry compliance requirements)
- Better delivery of national public transport and social policy initiatives such as Super Gold and Community Connect cards.
- Rapid changes in the event of disruption such as COVID-19 by enabling effective, rapid support for regional and national responses including social tracing for all those with registered cards, and to enable options for fare products and prices, for on-going travel, and for revenue stream protection.
- Potential to add wider transport related applications such as park-and-ride and road tolling.

Key service objectives

Taking account of the key strategic responses, the following service objectives were agreed in the National Ticketing Programme scope definition, and define the outcomes that a national ticketing solution is to achieve. These outcomes would address the problem statements and, when achieved, would result in the high level benefits identified in the ILM.

The key objectives are for a single, national ticketing solution to:

- Maximise value for money at national and regional levels.
- Reduce barriers to the use of public transport.
- Provide consistent and reliable customer experience at all times.
- Provide choice of fare payment methods.
- Enable customer interaction through a range of communication channels.
- Minimise requirement for cash use and handling, while recognising different needs by those accessing public transport and therefore cash handling across the country.
- Enable operational configuration changes quickly, easily and cost-effectively at local level.
- Minimise operational support and management impact for PTAs.
- Enable full support of revenue protection obligations and activities.
- Integrate with PTAs/regional councils' existing systems.
- Minimise implementation and transition impacts.
- Accommodate new technologies and emerging trends including mobile apps that could lead to solutions such as Mobility as a Service (MaaS).
- Support whole of government initiatives such as PTOM.

Strategic alignment

The service objectives described above for a single, national, ticketing solution strongly align with the Government Policy Statement on Land Transport, the objectives and targets in the National Land Transport Plan and the Regional Public Transport Plans of regional councils operating as PTAs participating in the NTS.

Government Policy Statement on Land Transport

The Government Policy Statement on Land Transport 2021 (the GPS) identifies five key outcomes – inclusive access, healthy and safe people, economic prosperity, environmental sustainability, and resilience and security, and that investment in land transport will be guided by four strategic priorities – safety, better travel options, improving freight connections, and climate change.

The table below summarises the specific contributions from the NTS towards these strategic priorities.

Table 4: National land transport priorities directly contributed to by an NTS

GPS outcome	NTS contribution
<p>Better travel options: Providing people with better travel options to access places for earning, learning, and participating in society</p> <p>Improve people's transport choices in getting to places where they live, work and play, and to make sure our cities and towns have transport networks that are fit for purpose and fit for the future.</p> <p>Short to medium term results (by 2031)</p> <ul style="list-style-type: none"> Improved access to social and economic opportunities. Public transport and active modes that are more available and/or accessible. Increased share of travel by public transport and active modes. Reduced greenhouse gas emissions. Reduced air and noise pollution. 	<p>A modern ticketing and payment solution that is account-based and open loop would:</p> <ul style="list-style-type: none"> Make it easy and convenient to access public transport anywhere in New Zealand and pay in the same way with a bank-issued debit/credit card or virtual card on a mobile device. There would be no need to purchase a ticket or card or to have cash or top up before travelling. Transit cards, SuperGold and single tickets would also be options for some people. Guarantee the lowest fare option each day for every customer's journeys Enable customer self-service benefits from managing their own and their family's transport accounts anywhere in New Zealand Receive better information because customers can control the information they receive Provide better information about passengers' trips that informs continual improvements to network design and operations. <p>This convenience and ease of use would help to make public transport more accessible and a more viable alternative to private vehicles, leading to increased patronage and mode share and, in turn, reduce GHG and air/noise pollution.</p> <p>Improved business information from a modern ticketing solution underpins ongoing refinement of network design and operations, which then delivers better customer service and makes public transport an increasingly viable travel option.</p>
<p>Safety: Developing a transport system</p>	<p>More people travelling by public transport with its</p>

where no-one is killed or seriously injured

Develop a transport system that advances New Zealand's vision that no-one is killed or seriously injured while travelling. New Zealand roads will be made substantially safer.

Short to medium term results (by 2031)

- Reduced number of deaths and serious injuries.
- A safer land transport network.

higher safety record would contribute to a safer land transport network and reduced numbers of deaths and serious injuries.

Climate change: Transforming a low carbon transport system that supports emissions reductions aligned with national commitments, while improving safety and inclusive access.

Support the rapid transition to a low carbon transport system, and contribute to a resilient transport sector that reduces harmful emissions, giving effect to the emissions budgets to be released in 2021.

Short to medium term results (by 2031)

- Reduced greenhouse gas emissions
- Reduced air and noise pollution
- Improved resilience of the transport system.

More people travelling by public transport, which is becoming increasingly electrified, would contribute to fewer private vehicles and consequently reduced emissions and air/noise pollution.

Improving freight connections: Improving freight connections to support economic activity.

Well-designed transport corridors with efficient, reliable, and resilient connections will support productive economic activity.

Short to medium term results (by 2031)

- Freight routes that are more reliable
- Freight routes that are more resilient
- Reduced greenhouse gas emissions
- Reduced air and noise pollution.

More people travelling by public transport would contribute to fewer private vehicles and consequently reduced congestion resulting in freight routes that are more reliable and efficient.

A modern NTS would improve access to public transport across modes with better travel options by:

- providing choice for customers to access and pay for public transport by being able to tag on and off trains, buses and ferries with Visa or MasterCard (debit or credit card), mobile payment, or a transit card. Using Visa, MasterCard or mobile payment means no queuing to top up cards and no need for cash on-board or a ticket office/retailer to purchase tickets.
- Maintaining the concession record against a debit/credit card in the back office so that fare concessions, including SuperGold, are automatically calculated (for those registered and eligible) in accordance with local and national fare policies ensuring the lowest fare

Multiple payment options also provide the opportunity to remove cash on-board. Eliminating cash handling reduces costs as there is no need for administrative support to manage floats, reconcile and bank cash, or for the related security services. No cash handling reduces the potential spread of

viruses through touch, and no cash on-board removes the risk of theft and fraud and improves driver safety.

While not a condition precedent for the introduction of government public transport and social policy priorities, an NTS would greatly simplify their deployment. For example, by providing a payment platform for national transport concession initiatives such as SuperGold, an NTS provides a nationally-consistent customer experience and significant improvements in data collection and information such as actual rather than estimated SuperGold use and data for budgeting and policy development.

The GPS also references, and is consistent with, the New Zealand Disability Strategy, especially in relation to access.

New Zealand Disability Strategy

The vision for the New Zealand Disability Strategy is:

"New Zealand is a non-disabling society – a place where disabled people have an equal opportunity to achieve their goals and aspirations, and all of New Zealand works together to make this happen."

Non-disabling is about removing the barriers in society that disable people with impairments.

The strategy sets out eight outcomes⁴ that will contribute towards achieving the vision. *Outcome 5: Accessibility* includes being able to get from one place to another easily and safely, feeling safe taking public transport to get around, and being treated well when doing so, with information and communications that are easy to access using appropriate formats and languages.

An NTS will require accessible features determined with feedback from the disabled community and SuperGold users, and apply best practice. This includes use of audible and visual messaging at readers, gates and ticket machines; tones to identify platform validators, help points or other hardware; positioning of hardware; accessible websites and phone apps with suitable text size and contrast for ease of screen reading, etc.

New Zealand Government's Digital Transformation Strategy

The government's recent consultation paper "Creating a Digital Strategy for Aotearoa" is about how New Zealand keeps pace with changes in digital technologies and how these are used in our economy and across our communities. The vision and goals of the digital strategy are based around Mahi Tika (Trust), Mahi Tahi (Inclusion), and Mahi Ake (Growth). *"The Digital Strategy will set the tone for what is a resilient, sustainable, low emissions, and future-proofed Aotearoa New Zealand."* It talks about wanting New Zealand to be *"an early adopter and world leader in the digital economy"*.

An important part of the success of the strategy is for all significant government services to be available digitally, but that it is important to ensure that those at most risk of being digitally excluded – people who are older, Māori, Pacific, disabled, live in low socio-economic communities or are underemployed – or do not want to access government services digitally, can access them non-digitally. While an NTS would contribute to the provision of digital government services, the challenges will be to ensure inclusion for those who are digitally excluded, especially those solely reliant on public transport.

The strategy highlights the importance of trust and how digital technologies are created, used, and governed. For an NTS, it will be essential to ensure the digital services and technologies consumers

⁴ New Zealand Disability Strategy 2016 – 2026, page 22, sets out the eight outcomes: 1. Education, 2. Employment and economic security, 3. Health and well-being, 4. Rights protection and justice, 5. Accessibility, 6. Attitudes, 7. Choice and control, and 8. Leadership.

use are adequately protected and the personal information of New Zealanders is utilised in ways that they expect and in line with the Privacy Act 2020.

Regional public transport plans and regional land transport plans

Each regional public transport plan is consistent with the GPS in a way that is relevant for that regions population, demographic, and geographic characteristics.

Auckland's RPTP's outlook states that *"transport technology has continued to evolve rapidly, in tandem with our customer's expectations. More powerful analytical tools, with richer data, are improving AT's ability to plan. 'Big data', the power of the smartphone and new operating models mean that, in time, delivery of public transport services may be different from what we experience now as traditional bus, train or ferry services. AT will also be able to identify more localised information and provide services that better reflect the needs of individual communities. Looking further out, these same technologies are driving us towards a synthesis of transport services with the evolution of the Mobility as a Service (MaaS) model raising the prospect of seamless journeys across multiple modes, enhancing the customer experience"*.

The overall vision of Greater Wellington's Regional Land Transport Plan 2021 is *"a connected region with safe, accessible and liveable places - where people can easily, safely and sustainably access the things that matter to them"*. The NTS would provide greater convenience, ease of use, and access to public transport, leading to increased patronage and contributing to the key headline measure of a *40% mode shift from private vehicles to public transport and active modes by 2030*.

An NTS would contribute to achieving these visions by providing convenience, ease of access and payment choice and lowest fare price guarantees. Accessing buses, trains and ferries using a bank-issued debit/credit card or virtual card on a mobile device:

- speeds up boarding – tag on with an existing debit/credit card or virtual card without having to find cash or top-up a prepaid transit card;
- removes customers' anxiety about not having cash or sufficient prepaid balance on a transit card;
- provides payment choices for customers, and makes use of public transport easier and more convenient;
- guarantees customers are charged the lowest daily charge for their journeys through their travel account at the end of each day.

Customer satisfaction is a key measure that PTAs monitor regularly. Providing payment choices for customers, reducing payment anxiety, increasing convenience by not needing additional cards, not needing to top-up or carry cash and being able to manage their travel account on-line contributes to a better experience using public transport and improved customer satisfaction.

Satisfied customer are likely to travel more by public transport and recommend using public transport to family and friends, resulting in increasing patronage, improved farebox recovery and mode shift, which are KPIs in every regions RPTP.

Appendix 3 summarises the key outcomes and priorities for the regions and where an NTS would contribute.

Emissions Reduction Plan

The consultation discussion document “Transitioning to a low-emissions and climate-resilient future”⁵ includes discussion about the need for behaviour change and empowering action “as a net-zero future depends on individuals, households and organisations changing their behaviour”.

It further states that “in the short term, we can lower emissions by encouraging New Zealanders to make choices and new actions – for example, using the car less, taking public transport, native tree planting and walking and cycling (active travel)”.

Transport is New Zealand's second-largest source of greenhouse gas emissions, responsible for 43 per cent of total domestic CO₂ emissions. The Climate Change Commission (the Commission) recommends reducing transport emissions by 13 per cent by 2030 and 41 per cent by 2035 (compared to 2019). To do this, the Commission recommends the Government focuses on three areas to reduce emissions from the transport system, the first being

*“Reducing reliance on cars and supporting people to walk, cycle and use public transport”.*⁶

The target for this focus area is to:

“Reduce vehicle km travelled (VKT) by 20% by 2035, by providing better travel options, particularly in the largest cities.”

The recommended steps to achieve this include:

- Provide New Zealanders with better travel choices by implementing already agreed mode shift plans in our largest cities, in partnership with local government.
- Support New Zealanders to use public transport, walk and cycle by making significant improvements to public transport services nationwide, and investing in walking, cycling and shared mobility. This includes assessment of mass transport in Auckland, Wellington and Christchurch.
- Make public transport cheaper – reduce public transport fares to make it more competitive with cars and to lower the cost barrier for low-income people along with *convenience* and accessibility.
- Engage with the public to build support for active and shared travel.

By improving the reach, frequency and quality of public transport, the Commission noted that *“Encouraging the uptake of public transport, walking, and cycling and managing demand on the transport network offers significant benefits beyond reducing emissions. This includes improved travel choice and accessibility, better health and safety, and less congestion.”*

Well-integrated networks of public transport services can significantly increase levels of access between communities, and are vital for connecting employers to labour markets, and individuals to social and economic opportunities.

Public transport can provide the backbone for our cities to grow in a way that avoids emissions from new development.

We also need to provide better travel choices in New Zealand's regions and rural areas, including by public transport. Too many parts of regional New Zealand are only accessible by private vehicle.”

In the first emissions budget period of 2022 -2025, the key actions include establishing the planning and funding principles for a national public transport network, progressing Auckland light rail and Let's

⁵ Ministry for the Environment. 2021. *Te hau mārohi ki anamata | Transitioning to a low-emissions and climate-resilient future: Have your say and shape the emissions reduction plan.*

⁶ The other two areas recommended by the Commission to reduce transport emissions are by rapidly adopting low-emission vehicles and fuels, and beginning work now to decarbonise heavy transport and freight.

Get Wellington Moving initiatives, working on a mass rapid transit network for Greater Christchurch, investigating the potential of a mobility as a service platform to encourage the uptake of low-emissions modes, and delivering national integrated ticketing.

The NTS will be an enabler in achieving improved accessibility, convenience and ease of use of public transport, and the establishment of Mobility as a Service platforms and deliver national integrated ticketing.

International trends

Automated fares and ticketing started with closed loop systems

International trends in automated fare collection started in 1997 with Hong Kong's deployment of their "Octopus" contactless card. This was followed by deployment in Singapore, and then London's Oyster card in 2003. All new implementations thereafter (including Auckland's HOP from 2012/13 and Wellington's Snapper) were focused on smart cards providing an electronic purse of money (stored value).

These contactless smartcards interact with a series of on-board devices to identify the entitlement of the person to travel, calculate the fare required for a specific journey and undertake the payment process for the relevant fare, using information stored on the card. The card is the source of truth in respect of the customer. Typically, these Closed Loop Ticketing solutions are proprietary causing 'vendor lock-in'. And since all ticketing logic resides in each ticketing validator, software and configuration management of card reading devices, including changes to fare policies and concessions, is a costly and lengthy process, and any errors often impact a large number of customers. These systems represent the majority of automated fare collection systems around the world.

International moves to account-based and open loop ticketing

- The advent of good 3G and 4G communications from bus and train to the back office has allowed a move internationally away from closed loop, card-centric approaches⁷. Account-based ticketing shifts customers' financial information and fare calculation away from the card to a user's transit account and/or bank debit/credit card account. Account-based ticketing, also termed 'cloud-based ticketing' enables:
- Rich information to be gathered by transport network operators on the nature and precise location of system users.
- Easier and more flexible management of operational changes to fares and networks (amending routes, stops, etc.).
- Easier and faster introduction of new products and fare policies which can be initiated at the back office and require no changes to customer cards.
- Avoidance of requirements to generate and distribute extensive fare and customer data to all ticketing devices.
- Lower cost fare media as the cards or other token device (such as smartphones) do not need to be as smart. The cards or other devices simply need to identify the holder, and do not need information written back to them.
- Lower cost reader technology as processing is done at the back office rather than on each reading device, and in the event of a failed connection, can store passenger trip information until the connection is restored.
- Easier change management from old to new systems.

⁷ Page 5 ALCO Consulting Paper for GW – High Level Advice on GW Proposed IFT Scheme April 2015.

- Easier introduction of new technology over time.
- The ability to integrate with other payment applications for point-to-point transactions such as national fare concessions, park-and-ride, road tolling, and congestion charging.

Supporting the growing introduction of account-based systems has been the fact that banking systems have made significant advances in contactless card and supporting technologies. Applying these gains in contactless technology to transit ticketing is a natural progression⁸. Open loop systems are those that accept branded, “open standard,” EMV⁹ cards or virtual cards on smart phone devices to integrate with the account-based system. The application of open loop systems to public transport networks enables:

- Greater customer convenience because their existing Visa or MasterCard, or the virtual card on their smart phone/device, can be used to “pay as you go” for transit without the need to research how to access the system or acquire and top-up a stored value card. This convenience has seen increases in patronage as customers can simply turn up, tap and travel, improving overall accessibility to public transport. Refer to section 5.7 for further discussion about the evidence for increased patronage.
- Lower cost for transport operators as cards and reader equipment are based on open standards and are commercially available off-the-shelf compared with proprietary closed loop equipment.

Global snapshot - others are introducing account-based solutions

Cities around the world have been introducing account-based ticketing systems since London in 2013 (introduced alongside the Oyster Card), Chicago in 2014, Philadelphia, Portland and Boston in 2016 and Sydney in 2017, amongst others as illustrated in Figure 10 below. This shows the extent of the account-based ticketing that has been implemented already and is currently under development around the world. The large number of account-based solutions now in operation provides strong assurance of the maturity of these systems and the capability of system suppliers.

Several of these implementations have particular parallels with a New Zealand NTS. For example, South-east Queensland introduced account-based ticketing and open loop (EMV) in 2020 including mobile payments (iPhone, Android), a multi-tenanted solution, a large geographic area, a similar patronage profile with one large region (Brisbane) and several smaller regions, and a similar population. These examples including how each are relevant for a New Zealand NTS are set out in Appendix 2.

Figure 10 Example implementations of account-based and open loop solutions

⁸ Contactless Payments and Open-Loop Ticketing, p.1, L.E.K. & MasterCard, 2016.

⁹ Europay, MasterCard and Visa standard



Public Transport Payment and Technology Adoption Outlook

Successful adoption of open loop ticketing payments is dependent on a high proportion of bank-issued contactless bank cards in use in the retail environment. New Zealand is now in this position and the majority of customers are ready for open loop to be the transit payment of choice. Covid-19 has seen a significant increase in contactless use by retail customers – up from 68% pre-Covid to 88% in September 2020.

While 99.4%¹⁰ (3rd in the world) of New Zealand residents have bank accounts, 93.8%⁸ (3rd in the world) are in possession of a debit card, and 83.23%⁸ (4th in the world) use electronic payments when making payments. The use of cash is the lowest in the world; two-thirds of New Zealanders do not carry cash, and only 6% use cash as their preferred way to pay¹¹. New Zealand has the highest transactions per capita per annum for debit and credit card transactions and the lowest total cash as a percentage of GDP at 2.1%. Banks' withdrawal of cheques as a payment option in the first half of 2021 has further encouraged debit and credit card use.

The limiting factor to further growth is card companies and banks charging high merchant service fees (MSFs) for contactless transactions. This has resulted in small independent retail merchants refusing to accept contactless transactions, resulting in retail card use in New Zealand still predominantly based on EFTPOS swipe/insertable cards which incur no or low fees for retailers. ANZ report that,

¹⁰ MBIE Retail Payments Systems Issues Paper December 2016

¹¹ MasterCard research presented June 2017

before Covid, the split of ANZ merchant-processed debit transactions in a face-to-face retail environment was 20 percent contactless and 80 percent EFTPOS. At end-June 2020, that split increased to 30/70. In August 2020, banks significantly reduced MSFs from an average of 1.1% and 1.5% for debit and credit cards respectively by about half, with ANZ at 0.7% and Westpac at 0.6% for debit cards. This should see increasing use of contactless retail transactions as more retailers provide the capability.

Overall, the pace of electronic change in New Zealand is one of the highest in the world due to fast adoption and a high preference for electronic payments. It is anticipated that the uptake of public transport fare payment using contactless bank-issued cards or mobile payment wallets would rapidly reach high levels following introduction of an account-based and open loop ticketing and payment solution.

Public transport customer preference research in New Zealand also indicates that there is an inherent expectation for customer self-service using personal devices for information, account management, payment and purchasing. It also indicates that the quality of this experience is expected to be high. Allied to this is an acknowledged willingness to embrace technology into mainstream customer activity in New Zealand; therefore, a ticketing solution will need to be capable of servicing these channels to the highest standards.

The NTS solution concepts anticipate that PTAs will minimise and, in due course, eliminate cash use for public transport fare payment, especially as a result of Covid. However, cash usage currently remains a core customer expectation.

Customer insights

Customer insights have been drawn from a range of research over the last three years. This included work undertaken by; (i) the National Ticketing Programme in February 2017 (set out in Decision Paper D9) on customer experience requirements; (ii) Colmar Brunton in September 2017 – Understanding Public Transport Cash Payers; (iii) Waka Kotahi NZTA in the February and May 2019 Accessibility Workshops; (iv) PwC in April and May 2019 – Project NEXT Customer Experience Research report, the Project NEXT Ticketing Solution RFP Input: Customer Experience Input Report, and the National Ticketing Research undertaken by GravitasOPG for Waka Kotahi in 2021. These are referenced in Appendix 4.

These customer insights have been used to help identify and develop the business requirements for a solution that will best meet customer experience needs. In summary, these survey findings reveal the following:

Importance of education – both during transition and to ensure a good experience - no one wants to be publicly embarrassed because the system isn't easy to understand and use

- **During transition** – There is an amount of anxiety on learning new ways to pay and, while there is a good reason for why they should have to, customers like to know in advance what they need to do. Not being able to clearly understand how to use a certain option will be a barrier to adoption, because people just won't even try.
- **Unconscious vs. self-aware experience** – While frequent travellers are often on autopilot with little awareness of the travel experience until a disruption occurs, infrequent travellers, first timers, and those with accessibility needs have anxiety over how to navigate public transport and know what to do and when, including successfully tagging on/off.

Transit cards have strong appeal – because of the familiarity and benefits of current HOP and Snapper closed loop systems, people showed preference for what is familiar, but added they would

feel more secure with a central account rather than all information and money being stored on the card itself.

Unclear value proposition for use of smart cards and QR codes – being clear on the value proposition of a smart ticket is essential for customers to see it as a genuine option, e.g. how would free public transport work for special events using the event ticket so no need to carry two tickets. Participants thought a smart ticket could be good for tourists or infrequent travellers for purchase of travel in advance and agreed that it would be useful as part of an event ticket or for groups such as schools or sports teams travelling together.

Tagging on/off is a moment that matters – the tag on experience should be simple and completely self-explanatory and customers want the reader to deliver simple yet helpful audio/visual messages to know that they've done it right. If the card is denied, people want to have information on what to do, and want to know that they can sort issues out easily. Tag off has the extra concern that they will be charged extra, which they will have to rectify themselves.

Low perceived effort in using bank cards because of the convenience of contactless bank-issued cards such as Visa's PayWave, not having to carry many cards, and the added environmental sustainability of using an existing card to reduce paper tickets and new additional plastic cards. However, there are concerns about:

- how much their bank card would be charged if they forget to tag off
- being on a Deny List could prove a significant issue even though the chance is extremely low. The expectation is to take no more than a day to get off a deny list and ideally immediately following a call to a contact centre or after making a minimum account payment.
- security, privacy, and identity when required to present a card to a revenue inspector. It is essential that all customers can recognise inspectors and know what inspectors will do and what information they will see.
- risk of personal safety and security at stations when presenting bank cards in public places including security risks of PayWave from fraudulent access such as skimming.

A key "non-negotiable" for customers is the underlying expectation of best value fares, i.e. that fares are affordable and they will be automatically charged the minimum cost of their journey across modes per day. Cost and convenience are key motivators for customers when deciding to use public transport.

Other 'non-negotiables' emerging from the insights included:

1. One transit card for the country - with fares calculated automatically based on location of tag on/tag off
2. Consistency in branding to ensure all services are easily identified and navigated.

The recent National Ticketing Research undertaken by GravitasOPG is particularly insightful about how public transport users currently make payments and how they feel about the proposed new system. The findings reveal that:

Currently – 90% already use contactless smartcards or SuperGold to pay for PT

Overall, more than four out of five use a smart card and a quarter use cash but use varies by region:

Table 5 Current use of cash and smart cards

	Smart-card use	Cash use
Northland	66%	55%
Auckland	93%	12%
Bay of Plenty	59%	29%

Waikato	68%	41%
Manawatu, Whanganui, Taranaki	45%	54%
Hawkes Bay	2%	73%
Wellington	84%	25%
Canterbury	90%	31%
Otago	83%	20%
Rest of South Island	47%	59%

Note that payment types are not mutually exclusive

For the future – 89% prefer contactless payments when given the new options

- 41% preferring contactless debit/credit cards
- 48% preferring a transit card

81% are likely to use a card-based payment for PT in another region

Figure 11 Proportion of PT users who will and will not use debit/credit cards or virtual cards



Public transport ticketing and payment priorities

Urgency for GW and ECan

Until a national ticketing and payment solution is introduced, GW is still operating “Victorian-era” paper tickets across its rail network and cannot implement integrated fares and ticketing and the associated fare policies originally planned for 2017/18 in its Long Term Plan. Delays mean GW is forgoing certain cost reductions post 2020 under its contractual commitment with the Wellington commuter rail provider, and issues such as significant revenue leakage remain until paper tickets on trains are replaced with an account-based payment system.

ECan’s current closed loop system is at end-of-life with devices and equipment wearing out and a lack of information to refine network services due to its tag-on only system. A new solution is required for 2022/23.

Open loop to increase public transport use in Auckland

By implementing EMV-based open loop technology, AT expect the increased customer convenience to bring a significant lift in use of public transport across Auckland, particularly people new to public transport and occasional users, while reducing the cost of issuing AT HOP transit cards.

AT's review of customer needs¹² revealed that 51% of customers (May 2016) had a strong desire to use a debit or credit card for travel and 73% (February 2017) have a contactless debit or credit card. 65% of customers wanted to be able to use their mobile phone to pay for public transport. Customers saw the key benefits being convenience and time savings.

Moving to an account-based, open loop solution would meet these customer requirements and could speed up adoption of third party products because including public transport widens the scope for everyday users.

Account-based imperative politically urgent

An account-based solution meets regional and national requirements to improve public transport accessibility while enabling broader policy initiatives to integrate public transport payments with other services such as park and ride and road tolling.

Sustainable capability essential

Rapidly changing technology and customers' expectations are driving demand for easier access and joined up transport and related services. Achieving this requires sustainable technological, infrastructure and organisational capability and capacity.

Risks and constraints

There are several key strategic risk and limitations with a single, national ticketing solution.

Market lock-in with one supplier nationally could mean potentially missed opportunities of "technology competition leap-frogging" that can be achieved through two or more systems, and could limit future ability to adapt and respond to new and/or disruptive technologies.

Building a system that is narrowly focused and locked down to specific products and services rather than enabling new products and services in the future could limit the ability of PTAs to best meet changing circumstances and customer demands. Finding the 'goldilocks zone' will be a challenge as the solution will need to balance a range of factors such as costs, effective delivery of core functions, and multiple user organisations with specific, local requirements, and the flexibility to add new products and services in the future.

One central, account-based system poses wider and more significant digital risks than the current regional closed loop solutions. This could range from the extreme situation of a sustained cyber-attack on the centralised system which could potentially shut down ticketing operations nationally rather than regionally; contracted suppliers storing personal data offshore in a jurisdiction which exposes the NTS and customers to privacy risks; through to inadvertent security and privacy gaps as a result of complex data sharing between many participants.

Higher than expected total costs of ownership could place an NTS at risk of being unaffordable. This depends on a number of factors such as the value central government places on the benefits of a centralised accounts-based payment platform, and the amount that regions, especially Auckland, Wellington and Christchurch, must fund from ratepayers.

¹² Future of AT HOP Research, May 2016

The impact of Covid-19 could adversely affect timeframes and costs. Global delays in completing other projects around the work could affect suppliers' resource capacity and capability, and delays in production and shipping of equipment together with price rises could impact affordability.

There are ways to mitigate the effect of these risks. Open architecture helps to limit the effect of single supplier lock-in. This is managed in other national systems, and it may be possible to keep the solution 'evergreen' through termination for convenience of separable portions of the system and, within capability, capacity and budget constraints, to run cloud-based services that are regularly updated.

The complexity of integrated fares and ticketing systems that introduce public-facing technology across multiple public transport networks and providers means that a range of commercial, implementation and operational risks will need to be managed. These risks are listed below and their impacts, mitigation and allocation are described in the Financial, Commercial and Management Cases.

- (i) The decision-making process across multiple investors is slow.
- (ii) One or more of the larger participants withdraws their participation in an NTS solution in preference of extending their current solution.
- (iii) There is insufficient capability and/or capacity to deliver to expected quality and timeframes.
- (iv) National benefits of investment prove difficult to quantify, measure and realise and regional benefits are less than expected, for example:
 - COVID results in workplace changes that lead to lower ongoing patronage
 - Customers do not embrace open hop capability to the extent predicted.
- (v) Integration between the different suppliers is not managed by the preferred supplier within expected boundaries and timeframes resulting in delays, rework and additional costs.
- (vi) A major technical failure during transition could result in significant delays and additional costs. Technical failure after 'go-live' causing widespread cancellation of services would result in loss of revenue and reputational risk.

Determining potential alternatives



Potential alternative ticketing solutions

Key messages

The preferred option is the NTS – a single, national, account-based, open-loop, ticketing and payment solution.

There are few realistic alternative ticketing options – free public transport, Do Nothing and Do Minimum do not address the problem statements or achieve the benefits of investment.

The most realistic counterfactual is a Do Minimum Plus option which sees current systems being upgraded.

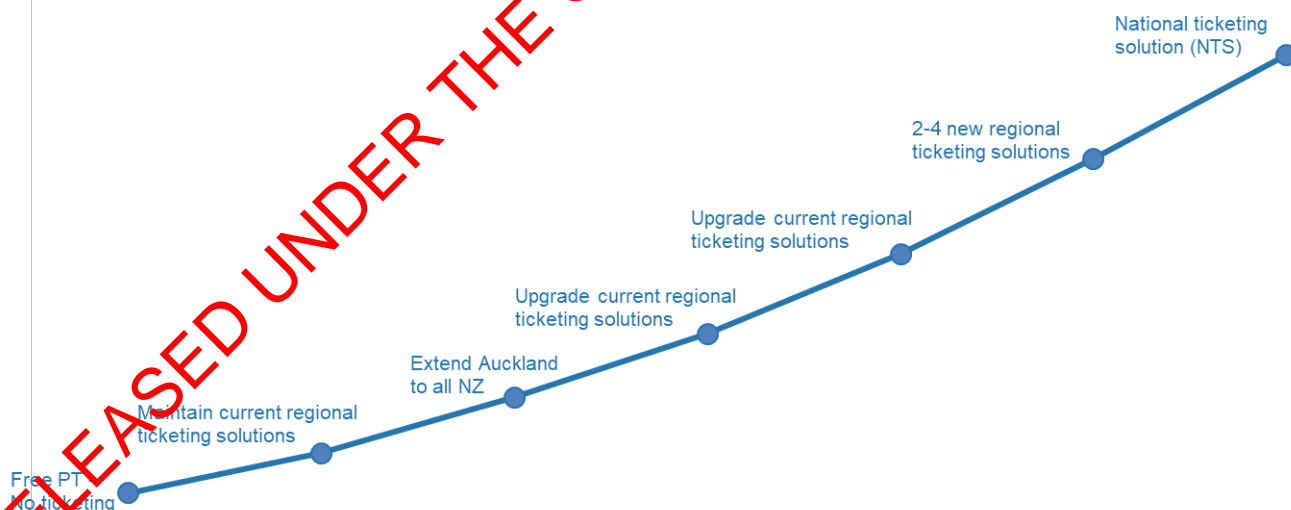
Only the NTS provides national benefits.

There are few overall alternatives

A ticketing solution is an essential part of providing public transport as it provides two key functions – a payment system that enables users to purchase tickets to travel on public transport, and an information system that identifies where and how many people got on and off at specific stops and stations and the types of traveller such as those paying full fare and those eligible for concessions.

Options range from no ticketing system and free travel by all users through to a single national system, as illustrated below.

Figure 12 There are few viable options for ticketing and the “Long List” is short



What if public transport was free?

Free use has had mixed results with most systems trialling free use (for all) reverting to paid fares. Free use is about fare policy rather than ticketing and most advocates for free use are focused on reducing cost barriers for those with low incomes and students rather than free use for all. The key

advantage of free use is increased patronage and better accessibility for those on low incomes and this can be achieved through other, more targeted, policy initiatives such as the Community Connect card being trialled in Auckland. The key disadvantages are that farebox revenue must be made up from rates or other revenue sources which is often not practical and, for some, not considered equitable. In those countries and cities that have introduced free public transport, there has been little reduction in private vehicle use.

To provide efficient, cost effective, high quality public transport requires the use of tickets to tag on and off to provide the information to continually monitor performance and manage day-to-day operations. Free use disincentivises use of tickets resulting in loss of information making it more difficult to improve network operations to best meet demand, and in other jurisdictions there has been little further development of public transport services after the introduction of free fares. Rather, improving service quality has the greatest effect in growing patronage.

Not having a ticketing solution is not a viable option and was not considered further.

Retain existing solutions for the next 10 years

Under this option, each PTA would extend use of their existing closed loop platforms for the foreseeable future, refresh equipment only when essential and “sweat the asset”. Ongoing investment would be limited to essential changes required to meet fare policy and legislative requirements. Extended agreements would need to be negotiated with existing suppliers to avoid the cost of procurement, transition and change.

AT would continue with their HOP closed loop solution and existing supplier, Thales, with reduced on-going investment. The existing contract due to expire in 2026 (after extension) would be further extended. GW would continue with their existing closed loop solution provider for bus, Snapper, and continue with paper tickets on rail, without integration between modes. No changes would be required to existing contracts. ECan would continue with their existing supplier, INIT, offering a tag-on only, closed loop solution, the existing contract extended further, and equipment replace only when it stopped working. The Regional Consortium would continue with their RITS tag-on / tag-off, closed loop system and extend the contract beyond the current 5 year term.

Existing systems are at or nearing end-of-life – either technologically or economically, or both, as in the case of Greater Christchurch’s electronic Metro Card system. Christchurch’s Metro Card was introduced in October 2003 and is tag-on only which means very limited information about the trip and the type of user. A replacement ticketing solution for Christchurch is a high priority for the National Ticketing Programme.

Also, Wellington’s use of paper tickets on rail is antiquated and technologically and economically obsolete. It requires high levels of staff to maintain, has significant revenue leakage, and provides poor information for operational management.

While the Regional Consortium’s Bee Card, Wellington’s Snapper on buses, and Auckland’s HOP system could be retained, customer surveys show that customer expectations of payment technology will not be met by these solutions. For example, only AT’s HOP system incorporates integrated ticketing and none have open loop capability whereby users could tag-on and off using a bank-issued card or a virtual card on a mobile device.

The need for significant mode shift away from private vehicle use will require a public transport system that can compete and current ticketing systems lack the convenience and ease of use that will assist with attracting and retaining customers.

This option was not evaluated further.

Extend Auckland's HOP system to all of New Zealand

The option to extend AT's HOP system to all participating PTAs was considered and assessed by NineSquared¹³ during the development of the earlier Indicative Business Case. NineSquared assessed whether it would be better to extend the existing AT HOP system to all PTAs by 2022/23 and defer the benefits that come from implementing an account-based ticketing system until 2026 (when the current AT HOP contract ends), or whether the benefits of an account-based system were sufficiently large that its early introduction (2022/23) is sensible from a financial, customer and public transport perspective.

Developing a single account-based ticketing system now, and extended to AT HOP in 2026, was the lowest cost scenario. NineSquared noted that their economic scenario that transitioned AT HOP to a single, national, account-based solution in 2023 rather than 2026 suggested only marginal reductions in net present cost of between \$2.8 million and \$4.5 million.

NineSquared concluded that, from a financial perspective, the comparator model outcomes indicate a new account-based solution should be procured early rather than firstly transitioning to the AT HOP system and jointly procuring an account-based ticketing system in 2026.

This option was not evaluated further.

Enhance current solutions for the next 10 years - Do Minimum

Under this option, existing systems would be retained and enhanced whereby:

- each PTA would seek to extend use of their existing closed loop platforms for the foreseeable future
- a local path for minimum investment improvements would be supported
- there is no full market procurement
- extended agreements are negotiated with existing suppliers to avoid the cost of procurement, transition and change
- implementation projects and operations are locally managed.

This is expected to result in:

- AT entering a new contract with Thales prior to the current contract extension ending in 2026 and adding open loop functionality to HOP.
- GW continuing with their existing supplier, Snapper, with its closed loop solution for bus and extend this to Snapper on rail – a trial is currently underway.
- ECan joins the Regional Consortium to deliver a tag-on / tag-off closed loop solution with existing supplier, INIT, the existing contract is further extended and equipment is deployed from the previously procured pool.
- Regional Consortium continues with its RITS tag-on / tag-off, closed loop solution and extends the contract for this beyond the current 5 year term.

This is very similar to the Do Minimum Plus option which is the path that AT and GW would take if the NTS did not proceed. Therefore the Do Minimum was not taken further.

Upgrade current solutions over the next 10 years - Do Minimum Plus

Under this option, existing systems would be retained and upgraded. This is expected to result in:

- AT entering a new contract with Thales prior to the current contract ending in 2026 and adding account-based and open loop functionality.

¹³ NineSquared is a specialist economic consulting and commercial advisory firm based in Australia specialising in the fields of transport, resources and regulatory economics, policy development and analysis, and advising on commercial arrangements between government and the private sector.

- GW extending Snapper to rail – a trial is currently underway – and adding open-loop and account-based functionality in the future (next 2-5 years).
- ECan either joining the RC or procuring a new ticketing solution which would include account-based and open loop capability.
- RC extending their current contract and continuing with the Bee Card.

This is the preferred counterfactual by GW and AT as it is the pathway they have been following and would ramp up if the NTS did not proceed.

Two to four new regional solutions

This option involves procuring new solutions for each region with each PTA designing and executing a procurement strategy with a business case in line with their own needs, funding and timing, for the delivery of their solution. Investment would be aligned to regional long term plans and requirements, with implementation and operations managed locally.

There are several variations under this option:

- AT procures a new account-based open loop solution and GW, ECan and RC jointly procure an account-based open loop solution
- AT and GW jointly procure a new account-based and open loop solution, as does ECan and RC
- AT and GW each procures a new account-based open loop solution and ECan and RC jointly procure an account-based open loop solution,
- AT, GW and ECan each procure a new account-based open loop solution and RC either retains its existing solution or procures a new solution later.

One variation of the option was considered previously. This comprised GW, ECan and RC developing an account-based and open loop solution while AT continued with HOP. This option was discontinued when AT joined the NTS procurement process in 2018. For GW, ECan and RC, this would be roughly similar in cost to the current NTS solution; adding separate solution development costs for AT would result in higher overall costs nationally. As such, this option was not considered further.

Single national solution

An NTS transitioning PTAs on a staged basis over 5 years is likely to maximise the benefits of investment by providing significant national capability not available in any other option, and would involve one procurement cost rather than the multiple procurement processes of the other options. This solution is described in detail in the Economic Case.

Ticketing solutions comprise a range of component parts which need to be brought together to form a cohesive and integrated whole. The conceptual design involved defining the components that would achieve the best NTS solution for New Zealand. These components include:

- Ticketing and payments
 - Concept of operations - operating model and commercial model
 - Supporting systems that enable integration with real time information systems, financial systems, transport planning systems, etc.
- Extensibility
- Revenue protection
- Support for cash fares
- Support of regional fare policies
- Reporting.

For each component (or layer) there are options. These were evaluated against criteria relevant to that component, and documented through a series of decision papers, culminating in a 'solution concept' paper to ensure the most suitable mix of components were identified to best deliver the benefits of investment.

The details of the multi-criteria analysis and preferred option for each component forming a single, national solution are set out in Appendix 5.

Options to be further evaluated

Two options were taken forward to the Economic Case for evaluation:

- (i) A single, national ticketing solution
- (ii) Upgrading current solutions, (or the Do Minimum Plus option).

NTS concept – a central solution with regional flexibility

The NTS concept is for a modern solution available to participating PTAs that provides strong national and regional benefits that cannot be achieved by maintaining the current regional approach. While each of the regional PTAs has different business requirements driven by size, topography, local regulations, modes, fare policy, and history, a modular, segmented and parameter driven approach together with an appropriate commercial model would give each region autonomy and flexibility for their individual requirements with benefits that can only be achieved with a single national solution.

Because the NTS environment consists of multiple PTAs, a single, central solution will need to be 'multi-tenanted' to:

- Segment each PTA as a separate financial entity
- Segment specifications of routes/trips and fares
- Allow PTA-based business rules for each PTA's own segment (if required)
- Allow transport operators to serve multiple PTAs.

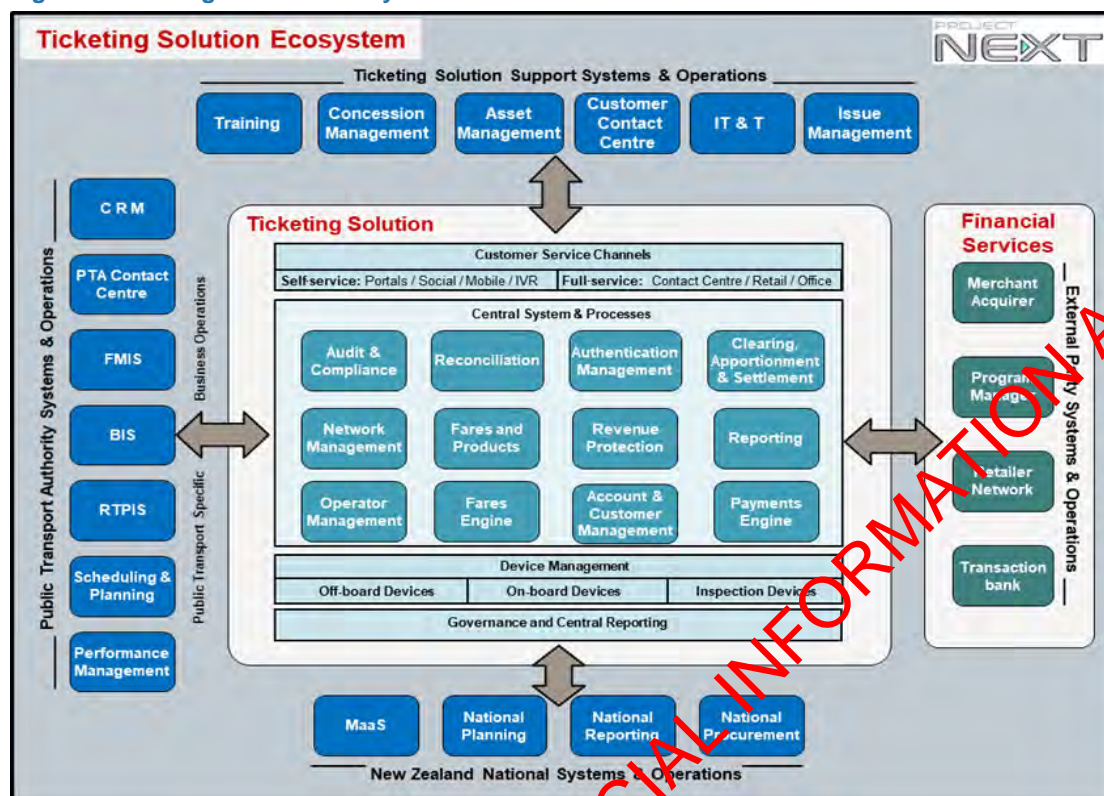
Such a system should allow for:

- End-users to be a single entity, regardless of the PTA they are utilising at any time
- Accounts related to customers, not PTAs – a PTA will not be able to "own" an account
- Products that apply across all PTA's, e.g. national products such as SuperGold or the Community Connect card
- Potential to add other transport-related point-to-point applications to the solution, such as road tolling, park and ride, and congestion charging.

NTS components

The NTS comprises a set of components interacting within a wider ecosystem, illustrated in Figure 4 below.

Figure 4 Ticketing Solution Ecosystem



Do Minimum Plus Counterfactual

The Do Minimum Plus option provides the counterfactual against which the NTS can be compared. It includes those facilities, functions and services that are either currently committed or formally planned over the 15-year appraisal period, which means that to be a valid basis for comparison the Do Minimum Plus option includes:

- maintenance and/or replacement of existing facilities/functions/services in each region
- upgrade projects that introduce new functionality such as open loop
- completion and maintenance of committed projects or policies in each region
- continuation and improvement of public transport policies.

This means that the counterfactual description for each PTA's way forward is that:

AT would extend the life of the HOP closed loop integrated ticketing solution for buses, rail and ferries and add account-based and open loop capability including capital replacement of on-board card readers and all other required front office hardware to enable these improvements. AT expects to gain a small, increase in patronage from the introduction of open loop, which would improve efficiency and reduce the need for future increases in staff numbers.

GW would continue the closed loop Snapper ticketing system for buses and replace paper tickets on rail and ferries with Snapper (and manage validation using on-board electronic handheld ticket validators rather than gated stations). This includes a minimum EMV capability, initially with fixed fares and without daily aggregation. However, technology evolution to an account-based solution with full EMV capability would be anticipated during the life of the counterfactual. GW expects the introduction of Snapper on rail (and ferry) to provide a range of benefits including:

- improved revenue protection
- removing cash on-board and paper tickets

- (iii) other savings from train-based staff efficiencies, reduced retail network commissions and other efficiency and growth benefits
- (iv) time savings for customers through avoiding time spent topping up.

Regional Consortium would extend the contract to continue with RITS. The Regional Consortium has achieved four main benefits since the staged introduction of RITS was completed in 2019/20:

- (i) improved information management
- (ii) reduced fare evasion
- (iii) enhanced customer retail experience
- (iv) reduced travel time.

ECan would replace the current electronic ticketing system, which is now at end-of-life (technologically and economically), with a solution similar to RITS or join RITS with the addition of mobile payment. By adopting RITS and a new mobile app, ECan expects to gain similar levels of benefits as the RC (as they both have very similar levels of patronage).

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Economic Case

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Economic Case – Exploring the Preferred Way Forward

Key Messages

The NTS is an account-based ticketing system with open loop payment functionality, a multi-tenanted platform, a shared services operating model, open standards, effective revenue protection, and standardised fare policies across New Zealand albeit with some flexibility for regional fare policies.

The NTS will enable all PTAs to benefit from a world-class solution that would be financially unattainable individually.

Reduced costs of fare collection and customer convenience have been catalysts for introducing account-based, open-loop solutions in cities like London. Using existing bank-issued cards and avoiding the need to purchase a transit card, find cash, queue to purchase tickets or load value is a boon for all users, especially casual users and tourists.

A national account-based solution enables the implementation of national policies, provides capability such as Covid tracing and tracking, and regional benefits such as rapid changes to fare policies and information to support network and operational improvements and efficiencies.

Cost benefit analysis focuses on two options – (i) the NTS implemented on a staged basis for ECan, GW, AT, and RC; and (ii) the Do Minimum Plus counterfactual that continues with and upgrades current regional solutions.

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Process for economic assessment

The purpose of this economic case, which is informed by the preferred supplier's information and costs from the BAFO stage of the procurement process, is to:

- describe the NTS solution that will best deliver the benefits of investment (as set out in the ILM), and
 - consider the NTS solution against a reference case (or counterfactual) – a base case scenario that describes what is expected if the NTS does not go ahead,
- apply two types of assessment:
- quantitative assessment which involves cost benefit analysis of both the NTS and the counterfactual
 - qualitative assessment against the benefits of investment in an NTS.

The economic assessment sets out the following:

- (i) Description of the NTS solution concept and components.
- (ii) Description of the service concept.

- (iii) Description of the agreed reference case, or counterfactual.
- (iv) Benefits, both monetised and non-monetised for the NTS and reference case.
- (v) Costs and assumptions for the NTS and reference case.
- (vi) Cost benefit analysis.
- (vii) Multi-criteria evaluation.
- (viii) Results and conclusions.

NTS description

The requirements for the preferred NTS take account of the integrated ticketing requirements for GW, AT, ECan and RC, and customer feedback. The solution comprises:

- **An account-based ticketing and payment system** with open loop functionality which provides the lowest cost of ownership, highest customer convenience (which should see increase patronage), support for all fare models, and is easy to adopt to new technologies - key outcomes already proven by early adopters of this approach.
- **A centralised, shared-services operating model** whereby a single operating entity will provide a range of common operational, procurement, compliance and management services for all participants.
- **Support systems** based on:
 - A “standards” based approach using open standards (where these exist) across all components of the system.
 - Openness obtained through the use of APIs that are published and based on open API standards.
 - Security mechanisms across all open interfaces.
- **Revenue protection** on buses, trains and ferries will require tag on – tag off for all trips on all modes, revenue protection “inspection” capability on all modes, and applying new legislative amendments to support enforcement of revenue protection.
- **Optimised support of regional fare policies** whereby the NTS supports fare policies within a standardised range. While regions need to control setting of fare policy to ensure they maintain their patronage and revenue targets, the wide variety of fares, fare structures, concessions and products applied across regions means there is a substantial opportunity to standardise and simplify fare policy while still giving regions the flexibility and control they require with further potential for regional customisation when a defined threshold is met. Opportunities for standardisation are set out in Appendix 5.
- **Reporting** capability sufficient to meet ‘fit for purpose’ financial, operating and PTOM performance requirements.

The aim is for the NTS to align with customers’ expectations from day one by offering:

- User-friendly and convenient cashless and contactless payment that is intuitive, easy to use and speeds up the journey.
- A flexible range of low-effort options for participation (pay-as-you-go and account-based) to suit a variety of current and future customer needs and preferences.
- A flexible range of channels (mobile, online, retail) to provide customer information and for account management that allows customers easy access to manage their funds.

- Financial incentives (such as discounts and concessions) that encourage and reward participation.

An account-based ticketing and payment solution could support potential future concepts such as MaaS and Smart Cities. The NTS requirements, particularly around data capture and reporting, will support:

- Future intercity transport including bus and train services (such as Hamilton to Auckland and Palmerston North to Wellington), as well as Ride-Sharing transport services.
- Modern connected network design and services.
- Integrated transit app development.

Ticketing service concept

The ticketing service concept for an account-based ticketing solution with open-loop payment functionality, shared services, and scheme management are described below.

Account Based Ticketing with Open Loop payment functionality

- Customers use open-loop EMV fare media (including mobile payments) to interact with the ticketing service on all travel modes.
- Customers may choose to use a prepaid contactless payment card (Transit Card) or a post-paid, bank-issued contactless payment card, either of which may be a physical or virtual card.
- The prepaid card is transit specific, may be branded, and can be used for travel with any PTA.
- Customers travel on services provided by one or more Public Transport Operators (PTOs) that are identified to the customer as belonging to a PTA's Ticketing Scheme.
- Customer services are accessed through PTAs. (Note that PTOs do not provide ticketing customer services other than during travel.)
- Customers may choose to register a Transit Account to access fare concessions, ticketing customer services, and travel products and features.
- Ticket vending machines and/or a retail network could provide single use tickets for those without a pre-paid card or EMV card.
- Cash on board buses could remain an option for some PTAs, either during transition or for a fixed period (say 5 years), or on a permanent basis.
- A period of transition is expected to enable customers to move from a closed loop, prepaid card solution to the new account-based solution.

Shared Services

A shared services operation to facilitate or provide the functional requirements for the successful delivery of the NTS will be established within Waka Kotahi. The shared services function will work in collaboration with PTAs to manage the operation of the ticketing services. The intention is for each PTA to retain its autonomy in key areas subject to the constraints of the New Zealand-wide, multiparty, governance, operating, commercial and contracting framework of the NTS. The shared services operation is described further in the Commercial Case (contractual agreements) and Management Case (implementation and operation).

Scheme management options

The preferred management option for the NTS is that:

- The TSP will manage a single ticketing solution serving multiple PTAs, and PTOs providing exempt services, the relationship with acquiring banks, and shared services operations.
- The TSP manages the centralised automated fare collection (AFC) system processing services and third party-provided Transit Card services for all aspects of ticketing transaction processing, payments processing and operational services on behalf of all PTAs.
- The solution will provide a multi-tenanted, single system for all transport authorities (Auckland Transport, Greater Wellington, Environment Canterbury and the Regional Consortium) and for three travel modes (bus, rail, and ferry).
- The solution will be extensible whereby the NTS design, architecture and implementation can be readily extended to incorporate new operating entities and/or new business functions such as other transport related services that could be serviced by and managed through a national Transport Account, such as road tolling, congestion charging, and park and ride. (Refer to 'Extensibility' in Appendix 5.)

Approach to cost benefit analysis

For this 'Iteration 3' version of the detailed business case, the cost benefit analysis will compare the benefits and costs of the NTS for GW, ECan, AT and RC described above against the benefits and costs of the counterfactual.

The cost benefit analysis follows a structured approach consistent with guidance from Waka Kotahi's Investment Decision Making Framework including the Benefits Management Framework and business case guidance, appropriately tailored to reflect the nature and timeframes of an electronic, integrated fares and ticketing solution.

Calculations are based on NZ dollars (Year 1 = 2021/22) with a mid-year discount rate of 4% to calculate the present value (PV) of costs and benefits, and the resulting net present value.

A 15 year time period from 2022/23 to 2036/37 is used which reflects the expected lifespan of an account-based, open loop, integrated fares and ticketing system *from the time of the first meaningful live production use for the last of GW, AT and ECan to implement the NTS (irrespective of the staging sequence).*

Benefits and costs of the counterfactual

The Do Minimum Plus option amalgamates the costs and benefits of each PTA's planned maintenance and upgrade path for their current ticketing system. These benefits and costs are described below.

Benefits

Both monetised and non-monetised benefits are expected from the enhancements and upgrades to current systems that PTA's have in progress or planned in the short to medium term.

For the Regional Consortium, the staged introduction of RITS from 2019 provides four main benefits – improved information management, reduced fare evasion, enhanced customer retail experience and reduced travel time. By adopting RITS (plus mobile payments), ECan is assumed to gain similar benefits. The financial revenue impacts of these benefits for RC and ECan are estimated at \$42.8 million (present value at 4% over 15 years).

AT expects to gain a small increase in patronage of about 1% (in approximately the first year only) with the introduction of open-loop capability. The economic impact is a small decongestion benefit by reducing private vehicle use and is estimated at \$116.7 million (at 4% over 15 years).

Also, AT expect to gain small efficiency improvements and avoid the need for increases in staff numbers as patronage increases. The financial benefit is estimated at \$8.3 million (present value at 4% over 15 years).

The introduction of Snapper on rail (and ferry) is expected to provide a range of revenue benefits for GW, particularly from increased revenue protection, and also from removal of paper tickets, a reduced retail network, train-based staff efficiencies, and other efficiency and growth benefits. The financial savings from no paper tickets amounts to about \$31.7 million (present value at 4% over 15 years).

Snapper on rail is expected to make it faster and easier to check that cards are tagged on appropriately using hand-held devices than to clip paper tickets. The overall financial impact of improved revenue protection amounts to approximately \$79 million over 15 years (discounted at 4% over 15 years). However, there is an economic disbenefit because, with the additional cards required for Snapper on rail, more customers will spend time topping up, resulting in an economic cost impact of about \$14.5 million (present value at 4% over 15 years).

Table 6 Monetised economic benefits the counterfactual

Monetised economic benefits	Present value (at over 15 years) \$ million
AT	
– Increase in patronage for which the economic benefit is a small reduction in congestion	116.7
GW	
– Disbenefit of cost of customers time spent topping up	-14.5
Total benefits (PV over 15 years at 4%)	102.2

Table 7 Revenue benefits for the counterfactual

Financial revenue benefits	Present value (at over 15 years) \$ million
AT	
– FTE costs avoided (contact centres, staff)	8.3
GW	
– Revenue protection	79.4
– No paper tickets	31.7
ECan and RC	
– Operational efficiencies	42.8
Total benefits (PV over 15 years at 4%)	147.7

Costs

The Do Minimum Plus costs include ticket and payment services and management costs, operational ticketing and revenue system support (reconciliation, reporting, etc.), card costs, equipment maintenance, extending current systems contracts where required, and replacing capital equipment such as on-board card readers at end-of-life as required. For each region this comprises:

- **AT** – extending the life of the HOP closed loop integrated ticketing solution for buses, rail and ferries and adding account-based and open loop capability including capital replacement of on-board card readers to enable these improvements.

- **GW** – continuing the closed loop ticketing system (Snapper) for buses and replacing paper tickets on rail and ferries with the Snapper system (and managing validation using on-board electronic handheld ticket validators rather than gated stations), and adding open-loop and account-based capability over the next 2 – 5 years.
- **ECan** – the estimated capital and operating costs of joining RITS to replace the current ticketing solution and adding mobile payment capability (as a proxy for the cost of a similar closed loop and mobile payment system).
- **RC** – the capital and operating costs of extending the contract to continue with RITS.

The estimated costs are summarised below and amount to a total capital and operating cost of approximately \$1,000 million (nominal) over 15 years with a present value of approximately \$760 million (at 4% over 15 years).

Table 8 Summary of Estimated Do Minimum Costs (\$ millions)

Estimated costs	Nominal cost (over 15 years) \$ million
AT	
Operating costs	
- Ticketing service provider	
- AT operating costs	
- Merchant Acquirer fees	
- Retail Network Manager	
- Transit Card Programme Manager	
Capital costs	
Total nominal costs	
Total present value costs	
GW	
Operating costs	
- Ticketing service provider	
- GW operating costs	
- Merchant Acquirer fees	
Capital costs	
Total nominal costs	
Total present value costs	
ECan	
Operating costs	
- Ticketing service provider	
- Shared services	
- ECan operating costs	
- Merchant Acquirer fees	
- Retail Network Manager	
- Transit Card Programme Manager	
Capital costs	
Total nominal costs	
Total present value costs	
RC	
Operating costs	
- Ticketing service provider	
- Shared services	
- Regional Consortium operating costs	
Capital costs	
Total nominal costs	

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Total present value costs	Section 9(2)(b)(ii)
Combined	
Total operating costs	
Total capital costs	
Total Nominal Costs (over 15 years in 2021/22 dollars)	1001.4
Present Value (at 4% over 15 years)	758.0

Do minimum assumptions

Do Minimum costs have been estimated and provided by each of the four participants.

Different systems and contracting arrangements between PTAs mean that not all costs are directly comparable, but reasonably reflect the capital and operating costs of the counterfactual Do Minimum Plus ticketing and payment systems as defined above.

Costs were identified from financial systems and information from current suppliers. Some costs have been attributed based on estimates of time where staff/teams provide services wider than ticketing. PTAs have made considerable effort to determine these costs as accurately as possible. Generally, financial systems have limited capability to identify costs by function where these functions, such as ticketing, are typically integrated with the wider costs of providing public transport. As such the completeness and accuracy of current ticketing costs and the Do Minimum Plus estimates cannot easily be tested for accuracy and completeness.

Variable costs that scale with increases in public transport use such as transaction fees and paper ticket consumables have been scaled in accordance with the patronage projections. No other costs have been scaled.

Capital replacement and upgrade costs have been incorporated based on the estimated cost and timing provided by each PTA. These cost estimates are largely based on current supplier estimates.

Interest and financing costs have been excluded. No assessment has been made as to the ability of PTAs to fund their ongoing counterfactual costs.

All costs provided by PTAs exclude GST. GST is not included in the counterfactual costs and benefits.

A summary of projected costs for each PTA is set out in Appendix 8 – Cost benefit supporting information.

Limitations of the Do Minimum Plus estimations

The cost estimations made in the Do Minimum Plus scenario for the upgrading of the AT HOP and GW Snapper ticketing and payment solutions for account-based and open-loop development are based on information provided by their current solution providers. Unlike the NTS solution, the requirements have not been tested in the market through a procurement process or through detailed contract negotiation.

This means that, based on the cost increases that occurred during the procurement process for the NTS, these AT and GW costs could be materially understated, and may not represent best value for money for the quality of solution obtained.

Given the level of expenditure and funding required from the NLTF for both of these development upgrades, government procurement rules would require full market procurement processes, also adding to the costs of each solution.

Benefits and Costs of the NTS

Staged introduction of the NTS preferred option

PTA participation in the NTS option described above is expected to follow a staged implementation determined by priority and urgency of PTA requirements. The expected sequence of implementation is assumed to be:

Table 9 Assumed on-boarding dates

PTA	NTS on-boarding dates*
Shared services operation (SSO)	July 2022
ECan	July 2023
GW	March 2024
AT (bus, train and ferry)	November 2024
RC	February 2025

*Dates when NTS will start operating and costs will begin to be incurred

As noted in section 5.5, the timeframe for the benefits and costs will reflect 10 years of operation from the first meaningful live production use for the last of GW, EC and AT.

NTS benefits

The benefits of investment in an NTS to resolve the problems identified in the ILM (as set out previously in the Strategic Case), comprise non-monetised (and measurable) benefits and monetised benefits.

1.1.1.1 Qualitative benefits

The NTS provides substantial qualitative benefits which are either not achieved or only partly achieved by the Do Minimum Plus counterfactual. While these benefits cannot be easily monetised, they nevertheless provide significant value for customers, PT operations, government policy, and a platform for innovation. These are discussed below and listed along with applicable measures in Appendix 7.

Customer benefits

Convenience of using a customer's own token/card removes a barrier to access and provides a strong additional incentive to use PT, especially as:

- Customers save time and cost by avoiding the need to acquire a transit card (although they may need to register their bank-issued card if eligible to receive concessions)
- There is a high penetration of bank-issued contactless cards across New Zealand and increasing use of tokens (mobile phones/watches)
- Account-based means no searching for a kiosk or retailer and queuing to top up smart-cards; no need for cash on-board or a ticket office/retailer to purchase tickets; and no need to understand the specific ticketing system of different authorities when travelling between regions
- Customers can turn up, 'tap' and travel, paying for transit as and when they use it without having funds tied up on a stored-value smartcard or worrying about whether they have sufficient funds to complete the journey
- Intuitive to use – the process of tagging on is just like making a contactless payment but with the extra step of also needing to tag off
- It enables spontaneous and casual use of public transport
- It is easy and convenient for tourists who do not need to obtain a transit card.

While the aggregate time and cost savings for customers from these benefits could be substantial, no quantification has been made in the cost benefit calculation. For example, the customer cost savings alone from not needing about 1.5 million transit cards over 15 years could amount to about \$25 million. Time savings for customers not needing to top up are difficult to quantify but could be in the order of \$200 million per annum over 15 years (based on the time estimated by GW to top-up Snapper cards).

Payment choice is provided through the options of using Visa or MasterCard (debit or credit card), mobile payment, or a transit card to tag on and off. Multiple payment options provide:

- The opportunity to remove cash on-board, eliminating labour intensive cash handling which both reduces costs and the potential spread of viruses
- Flexibility for different types of users such as students, commuters, elderly, disabled, casual, and tourists.

Confidence of always receiving the lowest fare option because aggregated journey information is processed at the end of the day when all concessions can be applied, which:

- Removes the need for multiple and confusing ticketing products
- Ensures those on low incomes can readily access the lowest fare option without having to “pay in advance” for a concession ticket such as a 10-trip multi ticket
- Enables eligibility for concession to be held at the account level and easily changed when required
- Provides access to fare concessions (for those registered and eligible) in accordance with local and national fare policies
- Enables national policies such as free off peak public transport for older persons, for example, via a “chipped” contactless SuperGold card or mobile phone app.

Better information with notifications provided through integrated media, which enables:

- More information for customers (number of seats available, bus full, etc.)
- Integration with third parties to provide wider services such as customer apps
- Future innovation such as enabling MaaS related products and smart cities initiatives.

Improved accessibility for those with disabilities through account-based eligibility for concessions and easier to use on-board devices.

A nationally-consistent customer experience whereby customers can readily access public transport in the same way wherever it is provided in New Zealand.

Patronage growth as a result of the improved ticketing experience for customers has been cited in major cities around the world, such as London. These are difficult to attribute solely to account-based and open-loop ticketing as other changes are often implemented at the same time. Refer to the discussion on patronage growth in Section 5.7.2.2.

Flow on effects from making public transport more attractive and increasing patronage through improved convenience and access provides health benefits through increased active mode travel (mainly walking between home and the bus stop or station), and helps to reduce private vehicle use, which, in turn, contributes to less congestion, improved safety, and better environmental outcomes such as reduced carbon emissions, especially as the proportion of electric vehicles in the public transport fleet increases.

Operational benefits

Rich data enables improved network and fleet management such as improvements to network design to reflect customer demand profiles, and improvements to fleet efficiency by, for example, allocation of the most appropriate vehicle type and size to each route by demand profile.

Ability to quickly introduce new products and policies, respond to special events, and to unforeseen disruption to improve network (and wider transport) resilience.

Reducing cash on board has a wide range of benefits, especially for transport operators and drivers, including:

- Drivers are safer through no longer being a target for cash theft
- Preventing the health impacts of handling cash and paper tickets (such as the spread of Covid and other viruses)
- No cash handling costs (which can be as high as 25% of the total ticketing cost of a traditional system) because there is no driver and administration staff time required to handle cash, no consumable paper tickets, and no impact on the environment
- Reduces the manual effort required to provide data for contract compliance monitoring under PTOM
- Reduces dwell time on buses because open loop functionality and minimising on-board cash means that, depending on the type of bus used, buses load faster and/or higher capacity buses can be used. This should increase peak efficiency and reduce journey times, thereby saving customers' time and reducing vehicle fuel use and emissions.

Revenue protection is improved. International experience indicates that revenue losses, especially with paper tickets and cash on-board, are in the order of 10% - 20%. Loss of revenue, especially with paper tickets, occurs by deliberate fraud and by mistake. For example, passengers find ways to avoid paying for a ticket such as moving to avoid a conductor or reusing a poorly checked ticket, travel further than entitled by their ticket, or the conductor undercharges, or by inadvertent error, whereby the conductor fails to check all tickets or to issue a ticket on a very full train. Contactless cards are easier and faster to check using hand held devices ensuring there are fewer instances of revenue leakage. Similarly, card readers on gates make it harder, although not impossible, to access the platform and avoid paying a fare.

Government and regional policy benefits

Simplified deployment of government policy can be achieved with a back-office account-based payment platform, such as enabling the Community Connect card, which is a more focused policy initiative than could be achieved when the SuperGold national transport concession was introduced. Also, it could facilitate regional and national point-to-point transport charging initiatives such as road tolling, park and ride, and congestion charging.

Significant improvements in data collection and information - an NTS would provide complete and accurate national information that is not currently available, for example, data for local government reimbursement of the SuperGold concession based on actual usage, and data that supports budgeting and policy development.

Ability to quickly implement changes - A modern, account-based ticketing solution would provide the ability to quickly implement changes or new capability such as ticketing requirements on the introduction of light rail, and avoids the need for another fee engine.

Support for national emergencies such as Covid tracking and tracing is achievable with an account based solution, and it reduces the need to support paper tickets and cash handling to prevent virus transmission by contact. Encouraging registration is important so that the system can identify where an individual has used the public transport service. Contact tracing teams obtain richer data that can enable faster contact tracing, which could mean more localised lockdowns, reducing the economic impact and enabling faster recovery. Even non registered customers using a bank-issued card could theoretically be traced via the banking system. Clear, auditable processes would be required in all cases. While it is possible to trace a registered closed loop card with the current systems,

unregistered cards and cash cannot be traced. Also, the ability to make rapid changes to fares provides operational flexibility as regions move in and out of lockdown.

Enables seamless transition - an account-based system could be used by other transport operators in the future such as the Ministry of Education's rural school bus service, and would provide rich data including tracking usage, and Covid tracing. Creating an account for a school-aged student enables that account to be seamlessly carried through to tertiary concessions and progress to regular workforce commuting, as public transport becomes a long established, easy to use transport mode, especially for the urban 15 to 25 year age group.

National efficiency is achieved as the investment cost for ongoing enhancements of the ticketing system only requires one development path, all features are provided nationally so that everyone gets the benefits, and the supplier is incentivised to be based in New Zealand improving responsiveness of support, all of which are big benefits for smaller regions.

1.1.1.2 Monetised NTS economic benefits

Most cities that have introduced account-based ticketing and open loop functionality cite benefits from reduced costs of fare collection (COFR), increased patronage, improved revenue protection, and customer time savings.

The NTS is expected to achieve all of the benefits identified in each PTA's counterfactual (Do Minimum Plus) and the overall wider benefit of a small, initial increase in patronage. These benefits are summarised below and explained further in Appendix 8.

Patronage growth

International evidence suggests the introduction of account-based and open loop ticketing and payments will result in increased patronage. However, these typically describe patronage and farebox revenue before and after introduction of the ticketing changes, without taking account of other changes made in parallel, such as fare policies, service levels, service quality, communications and marketing initiatives, or significant externalities such as increases in oil prices, interest rates, parking charges, etc. Attributing the impact of each of these drivers on patronage is difficult and has generally not been attempted.

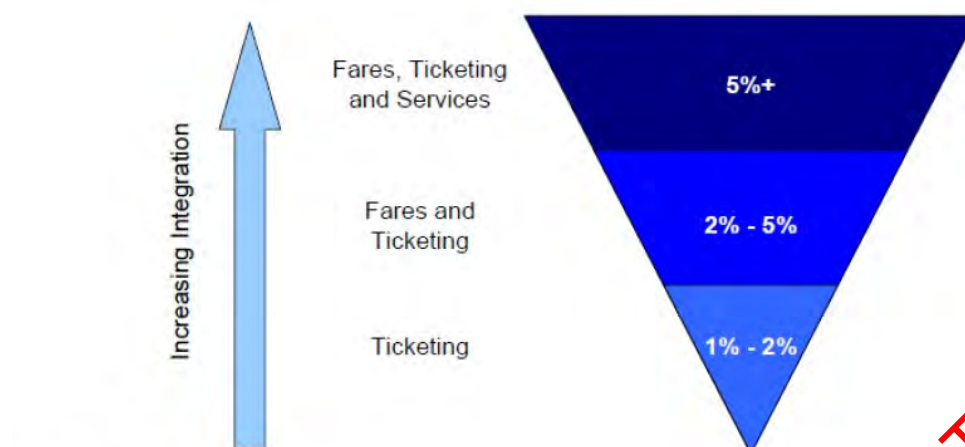
Fair setting, for example, is a key factor in the rate of adoption of open loop (and consequential uptake in patronage). For example, where contactless payments are only accepted in place of a single ride ticket or at a premium to other ticketing options (e.g. Chicago), adoption has been low. Where smarter daily or weekly fare calculations have made the open-loop offering the same price as, or in some cases cheaper than, other ticketing, adoption has been high as experienced by Transport for London (TfL). TfL's initial pilot stages were limited to a "retail-like" flat fare contactless payment option, only available on buses. However, in 2014, when TfL expanded use across its entire network, introducing daily and weekly capping and fare parity, adoption grew rapidly.

Two Booz Allen studies provide useful insight into the potential impact on patronage. The first looks at the effect of introducing integrated ticketing. Integrated ticketing, while already implemented in Auckland, would be fully enabled by an NTS and significantly increase customer benefits for GW and ECan. Booz Allen noted that although there is a body of international evidence to suggest integration will have a positive impact on demand for public transport, most of this evidence is compromised because integration was accompanied by significant fare level changes, as indeed was the case in Auckland when HOP was introduced.

Booz Allen modelled the impact of integration in South East Queensland when it rolled out 'seamless' public transport ticketing and fares policies in 2004. This saw patronage increases of 9.7% in 2004/05 and 11.6% in 2005/06. While there were other externalities such as increases in oil prices and interest rates which would have favoured public transport at the expense of private vehicles, integrated ticketing was a driver of increased demand. Booz Allen identified three internal drivers responsible for the patronage increases – fares and ticketing, service quality and marketing and communications campaigns. They concluded that integrated ticketing contributed approximately 5% to patronage growth in 2004/05 and more than 3% in 2005/06.

The second study considered the effects of fares and ticketing integration in Auckland based on the Auckland Public Transport model. This indicated that integrated ticketing and fares would lead to a one-off increase in patronage of 2% in the first year and could grow to 5% in year 10 because of the far higher level of service integration by then. Booz Allen's conclusion is best summarised in Figure 13 below.

Figure 13 Potential patronage uplift due to ticketing integration



Source: Booz Allen Hamilton estimates.

L.E.K.¹⁴ state that: "Acceptance of contactless payments is likely to drive additional usage of transit networks, because it:

- Adds an additional way for customers to pay for and access transit, increasing the addressable pool of customers by further reducing ticketing as a barrier to transit use
- Generates time savings and convenience for customers, relative to smart cards and other ticketing media.

Considering the time savings delivered by contactless payments, due to the removal of the requirement to acquire and top up cards, additional patronage of approximately 1% could be expected for a system migrating from closed-loop to open-loop automated fare collection.

Considering this evidence together with the experience of our subject matter experts, a reasonable NTS assumption is a conservative increase in patronage in the range of 1.5% and 2.5% in the first year only and retained thereafter. This is set out in Appendix 8.

Decongestion benefits

The impact of an increase in patronage is a reduction of people travelling by private vehicle and a reduction in congestion, especially at peak times. The monetised benefit is based on applying the weighted average peak and off-peak benefits values (specific for each region) to the patronage increase for that region. Benefit values are set out in the Waka Kotahi Monetised Benefits and Costs Manual and incorporate a range of factors including road user travel time, crash and VOC savings, environmental benefits and the benefits of the improved public transport services for existing and additional public transport customers.

The decongestion benefits for each region are set out in the table below.

¹⁴ Contactless Payments and Open-Loop Ticketing, M. Streeting and D. Howe

Table 10 Summary of decongestion benefits for each PTA

Decongestion benefits	Nominal benefit (over 15 years) \$ million
AT	330.7
GW	114.5
ECan	11.8
RC	8.9
Total decongestion benefits	465.9
Present value (at 4% over 15 years)	330.4

1.1.1.3 Revenue benefits

Revenue protection

Improving revenue security to address rail fare evasion for GW would be achieved with a range of initiatives including tag on/tag off, electronic fare inspections on trains and recent legislative changes that provide wider enforcement powers. Fare evasion is expected to drop from an estimated 15% to 5%. This amounts to additional fare revenue of about \$4 million in 2022/23 and about \$9 million per annum by 2035/36. Based on a 12% reduction in fare evasion, GW could expect to recover revenue amounting to a present value of about \$100 million (at 4% over 15 years).

Table 11: Total revenue benefits of the NTS

Benefit	Explanation of benefit calculation	\$ benefit range for AT, GW, ECan, & RC (present value at 4% over 15 years)
Patronage revenue	A patronage increase of between approximately 1.5% and 2.5% is assumed from ticket integration and lowering of barriers to travel for the majority of users during the first year of operation only, based on post-Covid patronage projections, resulting in additional revenue nationally	\$72m – \$108m Mid-point benefit \$90.7
Fare evasion	GW expects to see rail revenue losses decrease from an estimated 15% to 3% per annum based on expected 2024 annual rail revenue of about \$52 million (post-Covid) less the additional customer time for topping up Snapper cards used for rail, estimated at about \$4.4 million. With high uptake of HOP across Auckland buses, trains and ferries, introducing NTS is unlikely to provide further reduction in fare evasion and no benefits have been assumed.	\$81m – \$122m Mid-point benefit \$102.10
Total Estimated Monetised Benefit		\$153m – \$230m Mid-point benefit \$192.8m

These benefits are included in the financial projections set out in the Financial Case.

NTS Costs

Basis of cost estimates

A total cost of ownership (TCO) model was developed to provide a detailed cost estimate for the NTS. This incorporates pricing information based on the following key assumptions and limitations.

- **The TCO model uses inputs from the following sources:**
 - Ticketing BAFO pricing response.
 - Project team assumptions – inputs provided by relevant subject matter experts (SMEs).
- **No charging arrangements are assessed in the TCO model** – The TCO model only calculates the total cost of ownership of the NTS and the direct costs incurred by each party in the NTS. It does not calculate the charges from the third party providers to the shared services operation (SSO), or charges from the SSO to PTAs.
- **Interest and financing costs are excluded** – The TCO model does not calculate interest income on cash balances or the financing costs of funding any potential cash deficits.
- **National Ticketing Solution one-off and fixed costs are not scaled by the number of PTAs** – Certain one-off costs and fixed costs in the TCO model are assumed to be constant regardless of the number of PTAs actively participating in the NTS.
- **Constant economies of scale for variable costs** – The TCO model assumes that as more PTAs come onto the NTS, there is no change in the per unit cost of any variable costs, i.e. there are no economies or diseconomies of scale.
- **Uncertain ticketing solution phasing** – The TCO model assumes dates when the PTAs will join the NTS (refer to Table 10 above). This phasing is not definitive. It will evolve as the PTAs assess the ticketing solution and practical transition requirements.
- **Revenue is excluded** – The TCO model does not include any revenue from ticket sales or PTA funding, except for use in sense checks.
- **No GST in the TCO model** – GST is not included in the TCO model.
- **Merchant acquirer, program manager and retail network manager on-going costs** assume that the steady-state (e.g. 2030) value is 100% scalable by the number of passenger trips.
- **No cost escalation** – No costs in the TCO model have been escalated.
- **Potential duplication of costs** due to unconfirmed outsourcing scope. A service catalogue will be prepared with the preferred supplier which should identify duplication of costs between the TSP, SSO and PTAs.

Estimated total cost of ownership

The overall outputs from the TCO model are summarised below. Refer to Appendix 9 for further details of the inputs relating to these costs.

Table 12 Full costs of the NTS including implementation and transition over 15 years (2021/22 to 2035/36)

Operating Cost Category	Operating Expenditure \$ million	% of total opex	% of total NTS
Ticketing provider costs Includes annual support and licensing costs, prime contractor costs, outsourced technology services (ITO), back office costs like asset tracking, finance processes, security, reporting, business continuity, issue management, release management, operations, etc.	section 9(2)(b)(ii)		

Front office maintenance

Maintenance costs on front office equipment

Merchant acquirer (MA)

Ongoing operating costs for daily settlement including estimated fees for contactless transactions but excluding transit card fees.

Program manager costs (TCPM)

Ongoing operating costs for daily settlement including estimated fees for contactless transactions but excluding transit card fees.

Retail network manager costs (RNM)

Ongoing retail network costs including maintaining and running the network and costs for transit card sales and top-ups.

PTA ticketing solution costs

Support costs for PTAs to operate first line customer support, and costs for related TTP staff.

Shared Service Organisation establishment

Costs to setup the TTP team within Waka Kotahi - 50% of original estimate assumed to be operating costs.

Shared Service Organisation support costs

Ongoing costs of running the TTP team over 15 years.

Total operating costs over 15 years (nominal)

section 9(2)(b)(ii)

986.7

section 9(2)(b)(ii)

Capital Expenditure Cost Category	Capital Expenditure \$ million	% of total capex	% of total NTS
Software and licenses Central ticketing system design & build costs.	section 9(2)(b)(ii)		
Equipment - back office Equipment costs for central system, mobile app development, and web portals.			
Equipment - front office Validators on buses, ferries, train gatelines, bus driver consoles, ticket vending machines, inspection devices, all including installation but excluding maintenance.			
Compliance and certification Ticketing device certifications including PCI/DSS and related payment industry requirements.			
Design, build, test Capital costs of design, build & test phases of programme.			
Merchant acquirer setup No capex expected for Merchant Acquirer.			
Transit card programme manager setup Setup of Transit Card Programme Manager (TCPM) system, including interfaces to central system.			
Retail network manager setup Setup of national Retail network for Transit cards, including interfaces to TCPM and ticketing provider.			
Shared Service Organisation setup Capital cost estimate for TTP within Waka Kotahi.			
Total capital costs over 15 years (nominal)			
Total capital and operating costs			
	1,125.8		
Risk adjustments	Risk Expenditure \$ million	% of total risk	% of total NTS

TSP pricing risk adjustments

Various risk based cost adjustments made by the pricing team (RPAT) during the RFP process to reflect an equivalent basis for supplier pricing between respondents and to account for shortfalls in response/functions.

TSP non-pricing risk adjustments

Various risk based cost adjustments made by the pricing team (RPAT) during the RFP process to reflect differences in RFP quality scores between suppliers.

Total Risk Adjustment Costs

Transition and existing system run-out costs

Transition Expenditure \$ million	% of total transition	% of total NTS
283.3	100.0%	19.9%

Transition costs

PTA costs of transitioning from old system to new system. Excludes hardware replacement costs, but includes card transition costs, media and contact centre costs, operational support for transition and ambassadors to help customers.

Do minimum costs - phase out of old systems

Costs of running existing ticketing systems up until the point of a completed transition.

Total Transition and Existing System Run-out Costs

section 9(2)(b)(ii)

Total cost of NTS system

Present value (at 4% over 15 years)

1,436.8	100.0%
1,145.5	

section 9(2)(b)(ii)

Comparison of estimated NTS and counterfactual costs

Steady state costs

Annual steady state operating costs for the NTS at 2029/30 (after all PTAs have transitioned) are estimated at \$71 million. These compare with the estimated counterfactual steady state operating costs of about \$60 million. The key area of difference driving the higher NTS costs is centralised shared services, while the increase in PTA's direct costs is offset by the lower TSP direct costs.

Table 13 Estimated comparison of steady state operating costs (nominal) in year 2029/30

	NTS		Counterfactual	
	Nominal cost \$ millions	Percentage of total	Nominal cost \$ millions	Percentage of total
TSP direct annual cost	section 9(2)(b)(ii)			
SSO direct annual cost				
PTAs direct annual cost (including front office maintenance)				
Program manager direct annual cost				
Merchant acquirer direct annual cost				
Retail network manager direct annual cost				
Total estimated costs (nominal) at 2030				

Net present value comparison of benefits and costs

The estimated present values for the NTS and Do Minimum Plus over the 15 years from 2021/22 to 2035/36 at a discount rate of 4% are:

Table 14 PV of estimated benefits and costs over the period 2022/23 to 2036/37 at 4%

	Do Minimum Plus \$millions	NTS \$millions	Additional NTS costs and benefits \$millions
Benefits:			
• AT	116.7	233.4	116.7
• GW	-14.5	77.9	92.4
• ECAN	-	8.7	8.7
• RC	-	6.3	6.3
Total present value of benefits	102.2	326.3	224.1
Costs:			
• AT			
• GW			
• ECAN			
• RC			
• National			
Total present value of costs	758.0	1,145.5	387.5
Total NPV (cost) at 4% over 15 years	-655.8	-819.2	-163.4
BCR			0.6

The Do Minimum costs have been prepared by each PTA, with varying levels of cost estimation confidence. None have been independently reviewed, although RC and parts of AT costs are based on actual current operating and equipment costs.

Both GW and AT have included significant upgrades in the Do Minimum Plus. GW would introduce Snapper on rail and integrated tickets with accounts-based and open-loop capability. AT would introduce account-based and open-loop. Experience with the implementation of RITS and responses over the NTS procurement process indicate that costs are likely to be higher than suppliers' initial estimates.

Sensitivity analysis

Looking at Table 14 above, an increase in NTS costs obviously increases the cost difference to the Do Minimum Plus option. An increase in NTS costs of 10% would result in a net present cost difference of \$278.0 million, as shown in Table 15 below. This is a significant negative NPV change of 70% (and a BCR decline from 0.6 to 0.5).

Table 15 Net Cost Benefit Sensitivity of NTS costs increasing by 10%

Present value at 4% over 15 years	Do Minimum Plus \$millions	NTS \$millions	Difference \$millions
Benefits	102.2	326.3	224.1
Costs	758.0	1,260.1	502.1
Net present cost	-655.8	-933.8	-278.0

BCR	0.5
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However, cost increases are likely to impact both the NTS and Do Minimum Plus options. Applying a 10% increase to both results in a much less dramatic increase in the cost differential between the two options, as illustrated in Table 16 below. Nevertheless, the NTS is sensitive to cost increases.

Table 16 Net Cost Benefit Sensitivity of both NTS costs increasing by 10%

Present value at 4% over 15 years	Do Minimum Plus \$millions	NTS \$millions	Difference \$millions
Benefits	102.2	326.3	224.1
Costs	833.8	1,260.1	426.3
Net present cost	731.6	933.8	-202.2

BCR **0.5**

Because the level of benefits are only about 30% of costs, changes have a much smaller impact on overall net present costs, and NTS benefits would need to decline by 35% to have the same level of impact as a 10% cost increase. However, the effect of a 35% decline in benefits on the BCR is much more significant, from 0.6 to 0.3, as in Table 17 below.

Table 17 Net Cost Benefit Sensitivity of NTS benefits declining by 35%

Present value at 4% over 15 years	Do Minimum Plus \$millions	NTS \$millions	Difference \$millions
Benefits	102,207,058	210,668,085	108,461,028
Costs	757,987,447	1,145,543,405	-387,555,957
Net present cost	-655,780,389	-934,875,319	-279,094,930

BCR **0.3**

This cost sensitivity can also be seen as discount rates increase, resulting in the NPV difference between the options increasing and the BCR declining, as in the table below.

Table 18 Discount rate sensitivity

Net Present Value over 15 years	2% Sensitivity \$ million	4% Base Case \$ million	6% Sensitivity \$ million
Present value of NTS benefits	386.0	326.3	277.9
Present value of NTS costs	1,277.3	1,145.5	1,035.7
Net Present Value (cost) of NTS	891.3	-819.2	-757.8
Present value of counterfactual benefits	121.3	102.2	86.8
Present value of counterfactual costs	867.3	758.0	668.1
Net Present Value (cost) of counterfactual	-746.0	-655.8	-581.3
NPV Difference	145.3	163.4	176.5
BCR Difference	0.7	0.6	0.5

This reinforces the obvious conclusion that identifying areas where NTS costs could be reduced will positively impact the cost benefit results.

The key areas where the NTS costs are significantly more than the Do Minimum Plus are the shared services function and the cost of transition and phase out of the legacy systems, as seen in cost comparison table below.

Table 19 Comparison of NTS and Do Minimum costs showing the areas of key cost differences

	NTS \$millions	Do Minimum Plus \$millions
(non-discounted over 15 years)		
Operating Expenditure		
Ticketing solution provider costs (TSP)		
Financial services costs (MA, RNM, TCPM)		
PTA ticketing solution costs (TSO)		
Shared service organisation (TTP)		
Capital Expenditure		
Back office costs, including design, build, test (TSP)		
PTA equipment (TSP)		
Financial services costs (MA, RNM, TCPM)		
Shared service organisation (TTP)		
Total NTS before risk, transition & legacy phase out	1,125.8	1,003.4
Risk cost adjustments		
Transition costs		
Do minimum costs - phase out of old systems		
Total cost of NTS system over 15 years (non-discounted over 15 years)	1,436.8	1,012.6

Qualitative evaluation

Project objectives and criteria

Evaluation based solely on quantified costs and benefits only provides part of the picture. The solution should deliver the benefits from investment, many of which cannot easily be estimated in dollars. Multi-criteria analysis is required to assess how well the preferred solution delivers the wider benefits originally envisaged in the ILM workshops. Criteria were developed based around the four ILM benefits and the evaluation criteria used in the procurement process to evaluate the responses to the RFP for the ticketing solution. These are described below.

Table 20 Description of evaluation criteria

Evaluation Criteria	Description
1 Enhanced customer (PT user) experience	
1.1 Improves customer convenience	Does the option ensure intuitive ease of use to obtain and pay for tickets?
1.2 Provides multiple ticketing and payment options	Will the option provide multiple payment alternatives that maximise convenience for the widest range of customers?
1.3 Encourages mode shift	Will the option make it easier for new customers to choose and use public transport as a mode?
1.4 Ensures a consistent customer experience	Will the option provide a consistent customer experience across New Zealand?
1.5 Improves access to public transport	Will the option provide improved or easier access to public transport, especially for those with disabilities including auditory capability and location of devices/ screens (e.g. for wheelchair access), etc.?

2	Affordable, efficient and effective PT networks	
2.1	Whole-of-life cost is affordable	Is the expected whole of life cost within budget/funding expectations?
2.2	Solution represents value for money	Is the cost benefit positive, including consideration of the qualitative benefits?
2.3	Improves the quality of operational information	Will the option provide richer information to manage day-to-day operations?
2.4	Improves the quality of network design information	Will the option provide more insightful data to inform network and timetable design?
2.5	Improves the quality of management information	Will the option improve the quality of information for the development of strategic planning and local and national public transport policies?
2.6	Improves speed of fare policy changes	Will the option support rapid changes to scheduled fare products and prices such as fare products for special events
2.7	Supports rapid management of disruptions	Will the option support rapid management of disruptions including pandemic (Covid) tracking/tracing information
3	Improved public and government confidence in PT investments	
3.1	Provides opportunities for innovation	Will the option expand opportunities for innovation and capability to create more flexible and attractive public transport networks?
3.2	Enables wider transport-related applications	Will the option enable wider transport-related applications such as park-and-ride and road tolling?
3.4	Allows/enables third party integration	Does the option enable integration with third parties to provide wider services?
3.5	Ensures technology is non-proprietary	Do the solution components comply with standards to ensure there is no proprietary lock-in?
3.6	Enables technology to be upgraded by component	Can each solution component be upgraded independently as technology develops?
4	Expedited realisation of national and regional benefits	
4.1	Aligns with national PT priorities	Does the option align with national PT priorities in the National Policy Statement on Land Transport, the Disability Strategy and the Ministry of Transport's Transport Outcomes Framework?
4.2	Aligns with regional PT priorities	Does the option align with regional PT priorities in each region's LTP, RPTP, etc?
4.3	Delivers suitable solution scope for all PTAs	Does the solution meet the detailed requirements specifications and scale affordably from small to large PT environments?
4.4	Ensures legal and commercial alignment	Can the solution be contracted in accordance with government procurement guidelines and be implemented in accordance with PTOM and other legislative requirements.
4.5	Ensures implementation within PTAs capacity and capability	Do PTAs have the capacity and capability for successful implementation and transition?
4.6	Ensures suppliers have sufficient capacity and capability	Do the suppliers in the New Zealand market have the capacity and capability for successful implementation/ transition?
4.7	Enables flexibility and control (including roadmap alignment) within capacity	Is there sufficient supplier capacity to ensure roll out timeframes are met while being sufficiently dynamic to enable a change in sequencing of the roll out or parallel

	constraints	implementation?
4.8	Demonstrates long term commitment from supplier	Are suppliers committed and responsive to supporting the operation of the NTS (and PTAs) over the 15 year or more life of the solution?
5	Risks	
5.1	Cost risks are manageable	How certain are the costs?
5.2	Technology risks are manageable	How certain and proven is the technology solution?
5.3	Timeframe risks are manageable	Can the system be implemented in a reasonable timeframe? How long could the existing system be maintained, e.g. ECAN?
6	Overall ranking	
6.1	Overall assessment	How does the NTS rank against the counterfactual as a solution to the problems identified compared with the other options?

Scoring of qualitative evaluation using multicriteria analysis

Evaluating the benefits of investment in an NTS against the Do Minimum Plus using a scoring approach enables the options to be ranked. Each Do Minimum Plus solution was separately scored in the table below and an “average” score calculated overall.

Table 21 Scoring of qualitative evaluation

Critical Success Factor		Counterfactual				
Scoring categories		Score (0 – 4)				
0 = Does not enable 1 = Enables a little 2 = Partly enables 3 = Mostly enables 4 = Fully enables		AT	GW	ECan	RC	NTS
1	Enhanced customer (PT user) experience					
1.1	Improves customer convenience	4	2	2	0	4
1.2	Provides multiple ticketing and payment options	4	1	1	0	4
1.3	Encourages mode shift	2	1	1	0	3
1.4	Consistent customer experience	2	2	2	2	4
1.5	Improves access to public transport	2	1	1	0	3
2	Affordable, efficient and effective PT networks					
2.1	Whole of life cost is affordable	3	3	3	3	3
2.2	Solution represents value for money	3	2	2	2	3
2.3	Improves the quality of operational information	2	2	1	0	3
2.4	Improves the quality of network design information	1	3	2	1	4
2.5	Improves the quality of management information	1	3	2	1	4
2.6	Improves speed of fare policy changes	0	0	0	0	3
2.7	Supports rapid management of disruptions	1	0	0	0	3
3	Improved public and government confidence in PT investments					
3.1	Provides opportunities for innovation	1	2	1	1	3
3.2	Enables wider transport-related applications	1	1	1	1	3
3.3	Allows/enables third party integration	1	1	1	1	3
3.4	Ensures technology is non proprietary	0	0	0	0	2
3.5	Enables technology to be upgraded by component	2	1	1	1	3
4	Expedited realisation of national and regional benefits					

4.1	Aligns with national PT priorities	2	1	1	1	4
4.2	Aligns with regional PT priorities	4	2	2	1	4
4.3	Solution scope and suitability (for all PTAs)	3	2	2	2	4
4.4	Legal and commercial alignment	1	1	1	1	3
4.5	PTA capacity and capability	3	1	2	2	3
4.6	Supplier capacity and capability	3	2	1	1	3
4.7	Flexibility and control (including roadmap alignment)	3	2	1	0	3
4.8	Supplier long term commitment	4	4	3	2	4
5	Risks					
5.1	Cost risk (High risk = 0 Low risk = 4)	2	2	2	2	2
5.2	Technology risk (High risk = 0 Low risk = 4)	1	4	4	4	1
5.3	Timeframe risk (High risk = 0 Low risk = 4)	2	2	2	2	1
6	Overall ranking					
6.1	Overall assessment (Highest score is best)	58	46	42	32	88
6.2	Weighting based on patronage	57%	29%	10%	10%	100%
6.3	Weighted average assessment		52.3			88

Key Economic Risks

The following two key economic risks could delay or prevent the NTS from proceeding. The approach to mitigation will require effective communications and governance, excellent planning and management, and co-operation from all parties.

Key risks	Mitigation Approach
Transition costs for PTAs moving from their existing ticketing systems make the NTS unaffordable	<ul style="list-style-type: none"> • Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure realistic and pragmatic transition plans • Close management of agreed transition plans including oversight and assurance relating to key contractual obligations in this area between suppliers and PTAs and the Waka Kotahi shared service function (TTP) • Consideration of NLTF funding to assist with PTA transition costs for the greater good.
National benefits for the NTS are not realised as differences between local and national outcomes cannot be resolved for the good of NZ	<ul style="list-style-type: none"> • Early engagement with PTAs to establish the scope and parameters to underpin a national customer experience • Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure alignment on National outcomes • Close working between PTA participants, the Waka Kotahi Public Transport team, TTP and other interested stakeholders to identify and resolve issues early

Summary of the economic assessment

The following table summarises the results of the cost benefit analysis and evaluation of the benefits of investment:

Table 22 Summary of economic assessment

	NTS	Do Minimum Plus
Analysis period	15 years	15 years
Capital Costs (nominal \$ millions over 15 years)	section 9(2)(b)(ii)	
Operating costs (nominal \$ millions over 15 years)		
Risk, transition and legacy phase out costs (nominal \$ millions over 15 years)		
Whole of life operating costs including risk, transition and legacy phase out (nominal \$ millions)	\$1,436.8m	1,012.7m
Cost benefit analysis		
Present value of benefits (at 4% over 15 years)	\$326.3m	\$102.2m
Present value of costs at 4% over 15 years	\$1,145.5m	\$758.0m
NPV (net present cost) at 4% over 15 years	-\$819.2m	-\$655.8m
Qualitative evaluation		
Enhanced customer (PT user) experience	18.0	11.4
Affordable, efficient and effective PT networks	23.0	11.0
Improved public and government confidence in PT investments	14.0	4.8
Expedited realisation of national and regional benefits	29.0	18.8
Risks	4.0	6.3
Total score	88	52.3

Overall, this analysis indicates that, while costs of the NTS are higher overall, it delivers significantly greater benefits from investment than the Do Minimum Plus counterfactual. The key areas that will require close management are transition and the phasing out of current systems.

Financial Case

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Financial Case

Key messages

Financial projections identify funding requirements for capital expenditure of about mainly over the first five years as PTAs transition to the NTS, and annual operating funding requirements of about \$55 million.

Proposed funding arrangements would see capital, establishment, implementation and operating costs relating to ticketing provider services and financial services being fully funded from the NLTF.

PTAs would fund maintenance of their front office equipment; frontline customer support; transition costs of moving to the NTS; and closure of their existing system; and receive their normal FAR for the costs that they will fund.

Funding arrangements have not yet been agreed and approved by the Waka Kotahi board or with participating PTAs.

Introduction

The financial case sets out the projected financial costs and revenue benefits and focuses on the affordability and funding of the preferred option.

Approach to financial projections

The financial projections are based on the total cost of ownership model and assumptions described in Section 5, Economic Case. These are based on 2021/22 dollars, are not-discounted or adjusted for inflation, and exclude GST.

Overall financial projections

The table below sets out the estimated (non-discounted) capital and operating expenditure and estimated increase in revenue over the expected 15 year life of the NTS.

Table 23 Financial revenue and expenditure projections

	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	Total
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
Capital expenditure																
Operating expenditure																
TSP risk adjustments																
Total nominal cost of solution																1,148.5
Transition expenditure																
Phase out expenditure																
Total expenditure																
Revenue																
Net expenditure																

Funding requirements

Capital funding is mainly required in the first five years as each PTA transitions to the NTS. This amounts to \$136 million. Net annual operating expenditure (mainly after allowing for revenue from increased patronage) amounts to about \$55 million. Comparison with the counterfactual (refer to the Economic Case) suggests that the additional net operating cost of the NTS is about \$10 million annually.

Table 24 Estimated funding required

	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	Total
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
Estimated operating expenditure																
Less estimated revenue																
Estimated net operating funding required																
Estimated capital funding required																
Total estimated funding required																

Funding arrangements

Funding arrangements have not yet been agreed by the Waka Kotahi board or with the participating PTAs.

Although subject to change, a working assumption for funding has been applied in this business case as follows:

(i) Waka Kotahi will fully fund the following capital, establishment and operating costs:

- software and licences
- equipment (both back office and front office)
- compliance and certification
- design build & test
- merchant acquirer setup and operating costs (if any)
- transit card setup and programme manager operating costs
- retail manager setup and retail network operating costs
- TTP setup and operating costs.

(ii) Participants will fund:

- maintenance of their front office equipment
- ticketing solution costs for frontline service customer support
- transition costs of moving to the NTS
- closure of their existing system.

(iii) Participants will receive their normal FAR for the costs that they will fund.

This arrangement would ensure a seamless operating environment. Waka Kotahi would assume responsibility for the establishment and operation of the solution, funded from the National Land

Transport Fund – Public Transport Service Account, offset by reduced payments to PTAs for the subsidised operation of public transport. As a quid pro quo, the PTAs will be saving the costs of running their current ticketing solutions to match this reduced funding.

This proposal would alleviate the need for complex funding and commercial arrangements between PTAs (i.e. shareholder percentage of the shared services organisation and percentage share of turnover/operating costs on a per annum basis) and will also allow for easy transition should the PTA change (e.g. move from a Regional Council to a Territorial Council delivery model or vice versa).

PTAs will also be responsible for their share of transition costs except where the burden is onerous due to national requirements in which case additional Waka Kotahi support beyond FAR may be sought.

While under this model Waka Kotahi will own, pay for and operate the back-office functions of the ticketing solution, there remains a need for shared governance and absolute commitment from PTAs.

Funding Risks

The impact of the following financial risks could mean delay resulting in increased costs from further extending and upgrading current systems, especially for ECan and GW rail.

Key Risk	Mitigation Approach
The NTS funding model cannot be agreed by Waka Kotahi and participant PTAs resulting in delay	Document and socialise the new NTS funding model with: <ul style="list-style-type: none"> Waka Kotahi Risk & Assurance Committee ahead of seeking Board approval PTAs to present to their Board/Councils ahead of contract signature Waka Kotahi I&F, Legal and Transport Services staff
Funding is not available to progress the NTS according to the desired implementation roadmap	Securing funding for ECan and GW implementations through the Waka Kotahi Nationally Delivered Programmes for the next NLTP period 2021-24 Securing funding for AT and RITS councils in the NLTP period 2024-26 Close alignment of expected funding requirements post contract signature with Waka Kotahi NLTP & Treasury planning

Commercial Case

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Commercial Case

Key messages

A national ticketing solution involves a large scale, complex procurement due to multiple participants of varying scale, varying joining dates, and varying needs.

A procurement strategy appropriate for this level of scale and complexity has been undertaken involving a dual procurement process for the ticketing solution and for financial services.

An outcomes-based approach was applied to procurement of the ticketing solution where respondents determine the optimum means of delivering requirements, whereas financial services are more of a commodity-type service with the contract focusing on operational excellence and price certainty.

The next stage of procurement is to identify the preferred supplier and undertake contract negotiations.

Key risks are about affordability and funding, slow decision-making, withdrawal by one or more participants, and insufficient capacity and capability to deliver to timeframes and quality, especially as a result of COVID. These risks are manageable and mainly fall within the responsibility of Waka Kotahi (TTP), the NTS Participants group and the national Mobility Payments Governance Group (MPGG).

Introduction

The Commercial Case assesses the procurement strategy and process, solution requirements, contractual arrangements, and risk allocation for:

- (i) the procurement of the preferred option outlined in the economic case for the design, build and operation of an account-based, open loop, ticketing and payment solution delivered through a shared services operating model; and
- (ii) the structures and contracting approach over the term of the contract.

The approach set out in the Project NEXT Procurement Strategy¹⁵ has been designed to ensure value for money balanced across the participating PTAs, Waka Kotahi, and public transport users (customers).

Procurement strategy

Purpose

The purpose of the Procurement Strategy is to clearly set out the procurement approach and rationale for procuring the NTS, to provide decision-makers with confidence that procurement is well planned, and to provide clear guidance to those responsible for delivering the Procurement Strategy. The procurement strategy assumes:

- Single procurement
- Procurement of a solution not a system

¹⁵ Project NEXT Procurement Strategy, 30 May 2018

- A centralised shared service operating model provided by Waka Kotahi

The Procurement Strategy was approved by the Waka Kotahi procurement team on 15 June 2018.

NTS is a large scale, complex procurement

A single, national ticketing solution is a large scale, complex procurement. This complexity arises from:

Involvement of many key organisations – the business objects model identifies the primary (but not all) organisational entities and relationships involved in the NTS. Refer to Figure 11 below.

Multiple participants – 13 participating PTAs and Waka Kotahi.

'Project-specific' procurement – procurement for each PTA should not compromise its broader public transport strategy, and should be consistent with the Government Policy Statement on Land Transport, the New Zealand Disability Strategy, other policy initiatives such as SuperGold and the Community Connect card, and Waka Kotahi's strategy and programmes.

Varying scale – PTA participants range from AT and GW with a rail, bus and ferry network with over 79 million and 38 million public transport trips respectively per year to PTAs such as Northland with a small bus network and about 300,000 public transport trips per year.

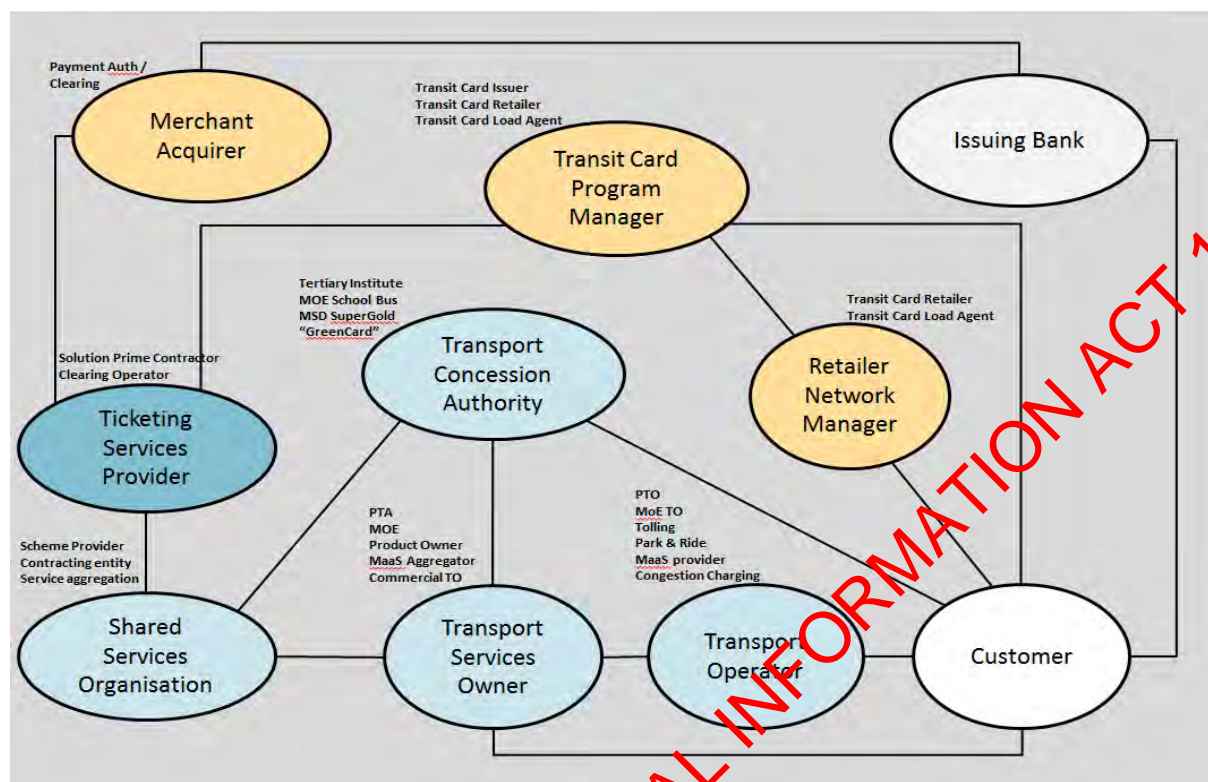
Differing joining periods – PTAs will implement the National Ticketing Solution over a period of about five years as each PTA's existing or interim solution agreement ends. This period will be from 2022 (when ECan and/or GW begins implementation) through to 2025 (prior to the end of the extended term in AT's agreement with its current ticketing solution provider) although some smaller regions could join after 2025.

Specific needs of PTAs – AT, GW and ECan each have specific requirements, as follows:

- AT requires appropriate economic treatment of its investment in its current system such as which infrastructure elements it will reuse and, therefore, which parts of their existing HOP system will be out of scope or will need to be integrated with the national solution;
- GW has a preferred implementation sequence which requires the Ticketing Solution for rail ahead of buses and ferries, and integrated ticketing is critical to realising GW's fare policy.
- ECan has ageing equipment and devices at end-of-life needing to be replaced and limited system functionality such as tag-on only, which limits the data available to support continual improvement of network services.

The business object model below illustrates the range of organisational entities involved in the NTS and the primary relationships.

Figure 14 Business object model



Dual procurement processes

Processes to procure a ticketing solution and financial services have been run as parallel work streams, i.e. with separate project teams reporting to the Project NEXT Steering Group. This dual procurement approach was based on feedback from the market¹⁶, consideration of the implementation models and risks, development of the Transit Payments Guidelines project with financial sector engagement, and implications for open loop solutions at a national level.

The Procurement Strategy and related Procurement Plan have ensured a procurement process that follows best practice procurement principles and compliance with government procurement guidelines.

High level requirements

The description of the components and requirements of the NTS are set out in sections 5.3 and 5.4 of the Economic Case.

At a high level, the Ticketing Solution comprises:

The central ticketing solution – The design, build, test and deployment of the core software and equipment that provides the heart of the central solution, including:

- ticketing solution supporting applications and components, including design, build, test and deployment of each of those;

¹⁶ A Market Sounding was undertaken during May, June and July 2017 and resulted in 27 submissions, indicating significant interest from the market. There was strong support for the proposed solution concept, endorsement of a two stage ticketing solution procurement approach, and strong recommendations for interaction with potential suppliers between the ROI and RFP stages.

- ticketing solution configuration services;
- integration services and systems to the relevant PTA's systems, including design, build, test and deployment;
- equipment, including on-vehicle equipment, validators, control gates at railway stations (where applicable), etc. which will need to be procured, designed, installed and deployed
- IT infrastructure and networks procurement, establishment, testing and deployment
- engineering design, risk assessment, specification and consenting (primarily for the rail solution e.g. gates, ticket vending machines, etc.)
- static ticketing device specification, procurement and installation
- application and infrastructure software licence specification and procurement
- project management services
- governance and relationship management services.

Transition services – Including training services, transition management, card media transition, data and information transition, security testing and financial service compliance testing.

Service delivery – Including project management and service delivery establishment.

Operations services – Including IT support, maintenance and hosting, business process outsourced services (the scope of which will be decided following ROI responses to assess the capability of ROI respondents), on-going configuration and management, ongoing financial services compliance, ongoing security testing, application and equipment support and maintenance, asset management, reporting, incident and event management, service delivery management.

Governance – Relationship management and governance of the project and ongoing operations.

The requirements for financial services comprise three components:

Component One: Merchant Acquiring Services

The merchant acquiring services provider deals with the payment part of the transactions from the account associated with the card used to pay for a journey. The merchant acquiring services provider processes verification requests at the tag-on part of a passenger's journey and also processes, authorises and settles the request for payment to be made from the passenger's card account.

Component Two: Transit Card Program Manager Services

The transit card programme manager will issue 'transit' cards that passengers can pre-load with value and use to pay for their journeys on public transport. The card could not be used for any other purpose. The programme manager will produce and issue EMV-compliant transit cards and distribute the transit cards through the retail network.

Component Three: Transit Card Retailer Network Manager Services

The retail network provider will provide and manage the retail outlets where passengers can obtain a transit card, then load and top up the transit card with value. The retail network provider will need to have an ATM and/or POS (point of sale) terminal network to offer the top-up function. The POS terminal network will need to comply with and implement the New Zealand Transit Payment Guidelines.

Components One and Two above include:

- *transition services* to design, build, test and integrate each Financial Services component with the ticketing solution
- *implementation services* such as project and service delivery management and governance
- *operations services* to ensure the ongoing provision of financial services, incident and event management, and reporting processes
- *other financial services* required for other possible related products and services such as park and ride.

These requirements comply with the New Zealand Transit Payments Guidelines which were developed prior to the issue of the Financial Services RFT and the appointment of the banking and associated service providers.

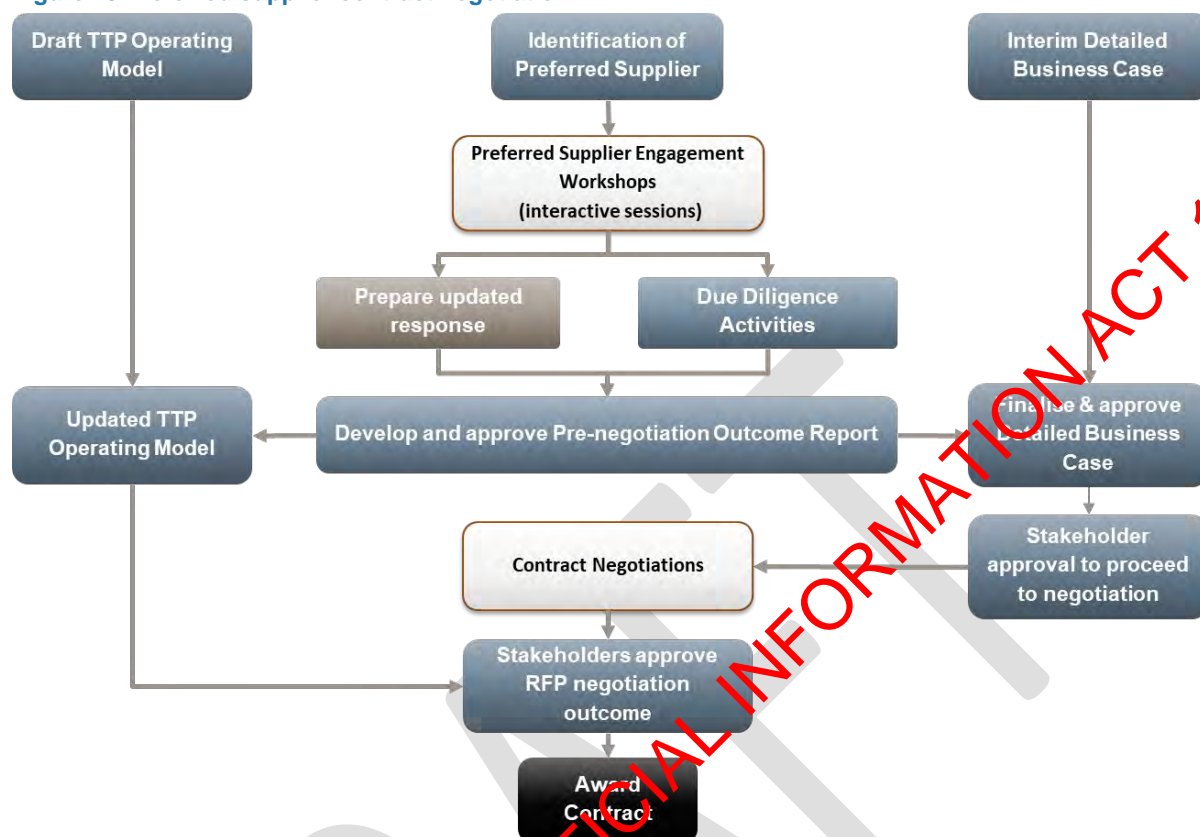
The need for shared services

To successfully operate the NTS, a shared service function is required to provide the co-ordination and management of services from the NTS suppliers to each of the participants. Waka Kotahi is responsible for delivering this shared service function, the nature of which will be described by the operating model. The operating model defines the relationships and approach to delivery of these services to support participating PTAs (as the customers of the NTS).

The Ticketing Solution RFP and Financial Services RFT required the financial services to be managed by the Ticketing Solution Provider (TSP) as primary contractor.

The requirements, roles and responsibilities to be managed through the operating model, including the scope of the shared service functions, will be determined in detail during contract negotiation with the preferred supplier. These steps are set out in the diagram below.

Figure 15 Preferred supplier contract negotiation



Also, transition strategies will impact the way in which the shared service organisation interacts with the operating models of the participating PTAs and for how long that will be required. Although it is not planned to manage existing PTA ticketing operations within the operating model, it is the intention through the iterations of the model to identify opportunities to utilise existing capability within each PTA to support both existing and future operations.

Participants and timing involved in transitioning to the National Ticketing Solution

While the sequencing and timing for each PTA to transition to the NTS is yet to be formally agreed through Participation Agreements, the roll-out of the NTS can be broadly described as follows:

- (i) development of the initial NTS platform for ECan
- (ii) transition by GW Rail closely followed by GW Bus
- (iii) transition by AT
- (iv) transition by the Regional Consortium.

Commercial operating model

Key design principles

The NTS operating model will comprise a single national implementation – one platform, one solution, multi-tenanted – and include a single shared services operation that will:

- be a business unit within Waka Kotahi, known as Transport Ticketing and Payments, that sits between the suppliers (ticketing and financial service providers) and the PTAs and other future participants

- operate from day one of NTS operations
- will operate on a non-profit basis
- convert a combination of third-party charges and shared service internal costs into a charging arrangement agreed with each PTA.

A single shared services operation reduces the number of third party service provider contracts and supports a multi-tenanted solution.

Establishing the shared services operation as a business unit within Waka Kotahi will bring market credibility and enable comprehensive security of financing and funding arrangements. Some services currently performed by PTAs may transition to the shared services operation.

All PTAs will be encouraged to transition to the NTS as early as possible. The aim is to deliver the benefits of the NTS as soon as possible and reduce the cost and risk on the first few parties to transition. This improves the credibility of the NTS to third party service providers.

To meet the needs of all PTAs, the NTS will offer multiple service delivery tiers. This provides PTAs with a range of fit for purpose services, produces lower cost options for smaller PTAs, ensures local authorities meet their legislative requirements to ensure the efficient and effective use of their resources, and supports Waka Kotahi's requirement to use NLTF revenue in a manner that seeks value for money.

Operating costs directly allocable to PTAs will be borne by that PTA. Directly allocable costs should not be subsidised by other PTAs as they generally receive no benefit, and each PTA has the opportunity to design the service and solution for their region.

All risks should be allocated, where possible, to the party best able to manage the risk.

Shared services

As part of the agreements between the NTS participants, Waka Kotahi will act as the scheme operator and will:

- be the sole Party who contracts with each NTS Supplier under the relevant Master Service Agreement (MSA) for the benefit of the PTAs and itself
- be primarily responsible for managing the relationship with each NTS Supplier
- facilitate the provision of the NTS and the associated services to the agreed service levels and performance standards
- facilitate the PTA's transition planning and actual transition in collaboration with the PTAs and the relevant NTS Supplier
- provide Managed Services in its own right
- not have greater liability to a PTA (either alone or in aggregate) under the agreement than Waka Kotahi can recover from other parties, (apart from limited exceptions).

The TTP team will be established to enable Waka Kotahi to carry out these functions. TTP will be responsible for carrying out Waka Kotahi's role as the scheme operator to co-ordinate and manage the NTS. This includes operational delivery of services and the implementation and management aspects associated with the delivery of the NTS programme. This means that the operating model will evolve over time and its focus will transition alongside the implementation programme.

It is expected that TTP will utilise a combination of dedicated and ancillary resources from within Waka Kotahi and engage with, manage and co-ordinate resources across the parties to deliver the NTS outputs.

The Participants Group of PTAs, as members of the NTS governance structure, will collectively have control over how the operating model develops and, in many cases, the evolution of the TTP functions will be a response to decisions and requirements that come from each PTA.

1.1.1.4 Shared services objectives

The objectives for the shared services operation are to:

- procure a core system and capability to support a national transport account for each customer
- ensure a nationally interoperable, consistent, customer experience for all regions (with no exceptions)
- enable national transport and social and economic outcomes as defined in the GPS including:
 - national concessions such as SuperGold card, the Community Connect card and Total Mobility
 - national priorities including access for all, mode shift to public transport, and demand responsive travel
 - other government transport-related services in the future
 - tourism.
- establish nationally consistent travel and payment information alongside the capability to manage it
- align with existing transport payment operations such as ticketing and road tolling
- adopt funding, governance and risk management structures acceptable to the public sector stakeholders
- be commercially acceptable to service providers.

TTP interaction with Participants

The TTP team will be managed by Waka Kotahi but will operate under the governance structures as described in the NTS Participation Agreement. PTAs, as members of the NTS governance group, will provide the governance for TTP and therefore will be informed Participants in the operations. The proposed governance structures demonstrate this with alignment through the internal Waka Kotahi management structures and also to the NTS Participant Group. An important distinction here is that it is assumed that all the Participants will be represented in the NTS Participants Group and that the key engagements are therefore with PTAs.

The solution envisages Transport Service Operators and other commercial entities being able to access these services. Although these commercial arrangements are yet to be defined, it is not envisaged that these parties will be Participants in the same form as the PTAs; rather, they will be managed via a future contractual model agreed with the TTP, with a defined set of services being provided.

A key function for the TTP will be providing assurance to the Participants that the NTS services are being delivered correctly by the service providers in line with agreed service levels. Engagement Forums are proposed as a mechanism to support the processes within the operating model with the dual purposes of:

- enabling engagement and collaboration between Participants on topics such as design decisions and the customer experience approach, etc.
- helping the TTP to gain insight and assurance over the NTS processes and share this directly with Participants.

Contracting principles and content

1.1.1.5 Ticketing Solution

A “partnering” model for the delivery of Ticketing Services will align the long-term strategic nature of the relationship, the specialist services required, and the need to solve problems in a collaborative manner to achieve optimal outcomes.

Aligning PTAs’ expectations with the TSP’s solution, and accurately documenting those aligned expectations, will be critical to mitigating risk for both the supplier and PTAs (as customers). This collaborative approach will be used to develop appropriate contractual principles, terms and processes, and development of services schedules, while ensuring clear accountabilities and consequences for not providing the required services, deliverables or standards.

Therefore, the contract with the TSP will have more of an outcomes-based focus than the agreement with the Financial Services Provider(s).

1.1.1.6 Ticketing services contract term

The contract term for the Ticketing Services Master Agreement (TSMA) proposed in the RFP will take account of the requirement to transition all participating PTAs’ services on a staged basis over a period of five to seven years. Therefore, consideration must be given to the length of contract term *remaining* after the last PTA is expected to join the NTS. The recommended term of the TSMA would be 10 years from commencement of the contract signing for the last meaningful production use by ECan, GW and AT irrespective of sequence.

1.1.1.7 Process for reviews

As the TSMA could continue for up to 19 or 20 years at the PTAs’ discretion, it would include a process for reviews to occur at particular times. Commitments about the solution refresh would depend on what commitments are agreed as part of continuous improvement and upgrades during the term.

The recommended approach for conducting a review is that PTAs will review the TSMA prior to the expiry of the initial term in 2032, and again in 2036, and assess whether the national ticketing solution:

- satisfies the PTAs value for money requirements, including assessing the performance of the supplier against requirements, reviewing the supplier’s technology performance and roadmap, and the total cost of using the NTS
- meets the current and future needs of communities, including customer satisfaction and the goals and objectives of customers compared to the supplier
- that the services being performed are efficient, effective and appropriate for current and anticipated future circumstances, including potential improvements or changes that may be required.

As with any agreement, there would be nothing to stop PTAs (as customers) performing their own review independently at any time.

1.1.1.8 Performance management

Performance management will be a key facet of the contracts for the Ticketing Solution. Typical supplier risk areas include:

- initial low pricing and limitations on what is “in-scope”, with a view to driving profit through aggressive change management following appointment and creation of a “vendor lock-in” situation
- non-delivery against service levels, or focus on service levels which do not reflect the business outcomes

- complex decision making and approvals processes leading to project delays, for example, through an overly complex change management control process that gives the supplier the right to decline a reasonable request.

Such risk scenarios will be considered and addressed to achieve the correct balance of performance management tools and “partnering” behaviour. Focus will be on:

- clear definition of mandatory criteria
- service levels aligned to business outcomes not the activity or system
- technical performance aligned to customer experience and service efficiency.

A risk/reward model will be constructed which rewards positive behaviour that delivers additional value and outcomes (beyond a baseline) and which compensates for and discourages poor quality outcomes. Such a regime will normally be uneven (i.e. the downside of poor performance is significantly greater than the upside of good performance) which helps prevent a supplier “gaming” the contract.

1.1.1.9 Financial services

The contracts with each of the Financial Services provider(s) are for more of a commodity-type service with the emphasis on operational excellence and price certainty. Collaboration and long term partnering will be less of a driver for the parties, particularly for component one of the Financial Services, compared to the relationship with the Ticketing Solution provider.

1.1.1.10 Financial services contract term

Financial Services are generally more commoditised and substitutable with relatively lower risk and difficulty (compared to the Ticketing Solution). Consequently, a shorter contract term for the merchant acquiring services and settlement services would be appropriate to maintain competitiveness, while still allowing a Financial Services provider to adequately recoup its investment cost in establishing the relevant Financial Services component. A longer term for the programme manager services and retail network manager may be more appropriate to enable sufficient continuity.

1.1.1.11 Rule 10.21 – maximum term of a service contract

The NTS procurement will be classified as “infrastructure” for the purposes of the Waka Kotahi Procurement Manual. Under Rule 10.21 the maximum term is set at five years including any optional extension periods. This length of term is considered inappropriate for the Ticketing Solution contracts because:

- it does not support the model for participating PTAs to transition to the National Ticketing Solution over many years, as is contemplated;
- it does not provide sufficient certainty for the supply of the services if any subsequent provider cannot commence services provision on time;
- it does not provide sufficient certainty for return on investment for suppliers;
- the life of the assets will exceed five years;
- it will not be attractive to many potential suppliers, thereby potentially reducing the number of suppliers that might have otherwise responded and reducing the likelihood of a best value for money outcome through a competitive process; and
- it is not aligned to industry trends for outsourced service arrangements for ticketing solutions.

The NTS participants will seek an exemption from Rule 10.21 of the Waka Kotahi Manual to allow the term for the NTS contracts to be determined based on a range of factors designed to provide the best outcome for both procuring and supplier parties.

Risk mitigation and allocation

Large scale procurement and integration projects involving multiple parties are complex and carry significant risks. In particular, overseas experience has shown that ticketing solution procurement and implementation projects have been higher risk.

The key risks were described briefly in the Strategic Case and the impact, mitigation opportunities and allocation is summarised in Table 19 below. The general principle is that 'risks should rest with the party best able to manage them', subject to value for money. Given the multiple parties involved, most have some responsibility for risk mitigation, with Waka Kotahi having a key mitigation role because, as the contracting party, they are responsible for contract management.

Risks are set out in more detail in Appendix 6.

Table 25 Summary of risk implications and mitigation

Risk	Impact	Mitigation	Allocation
Cost Risk			
(i) The overall cost of an NTS is high	→Likelihood = M	The preferred supplier negotiation stage of procurement is expected to result in reduced cost due to: <ul style="list-style-type: none">• identification of potential double counting of services between the TSP, SSO and PTAs• changes to requirements resulting in price reductions, e.g. a more off-the-shelf rather than customised solution. Fully funding (100%) the majority of costs from the NLTF would ensure affordability and attractiveness of the national solution for PTAs.	<ul style="list-style-type: none">• Waka Kotahi
(ii) NTS lacks sufficient priority amongst other NLTF priorities to be funded	→Consequence = H		
(iii) The allocation of costs shared between government and the regional councils (participating PTAs) is difficult or cannot be agreed	→NTS is delayed or does not proceed →Higher than anticipated whole of life costs and the extent to which costs can be funded 100% from the NLTF could result in the solution being seen as unaffordable for some or all parties. The impact could be delayed rollout of the NTS solution, one or more parties pulling out, or the NTS not proceeding.		
Multiple Participant Risk			
(iv) Decision-making process across multiple investors is slow	→Likelihood = M →Consequence = M →Delay and increased costs	Strong stakeholder governance and management to co-ordinate decision-making requirements and timeframes across all parties, and ensure all are supported and well equipped to make timely decisions Interim solutions were subject to ongoing support for transition to the NTS. Effective governance is in place to ensure NTS proceeds at pace to implementation.	<ul style="list-style-type: none">• MPGG
(v) One or more participants decide to delay or stop investment in the NTS solution and extend their current/interim solution because of cost, delays or lack of contract agreement	→Delayed rollout of the NTS solution and increased whole of life costs. →Changes to the scheduled staging of implementation across PTAs resulting in delays and increased costs. →Delays cause one or more PTAs to seek alternative solutions or extend current solutions.		

Risk	Impact	Mitigation	Allocation
	<p>→Reduced scale of the NTS may make the cost unaffordable for the remaining participants.</p> <p>→The preferred supplier may decide to withdraw as the smaller scale is unprofitable to deliver and operate.</p>		
<p>Operational Risks</p> <p>(vi) There is insufficient capability and /or capacity to deliver to expected quality and timeframes</p>	<p>→Likelihood = M</p> <p>→Consequence = M</p> <p>→Delays and increased costs.</p> <p>→The global impact of COVID-19 is expected to cause:</p> <ul style="list-style-type: none"> • delays to implementations in other jurisdictions which will delay the start of the NTS, and/or • see implementation staffed by a much less experienced and capable team with consequential impacts on quality and slower delivery and/or • delays in production and shipping of equipment. <p>→Limited capacity and experience of PTA staff could impact quality and timeframes.</p> <p>→Similarly, the capability of TTP within Waka Kotahi has not been tested, but includes experienced staff.</p>	<p>A pragmatic response may be required that considers:</p> <ul style="list-style-type: none"> • Implementing a much more “off the shelf” solution • obtaining support from other jurisdictions to train and/or staff a stronger internal implementation team • delaying implementation by 6 – 12 months to allow for product lead times, etc. 	<ul style="list-style-type: none"> • Waka Kotahi (TTP shared services)
<p>Technology Risk</p> <p>(vii) Reputational damage because of a significant NTS operational failure. A failure could arise from a compliance breach and loss of private information,</p>	<p>→Likelihood = M</p> <p>→Consequence = M</p> <p>→Lower patronage and revenue than predicted.</p> <p>→Lack of customer trust in used of public transport.</p> <p>→Mode shift targets not</p>	<p>High quality implementation</p> <p>Strong focus on a great customer experience from day one.</p> <p>Strong operational controls and compliance</p>	<p>Waka Kotahi</p>

<i>Risk</i>	<i>Impact</i>	<i>Mitigation</i>	<i>Allocation</i>
operational failure causing or cancellation of services and/or loss of revenue, or transition issues that similarly cause cancellation of services and/or loss of	achieved and increased use of private vehicles. →Technology improvements are not readily achievable	Effective contractual performance incentives Implement open systems wherever possible Include contractual requirements that enable upgrades to be applied when these are available for other jurisdictions.	
Digital Risk (viii) Data breaches result in system failure and/or loss of personal information	→Likelihood = M →Consequence = M →Disruption of services →Loss of revenue →Customer details exposed/lost →Reputational damage	Ensure comprehensive security & privacy regime for all aspects of the NTS, suppliers, systems, processes, staff Develop comprehensive & timely reporting processes to detect and report any system breach or control failure	Waka Kotahi

Management Case

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Management Case

Key messages

Shared services functions are critical to the success of the NTS and will be provided by Waka Kotahi as an internal business unit – Transport Ticketing and Payments (TTP).

TTP will manage the contracts of the ticketing and financial services providers, provide assurance over performance, and project management the establishment and transition of PTAs to the NTS.

A clear governance structure is in place which includes full PTA participation. The TTP will operate under this governance structure.

A conceptual roadmap and high level workplan identify the process and responsibilities for establishment. Detailed planning will be undertaken with the ticketing services provider when contracted.

PTAs will need to determine the most cost-effective, practical, transition technology option in conjunction with the TSP and TTP including possible infrastructure re-use.

Introduction

The Management Case assesses whether the proposed NTS is likely to be successfully delivered by setting out the key roles and implementation arrangements that will ensure the NTS can be implemented in each region and how project benefits will be realised and risks managed.

Operation of shared services is a critical role

Central to the implementation of the NTS is that Waka Kotahi will take the contractual and service provision lead by acting as the scheme operator. As previously explained in the Commercial Case, Waka Kotahi will establish the shared services operation that will be required to facilitate operations for the successful delivery of the NTS.

TTP will operate under the governance structures agreed in the NTS Participation Agreement with PTAs. TTP will have four key functions: (i) technology, (ii) operations, (iii) delivery, and (iv) strategy and future development.

The functional scope is illustrated in

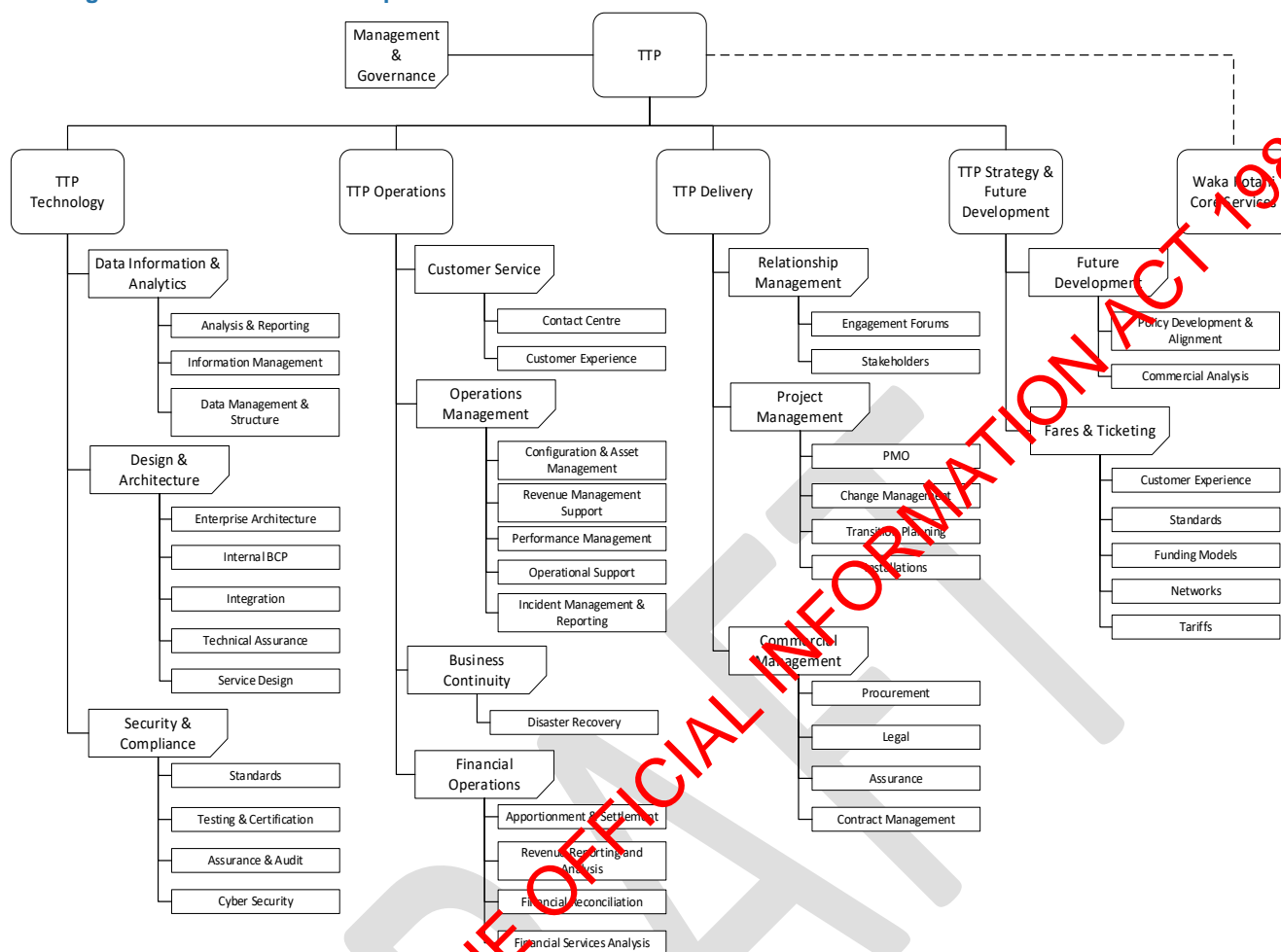
Figure 16 below. The key functions are expected to adjust over time to allow flexibility depending on the stage of the NTS programme. The structure of the four functional areas is intended to allow each to undertake their specific roles that contribute to the effective implementation and ongoing operation of the NTS as a whole to deliver ticketing and payment services for the PTAs. The TTP Manager carries the responsibility for provision of these services, a significant component of which will be providing assurance over the quality of the deliverables and of the performance of the TSP and other contracted entities. Each functional area provides input to allow the TTP Manager to provide a statement of overall assurance.

These responsibilities mean that during the implementation phase TTP will be primarily responsible for holding the suppliers to a delivery programme and consequent contractual performance. As the programme transitions into operations, the contractual management aspects will widen to include monitoring of suppliers' performance through undertaking specific assurance activities such as ensuring compliance with NTS policies and protocols, and holding the suppliers to account against agreed service performance levels.

The TTP Manager will be responsible for:

- contract management of NTS suppliers
- management of the TTP NTS service obligations
- providing assurance of the overall NTS to the governance structure
- delivery and change management of the NTS within the context of shared programme responsibilities with suppliers and PTAs
- stakeholder management and engagement
- assessment of needs, strategic direction and policy/legislative requirements to support the future NTS direction
- creation and management of an annual planning process, linked to the notified requirements from the participating authorities.

Figure 16 TTP functional scope



High level work programme to design, build, and implement

The implementation programme plan will be developed in conjunction with the contracted ticketing service provider. However, the programme plan is expected to include a number of separate projects as set out below (as a minimum).

Table 26 Likely range of projects required under the design, build and implement programme of work

Project	Responsibility
NTS Shared Service Organisation Entity Establishment (governance, legal, funding, etc.)	Waka Kotahi
NTS Shared Service Organisation Facilities Establishment (realisation, resourcing, facilities, systems, etc.)	TTP
NTS design	Ticketing Solution Supplier under a centralised contract with Waka Kotahi
NTS build and implementation of core ticketing platform	Ticketing Solution Supplier under a centralised contract with Waka Kotahi

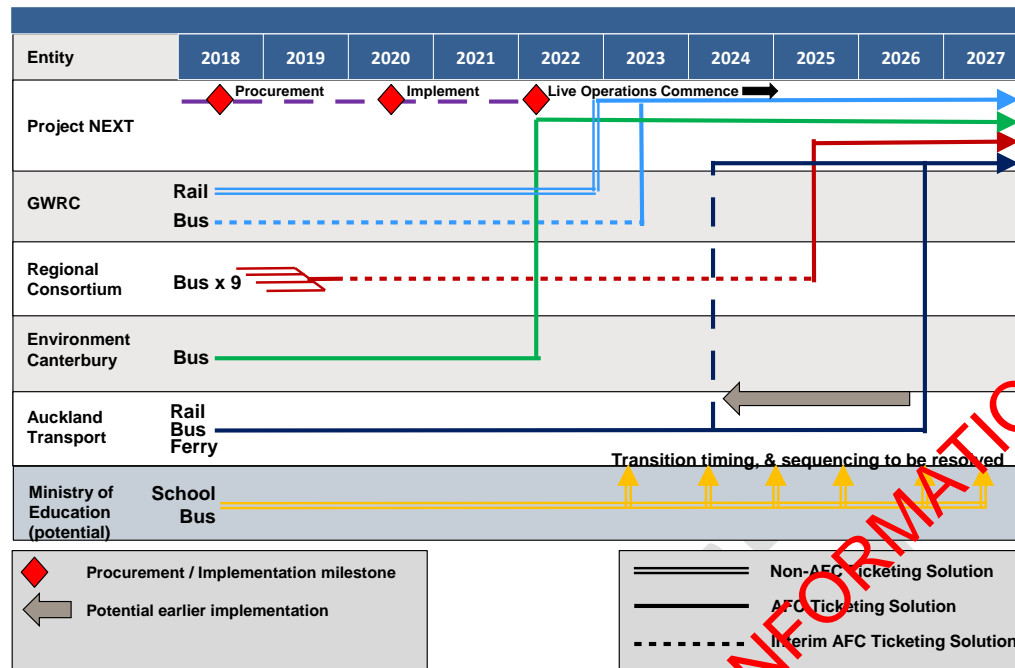
Project	Responsibility
NTS Financial Services, merchant acquirer establishment	Ticketing Solution Supplier and Merchant Acquirer under a centralised contract with Waka Kotahi
NTS Financial Services, program manager establishment	Ticketing Solution Supplier and Programme Manager under a centralised contract with Waka Kotahi
NTS Financial Services, retailer network manager establishment	Ticketing Solution Supplier and Retailer Network Manager under a centralised contract with Waka Kotahi
NTS Program Office (for planning and oversight of the multi-year transition program)	TTP
ECan Bus Solution Implementation (a) supplier side (b) ECan side (see PTA Implementation Scope below)	Ticketing Solution Supplier under a Centralised Project ECan
GW Rail Solution Implementation (a) supplier side (b) GW side (see PTA Implementation Scope below)	Ticketing Solution Supplier under a centralised contract with Waka Kotahi GW
Repeats per 9 and 10 above for GW Bus and then each PTA for each specific implementation project	Ticketing Solution Supplier under a Centralised Project and the PTA with respective scope of work as set out in PTA Implementation Scope

The programme and project management approach will be designed to optimise delivery by leveraging the experience of contracted organisations – TSP, financial services providers (MA, PM, RM), - and the capability of experienced personnel within Waka Kotahi / TTP and the PTAs who have previous implementation experience.

Conceptual roadmap

The conceptual roadmap sets out the key milestones and how implementation would be staged for the PTAs. This is likely to see ECan being the first PTA to implement the NTS followed by GW with staged implementation starting with rail followed by bus.

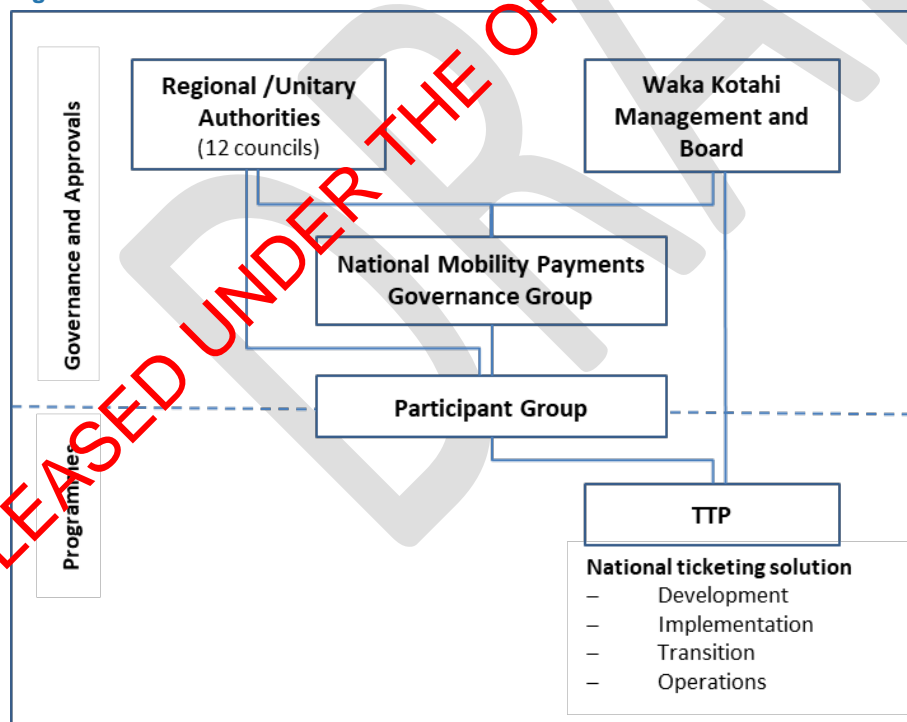
Figure 17 Conceptual roadmap, June 2019



Programme governance

The transition from Procurement to Design, Build and Implement will be established under a revised governance and operating model for the participating PTAs, illustrated in Figure 18 below.

Figure 18 NTS Governance Structure



Transition technology options for PTAs

A key element of the implementation of the NTS is the transition process for each PTA. They will need to determine their most cost-effective, practical, transition technology option in conjunction with the TSP and TTP including possible infrastructure re-use.

Transition to EMV devices

A key transition task is to migrate from the current stored value card readers and cards to the new EMV card readers. The current environment has four closed-loop stored value solutions from four suppliers that will each transition across to the NTS. Because card technology and fare calculation methods will change, it will be important to minimise customer impact and ensure a smooth transition. There are potential technology options that could assist with migration from these legacy closed-loop stored-value solutions to a new account-based solution and the preferred method will depend on the TSP's solution technology and the level of co-operation provided by legacy suppliers.

Five options (four technical solutions and one non-technical) have been identified comprising:

Option 1 – New acceptance device reads legacy fare media

Requires a new validator/reader that is capable of accepting both legacy fare media and EMV capability to be gradually installed across a transport network. This involves large effort and time by the TSP and co-operation from legacy suppliers.

Option 2 – Old acceptance device reads new EMV fare media

Would give the best customer experience and involves moderate time and effort, largely from the legacy suppliers.

Option 3 – Turn old fare media into a token

Requires significant development from both the legacy and new system suppliers.

Option 4 – Dual readers

Where a customer will need to choose, depending on their fare media, which device to use. This is not very customer friendly and adds some engineering challenges in terms of vehicles and fixed readers.

Option 5 – Forklift upgrade

Not a technology option, but rather a complete replacement of one system for another over a short period of time. This is likely to be most useful for smaller regions but has some customer impact.

There is no right option. A range of factors will determine the choice of transition including size (number of vehicles, stations, wharves, etc.), integration of fares (modes and/or transfers), geography, and contracted operators. Different regions will need to select the option that best supports their situation. The NTS is required to offer strong support for balance transfers and for transfer of existing concession information.

Infrastructure leverage

Many transport authorities have significant investment in ticketing assets that could be re-used in a new ticketing solution. Depending on age and the technology compatibility, there may be time, cost and customer benefits from re-use. Examples include:

- Gates at platforms and wharves
- Acceptance Devices on board vehicles and platforms, including acceptance devices used to read the Fare Media, driver consoles, AVL devices, and communications hubs
- Ticket Vending Machines
- Inspection devices
- Retail and Customer Service Centre Devices.

Further explanation is included in Appendix 5.

Planning for change, benefits realisation and risk management

Change management planning

Change management planning will be a key aspect of the transition plan for each region. TTP will provide change management support as part of the project management for each regional implementation. Transition planning, change management and stakeholder engagement are specific functions within the Delivery arm of TTP.

Benefits management planning

TTP will provide benefits management support as part of the project management for each regional implementation.

Risk management arrangements

TTP will provide detailed risk assessment and management as part of the programme /project management office (PMO) function for each regional implementation in conjunction with each PTA's management team.

Assurance and post-project/programme arrangements

TTP have specific responsibility for development and maintenance of a quality plan and assurance plan with regular reporting requirements to the Participants Group. This will include post project reviews. These will be critical following the first implementations to ensure lessons learned result in improvements to each successive transition.

END

Appendices

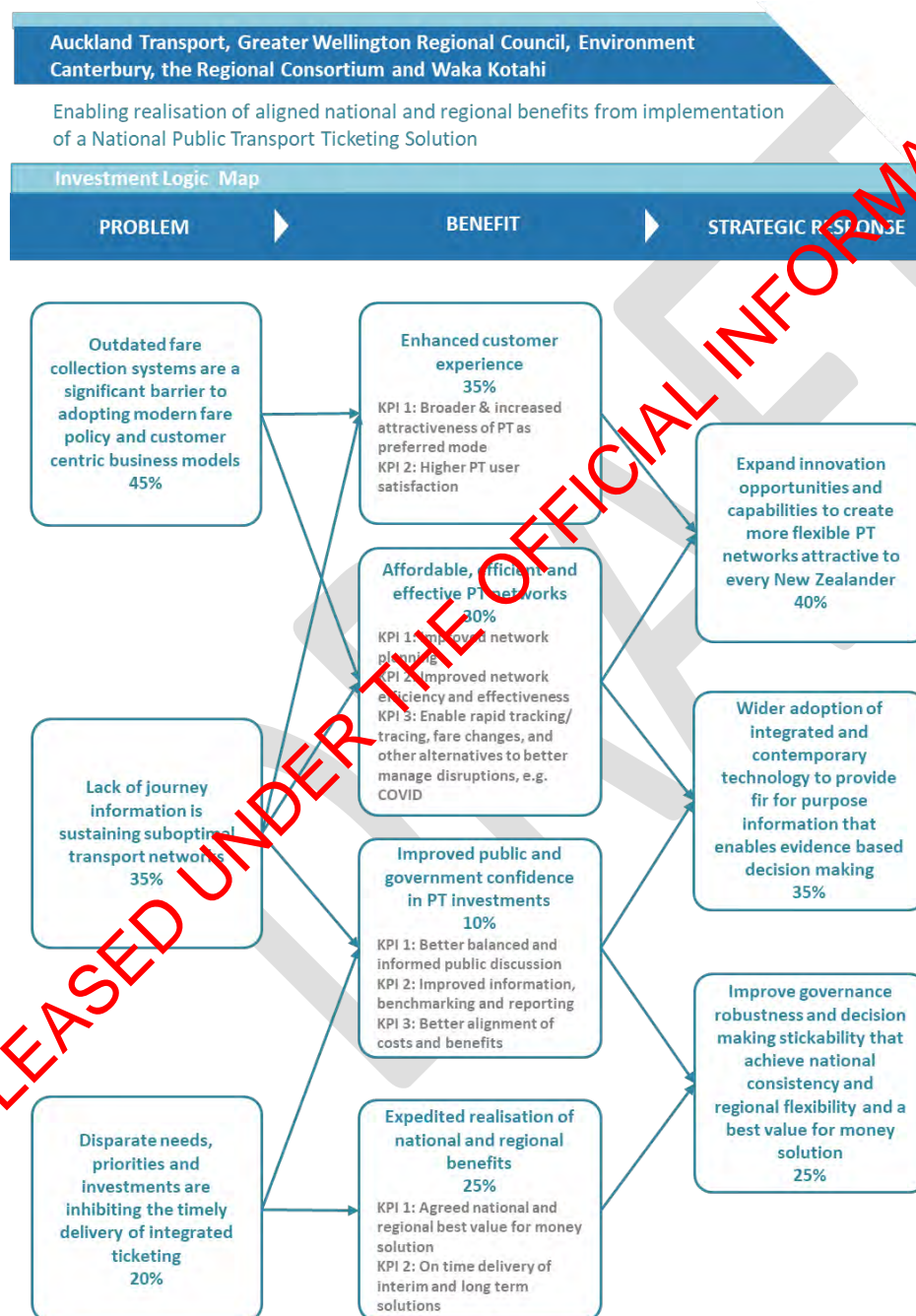
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Appendix 1 Investment Logic

Investment Logic Map

Investment Logic Mapping (ILM) workshops were conducted in July and August 2016 with senior representatives from Waka Kotahi NZTA, Greater Wellington Regional Council, Environment Canterbury and the Regional Consortium. The workshops defined three broad problems, the key benefits accruing from resolving these problems and the appropriate strategic responses. These are set out in the following ILM map and discussed further in the following sections.

Figure 19 Investment Logic Map



1. Outdated fare-collection systems are a significant barrier to adopting modern fare policy and customer centric business models

Current fare payment systems are a mix of closed loop transit payment cards and cash (paper tickets). These systems require management of multiple revenue streams, have high operating costs, and do not readily support sophisticated fare structures. Customers are required to store money on their cards, which require regular 'top-up', or pay cash; both lack convenience because of the additional steps and time required to be ready to use public transport.

Technology for ticketing and fare systems has evolved based on smartcards and tokens (e.g. mobile phones) with NFC¹⁷ capability developed originally by the banking sector. Customers experienced with modern banking systems expect ease of use and convenience, are familiar with making payments using mobile banking or their bank-issued cards with NFC (e.g. Visa payWave), and have similar expectations when using public transport.

However, adoption in public transport services has not kept pace. Cities such as Seoul, Washington DC, Boston and New York have only recently moved to these account-based and open loop technologies. Integrated ticketing with an account-based, open loop payment system provides significant customer convenience. For example, Transport for London reported a 40% increase in patronage over the first three years of introduction of their account-based, open loop system (alongside their closed loop Oyster card option which had almost no growth). This indicates customer preference for the convenience of using their existing bank-issued cards.

Lack of modern ticketing adds to the difficulty of providing a high quality user experience to attract people away from private cars, attract use by domestic and international travellers, and to reduce the current reliance on subsidies and cross subsidisation of services.

Modern account-based, open loop systems provide much greater flexibility to more quickly change fare policies to improve network performance and incentivise patronage. For example, the change in fare structures to a full zone-based system in Wellington in mid-2018 took two years and significant effort by Metlink and the public transport operators to implement. An account-based solution would significantly reduce this time.

Currently it is difficult to provide special / one-off fares to support sports and cultural events or to provide compensation or adjusted fares for disruptions– something that is much easier and faster to enable with a modern ticketing system.

2. Lack of journey information is sustaining suboptimal transport networks

In 2016, only Auckland had integrated ticketing while still providing cash fares, and all other PTAs had a mix of smart (stored value) cards, paper tickets and cash on-board. As such, public transport planning was based on coarse assumptions – demographics, estimated coverage, counts at journey start, revenue levels, availability / full service policy, etc. with a large proportion of cash tickets.

The current mix of card systems – HOP, Snapper, Metrocard, Bee Card, and cash fares (using paper tickets) – continues to be suboptimal, because of incomplete information about:

- Where passengers get on and off a service (trip information)
- What services passengers connect with (journey information)
- What type of passengers use a service – school student, tertiary student, on-peak commuter, off-peak commuter, elderly, disabled, etc.
- When these passengers travel.

¹⁷ Near-field communication (NFC) is a set of communication protocols or communication between two electronic devices over a distance of up to 4 cm.

As the proportion of card use increases (and cash diminishes), the quality of information improves enabling PTAs to better optimise their PT networks. For example, in Wellington, Snapper accounts for 80% of all bus trip payments and over 90% of fare revenue. In contrast, Wellington's rail ticketing is paper based with limited information about the number of people travelling and where people are getting on and off. Christchurch's Metrocard provides discounted fares but is tag-on only, which means there is incomplete information about where users are ending their trip. COVID-19 has resulted in a temporary suspension of cash on-board during lockdowns and this may be a factor in removing cash on board completely.

However, until PTAs have integrated ticketing, they will be unable to fully optimise their public transport services across their regions to best meet the daily, weekly, and monthly needs of customers, or to optimise strategic asset management to better allocate and prioritise expenditure. Operationally, information about day-to-day usage enables the public transport network to be fine-tuned to ensure capacity is available to meet demand and to improve the efficiency of fleet management, which cannot be easily achieved with current ticketing systems.

This further extends to being able to optimise the wider transport network to better manage congestion, improve the road network for efficient freight flows, and to cost-effectively manage road construction and maintenance.

At a national level, insufficient information makes policy decisions more difficult, such as making sound social policy decisions about transport funding support for the low waged, aged, disabled, and students.

3. Disparate needs, priorities and investments are inhibiting the timely delivery of integrated ticketing

A range of factors were identified about the lack of integrated ticketing and why Auckland is the only region to achieve integrated ticketing. These factors included:

- a. ***It is hard to deliver efficient, customer-centric public transport.*** In 2016, there were 16 ticketing systems across 12 regions and ILM participants were concerned that:

- investment at both regional and national levels was duplicated,
- operating costs and fare subsidies were higher than necessary and
- taxpayers, ratepayers and users were not receiving sufficient value for money.

Over the past four years the National Ticketing programme introduced an "interim" solution for the Regional Consortium (RITS) and extended the Snapper contract for Wellington resulting in four systems – HOP (Auckland), Snapper (Wellington), Metrocard (Canterbury), and Bee Card (RITS) – that reduces duplication and better aligns investment cycles.

- b. ***PTAs have insufficient scale and investment capability to independently implement and operate a cost-effective integrated ticketing system.*** In a global procurement environment, small PTAs are unlikely to elicit wide supplier interest in modern ticketing systems which limits their choices. Integrated ticketing enables a single ticket to be used for a public transport journey that involves transfers between services and/or modes (bus train and ferry). Integrated ticketing is important because it encourages people to use public transport by simplifying switching between transport modes and by increasing the efficiency of the services. Also, a modern, integrated ticketing solution enables fare policies that provide customer benefits such as a guaranteed lowest fare for a journey and caps on fares.

Providing an efficient public transport network requires frequent ridership information which is most easily achieved through tagging on and off, which means that even with free fares, some form of ticketing or alternative technology would be required to provide information.

- c. **Each council has differing public transport requirements.** Demographics, geographical areas, modes (bus, train and ferry), policies and systems
- d. **Councils are at different stages of investment** with different lifecycles and risks of obsolescence.
- e. **Multiple investors and decision-making complexity are barriers to timely delivery of a best value for money, single integrated ticketing solution for all.** PTAs have a history of independence and will have difficulty ceding some of their autonomy. Each investing PTA will want a voice in the decision-making process, which could slow decision-making, especially when considering consequences of compromise and trade-offs.
- f. **Most PTAs lack complete journey information and cannot target customer segments and optimise public transport services.** The lack of a customer-centric business model means that the focus of investment is on technology with the risk that the investment period will be too long to keep pace with changes in technology. (Refer to Problem 3 below.) Also, under PTOM, PTAs now need to run the ticketing and fare collection systems rather than the operators and will need to develop the capability and experience required. This means ongoing resource commitments for councils.
- g. **Politicians have a fear of large IT projects because of previous high profile failures and cost overruns.** Continuing high media attention keeps public transport issues high in the minds of the public which could heighten political fear of a large public transport IT project. Government investment in public transport requires efficient investment and this requires scale. For public transport ticketing, a national system would maximise scale.

The benefits of a national approach

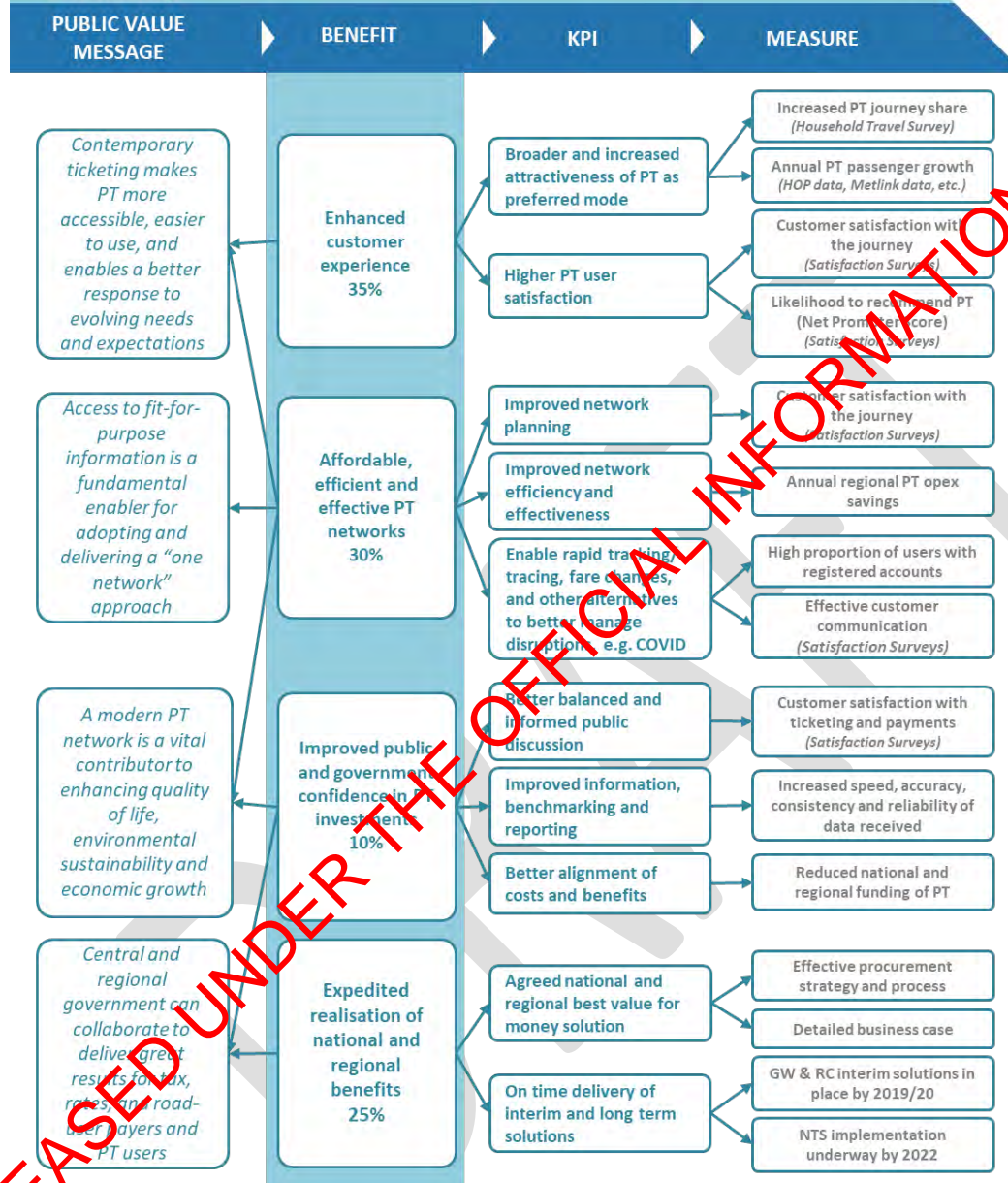
Having defined the problems, the ILM workshop focused on the benefits gained from introducing a national ticketing system and the strategic response to enable the delivery of the national ticketing system. The benefits map is set out below and the following section summarises how these key benefits unfold, and the required strategic responses. When considering benefits, workshop participants envisaged a national solution using the most recent proven technology – an account based payment system with open loop.

Figure 20 Investment Logic Benefits Map

Auckland Transport, Greater Wellington Regional Council, Environment Canterbury, the Regional Consortium and Waka Kotahi

Enabling realisation of aligned national and regional benefits from implementation of a National Public Transport Ticketing Solution

Benefits Map



1. Enhanced customer experience

A national ticketing solution would provide all customers with a consistent and reliable ticketing experience throughout New Zealand that is easy to access, and intuitive, efficient and convenient to use. Customers would have a better experience, being able to board more quickly, easily transfer between services, and be able to choose the type of payment option that works best for them, such as a transit card, debit/credit card or an account-based token (smartphone) as technology advances.

More specifically, a modern national ticketing solution would:

Provide universal access to public transport – Customers can take public transport anywhere in New Zealand, be charged and pay in the same way everywhere, and only need to learn one ticketing system and it's the same way to travel by public transport everywhere.

Encourage easy adoption – There is no need to purchase a card or top up before travelling, which encourages public transport use amongst casual users and visitors. Contactless debit cards:

- may provide an alternative to cash for some low income and cash reliant people,
- reduce travel planning time as customers do not need to factor in the ticket purchasing element in travel planning
- enable easy transfer between services
- provide visitors with access to public transport immediately on arrival using their overseas card or mobile payment device.

Ensure the lowest cost option – Each day the best fare is automatically calculated for each customer's journeys. Customers can pay for journeys after they travel, which means they don't need to tie up money on a prepaid travel card. Registered SuperGold customers can apply their SuperGold concession to their own bank-issued card or mobile device which means they no longer need to prepay in case they travel in peak times, and they can visit friends and family in other parts of New Zealand and still get their SuperGold discount.

Increase payment choice – Customers can pay using their contactless debit or credit card or pay using a digital contactless card on their mobile device.

Enable self-service benefits – Customers can manage their transport account anywhere in New Zealand, manage their family's accounts together and control their child's spending, keep track of their own spending on travel in one place, and correct their own journeys if they forget to tag on or off.

Provide better information – Notifications allow customers to control what information they receive including notifications when something goes wrong or when their travel is disrupted, enabling customers to adjust their journey to avoid disruptions and saving time by not waiting for their public transport service.

Achieve better customer service – Reduced interaction with the driver allows the driver to focus on those that need the most help.

2. An affordable, efficient, and effective public transport network that delivers operational efficiencies and strategic information

For PTAs, a nationally coordinated approach to regional ticketing systems will provide operational efficiencies, including:

New features and functions – For a marginal increase in investment, there would be a material change in functionality. Modern account-based ticketing solutions would:

- allow Councils to implement changes to their fares policy easily and cost effectively,
- support easy and cost-effective changes to public transport networks and services,
- easily and cost-effectively be extended to support other transport-related payments, such as park and ride,
- accommodate changes within an agreed framework, thereby requiring minimal need for third party intervention to make changes,
- make it easier and safer to travel to big events, which, in turn, speeds up foot traffic and reduces pedestrian congestion at key entry or exit points.

Enhanced data – A modern single, national ticketing and payments solution would provide a richness of information based on data that is complete, accurate and consistent across New Zealand. This would:

- improve reporting including the ability to benchmark performance,
- improve the network design, timetables, and fare structures within the limitations of existing infrastructure and fleet composition,
- provide a sound basis for changes and additions to infrastructure and fleet to best meet customer demand,
- improve network and fleet management,
- help inform strategic and operational decision-making including:
 - integration with authority PT systems
 - improved planning of public transport services and investment
 - designing networks and services that are more efficient
 - delivering an improved customer experience
- allow for easier implementation, monitoring and review of national policies such as SuperGold Card services and enable the introduction of the proposed Community Connect card.

Revenue collection – Modern ticketing systems enable the fare collection process to be streamlined, especially if cash on board was discontinued. This should:

- lower the total cost of fare collection for PTAs,
- support regional fares policy and easily accommodate changes,
- support easier inter-regional travel for customers and support revenue apportionment between PTAs.

Revenue protection – Modern account-based solutions with NFC card readers enable hand held devices to check that customers have tagged on. This reduces fare evasion, especially on rail, and avoids the high cost of gating some or all stations. Establish or enhance the PT revenue protection regime

Managing service delays and disruptions – with modern account-based solutions, the operator can choose to not to charge customers for delays in services, and manage disasters and other events more effectively to prevent customers being overcharged.

Supporting contactless ticketing to pay on public transport helps support revenue collection on services should there be a resurgence of COVID-19.

Procurement efficiency and contracting – One centralised procurement and contract management process for the whole of New Zealand should reduce the overall price compared with multiple regional procurements because it should:

- create economies of scale,
- provide increased negotiating power for New Zealand
- support net and gross contracting models,
- extend to multi-modes and multiple operators, as well as supporting additional or replacement operators
- reduce the overall cost of ongoing contract management compared with several regional solutions.

Marketing and brand – A single, national solution enables New Zealand-wide collateral and branding which should reduce costs.

Resourcing efficiency – A modern, single, national solution would enable easier management of the ticketing system without being resource intensive, and enable resources to be shared and/or redeployed in different ways.

3. Efficient, least cost, regional and national investment

Investment in a modern, single, national ticketing solution would achieve value-for-money for ratepayers, taxpayers and users by:

- providing increased convenience, access and a guaranteed lowest fare price for customers,
- providing more accurate and richer information to enable improvements to public transport operations,
- minimising duplication, enabling PTAs to share services and meet statutory, regulatory and industry compliance requirements, and supporting regional and national policy initiatives,
- easily and cost effectively accommodating changes such as supporting other transport-related payments.

Such investment would establish the base for future development and innovation because it would enable transport accounts not just for ticketing but for all transport payments such as:

- future payment integration with third party transport providers e.g. taxis, e-scooters, etc.
- park and ride, i.e. supporting mode shift through combined parking and public transport journey fares,
- congestion charges for drivers who enter congested areas at peak times.

4. Improved government and public confidence in PT investments

A convenient, easy to use and reliable ticketing solution would reduce barriers to accessing public transport because customers would have a convenient, easy to use and reliable means of accessing public transport without the need for a transit card, topping up or having cash. Reducing barriers to access should result in improved customer satisfaction and better balanced and informed public discussion about achieving mode shift.

Enabling mode shift plans (LGWM, ATAP) and achieving mode shift targets would see:

- increased patronage on public transport and reduced private vehicle journeys,
- a contribution towards climate change targets through decarbonisation of the transport network, improved air quality and overall health benefits, and improved road safety (with less cars on the road).

Ticketing systems provide levers to implement new central or local government policies. An accounts-based payment system would enable new national concessions such as the proposed Community Connect card, and support existing national concessions such as SuperGold.

Strategic responses

The LHM workshop participants identified three key strategic responses.

1. Improve governance robustness and decision-making stickability that achieve national consistency and regional flexibility and a best value-for-money solution

Councils (as PTAs) will need to collectively sign up and deliver to a single roadmap that delivers on everyone's needs. To achieve this they need a governance process "with teeth" to get decision-making and approval at each individual council. This will mean all councils working together to agree and mobilise the roadmap, set up the programme and governance structure and align investment cycles.

2. Wider adoption of integrated and contemporary technology to provide fit-for-purpose information that enables evidence-based decision-making

Consistency of information for knowledge creation decision-making will require data definition and ongoing resource capability for collection, access and analysis – “real-time” and granular at the regional level and periodically aggregated at the national level.

3. Expand innovation opportunities and capabilities to create more flexible public transport networks attractive to every New Zealander and international travellers

A modern ticketing system will enable adoption of customer-centric business models and fare policy and increase the attractiveness of public transport.

Appendix 2 Alignment with RLTPs

The national and regional policy hierarchy seeks to align Regional Land Transport Plans and Regional Public Transport Plans with the National Policy Statement on Land Transport.

Although regions are at differing levels of need and maturity with their public transport services, all have significant areas of commonality of objectives and KPIs for increasing patronage and farebox recovery, customer satisfaction and service reliability.

All PTAs include increased patronage in their KPIs. An NTS would provide greater customer convenience, ease of use, and access to public transport, leading to increased patronage which, for example, should contribute to Wellington's key headline measure of a 40% mode shift from private vehicles to public transport and active modes by 2030.

Farebox recovery ratio and cost per customer are key considerations for all PTAs. An NTS that reduces barriers to accessing public transport is expected to increase patronage and therefore farebox revenue.

Service reliability and punctuality (and knowing the likely journey time) are important considerations for customers using public transport.

Accessing buses, trains and ferries using a bank-issued debit/credit card or virtual card on a mobile device:

- speeds up boarding – no checking to find cash or topping up a prepaid transit card;
- removes customers' anxiety about not having cash or sufficient prepaid balance on a transit card;
- provides payment choices for customers, and makes use of public transport easier and more convenient;
- guarantees customers are charged the lowest daily charge for their journeys.

Customer satisfaction is a key measure that PTAs monitor regularly. Providing payment choices for customers and reducing payment anxiety, increasing convenience by not having additional cards, not needing to top-up or carry cash and being able to manage their travel account on-line contributes to a better experience using public transport and improved customer satisfaction.

The table below summarises the key outcomes and priorities for the regions.

RPTP objectives	Key measures
<p>Auckland</p> <ol style="list-style-type: none"> 1. <i>Expanding and enhancing rapid and frequent networks</i> 2. <i>Improving customer access to public transport</i> 3. <i>Improving Māori responsiveness.</i> 4. <i>Harnessing emerging technologies, which includes:</i> <ul style="list-style-type: none"> • Providing simpler and improved payment options for fares to make travel easier. • Using new transport modes generated by new digital technology to supplement and complement existing services, increasing access. • Ensuring we future proof for mobility-as-a-service models, which will change how people make travel choices. 	<p>KPIs:</p> <ul style="list-style-type: none"> • Boardings per annum across all public transport modes (bus, train and ferry) • Proximity of the population to public transport services • AT HOP card and AT app use • Farebox recovery ratio and cost per customer • Service reliability and punctuality • Customer satisfaction • Increased public transport patronage.
<p>Wellington</p> <ol style="list-style-type: none"> 1. Mode Shift Contribute to the regional target of a 40% increase in regional mode share from public transport and active modes by 2030, including delivery and implementation of Let's Get Wellington Moving and Wellington Regional Rail's Strategic Direction 2. Decarbonise the Public Transport Vehicle Fleet Reduce public transport emissions by accelerating decarbonisation of the vehicle fleet 3. Improve Customer Experience Continue to improve customer experience across all aspects of the network Prioritise the safety and maintenance of the public transport network to encourage safe behaviours. 	<p>KPIs:</p> <ul style="list-style-type: none"> • 40% increase in mode shift to public transport by 2030 • 60% reduction in public transport emissions by 2030 • 35% reduction in transport generated carbon emissions for the Wellington region by 2027 • 40% reduction in Greater Wellington generated emissions by 2025, and carbon neutral by 2030 • Maintain a customer satisfaction rating of greater than 92% for the overall trip • 40% reduction in serious injuries on the public transport network by 2030

RPTP objectives	Key measures
Canterbury <ol style="list-style-type: none"> <i>The public transport system connects people to where they want to go and provides a timely, attractive and convenient alternative to private car travel.</i> <i>The public transport system provides a high quality experience that retains existing customers, attracts new customers and achieves a high level of customer satisfaction.</i> <i>Public transport funding is sustainable and supports system objectives while providing value to the community.</i> <i>Public transport services that meet customer needs, benefit the wider community, and minimise environmental impacts are procured at a price that provides excellent value for money for customers and ratepayers.</i> 	KPIs: <ul style="list-style-type: none"> Proportion of Greater Christchurch urban households that can access one or more key activity centre by public transport within 30 minutes. Proportion of all peak-time trips to the central city made by public transport. Number of car trips replaced by public transport trips per year. Number of communities who receive financial support from Environment Canterbury to establish Community Vehicle Trusts. Number of passenger trips per year in Greater Christchurch and Timaru. Customer rating of service quality. Proportion of Total Mobility customers satisfied with the system. A safe public transport system. Passenger rating of value for money. Greenhouse gas emissions per passenger trip. Overall ratepayer rating. Proportion of public transport fleet that is zero emission.
Regional Consortium members	
Northland <ol style="list-style-type: none"> <i>An effective and efficient bus network in main centres</i> <i>People have access to shared transport options</i> <i>Reliable travel times and transport choice for communities servicing employment areas, retail and public services</i> 	KPIs: <ul style="list-style-type: none"> Patronage growth Mode share Fare box revenue by time period Service reliability and punctuality Customer satisfaction for public transport users. Disability access - proportion of services with disability access.
Waikato <ol style="list-style-type: none"> <i>Move towards a mass transit oriented network over time</i> <i>Connect our region in partnership with others to better coordinate funding and service provision</i> <i>Develop an accessible public transport system that improves end-to-end journey experiences to</i> 	KPIs: <ul style="list-style-type: none"> Increased patronage per head of population Increased provision of transport infrastructure public transport services in planned growth areas Increased public transport, walking and cycling travel to work mode share in Hamilton

RPTP objectives	Key measures
<i>encourage travel behaviour change</i>	<ul style="list-style-type: none"> Improved perception ratings across the region for public transport Improved public transport journey time on key routes Increased access to employment and education in rural communities Increased provision of transport infrastructure and public transport services in rural communities Increased public transport, walking and cycling travel to work mode share in rural communities Increased access to community services Increased level of investment targeting inclusive infrastructure in Hamilton and rural towns
<p>Bay of Plenty</p> <ol style="list-style-type: none"> Reliable and integrated public transport services that go where people want to go. Pursue improved accessibility for isolated communities and for mobility impaired persons where this can be delivered at reasonable cost. Fares, ticketing and information systems that attract and retain customers while covering a reasonable proportion of operating costs. A procurement system that enables efficient and effective delivery of public transport services High quality and accessible public transport infrastructure that supports safe and comfortable travel Reduce carbon intensity of transport to assist in meeting greenhouse gas targets 	<p>KPIs:</p> <ul style="list-style-type: none"> Customer Satisfaction Fare Box Recovery Patronage Perception of Safety and Security - increase perceptions of safety and security above 2017 levels Kilometres completed with electric buses
<p>Hawkes Bay</p> <ol style="list-style-type: none"> To improve end-to-end journey experiences on the public transport system, including mode transfer Partner with organisations and employers to increase public transport commuting and change perceptions of public transport. Investigate innovative ways to provide better transport options in small towns and suburban areas, and to extend hours of operation. 	<p>KPIs:</p> <ul style="list-style-type: none"> Patronage Farebox revenue Service reliability and punctuality Customer satisfaction Complaints – number received and quality of resolution

RPTP objectives	Key measures
Taranaki <ol style="list-style-type: none"> 1. A core network of accessible, integrated and reliable public transport services that support Taranaki's communities. 2. Responsive services that connect people with where they want to go. 3. A convenient and reliable public transport system using modern vehicles 4. Effective and efficient allocation of public transport funding 5. A fares and ticketing system that attracts and retains customers 6. Follow all legislative requirements and Waka Kotahi guidelines to establish units that will be contracted to Council 7. A procurement system that supports the efficient delivery of public transport services 8. A system of monitoring and review that supports continuous improvement 9. Improved access for communities and groups whose needs are not met by the public transport system 10. Improved access for communities and groups who rely on public transport as their main means of transport 11. Advocate for a high standard of public transport infrastructure that supports service provision and enhances the customer experience 12. Simple, visible, and intuitive customer information and service 	KPIs: <ul style="list-style-type: none"> • Total public transport boardings • Passenger km travelled Proportion of residents within 500 metres walk of a stop on the rapid and frequent service network • Patronage growth on all bus services • Service improvements delivered to schedule within agreed budgets • Customer satisfaction ratings for public transport services • Customer rating of public transport value for money • Reliability: late running and cancelled services • Punctuality: proportion of services "on time" (i.e. percentage of scheduled trips between 59 seconds before and 4 minutes and 59 seconds after the scheduled departure time at the selected points) • Proportion of services with disability access • Operating subsidy per passenger km • Farebox Recovery Ratio
Horizons <ol style="list-style-type: none"> 1. A reliable, integrated, accessible and sustainable public transport system 2. An effective procurement system that delivers the desired public transport services 3. A safe and accessible network of supporting infrastructure 4. Increasing patronage 	KPIs: <ul style="list-style-type: none"> • Patronage • Customer surveys • Access improvement for residents in small centres and satellite towns • Bus operation service levels • Fare and ticketing system will be easy for public transport customers and operators to understand and use, affordable and competitive with private vehicle use.
Nelson Tasman	

RPTP objectives	Key measures
<p>Provide a regional integrated public transport network that:</p> <ol style="list-style-type: none"> 1. Provides attractive, economic and viable transport choices for all sectors of the community 2. Reduces the reliance on private cars 3. Is sustainable and reduces carbon emissions. 	<p>KPIs:</p> <ul style="list-style-type: none"> • Patronage • Farebox recovery • Public feedback and consultation • Comparison/benchmarking with other regions including assessment across the following attributes <ul style="list-style-type: none"> – coverage – whether the network links people to the places that they want to get to – convenience – whether services enable people to travel when they want to, swiftly and reliably. A key element in this is frequency, supported by bus priority – facilities – whether the supporting infrastructure and vehicles are comfortable and attractive – fares – whether the fare is intuitive and affordable – information – whether it is easy for new users to find, understand and use services – delivery framework – whether the institutional framework is appropriate.
<p>Marlborough</p> <ol style="list-style-type: none"> 1. Continue to provide a quality bus service in Blenheim that includes continual improvements and provision of convenient bus stops. 2. Continue to support the Total Mobility Scheme in the Marlborough District, and allow new operators to join the Total Mobility Scheme 3. Continue to support the SuperGold initiative including provision of convenient bus stop locations. 	<p>KPIs:</p> <ul style="list-style-type: none"> • Patronage • 90% of passengers walking less than 500 metres to a bus stop • Extent of improvements to the bus network achieved • Extent of alternative funding

RPTP objectives	Key measures
Otago Southland <ol style="list-style-type: none"> 1. Contribute to carbon emission reduction and improved air quality through increased public transport mode share and sustainable fleet options. 2. Deliver an integrated Otago public transport network of infrastructure, services and land use that increases choice, improves network connectivity and contributes to social and economic prosperity. 3. Develop a public transport system that is adaptable. 4. Establish a public transport system that is safe, accessible, provides a high-quality experience that retains existing customers, attracts new customers and achieves high levels of satisfaction. 5. Deliver fares that are affordable for both users and communities. 	KPIs: <ul style="list-style-type: none"> • Patronage - annual public transport boarding in Queenstown and Dunedin per capita • Overall passenger satisfaction with Wakatipu Public Transport system at annual survey exceeds 97% • Percentage of Dunedin bus-users who are satisfied with the trip overall exceeds 91% • Percentage of scheduled services delivered (reliability exceeds 95%) • Percentage of scheduled services on time (punctuality - to five minutes exceeds 95%) • Percentage of users who are satisfied with the provision of timetable and services information (baseline to be established) • Percentage of users who are satisfied with the overall service of the Total Mobility Scheme (baseline to be established)

Appendix 3 Relevant international examples

The NTS procurement project (Project NEXT) team has kept a watch on developments and trends in other jurisdictions to provide information that could support decision making. This was supplemented by commissioning a report on trends and developments in ticketing – *Global Transit Ticketing and Fare Collection Report 2018*.

Globally a large number of projects have been established to run a procurement process in a similar way to Project NEXT, have selected a supplier and are in the process of implementing, or have gone live with a solution, and are offering their customers options that Project NEXT is also in the process of procuring. Five examples of projects with elements that are required for the NTS for New Zealand are described below.

Australia - South East Queensland

South East Queensland has had a closed loop card centric ticketing solution in Brisbane - the Go Card scheme - since 2008 which covered all public transport modes in Brisbane. From November 2012 customers have been able to use their Go Card for unlocking hire bikes. In 2018 a new Cubic account-based ticketing solution was introduced that accepts EMV Open Loop contactless bank cards.

TransLink account-based ticketing and open loop

The Open Loop implementation uses tag-on and tag-off, as for the Go Card, and customers could continue to use their Go Card to smooth transition. Instead of functioning with stored value, the Go Card is used as a token for the account-based ticketing solution. New customers can also procure the Go Card as an account-based ticketing token in case they choose not to use their bank-issued card. This offers similar functionality as the Transit Card for the NTS.

Relevance for New Zealand

The following aspects are recognised as relevant for the NTS:

- EMV Open Loop and account-based ticketing introduction in 2020
- Support for mobile wallet (iPhone, Android)
- Multi-tenanted, with the addition of new regions across Queensland
- Large geographic area comparable to New Zealand
 - Distance Cairns to Gold Coast Airport is 1785km
 - Distance Whangarei to Invercargill is 1795km
- Similar spread in patronage with large patronage in one region (Brisbane), smaller patronage in other regions and rural services with varying mobile coverage.
 - Population of Queensland is 5.1 million of which 2.3 million in Brisbane
 - Population of New Zealand is 4.8 million of which 1.7 million in Auckland

Source information

<https://www.itnews.com.au/news/qld-hands-go-card-upgrade-deal-to-cubic-494954>

<https://www.publications.qld.gov.au/dataset/translink-division-quarterly-reports/resource/a7fbca20-3083-4e1f-b677-11ab647c3c80>

United Kingdom – Transport for London

Transport for London was one of the first European closed loop card centric ticketing implementations with the Oyster Card. This card was initially introduced in June 2003 and started with concessions for elderly people, then as Pay As You Go based on stored value on the card for all TfL services and transport modes. By June 2012 over 43 million Oyster cards were issued. However, this method and operation of fare collection was expensive, costing 14% of the total collected fares.

TfL Account-Based Ticketing and Open Loop

TfL was one of the first to recognise the opportunities of accepting open loop and started investigating this in 2008. Their motivation was mainly built around the following considerations:

- 60% of tourists coming to London did not have an Oyster card on them. While it's a massive benefit for these customers that they can use what's in their pocket, it also saves TfL from the logistics of issuing Oyster Cards for this group of travellers.
- TfL owns the top up retailer infrastructure and recognised the opportunity to reduce this cost substantially by reducing the need for top up.
- The Department for Transport offered to bear the cost for upgrading 34,000 existing Oyster readers if they would also implement the UK ticketing standard ITSO. This resulted in the first generation of the TriReader, so called as it supports 3 technologies:
 1. Oyster Card (both on MIFARE Classic and MIFARE DESFire)
 2. ITSO Card as per the national standard (never actually implemented in London)
 3. EMV Contactless (Open Loop) for American Express, MasterCard and Visa

As well as tourists, local users recognised the benefits of EMV Open Loop and 2/3 of users converted to contactless as their preferred method of payment after just one trial use, and another 16 percent did so within a month. This achieved a cost reduction with the cost of fare collection coming down to 9% (from an initial 14%) and TfL has a goal to end at a cost level of just 6%.

While TfL is both the single authority and operator in London, they more recently had to add a number of other authorities. As of 2016 TfL has added payment for river services (Thames Rivers Services and Circular Cruise), each with their own fare regimes.

TfL have now introduced Pay As You Go for train operators arriving in London. As a result, 11 train operating companies (TOC) with their own fare regimes are now included in the TfL scheme. Most

recently Pay As You Go was extended to Potters Bar, Radlett and Brookman's Park National Rail stations in support of the Department for Transport's policy to extend smart ticketing around London.

Relevance for New Zealand

The following aspects are recognised as relevant for the NTS:

- EMV open loop and account-based ticketing (PAYG since 2014)
- Support for mobile wallet (iPhone, Android)
- Multi-tenanted
- Best fare promise
- Auto correct for missing tag-on/off
- Transit Payment Guidelines ¹⁸developed with the payment industry.

Source information

<https://www.mastercard.us/content/dam/mccom/en-us/documents/transport-for-london-case-study-april-2017.pdf>

<http://content.tfl.gov.uk/board-160203-item05-commissioners-report-v2.pdf>

<https://www.masstransitmag.com/technology/article/12277031/project-to-date-the-next-generation-of-fare-collection>

United States – Portland Oregon

In 2017 Trimet in Oregon introduced an Account Based Ticketing Solution called Hop Fastpass. Customers with their Hop Fastpass can pay in multiple transit systems in the wider region, like TriMet and C-TRAN buses, Portland Streetcar, MAX Light Rail, WES Commuter Rail and C-TRAN the Vine rapid transit. The Hop Fastpass can be purchased as a card or can be downloaded as a virtual card in Apple Pay wallet, Google Pay wallet and Samsung Pay wallet. Next to the Hop Fastpass, customers can use their existing contactless payment card (including mobile wallet versions).

At the time of going live for Trimet, on average only 0.3% of the issued bank cards were capable of contactless EMV and therefore this fare media was not seen as potentially becoming dominant. Therefore only full adult fares are offered on EMV contactless. Customers that wish to benefit from capping and/or have concessions need to be registered and use the Hop Fastpass.

Tariffing in Trimet is based on "tag-on-only"; in other word, they apply a flat fare mechanism that does not require tag-on and tag-off. This requires more interaction with the driver or a selection mechanism that the traveller themselves needs to apply.

When Trimet ran the procurement, a lot of effort in the tender document focussed on Open API's for the functionalities between the back office, the front end devices and the web portals. One of the aspects that Trimet worked on after the delivery of the ticketing solution was integration with other transport providers, Mobility as a Service (MaaS). The Open API's were considered an important advantage, as well as the Account Based Ticketing approach. Trimet found that while the technical base was solid, the challenges were more around finding commercial and contractual agreements.

Relevance for New Zealand

The following aspects are recognised as relevant for the NTS:

- Virtual Transit Card
- EMV open loop and account-based ticketing
- Open APIs

¹⁸ UK Cards Association led the initiative for the payment guidelines. Another example is Australia, where AusPayNet (previously APCA) has taken the lead for developing such, initially for Sydney ferry.

- MaaS integration
- Back office fare calculation and concession registration.

Source information

<https://www.govtech.com/fs/How-Contactless-Ticketing-Is-Increasing-Convenience-for-Transit-Travelers.html>

<https://www.initse.com/ende/projects/projects-north-america/portland-showcase.html>

The Netherlands – OV-Chipkaart

Trans Link Systems (TLS) in The Netherlands was the first ticketing implementation that applied a national scale. In 2008 all Dutch Public Transport Authorities accepted the OV-chipkaart. Some 60,000 devices are now accepting the roughly 18 million issued OV-chipkaart for travel based on tag-on and tag-off.

A single back office is used for the clearing, settlement and revenue attribution, as well as for customer support through web services and contact centre agents.

Although there are more than 75 different designs for the OV-chipkaart (including designs for each region), they all share a common OV-chipkaart branding, so customers understand the national function.

In 2012 Account Based Ticketing was added, initially focussing on business users. Now it is available for all registered customers, allowing for post-paid travel, rather than pre-paid travel. This was all done by upgrading the back office and did not require a change in the front end devices. Another update of the back office was completed in 2018 in preparation for EMV acceptance, including linking to an acquiring bank. By upgrading devices on a number of railway stations to accept EMV, a limited pilot was run in the first half of 2019 with 1,000 customers. This proved to be very successful and received strong support from the users.

As a result central government has set a target for full EMV contactless implementation by end of 2023, involving all devices to be upgraded to EMV.

Relevance for New Zealand

- National scale
- Multimodal integrated travel
- Multi tenanted back office
- National and regional concessions and travel products
- EMV open loop and account-based ticketing (EMV piloted)

Source information

<https://www.scheidt-bachmann.de/en/article/news/scheidt-bachmann-introduces-account-based-ticketing-to-the-dutch-fare-collection-system/>

<http://www.thalesgroup.com/en/events/uitp/news/netherland-ticketing>

<https://www.iamexpat.nl/expat-info/dutch-expat-news/end-ov-chipkaart-sight>

Chile – Valparaiso

The city of Valparaiso started a pilot for Account-based ticketing with EMV contactless cards for the Metro and buses in April 2018. This was a limited pilot with only 50 access points that have been upgraded to accept contactless EMV cards next to the existing closed loop cards. The next step in the pilot is focusing on student concession holders. While still in its early days, this is demonstrating that

EMV technology has become more mainstream and more affordable. The pilot included tag-on / tag-off based travel and fare calculation.

Relevance for New Zealand

- Low cost readers
- Open loop account-based ticketing
- Replacement of concession cards

Source information

<https://newsroom.mastercard.com/latin-america/es/press-releases/metro-valparaiso-implementa-innovador-sistema-de-pago-con-tarjeta-de-credito-sin-contacto/>

<http://www.mikroelektronika.com/en/card-validator-vega-cvb?from=0#fotky>

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Appendix 4 Obtaining customer insights

The following research has been undertaken over the last five years to develop an understanding of customer requirements and insights:

National Ticketing Programme February 2017 – Decision Paper D9 – Customer Experience Requirements

Paper evaluating the features most travellers expect in integrated fares and ticketing today and into the future and considers optional features that will encourage adoption by the minority of public transport travellers who currently have a preference for cash.

Colmar Brunton September 2017 – Understanding Public Transport Cash Payers

GW commissioned Colmar Brunton to understand the impact of removing cash payment for public transport fares and move to a cashless system. This multi-stage research was undertaken, incorporating quantitative and qualitative phases. Their report identifies findings and explores the underlying motivations behind cash preference for some public transport users and provides insights into a behaviour change strategy.

WAKA KOTAHI February and May 2019 - Accessibility Workshops

WAKA KOTAHI with the Project NEXT Team facilitated engagement workshops with accessibility representatives in Auckland and Wellington to surface the needs from people with disabilities, impairments and access concerns to ensure removal of barriers to public transport.

PwC April 2019 – Project NEXT Customer Experience Research

Project NEXT commissioned PwC to undertake customer experience research through undertaking qualitative research with a small sample in Auckland and Wellington focussed on selected areas of the ACCOUNT-BASED TICKETING Open Loop customer experience. Areas included customer transition experience, payment options, denial of travel, managing a transit card, concessions, group travel and consistent experience across NZ. PwC also had access to previous AT customer insights research undertaken by Futurescope – Enhancing HOP for current and prospective users 2016.

PwC May 2019 – Project NEXT Ticketing Solution RFP Input: Customer Experience Input Report

PwC report summarising the findings of the customer experience research identifying key customer experience requirements to deliver against future anticipated benefits, providing guidance and direction on ideal customer experience. This also draws upon a number of PwC chosen referenced customer experience research sources.

GravitasOPG – National Ticketing Research

Between 19 February 2021 and 21 March 2021, GravitasOPG undertook a survey of 2420 respondents who use public transport at least monthly (pre-COVID). This comprised an online survey with participants of previous public transport research for Waka Kotahi, Greater Wellington Regional Council, Auckland Transport and Dynata panel members, and by phone for hard to reach groups and those underrepresented on panels including the unbanked, youth, Māori and those with limited access to the internet.

The purpose of the study was to understand:

- How current PT users pay for PT, top-up, use contactless payments day-to-day, feel about cash use, and feel about the current PT payment system;

- Going forward, how users feel about the new system, prefer to pay for PT, can be encouraged to use the system, will use the system in other regions, and will use the system for children.

These customer insights have been used to help identify and develop the business requirements for a solution that will meet customer experience needs.

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Appendix 5 Determining the NTS Requirements

Core Ticketing Solution

Ticketing solutions are highly complex and with the advent of next generation technologies such as Account Based Ticketing, open-loop payments and new technologies for recognising the start / end of a customer journey, a number of key decisions were required to inform the scope and nature of the National Ticketing Solution.

Together with the unique environmental factors for a national capability with a single platform for all participating authorities, this further emphasised the need for investigations into a range of core solution components, including:

- Ticketing and payments
- Concept of operations - operating model and commercial model
- Supporting systems
- Revenue protection
- Support for cash and paper tickets
- Support of regional fare policy
- Reporting

For each of the above components there is a range of options, which form a 'long list'. These options were evaluated against criteria relevant to that component. The evaluation process was undertaken through a series of decision papers (refer to the bibliography), culminating in a 'solution concept' paper.

These papers assessed all of the components of a ticketing solution and the wider international context and emerging trends:

Table 27 Recommendations for the key components of the NTS

Decision paper reference and title	Recommendation
D1 Ticketing and payment model This issue also supported by decision papers D7 and D9	Hybrid account based and open loop system.
D2 Concept of operations	Centralised shared services operating model.
D3 NTP Supporting systems	Open standards based.
D4 Revenue protection	Require: tag on – tag off for all trips on all modes, revenue protection “inspection” capability on all modes, and legislative amendments to support revenue protection. Consider a partly gated solution, with on board, ad hoc inspection.
D5 Support of cash / paper tickets	No on-board cash and no paper tickets. Passengers without smart cards or another appropriate token (e.g. smart phone) purchase pre-paid travel cards. Pre-paid cards would be available.
D6 Support of Regional Fare Policy This issue also supported by D9	Support standardised fare capabilities with limited support only of regional fare policies.
D7 Regulatory framework	Recommended EMV compliant systems mean banks under Financial markets legislation are responsible for issuing cards and associated.
D8 Reporting (Financial and operational reporting)	<ul style="list-style-type: none"> • Limit scope to basic reporting • Evaluate additional regional requirements • Advanced reporting a separate post NTS activity • Outcome based descriptions
D9 Customer experience requirements	Hybrid approach delivers aim of integrated fares and ticketing for travellers from day one.
D10 Emerging trends around transit payment, future proofing.	Need for NTS project aligned with MaaS, Smart Cities, intercity and hub & spoke operations, distributed ledger payments, payments outside transport domain integrated smart apps and enhanced services discussed in strategic case

Decision paper reference and title	Recommendation
D11 Fares and product implementation model	Agreed threshold approach with a central solution plus potential for regional customisation.

A further Solution Concept report was developed providing detailed requirements arising from the recommendations from the decision papers.

The findings from a market sounding undertaken in May, June and July 2017 provided current market information that updated or superseded these papers. Refer to the GRETS Market Sounding Report, July 2017).

The preferred option for each component forms the preferred ticketing solution described below. The details of the considerations and multi-criteria analysis for each component are set out in the following sections.

Ticketing and payment options

The four integrated 'electronic' ticketing and payment models and the international trend towards account-based ticketing and open loop payment are described earlier in the Strategic case. Determining which is best for the NTS involved assessment using multi-criteria analysis.

In summary, the advantages and disadvantages are described in the following table.

Table 28 Advantages and disadvantages of the ticketing and payment options

	Advantages	Disadvantages
Closed Loop	<ul style="list-style-type: none"> Proven technology and wide range of suppliers. Fast transaction time allows fast boarding of passengers. Customers can see information during Tag On / Tag Off (e.g. remaining balance). Proven solution for concession management (e.g. SuperGold). PTA controls branding and the customer experience. 	<ul style="list-style-type: none"> Customer experience related to card acquisition, card cost and top-up, e.g. queues, limited access points, inconvenient. Complex and lengthy change process means high time to market for new services. Costly and complicated to introduce new technology. PTA liable for all card related fraud and security. Vendor product lock-in.
Account-based	<ul style="list-style-type: none"> Easy change management (done in back office). Easy, automated concession management. Very fast transaction time allows fast boarding. Low cost fare media possible (secure token). More flexible product options Easier to introduce new technology (than closed loop). 	<ul style="list-style-type: none"> Costly issuance of transit cards and related customer service (but less than closed Loop). Customer required to queue to purchase or top up transit card. Vendor product lock-in. PTA liable for all card related fraud and security. No display of information during tag on – tag off. Inspection potentially impacting afterwards rather than on the spot.

	Advantages	Disadvantages
Open Loop	<ul style="list-style-type: none"> Much reduced cost of fare media as payment cards are provided by the issuing banks. No need for customers to queue up for either purchasing cards or top up. Customer services partially covered by payment partners (issuing banks). Easy to introduce new technology Could provide a payment basis for MaaS. Easy change management. PTA not liable for card related fraud and security. Off the shelf technology for readers with large number of suppliers Proven standards used globally. 	<ul style="list-style-type: none"> No easy solution for concessions (e.g. child, student, SuperGold) or travel products. No display of information during tag on – tag off (as cost is only known at the end of the journey). Inspection potentially impacting afterwards rather than on the spot. Introduces third party transaction fees (Merchant Service Fee). Relatively new in transit with implementation models still evolving, however maturing rapidly.
Hybrid	<ul style="list-style-type: none"> Broadens customer benefits and minimises disadvantages such as enabling concessions by registering bank provided cards, reduces vendor lock in, lowers costs, etc. Highest customer convenience (and thus improved patronage) Supports all fare models Easy to introduce new technologies Lowest cost of ownership PTA not liable for card related fraud and security. Bank card acceptance in transport ticketing has matured to ensure good vendor response for procurement. 	<ul style="list-style-type: none"> Merchant Service Fee (MSF) is a new component that requires careful management and negotiation. Newest concept in transit with implementation models still evolving, however maturing rapidly. No display of information during tag on – tag off (as cost is only known at the end of the journey). Inspection potentially impacting afterwards rather than on the spot.

Assessment of the four options is set out in the following table which shows how a hybrid solution maximises the advantages of linking open loop functionality with an account-based ticketing system. For example, an account-based system brings easy concession handling of customer media and automated concession registration (such as SuperGold), and makes new, flexible products possible. Open loop adds customer convenience of not needing to queue for card purchases or for loading value on products, shares customer service between the PTAs and the issuing banks, and shifts security and fraud risk from PTAs to the issuing banks.

Table 29 Assessment of ticketing and payment options

OPTIONS	CLOSED LOOP	ACCOUNT BASED	OPEN LOOP	HYBRID
Proven technology	✓	✗	✓	✓
Easy change management	✗	✓	✓	✓
Fast card transaction	<350ms	<300ms	<400ms	<400ms
Easy concession handling of customer media	✓	✓	✗	✓

Easy automated concession registration (e.g. SuperGold)	x	✓	x	✓
Cost based on Opex/Capex investment	✓	✓	x	x
Cost based on transaction volume	x	x	✓	✓
Customer information available at Tag-On / Tag-Off	✓	x	x	✓
Low cost fare media	x	✓	✓	✓
New flexible product possible	x	✓	x	✓
Easy to introduce technology	x	✓	✓	✓
Customer service partially covered by banks	x	x	✓	✓
No need to queue for card purchase	x	x	✓	✓
No need to queue for loading value or products	x	x	✓	✓
Direct on the spot inspection available	✓	x	x	✓
Off the shelf technology readers	x	x	✓	✓
Limited responsibility for security and fraud	x	x	✓	✓

Market sounding responses support an account-based solution

A market sounding was carried out during May, June and July 2017 to better understand:

- developments and options in industry practice and technology, particularly in the areas of customer experience, operational cost and risk, operational flexibility, business integration and support, and future evolution and lifecycle management.
- areas where potential suppliers could identify better or more appropriate approaches to realising the NTS outcomes.

Also, the process provided the opportunity for potential suppliers to identify areas where the business requirements, procurement or implementation timeframes, scope of services, scale of the solution (including minimum project value/size) or other factors are limiting potential supplier's ability to propose a suitable solution, or that would discourage the potential supplier from continuing to participate in any ongoing procurement process.

There was universal support (100% of submissions) for account based ticketing as the key solution concept and general support for open loop and EMV standard. No respondents recommended exclusive closed-loop / proprietary solutions with stored value cards. Suppliers are generally payment method and channel agnostic.

Concept of operations - operating model and commercial model

THE NTS is required to deliver the next generation of ticketing services to participating PTAs. These PTAs have widely different scale, different modes of transport, capability and capacity and particular operating and policy requirements.

However, there are also substantial requirements in common. This high degree of commonality together with the investment and resource required to implement ticketing solutions means that a centralised delivery model – concept of operations - is a logical approach.

There are multiple models through which services could be centralised and multiple ways in which the services could be allocated to a regional, central or third party provider.

Whilst a shared service model is presumed for delivery of services, not all services can be delivered centrally, some will have to be delivered regionally and some through third parties. All services though will be contracted and managed centrally in a shared service model.

Effective operation of the NTS will require services to be delivered through central, regional and third party capabilities. Centralised provision should be considered the default option, except where

services have to be physically delivered regionally. Systems and support should be centralised wherever possible.

Centralised and regional services could themselves be delivered through some form of outsource agreement.

Third party provision is required for certain services irrespective of any shared service model and third parties may be procured and managed centrally to ensure optimal service quality and price for regions.

Support systems

A 'national-based' solution will need to interface with multiple regional systems, such as real time information systems, financial systems and transport planning systems.

Each region's system is likely to be different. Interfaces and connections to a national system will need to be developed differently for each variation, with the potential to create significant additional work for each region if bespoke interfaces have been defined. Therefore, the NTS should provide an interface mechanism that is standards-based where possible to minimise the need for costly and complex interface development.

Avoiding proprietary interface and data sharing should be avoided because it will:

- Lock any solution into a specific supplier
- Create a complex integration environment
- Make change and enhancements more complex and costly.

It is understood that interfaces into regional systems may not have an appropriate standard, so there is a need to develop open and published Application Programming Interfaces (APIs) to the NTS based on known and proven technologies; for example, Web Services where middleware could be utilised to minimise integration effort and enable ease of publishing these APIs.

The following assumptions have been made when analysing and evaluating the different standards:

- Only standards that are specific to electronic ticketing and its support have been considered. General IT standards and methodologies such as Internet RFCs (internet standards) are assumed as a given with any modern IT infrastructure.
- A specific technology may have different options which are covered by more than one standard. To provide flexibility, these standards are all considered within scope as this paper does not attempt to prescribe which of multiple choices would be selected.

The following principles should apply to the NTS and support systems:

- Where an accepted and approved standard is available from an authorised standards body, the standard should be used as part of the NTS solution.
- Interfaces between entities in any system where standards do not exist, should be communicated with open published interfaces (API's).
- Where de facto and emerging standards are in common place and no approved equivalent standard is available, these standards should be used.

These principles are designed to ensure that the system does not create a vendor lock-in with proprietary data and interfaces and other parties will be able to have access to components of the system.

The standards required include:

Open Loop standards - For open loop payment where existing fare media is used (chipped contactless bank cards) there is no choice but to comply with the standards already mandated by these schemes.

Transport Feed and Data Information - Standards that are used to share data about routes, time and fares.

Security - Any security standards or techniques must use algorithms and concepts that are in the public domain. The use of secret techniques will be strictly prohibited as this is not best practice and does not provide any surety over fraud or security breaches.

End-User Interface - Standards may form part of the human interface to ticketing within transport.

Open Interfaces - As described earlier, where a standard does not exist, an open interface specification is expected. These interfaces must be published and open for all to use. For machine-to-machine interfaces a form of Web Services should be used.

Extensibility

Extensibility refers to the characteristics of the National Ticketing Solution design, architecture and implementation to be readily extended to incorporate new operating entities and / or new business functions.

New Operating Entities

Over time the NTS will need to provide the ticketing needs for all Public Transport Authorities in New Zealand. This progressive transition process will be built around a series of core solution concepts tuned for each authority. The underlying design and architecture must enable this to be a seamless as possible through good design able to minimise customisation.

Equally, the NTS must be extensible to other types of organisation such as the Ministry of Education, new transport operators, concession authorities and the like.

New Business Functions

A core concept of the NTS is that it will be able to support MaaS solutions and integration in the future. This is centred on the account based design offering a single Transport Account for each participating customer. This will support the concept of end-to-end journeys through aggregation of services from both public and private operators.

Beyond MaaS there are a range of other transport related services that could be serviced by and managed through a national Transport Account. Examples include tolling, congestion charging, Park and ride and so forth. It is expected that such applications would include integration with specific business solutions, such as a tolling system with vehicle plate recognition, but integrated with the NTS for the presentation of all transactions in a common account, with payment management and aggregation and supporting business rules to enable value added services.

The characteristic of such business functions have to be carefully mapped to be supported and applicable to the core capabilities of the account based solution, e.g. transport related transactions with a transaction start point, end point and rules to calculate a charge.

Revenue protection

The NTS will enable participating PTAs to collect, account for and reconcile all fare revenue in support of the service contracting model(s) in use, whilst protecting revenues for multiple authorities with their own policies, through appropriate systems and processes.

The scope for revenue protection is therefore considerably broader than its conventional association with the customer's use of the ticketing solution, and the support of enforcement activity. As well as the innate security of the solution itself, revenue protection applies to all levels of NTS operation. It is related to the processes that will ensure that the correct fare for every trip is accurately and reliably calculated and charged, and the processes to ensure that the resulting revenue income is accurately and completely collected and accounted for.

The ability to uniquely record the start and end of every trip is a fundamental requirement of modern ticketing solutions because it provides for fare calculation, fares integration, customer experience, revenue security and the provision of quality data for operational management, network efficiency and

wider analytical and policy purposes. For revenue security, tag on tag off enables easier determination of a customer's valid right to be on the network, and permits fare policies that encourage appropriate use of the solution, such as applying fare penalties for incorrect use (like neglecting to tag off). Note that no decision is required on the adoption by the NTS of a tag on/tag off model, as the alternative (tag on only) presents such a range of disadvantages that it is self-disqualifying.

Key considerations for revenue protection include scheme security, fraud detection and management, revenue leakage and cash handling, customer behaviour and the different characteristics of buses and trains. These are explained briefly below.

Scheme Security

The processes that describe the integrity of the solution, ensuring the accuracy and completeness of transaction data, and protecting the ticketing solution from loss through inefficiency or fraudulent activity. The nature and scope of scheme security requirements will depend partly on the fares and ticketing payment solution that is adopted for the NTS.

- Closed-loop or account-based - security risk lies with the scheme operator.
- Open-loop payment solution incorporating alternative payment service providers, depending on the model adopted – security risk may be partly transferred from the scheme operator to the payment service provider.
- Account-based (with scheme-issued fare media and also with open loop payment capability) maintains a significant proportion of security risk with the scheme operator, and would therefore require similar security provision as a closed loop only solution.

Fraud detection and management

Fares and ticketing solutions of all types require capabilities to detect and isolate all known types of potentially fraudulent activity, to enable its full investigation, and to conclusively address it if proven. This capability will involve the use of tools to detect unusual usage (such as over-frequent use, or abnormal top-up activity), and the deployment of processes to contain and manage the impact of any security breach (such as the targeted hot-listing of identified fare media or the update of scheme-wide security).

Revenue leakage and cash handling

Operator staff may contribute to revenue leakage through indifference, or through deliberate action or inaction. For example, permitting free travel for ineligible customers or failing to collect revenue both lead to revenue loss, and the implications of handling cash in any system inevitably present situations where cash revenue can 'leak'. This provides a clear incentive to the NTS development to provide for minimising the direct interaction of staff with cash revenue.

Whether cash payment is permitted on board vehicles (involving manual cash handling by operators' staff and related to wider customer and operational efficiency reasons or is restricted to off-vehicle ticket purchase) has significant implications for potential revenue loss. The NTS participants may have different current or future policies relating to cash acceptance on board vehicles, which the solution is likely to need to accommodate.

Operators' management of collected cash revenue is a further potential weak link in the revenue protection chain. The NTS will need to provide the capability for reconciliation of cash fare revenues collected with the amount paid in by operator staff, or banked by the operator. Discrepancies could be an indicator of revenue loss or fraudulent activity.

It is also important to note that both fraudulent activity and revenue leakage may originate with highly creative and difficult-to-detect methods. It is essential that the NTS development adopts industry best

practice in these areas, and is informed by the experiences of other schemes where unforeseen problems have arisen.

Customer behaviour

While customer behaviour can be positively influenced by the fares and ticketing solution and fare policies, there are notorious scenarios in contemporary ticketing schemes where customer behaviour can expose and exploit a 'loophole' generated by the application of the solution to fare policy. The ability to 'game' the system through legitimate exploitation of fares policy can result in revenue loss as well as contributing to negative media perception of the scheme. Recent examples include the unintended misuse of Sydney's 'Opal' multi-journey weekly fare cap, which has since been withdrawn.

Modal operating models – support of revenue protection activity

Bus Revenue protection

While tag on/tag off operation can help to minimise the scope for fraudulent travel, the NTS must provide the capability for support of revenue protection activity. This may take the form of traditional random 'inspection', which requires customers to be able to demonstrate they are in possession of a valid right to use the service at the time and in the location in question (e.g. that they have tagged on, or possess a valid concession to travel).

Inspection will need to be able to determine the tag on status of a customer's fare media (or depending on the existence of alternative fare payment models, the payment token they have registered). This implies the use and full support of some form of hand-held revenue inspection device.

Rail Revenue protection

Wellington has rail services as part of its public transport network, which presents a number of rail-specific issues and requirements in the context of revenue protection. Unlike a bus or ferry, where access to and egress from the vehicle provides the opportunity to begin and end the trip by 'entering' and 'leaving' the system, access to the rail system in practical terms is taken as access to the station or platform.

In many rail systems, all stations are 'closed', that is, it is possible to enter or leave them only via controlled gated access routes. This is especially the case in urban mass transit or metro (underground) networks, where movement onto and off stations is constrained by the physical configuration of access points.

Wellington's rail network is currently entirely 'open'. It is also acknowledged that the practicality and cost of 'closing' all stations is prohibitive, and is also complex for other reasons (for instance, some stations provide access routes for pedestrians not making rail journeys).

Research to date and the model adopted by Auckland rail suggests that the most practical model would provide the opportunity to tag on and off at every station, with validators at suitable locations. It should be noted that tag on/tag off on trains rather than on platforms has almost no precedent in international practice, partly since it could impede high passenger volumes boarding and alighting, but also as the opportunity to tag off on board prematurely presents a significant fare evasion opportunity.

There should also be the opportunity to purchase a ticket prior to travel, but how this facility is provided (e.g. via ticket vending machines on platforms), its capabilities (e.g. via cash, card or other payment method) and whether, due to the alternative purchase options available under the chosen fare and ticketing payment model, it is cost-effective and necessary in all cases. This scenario would be supplemented by access control gates at selected points in the network, designed to encounter the majority of rail trips. Wellington station is clearly the primary candidate, as it accounts for either the start or end of around 80% of all rail trips on the network. Increasing the proportion of journeys with

access control at one end of the journey as a minimum would require gating initially at a limited number of strategic stations.

Legislation and powers of enforcement

The existing revenue protection policies and capabilities of the NTS participants may have evolved over extensive periods, to provide a pragmatic level of protection within relevant resource constraints and within the enforcement powers to which participants have access. However, it is expected that the opportunity to take full advantage both of the NTS and of new legislative powers will permit the development and support of enhanced revenue protection capabilities.

Recent changes to the Land Transport Act provide public transport authorities with significantly enhanced revenue protection capabilities, and the potential to ensure that the equitably-applied obligation to pay for travel remains the accepted norm.

Optimising support for regional fare policies

Each region is responsible for setting its own fare policy. This has led to a wide variety of fare structures, types of concessions and products. Fare levels vary from region to region with some having flat fares and some having multi-tiered fares. In each region, the same passengers are treated differently, have different rules for qualification for concessions, and have different fare levels.

While there are numerous regional differences, there are also many common themes that can be harnessed in a central ticketing solution to create standardised capabilities while still giving regions the local configurability and control they require.

In developing a ticketing solution, the NTS must be able to support fare policy for all participating PTAs. Two options for support of regional fare policy were considered:

- i. Support all current regional fare structures, concessions and products
- ii. Support standardised fare capabilities.

The benefits and risks of each option comprise:

Table 30 Benefits and risks of fare policy options

Option	Benefits	Risks
Support all current fare policies	<ul style="list-style-type: none"> Simplest for Regions – no fare change required Highest degree of flexibility (within constraints of current ticketing systems) 	<ul style="list-style-type: none"> Extremely high NTS development cost due to complexity of national solution Longer development time required Inconsistent passenger experience Fare complexity a barrier to patronage growth
Support standardised fare policy	<ul style="list-style-type: none"> NTS cost (and Regional contribution) minimised Standardised customer experience for all participating Regions Simplicity promotes patronage growth 	<ul style="list-style-type: none"> Less opportunity for local customisation Some fare policy change may be required at launch of the NTS Regions limited to the structures, concessions and products defined by the NTS

Because regions are mandated by Waka Kotahi to regularly review and update fares and fare policies, the NTS must be able to support fare policy changes. Options for fare policy changes could include: one programme across all PTAs; allowing local customisation; or an agreed threshold, as follows:

Table 31 Thresholds for local customisation of fare policies

Option	Benefits	Risks
One programme	<ul style="list-style-type: none"> Most cost effective option (lowest development cost) Fast and simple deployment All funding nationally managed 	<ul style="list-style-type: none"> No opportunity for local customisation
Agreed threshold	<ul style="list-style-type: none"> Cost effective Regional customisation possible if threshold met 	<ul style="list-style-type: none"> Regional customisation not supported below threshold
Customise	<ul style="list-style-type: none"> Regional customisation possible Most flexibility for regions 	<ul style="list-style-type: none"> Regions will need funding to have development completed Likely most complex local implementation Complex governance for managing prioritisation of customisations

In summary, a standardised fare policy would encourage fares that are simple, intuitive and easy to use, encourage patronage growth and are easier to support for PTAs. An agreed threshold approach to fares and product implementation maintains the benefits of a centrally funded programme of developments while maintaining the ability for any region to have customisation included if agreed thresholds are met.

Opportunities to standardise

Whilst each Region retains control and responsibility for their regional fare policy, fares and products, there are a number of areas identified which would benefit from standardisation at a national level. Generally these opportunities result in enhanced and consistent experience for customers and

efficiencies for Transport Service Providers. The following table sets out opportunities for standardisation across regions.

Table 32 Opportunities for National Standardisation

Opportunity	Description
Age and Concession Definitions	The age of a child / student is different in different regions, and therefore does not provide a consistent experience to customers. If we were to have national concessions where these ages were a factor, it would be more intuitive for travellers have uniformity for all New Zealand.
Refunds of Transit card Balance / Card Surrender	With a National Transit card, there will be a requirement to have a National Approach to the balance transfer from a transit card. This national approach may include a decision on first level partial balance refunds (at a Customer Service Centre) as well as second level refunds through a central entity. Part of this discussion should also consider whether a fee applies to either first or second level refund
Refunds for Fare Adjustment	Often there is a requirement to make a fare adjustment and have this adjusted to the transit account resulting in an adjustment transaction to a Transit Card or bank account for a contactless bank card. A consistent National Approach may be required to ensure consistent behaviour across multiple PTAs.
Network Topology	Each region has its own topology, resulting in the potential for duplicate names of routes, stops and trips. Consideration should be given to a set of standards that could be employed by each PTA, so that there is national approach to the PT Network Topology.
GTFS (General Transit Feed Specification)	The GTFS feed has become the default standard for communicating network topology and timetables to ticketing systems as well as other support systems such as real-time and journey planners. Most PTAs are now using this format; however, as the format does not support concepts such as PTOM units, some regions have adopted different extensions to this standard resulting in different interpretations. There is a requirement for a National Ticketing system to come up with a standard for all tenants.
Device User Interface	A National consistent approach to device messages is required. This would for instance cover the readable success and fail messages on validator and gate displays, coloured lights and sounds. Similar it could include accessibility GUIs and supported languages for vending machines.
Default Fares (Penalty) Policy	As a National Ticketing system, a consistent principle approach to how and when default fares (penalty fares) are applied would be more understandable to the customer.
Infringement policy	Legislation on this is relative new and so far only AT has implemented an infringement process. There is a potential to introduce a national consistent infringement policy.

Opportunity	Description
SuperGold Times	PTAs in New Zealand have implemented different rules governing the concession times for SuperGold users. This provides an inconsistent approach to these users. Considerations should be given to a national approach to these times.
Concession Verification	With many PTAs, now having to electronic verification of concessions; example MSD for SuperGold and some educational institutions, having a consistent National approach and/or a national portal will assist regions in implementing a verification process.
Mobile Apps and Websites	Mobile apps are expensive and difficult to manage. Should a Mobile App (that could be skinned) be part of a National approach to ticketing?
Transit card pricing	This considers the potential for a national pricing structure for the Transit Card. It may include pricing for the purchase of the Transit Card, proposed introduction pricing, minimum top up values.
Transit Card branding	This can cover the branding of the Transit Card itself, branding of "Tap Targets" on devices to assist in easy customer recognition as well as branding to be applied in communication material.
Operating hours / cut-off times	Although it is recognized that PTAs can define their own fare policy across days, the National Ticketing Solution will require a national agreed cut-off moment for end of day processing.
Fare Policy Simplification / Rationalisation	As this national solution is rolled out from Region to Region, there are opportunities to rationalise fare policy in a number of areas such as: What concessions are offered; <ul style="list-style-type: none"> • The level of discount for each concession; • How passenger qualify for concessions • Approach to daily and weekly caps • Approach to periodic passes • Approach to Journeys
Apportionment Settlement and Reconciliation Policy Simplification / Rationalisation	There are numerous aspects of apportionment, settlement and reconciliation which could benefit from a national approach including: <ul style="list-style-type: none"> • Method for apportioning revenue from journeys • Approach for PTOM reporting • Smart Ticket apportionment • All aspects of reconciliation (between systems/partners) • Many aspects of reporting

Support for cash and paper tickets

The ability for the NTS to support use of cash is a critical decision in development of the solution as it affects other key business areas - ticketing and payments, operating model, support systems, regional fare policy and revenue protection.

The options and implications for support of cash are summarised below.

Table 33 Option for cash on board and paper tickets

Option	Passenger	Operator	Public transport authority
Option 1 – maintain paper tickets on-board	<ul style="list-style-type: none"> Maximum flexibility for passengers Can travel with cash or use a smart card Slower boarding for all passengers, and potential service reliability issues in busier networks 	<ul style="list-style-type: none"> Cash handling on-board impacts boarding times, dwell times and network performance Off-board cash handling – clearance, reconciliation, reporting Serious security, fraud, revenue protection implications Operational overheads 	<ul style="list-style-type: none"> Under PTOM, can be challenging to incentivise Operators to effectively manage cash (as not their money) No destination data – potential impact to network planning
Option 2 – Paper tickets off-board only	<ul style="list-style-type: none"> Can access public transport using smart card, cash or smart phone Must be able to access somewhere to purchase a ticket either at outlets, via mobile, or self-service channels (much more limiting than on-board) 	<ul style="list-style-type: none"> Optimal for boarding times on-bus (minimises dwell times) No cash handling required on-board Optimal for revenue protection 	<ul style="list-style-type: none"> No destination data – potential impact to network planning Cash handling / maintenance / security required for ticket dispensing devices. Need extensive network of retailers to give passengers access (a challenge for smaller regions)
Option 3 – No paper tickets	<ul style="list-style-type: none"> Passengers without bank cards will need to purchase pre-paid cards or use their mobile to access public transport Passengers tag-on and tag-off all services No need to carry cash or have correct denomination 	<ul style="list-style-type: none"> Optimal for boarding times on-bus (minimises dwell times) No cash handling required on-board or off-board Optimal for revenue protection 	<ul style="list-style-type: none"> Optimal for network planning – all trips have origin-destination data No cash handling required

Considering evaluation criteria of customer experience (both for the smart-card user and the cash user), operational and service efficiency, data quality and capital and operating cost implications, no paper tickets (option 3) is preferred.

Reporting

One of the advantages of a modern ticketing solution is that, as part of the process, the ticketing system will collect an enormous amount of transaction data. Most of this data is of a financial nature

that will be used for financial clearing and settlement. The scope of the NTS will need to include reporting functionality to support this process. This means:

- Limiting the scope to basic reporting to focus on supporting functional operations
- Evaluating what additional regional reporting requirements can be met with the NTS solution
- Leaving advanced reporting out of scope for the NTS programme, and either link to the BI platform currently being procured to meet PTOM performance reporting, or a separate development after the successful deployment of the NTS
- Including Outcome-Based descriptions of the type of source data elements expected to be captured by the NTS solution.

Infrastructure Leverage

Many transport authorities have significant investment in ticketing assets that could be re-used in a new ticketing solution. Depending on age and the technology compatibility, there may be time, cost and customer benefits from re-use. Examples include:

Gates at platforms and wharves

Given that a gate mechanism can be controlled relatively easily, then an account-based ticketing supplier should be able to replace the inner workings of a gate with their own and leave the bulk of the physical gate intact. This alleviates new gate installation, which is a significant amount of work creating additional cost and delay.

Acceptance Devices on board vehicles and platforms

Currently, vehicles contain a range of ticketing and payment technology. Depending on suppliers, different combinations of functions are delivered with different devices. Current legacy systems devices that could be considered for reuse include:

- **Acceptance Devices** - used to read the Fare Media. There is often two or more of these devices on each vehicle as well as sometimes being included with the driver console.
- **Driver Consoles** - used by the driver for functions as cash sales, trip selection, etc.
- **AVL devices** - often a separate device that feeds location information to ticketing system components or real time system components.
- **Communications hubs** - mobile communication used to transport bi-directional information between the vehicle and back-office systems.

Historically most vehicle devices utilised for ticketing are proprietary to the supplier with no standards that govern a ticketing device to allow for open connectivity and integration with other components. Most new ticketing solution suppliers will have AVL inherently built into their devices. However, if AVL is a separate component, then existing AVL devices may be able to be utilised. The RFP asked for AVL capability to be built into their new equipment that can be leveraged by other PTA solutions such as Real time Information. In-vehicle communication hubs should be leveraged as these are now becoming common in vehicle fleets to provide backhaul communications. From a technical perspective, if vehicle devices support Ethernet or wireless, these hubs should have little difficulty being re-used.

Ticket Vending Machines

TVMs have an extensive user interface, often with multi language support and specific support for customers with visual impairment or with hearing difficulty. When supporting two types of media (legacy and new), the user interface must be obvious so customers can intuitively use the device with either media. This limits the options for account-based solution suppliers to offer improvements during transition.

As all current Ticket Vending Machines are for card present payment transactions, they already have online connectivity that is also required with the prepaid 'Transit Card' Program Manager to allow the device to perform a top up. Development effort must consider the numbers of vending machines and the expected duration of the transition phase during which both the new and legacy cards must be supported. Currently there are 90 Ticket Vending Machines across Auckland, 26 Ticketing Kiosks in Wellington, 4 in Otago and 1 in Waikato.

Inspection devices

Currently, only AT has Inspection Devices. These Android devices are unlikely to be based on hardware that is suitable to become EMV and PCI compliant and therefore most likely cannot be upgraded for inspection on contactless payment cards. The RITS solution also has some devices but it is unknown if these devices are suitable for EMV and PCI upgrade.

Customers will not be noticeably impacted if the Revenue Inspector is required to work with both an Inspection Device for legacy cards as well as an Inspection Device for EMV cards during the transition period.

Retail and Customer Service Centre Devices

The Retailer Network Manager will offer 'Transit Card' (prepaid close proximity card) sales and balance top up functionality, while using an application on the standard POS terminal of the retailers. Existing outlets in all regions can be brought into the Retail Network, this way providing both services for legacy cards (through the legacy retailer device) as well as for pre-paid 'Transit Cards' (through the POS). This will work for options 1, 2, 4 and 5. For Option 3, a separate development activity is required from the legacy supplier to offer services for the tokenised legacy cards.

Communications Network Infrastructure – Many PTAs have significant investment in LAN/WAN infrastructure. There should be no technical reason why these networks should not be leveraged. Technologies such as secure VPNs, VLANs and QOS should enable the core network infrastructure to be leveraged with minimal effort.

Appendix 6 – Key Risks

Key risks	Mitigation Approach
Operational Risks	
Prolonged approvals process The current target date of early 2023 as a pilot for ECan cannot be met due to a prolonged contract approvals process	<ul style="list-style-type: none"> Consider an at risk 'early works' programme ahead of contract signature to manage timelines Develop & maintain a realistic integrated programme plan as the basis for all time-based decision making when choosing target dates
A slow or extended approvals process extends the implementation timeline resulting in some Participants not joining	<ul style="list-style-type: none"> Sign up all NTS participants to the NTS Participation Agreement as soon as possible Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure ongoing commitment Develop plan for approvals and gain NTS Steering Group agreement in advance
Waka Kotahi does not have the capability to act as the shared service organisation (TTP) resulting in inefficiency and delay to the NTS implementation & operations	<ul style="list-style-type: none"> Waka Kotahi formal ELT agreement to establishing TTP including a supporting organisational design Clearly defined roles and responsibilities for TTP resources Clear internal Waka Kotahi Governance groups to oversee appropriate resourcing, reporting & stewardship Agreed ongoing budget for TTP and supporting controls
Waka Kotahi does not establish the shared service organisation (TTP) in a timely manner delaying the programme and increasing reliance on expensive contracting resource	<ul style="list-style-type: none"> TTP establishment and resourcing plan signed off as soon as practical Active recruitment of new permanent resources Agreed transition plan for knowledge handover from contracting resource to Waka Kotahi Contracts in place for ongoing consulting services where required
Lack of capacity and capability Unable to secure appropriate TTP staff due to market limitations which affects capability to manage, deploy and operate the NTS	<ul style="list-style-type: none"> TTP establishment and resourcing plan signed off as soon as practical and active recruitment to commence Consider plans to invest in non-ticketing staff through training and education & early involvement in the NTS Consider active secondments of ticketing staff resources from PTA participants
Covid-19 impacts on staff and suppliers affecting time, cost and quality of the NTS	<ul style="list-style-type: none"> Manage Covid-19 risks in line with Waka Kotahi policy Supplier will establish a local capability within NZ to mitigate risks of international travel Co-locate Waka Kotahi staff and supplier staff in NZ where possible & practical
Digital	

Complex data sharing arrangements between many participants creates potential security or privacy gaps in the NTS	<ul style="list-style-type: none"> Independent review of security & privacy implications at the NTS design phase Privacy impact assessments at appropriate points in NTS development, including engagement of Waka Kotahi Security/Privacy staff (or their delegates) as required Adequate contractual provisions for suppliers to comply with NTS requirements and to maintain compliance across the contract life Adequate Waka Kotahi policies & controls assuring security is operating as expected and regular audits to check Maintain PCI/DSS accreditation including supporting controls
Nature of data collected by the NTS makes the system a target for accidental and malicious actors	<ul style="list-style-type: none"> Ensure comprehensive security & privacy regime for all aspects of the NTS, suppliers, systems, processes, staff Develop comprehensive & timely reporting processes to detect and report any system breach or control failure
The end to end NTS is not secured adequately resulting in an information security & privacy breach	<ul style="list-style-type: none"> Involvement and independent review of security by Waka Kotahi staff at all key risk points over the life of the NTS, including in design/build/test phases, implementation, operations, and during transition Processes in place to detect & report on any security or control failures in a timely way Daily assurance over NTS operation, system security & integrity Maintain PCI/DSS accreditation including supporting controls
Contracted suppliers store personal data offshore in a jurisdiction which exposes the NTS and its customers to privacy risks	<ul style="list-style-type: none"> Review ticketing and financial supplier contracts carefully before signing, and take legal and other advice on the adequacy of data security, storage & transfer provisions, and obligations to make good on any failure Include provisions in Participation Agreements for similar requirements between participants Detailed consideration given to Te Tiriti in co-design and user experience including sovereignty of data.
Suppliers	
Lack of capacity and capability Supplier capability to deliver the NTS is compromised through an overseas location, differing time zones, and differing global priorities of work	<ul style="list-style-type: none"> Undertake due diligence process to ensure supplier responses are backed up by actual behaviour and experience in other jurisdictions Agree formal governance arrangements as part of the contracting process to ensure correct supplier behaviours at the right time and place Engage with existing customers of the chosen supplier where possible to gain visibility of the global workload and to agree mutually beneficial roadmaps where this is possible

Ability of suppliers to deliver the agreed scope within the committed timescales	<ul style="list-style-type: none"> Undertake due diligence process to ensure supplier responses are backed up by on time delivery in other jurisdictions Meet internal approvals deadlines according to supplier requirements so as not to be the main cause of delay for NTS rollout
Technology lock-in The choice of NTS results in technology lock-in and a potential lack of flexibility through contract length of 10+ years	<ul style="list-style-type: none"> Due diligence for existing solutions including overseas experiences Contractual break points at sensible times Ensure sufficient flexibility to negotiate with the chosen supplier during the contract to bring services in-house, or to potentially outsource more services to the supplier without a fundamental contract renegotiation
Integration not managed Integration between the different suppliers is not managed by the preferred supplier within expected boundaries & timeframes	<ul style="list-style-type: none"> Ensure early engagement between suppliers before contracts are signed to ensure they can work together properly Simplify the solution where practical to reduce interdependencies between competitors Actively manage suppliers
Technical failure Major technical failure results in loss or lack of service and no revenue collections	<ul style="list-style-type: none"> Ensure appropriate remediation clauses in contracts Develop recovery plans for an event and practice/test these regularly Due diligence with other customers to assess the risk of this kind of event and how to manage Connect in other necessary elements such as communications to manage events
Participants	•
Key Participant withdraws Key Participant(s) does not sign or withdraws from the NTS, affecting viability	<ul style="list-style-type: none"> Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure ongoing commitment Sign up all NTS participants to the NTS Participation Agreement as soon as possible Agree target NTS funding model to make joining attractive to participants Ongoing management commitment at all levels of Waka Kotahi & PTAs to ensure alignment
Delays Delays in timing mean that alignment to existing contracted ticketing services no longer exists	<ul style="list-style-type: none"> Expedite contract signatures, approvals processes & planning to ensure NTS rollout alignment with existing contract end dates Consider contract extensions where possible/necessary Make suitable contingency plans

Key Participant(s) take a longer than planned to agree and sign the Participant Agreements	<ul style="list-style-type: none"> Ensure participant early engagement in Participation Agreement development Actively manage outstanding tasks/risks/changes required to secure agreement Gain agreement 'in-principle' where possible Unblock at Mobility & Payments Governance Group (MPGG) where possible
<p>National framework consequences</p> <p>Working within a national framework is perceived to have negative consequences for local decision making</p>	<ul style="list-style-type: none"> Early engagement on what forms part of the National customer experience, and what remains local Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure ongoing commitment & to flush out areas of concern early Unblock at Mobility & Payments Governance Group (MPGG) where possible
<p>Confused accountabilities and complexity</p> <p>Lack of clarity over roles and responsibilities between PTAs and Waka Kotahi leading to confusion over accountability for aspects of the solution</p>	<ul style="list-style-type: none"> Agreed Joint Responsibility Matrix (JRM) Agreed and signed off Operating Model Active TTP & PTA involvement in BAFO negotiations which determine and agree the final solution
Multiple participants create complexity resulting in not being able to agree the operating model	<ul style="list-style-type: none"> Early & ongoing engagement in development of the NTS operating model Early & ongoing engagement with all PTAs, TTP and suppliers in agreeing the scope and scale of services Secondments from PTAs to TTP to ensure PTA views fairly represented and understood
Customer	
<p>Poor customer experience</p> <p>Technical or process failures result in a poor customer experience. For example:</p> <ul style="list-style-type: none"> System failures result in a lack of service for end customers and no revenue collection for NTS customers Process for transition from the existing solution to the NTS has negative consequences for customers A security or privacy breach results in compromised data for customer(s) 	<ul style="list-style-type: none"> Chose a capable supplier with proven global track record Ensure adequate testing and piloting throughout NTS deployments Adequately resource TTP and PTA teams to ensure success Engender a close & collaborative working relationship with each supplier Plan well for transitions including customer communications and education and simple & easy transition processes Test key processes before deploying Run 'white label' pilots for friends & family & journalists to test the system ahead of formal launch Consider a 'soft launch' approach to tease out issues and gradually increase volumes Good relations with each supplier to quickly resolve any issues Ensure adequate controls and monitoring in place to catch or

predict possible failures

- Ensure active response plans to fix issues quickly
- Run regular test exercises to simulate failure and test & refine responses
- Make customer transition as easy as possible
- Simplify refund processes, and make transferring pre-paid funds back to customers quickly and easily
- Have plans in place to actively correct individual journeys or large numbers of customers affected by a wider system issue
- Begin transition planning early, particularly around transitioning school children being mindful of holiday periods and volumes of customers to transition
- Involvement and independent review of security by Waka Kotahi/experts at all key risk points over the life of the NTS, including in design/build/test phases, implementation, operations, and during transition
- Processes in place to detect & report on any security or control failures in a timely way
- Daily assurance over NTS operation, system security & integrity
- Maintain PCI/DSS accreditation including supporting controls
- Processes in place to communicate with customers quickly and make good any issues

Appendix 7 – NTS Benefits

Description of benefits	National or regional	How to measure
Customer		
Encourage easy adoption		
No need to purchase a card or top up before travelling	National	Time saved; number of people lost on PT because they have no way to pay
Encourages PT use amongst casual users & visitors because visitors can access public transport immediately on arrival using their overseas card or mobile payment device	National	Patronage growth
Contactless debit cards may provide an alternative to cash for some low income and cash reliant people	National	Patronage growth; maintenance of travelling population in low income areas
Reduces travel planning time - don't need to factor in ticketing element in travel planning and users can transfer easily between services	National	Time saved
Lowest cost option		
Each day the best fare is automatically calculated for all my journeys	National	Analysis of users who 'over-pay' for convenience
I can pay for my journeys after I travel	National	Money that doesn't need to be prepaid
I don't need to tie up money on a prepaid travel card	National	\$ value of card balances held across NZ today
I can apply my SuperGold concession to my own card or device and still travel anywhere in NZ	National	SuperGold trips
As a registered SuperGold card user I no longer need to prepay in case I travel in peak times	National	SuperGold peak trip \$
I can visit friends and family in other parts of NZ and still get my SuperGold discount	National	SuperGold trips
Universal access to PT		
I can pay for PT in the same way anywhere in NZ	National	Patronage growth
I can take PT anywhere in NZ and be charged in the same way everywhere	National	Patronage growth
I can learn one system and it's the same way to travel everywhere on PT	National	Patronage growth
Increase choice		
I can pay using my contactless debit or credit card	National	Patronage growth
I can pay using a digital contactless card on my mobile device	National	Patronage growth
Self-service benefits		
I can manage my transport account anywhere in NZ	National	Reduced contact centre costs
I can manage my family's accounts together and control my child's spending	National	Reduced contact centre costs

Description of benefits	National or regional	How to measure
I can keep track of my own spending on travel in one place	National	Reduced contact centre costs
I can correct my own journeys if I forget to tag on or off	National	Reduced contact centre costs
Better information		
Notifications allow me to control what information I receive	National	Reduced contact centre costs
I can be told when something goes wrong	National	Time avoided waiting for services
I can be told when my travel is disrupted	National	Time avoided waiting for services
I can adjust my journey to avoid disruptions	National	Time avoided waiting for services
I can save time by not waiting for PT	National	Time avoided waiting for services
Better customer service		
Reduced interactions with the driver mean they can focus on those that need the most help	National	
Operational efficiency		
Enhanced data		
Improved network and fleet management	National	
Optimisation of services	National	
Consistent data across NZ	National	
Resourcing efficiency		
Can redeploy resources in different ways	National	Staff costs for ticketing today across NZ; reduced hardware spares
Revenue protection		
Establish or enhance the PT revenue protection regime	National	Reduced fare loss \$
Easier to administer fare splits across regional boundaries	National	
New features and functions		
If we do nothing, we will spend a similar amount of money on disconnected ticketing systems	National	\$ spent today on ticketing systems
Procurement efficiency		
Centralisation supports economies of scale for NZ which drives down price	National	\$ spent on procurement activities
Managing events		
We can make travel to big events safer and more efficient to speed up foot traffic and prevent pedestrian congestion at key entry or exit points	Regional	Time costs for attendees at events; safety \$?
We can manage crowds better while not overcharging customers or losing revenue	National	
Centralisation of contracts		
Central management of key contracts provides increased negotiating power for NZ	National	
Service delays		

Description of benefits	National or regional	How to measure
We can choose not to charge customers for delays in services	National	Fares saved due to service delays
Managing disruptions		
Supporting contactless ways to pay on PT helps support revenue collection on services should there be a resurgence of Covid-19	National	Drop in PT patronage as a result of Covid-19
We can manage disasters and other events more effectively to prevent customers being overcharged	Regional	Number of disrupted passengers on rail in peak Wellington
Provide a level of contact tracing in the event of COVID resurgence or other issue	National	
Marketing & brand		
NZ wide material & branding	National	Reduced cost
National policy initiatives		
Mode Shift		
NZ needs ticketing to support mode shift, city programmes (LGWM, ATAP) & climate change targets	National	Do minimum \$
Increases patronage on PT and reduces private vehicle journeys	National	Private car journeys avoided; reduced emissions
Supports decarbonisation of the transport network, improving air quality and overall health benefits, and improves road safety (less cars on the road)	National	Private car journeys avoided; reduced emissions
Supporting national policy		
Ticketing systems provide levers to implement new central or local government policies	National	
National concessions		
SuperGold & Community Connect card support, ease of setting up other national concessions	National	Number of SuperGold and Community Services cards issued in NZ
Future innovation		
Decrease congestion		
Charge drivers who enter congested areas at peak times to drive demand towards PT away from private vehicles	Regional	Time saved not sitting in traffic; reduced emissions
Park and ride		
Support mode shift through combined parking & PT journey fares	Regional	Time saved not sitting in traffic; reduced emissions
Third party integration		
Possible integration with third parties in the future e.g., scooters,	National	
Transport account		
Possible creation of a transport account for all transport payments e.g. parking, tolls etc	National	

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Appendix 8 Cost Benefit Supporting Information

Introduction

The NTS cost benefit analysis quantifies, as far as possible, the economic benefits and costs of introducing an accounts-based, open loop, integrated ticketing solution for GW, ECan, AT and RC. The analysis follows a structured approach consistent with guidance in relevant chapters of Waka Kotahi's Monetised Benefits and Costs Manual and Benefits Management Framework appropriately tailored to reflect the nature and lifespan of an electronic, integrated fares and ticketing solution.

This appendix sets out the detailed information supporting the quantified benefits and costs for the NTS and Do Minimum Plus counterfactual.

Monetised economic benefits

The economic benefits for both the Do Minimum Plus and NTS options are limited to the decongestion benefits from increased patronage. This assumes that increasing patronage will reduce the number of people travelling by private vehicle and have a small effect on reducing congestion.

The patronage increase is set out in Table 35. The decongestion benefits (both nominal and discounted) are set out in Tables 36 and 37.

The decongestion benefits are based on the following assumptions:

1. An NTS patronage increase of 2% for the first year only following each PTA's on-boarding date.
2. A Do Minimum Plus patronage increase of 1% for AT only following the introduction of open loop for the first year only following implementation
3. Decongestion values as set out in the Waka Kotahi Monetised Benefits and Costs Manual (MBMC):

Table 34 Decongestion values

Source: MBMC	Peak	Off-peak	Weighted Average
Auckland	\$12.61	\$0.86	\$5.56
Wellington	\$13.25	\$1.25	\$6.05
Christchurch	\$2.71	\$1.24	\$1.83
Other	\$2.06	\$1.00	\$1.42
Ratio of peak to off-peak			0.40
Update factor			1.57

4. Patronage data compiled from each PTAs post-Covid projections, set out below.

Table 35 Patronage data

	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035	1/07/2036
Bus															
AT	68,127,735	79,181,854	89,597,716	94,187,258	97,351,942	100,989,787	104,607,582	109,321,438	113,842,349	118,396,048	123,131,885	128,057,160	133,179,446	138,506,624	144,046,889
GWRC	23,449,688	25,102,731	26,656,093	27,706,696	28,487,976	29,398,326	30,228,971	31,447,541	32,628,601	33,697,480	34,615,683	35,654,154	36,723,778	37,825,492	38,960,257
ECan	13,558,529	13,980,099	14,401,669	14,652,349	14,903,029	15,153,709	15,411,322	15,673,315	15,939,761	16,210,737	16,486,319	16,766,587	17,051,619	17,341,496	17,341,496
RC	14,572,921	14,808,111	15,647,357	16,206,693	16,472,206	16,743,567	17,020,953	17,304,549	17,594,548	17,891,149	18,194,559	18,504,995	18,822,679	19,147,847	19,480,740
Train															
AT	29,558,552	34,354,598	38,873,724	40,864,987	42,238,047	43,816,397	45,386,048	47,431,247	49,342,733	51,368,442	53,423,180	55,560,107	57,782,511	60,093,812	62,497,564
GWRC	12,371,865	13,156,257	13,843,950	14,362,498	14,813,437	15,181,001	15,658,497	16,959,092	17,601,405	18,150,047	18,694,549	19,255,385	19,833,047	20,428,038	21,040,879
ECan	163,580	166,851	170,188	173,592	177,064	180,605	184,217	187,902	191,660	195,493	199,403	203,391	207,459	211,608	215,840
RC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Patronage															
AT	97,686,288	113,536,452	128,471,441	135,052,244	139,589,989	144,806,184	149,993,630	156,752,885	163,235,082	169,764,485	176,555,065	183,617,267	190,961,958	198,600,436	206,544,454
GWRC	35,821,554	38,258,988	40,500,042	42,069,194	43,301,413	44,579,327	45,887,468	48,406,633	50,250,007	51,757,507	53,310,232	54,909,539	56,556,825	58,253,530	60,001,136
ECan	13,722,109	14,146,950	14,571,857	14,825,941	15,080,093	15,334,314	15,595,539	15,861,217	16,131,421	16,406,230	16,685,722	16,969,978	17,259,078	17,553,104	17,557,336
RC	14,572,921	14,808,111	15,647,357	16,206,693	16,472,206	16,743,567	17,020,953	17,304,549	17,594,548	17,891,149	18,194,559	18,504,995	18,822,679	19,147,847	19,480,740

5. Calculation of disbenefits based on increase in patronage at appropriate PTA average rates

Table 36 NTS decongestion benefits - nominal and present value (at 4%)

	Nominal Total	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
AT	366,740,195	-	-	14,870,773	23,577,961	24,376,119	25,280,843	26,186,488	27,366,511	28,498,234	29,638,163	30,823,689	32,056,637	33,338,902	34,672,459
GWRC	125,848,660	-	2,409,412	7,693,793	7,991,885	8,276,963	8,468,735	8,717,242	9,195,808	9,545,994	9,832,374	10,127,345	10,431,165	10,744,100	11,066,423
ECan	12,856,203	-	812,024	836,413	850,997	865,585	880,177	895,171	910,421	925,931	941,704	957,747	974,063	990,657	1,007,534
RC	9,828,716	-	-	287,527	724,660	736,532	748,665	761,068	773,749	786,716	799,978	813,544	827,425	841,630	856,169
Total NPV at 4%															
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
AT	253,438,316	-	-	13,220,063	20,154,540	20,030,510	19,979,817	19,899,579	19,996,441	20,022,481	20,022,481	20,022,481	20,022,481	20,022,481	20,022,481
GWRC	88,312,113	-	2,227,637	6,839,754	6,831,497	6,761,147	6,692,964	6,624,388	6,719,287	6,706,889	6,642,399	6,578,530	6,515,275	6,452,628	6,390,584
ECan	9,227,954	-	750,761	743,560	727,436	711,448	695,617	680,257	665,236	650,547	636,182	622,134	608,397	594,963	581,826
RC	6,837,814	-	-	255,611	619,442	605,375	591,681	578,349	565,371	552,736	540,436	528,463	516,807	505,461	494,416

Table 37 Do Minimum Plus decongestion benefits – nominal and present value (at 4%)

	Nominal Total \$	1/07/2022 \$	1/07/2023 \$	1/07/2024 \$	1/07/2025 \$	1/07/2026 \$	1/07/2027 \$	1/07/2028 \$	1/07/2029 \$	1/07/2030 \$	1/07/2031 \$	1/07/2032 \$	1/07/2033 \$	1/07/2034 \$	1/07/2035 \$
AT	165,340,419	-	-	7,435,386	11,788,981	12,185,089	12,640,421	13,093,244	13,683,255	14,249,117	14,819,881	15,411,845	16,028,318	16,669,451	17,336,229
GWRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NPV Total \$	1/07/2022 \$	1/07/2023 \$	1/07/2024 \$	1/07/2025 \$	1/07/2026 \$	1/07/2027 \$	1/07/2028 \$	1/07/2029 \$	1/07/2030 \$	1/07/2031 \$	1/07/2032 \$	1/07/2033 \$	1/07/2034 \$	1/07/2035 \$
AT	116,707,918	-	-	6,610,031	10,077,270	10,015,255	9,989,909	9,949,789	9,998,221	10,011,240	10,011,240	10,011,240	10,011,240	10,011,240	10,011,240
GWRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Economic disbenefits

The economic disbenefits of the NTS and Do Minimum Plus relate to GW for the additional customer time topping-up transit cards on rail. The key assumptions are that:

- Snapper on rail conversion rate from transit card to EMV open-loop will be 10% whereas the NTS conversion rate will be 75%
- The number of annual Snapper on rail top ups is based on the proportion of rail to bus patronage
- The time spent topping up is an average across the channels as follows:

	% of total	Time spent for top-up (minutes)	Time Value of Money
Merchant top-ups	21%	4.00	11.54
Kiosk top-ups	21%	4.00	11.54
IOS top-ups	29%	0.50	11.54
Android top-ups	30%	0.50	11.54
Total	100%	9.00	46.15

Table 38 NTS disbenefits of additional transit card top-up for GW

GW	1/07/2021	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Cost of time spent topping up transit cards	-5,736,778	0	0	-114,689	-382,063	-399,798	-411,886	-425,890	-439,146	-457,643	-475,496	-491,581	-508,221	-525,438	-543,249
PV	-4,105,781														

Table 39 Do Minimum Plus disbenefits of GW additional transit card top-up

GWRC	1/07/2021	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Cost of time spent topping up transit cards	-20,258,240	0	0	-412,293	-1,351,794	-1,411,047	-1,453,707	-1,503,136	-1,555,422	-1,615,208	-1,678,213	-1,734,986	-1,793,719	-1,854,483	-1,917,347
PV	-14,500,860														

Economic costs – NTS detailed cost projection

The economic costs described in Section 5, Economic Case were derived from a detailed Total Cost of Ownership model comprising a range of capital and operating inputs and calculations that result in the estimate of the total costs over the 15 years expected operation of the NTS accounts-based, open-loop solution.

The detailed inputs are set out in Appendix 9.

The following cashflow projection of the operating and capital costs in 2021/22 dollars, and a present value calculation of the costs based on a 4% discount rate over 15 years is a key output from the model.

Table 40 NTS capital and operating cost projection over 15 years

	Total	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Operating Expenditure																
Ticketing provider costs																
Front office maintenance																
Merchant acquirer (MA)																
Program manager costs (TCPM)																
Retail network manager costs (RNM)																
PTA ticketing solution costs																
SSO establishment costs - opex portion																
SSO support costs																
Capital Expenditure																
Software + licenses																
Equipment - back office																
Equipment - front office																
Compliance + certification																
Design, build, test																
Merchant acquirer setup																
Transit card programme manager setup																
Retail network manager setup																
Shared Service Organisation (SSO) setup																
Total capex + opex before adjustments																
Risk adjustments																
TSP pricing risk adjustments																
TSP non-pricing risk adjustments																
Transition and existing system run-out costs																
Transition costs																
Do minimum phase out																
AT																
GWRC																
ECan																
Regional Consortium																
Do minimum costs - phase out of old systems																
Total cost of NTS system	\$1,436,824,535	\$14,405,221	\$158,181,748	\$211,172,614	\$193,551,286	\$106,356,814	\$72,202,604	\$72,440,271	\$76,976,034	\$73,024,635	\$74,002,762	\$74,933,646	\$76,312,330	\$76,101,097	\$81,893,022	\$75,270,451
Present value at 4% over 15 years	\$1,145,543,405															
	Total	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Risk adjustments																
TSP pricing risk adjustments																
Indexation																
FX																
Third party certification																
TSP non-pricing risk adjustments																
Kiosk																
Other																

Economic costs – Do Minimum Plus counterfactual

The Do Minimum Plus brings together the assumptions and estimated capital and operating costs prepared by each PTA to reflect a realistic continuation and, where required, upgrade of their current systems. Where possible, the same basic assumptions were applied to both the NTS and Do Minimum Plus such as patronage projections and scaling of variable costs. A key output is the cost projection over 15 years by PTA, below.

Table 41 Do Minimum Plus capital and operating cost projection over 15 years

Nominal cost over 15 years (in 2022/23 dollars)	Total	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37
	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million	\$ million
AT																
- Operating costs																
- Capital costs																
GW																
- Operating costs																
- Capital costs																
ECan																
- Operating costs																
- Capital costs																
RC																
- Operating costs																
- Capital costs																
Total operating costs																
Total capital costs																
Total Nominal Costs (over 15 years in 2021/22 dollars)	1,001.4	75.0	81.3	59.6	60.1	105.8	62.0	66.2	68.1	71.4	68.0	66.5	78.1	68.7	69.9	73.4
Present Value (at 4% over 15 years)	758.0															

Appendix 9 NTS total cost of ownership model - input assumptions and cost drivers

The following tables are key cost drivers for the estimation of the NTS costs model.

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	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Validators (onboard)															
Gisborne included in BAFO response - wasn't in RFP response															
AT	-	-	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974
GWRC	-	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166
ECan	-	602	602	602	602	602	602	602	602	602	602	602	602	602	602
Waikato	-	-	222	222	222	222	222	222	222	222	222	222	222	222	222
Bay of Plenty	-	-	246	246	246	246	246	246	246	246	246	246	246	246	246
Northland	-	-	30	30	30	30	30	30	30	30	30	30	30	30	30
Hawke's Bay	-	-	48	48	48	48	48	48	48	48	48	48	48	48	48
Taranaki	-	-	39	39	39	39	39	39	39	39	39	39	39	39	39
Manawatu-Whanganui	-	-	86	86	86	86	86	86	86	86	86	86	86	86	86
Nelson	-	-	23	23	23	23	23	23	23	23	23	23	23	23	23
Otago	-	-	192	192	192	192	192	192	192	192	192	192	192	192	192
Invercargill	-	-	28	28	28	28	28	28	28	28	28	28	28	28	28
Gisborne	-	-	22	22	22	22	22	22	22	22	22	22	22	22	22
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	1,768	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678
Driver consoles															
Gisborne included in BAFO response - wasn't in RFP response															
AT	-	-	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340
GWRC	-	466	466	466	466	466	466	466	466	466	466	466	466	466	466
ECan	-	305	305	305	305	305	305	305	305	305	305	305	305	305	305
Waikato	-	-	111	111	111	111	111	111	111	111	111	111	111	111	111
Bay of Plenty	-	-	125	125	125	125	125	125	125	125	125	125	125	125	125
Northland	-	-	15	15	15	15	15	15	15	15	15	15	15	15	15
Hawke's Bay	-	-	24	24	24	24	24	24	24	24	24	24	24	24	24
Taranaki	-	-	39	39	39	39	39	39	39	39	39	39	39	39	39
Manawatu-Whanganui	-	-	48	48	48	48	48	48	48	48	48	48	48	48	48
Nelson	-	-	15	15	15	15	15	15	15	15	15	15	15	15	15
Otago	-	-	96	96	96	96	96	96	96	96	96	96	96	96	96
Invercargill	-	-	17	17	17	17	17	17	17	17	17	17	17	17	17
Gisborne	-	-	13	13	13	13	13	13	13	13	13	13	13	13	13
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	771	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614
Ticketing vending machines + Ticket kiosk															
AT	-	-	120	120	120	120	120	120	120	120	120	120	120	120	120
GWRC	-	34	34	34	34	34	34	34	34	34	34	34	34	34	34
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	34	154	154	154	154	154	154	154	154	154	154	154	154	154

RELEASED UNDER THE OFFICIAL INFORMATION ACT 1982

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Inspection devices															
AT	-	-	200	200	200	200	200	200	200	200	200	200	200	200	200
GWRC	-	50	50	50	50	50	50	50	50	50	50	50	50	50	50
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	5	5	5	5	5	5	5	5	5	5	5	5	5
Bay of Plenty	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1
Northland	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1
Hawke's Bay	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1
Taranaki	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1
Manawatu-Whanganui	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	3	3	3	3	3	3	3	3	3	3	3	3	3
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	50	263	263	263	263	263	263	263	263	263	263	263	263	263
Gates															
AT	-	-	143	143	143	143	143	143	143	143	143	143	143	143	143
GWRC	-	6	6	6	6	6	6	6	6	6	6	6	6	6	6
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	6	149	149	149	149	149	149	149	149	149	149	149	149	149

section 9(2)(b)(ii)

2021/22 2022/23 2023/24 2024/25 2025/26 2026/27 2027/28 2028/29 2029/30 2030/31 2031/32 2032/33 2033/34 2034/35 2035/36

section 9(2)(b)(ii)

RELEASED UNDER THE OFFICIAL INFORMATION ACT 1982

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Number of PTAs															
AT	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1
GWRC	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1
ECan	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1
Waikato	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Bay of Plenty	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Northland	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Hawke's Bay	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Taranaki	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Manawatu-Whanganui	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Nelson	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Otago	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Invercargill	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	1	3	12	12	12	12	12	12	12	12	12	12	12
PTA interface staff															
AT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GWRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Change in onboard validators															
AT	-	-	2,974	-	-	-	-	-	-	-	-	-	-	-	-
GWRC	-	1,166	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	602	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	222	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	246	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	48	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	39	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	86	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	23	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	192	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	28	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	1,768	2,910	-	-	-	-	-	-	-	-	-	-	-	-

Detailed Business Case
Draft Iteration 3

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Change in driver consoles															
AT	-	-	1,340	-	-	-	-	-	-	-	-	-	-	-	-
GWRC	-	466	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	305	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	111	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	125	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	39	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	48	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	96	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	771	1,843	-	-	-	-	-	-	-	-	-	-	-	-
Change in ticketing vending machines															
AT	-	-	120	-	-	-	-	-	-	-	-	-	-	-	-
GWRC	-	34	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	34	120	-	-	-	-	-	-	-	-	-	-	-	-
Change in inspection devices															
AT	-	-	200	-	-	-	-	-	-	-	-	-	-	-	-
GWRC	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	50	213	-	-	-	-	-	-	-	-	-	-	-	-

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Change in gates															
AT	-	-	143	-	-	-	-	-	-	-	-	-	-	-	-
GWRC	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	6	143	-	-	-	-	-	-	-	-	-	-	-	-
Number of devices															
AT	-	-	5,026	5,026	5,026	5,026	5,026	5,026	5,026	5,026	5,026	5,026	5,026	5,026	5,026
GWRC	-	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884
ECan	-	923	923	923	923	923	923	923	923	923	923	923	923	923	923
Waikato	-	-	346	346	346	346	346	346	346	346	346	346	346	346	346
Bay of Plenty	-	-	379	379	379	379	379	379	379	379	379	379	379	379	379
Northland	-	-	51	51	51	51	51	51	51	51	51	51	51	51	51
Hawke's Bay	-	-	78	78	78	78	78	78	78	78	78	78	78	78	78
Taranaki	-	-	84	84	84	84	84	84	84	84	84	84	84	84	84
Manawatu-Whanganui	-	-	140	140	140	140	140	140	140	140	140	140	140	140	140
Nelson	-	-	43	43	43	43	43	43	43	43	43	43	43	43	43
Otago	-	-	299	299	299	299	299	299	299	299	299	299	299	299	299
Invercargill	-	-	49	49	49	49	49	49	49	49	49	49	49	49	49
Gisborne	-	-	37	37	37	37	37	37	37	37	37	37	37	37	37
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	2,807	9,339	9,339	9,339	9,339	9,339	9,339	9,339	9,339	9,339	9,339	9,339	9,339	9,339
Platform validators & mobile validators & CSC acceptance devices															
AT	-	-	249	249	249	249	249	249	249	249	249	249	249	249	249
GWRC	-	162	162	162	162	162	162	162	162	162	162	162	162	162	162
ECan	-	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Waikato	-	-	8	8	8	8	8	8	8	8	8	8	8	8	8
Bay of Plenty	-	-	7	7	7	7	7	7	7	7	7	7	7	7	7
Northland	-	-	5	5	5	5	5	5	5	5	5	5	5	5	5
Hawke's Bay	-	-	5	5	5	5	5	5	5	5	5	5	5	5	5
Taranaki	-	-	5	5	5	5	5	5	5	5	5	5	5	5	5
Manawatu-Whanganui	-	-	5	5	5	5	5	5	5	5	5	5	5	5	5
Nelson	-	-	5	5	5	5	5	5	5	5	5	5	5	5	5
Otago	-	-	8	8	8	8	8	8	8	8	8	8	8	8	8
Invercargill	-	-	4	4	4	4	4	4	4	4	4	4	4	4	4
Gisborne	-	-	2	2	2	2	2	2	2	2	2	2	2	2	2
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	178	481	481	481	481	481	481	481	481	481	481	481	481	481

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Change in platform validators & mobile validators & CSC acceptance devices															
AT	-	-	249	-	-	-	-	-	-	-	-	-	-	-	-
GWRC	-	162	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	178	303	-	-	-	-	-	-	-	-	-	-	-	-

Number of Transit cards issued

Update below based on file [TCO Inputs v7.3](https://infohub.nzta.govt.nz/otcs/cs.dli/link/50985917)

Allocation based on Transit card trips by PTA

AT	-	-	-	52,264	103,809	192,027	317,122	508,736	531,661	553,648	575,794	598,825	622,778	647,690	673,597	700,541
GWRC	-	-	16,545	24,850	32,337	59,568	97,628	155,637	164,182	170,434	175,547	180,813	186,238	191,825	197,580	203,507
ECan	-	-	18,455	8,941	11,396	20,745	33,582	52,896	53,797	54,713	55,645	56,593	57,557	58,538	59,535	59,550
Waikato	-	-	-	1,072	3,367	6,086	9,785	15,296	15,460	15,614	15,770	15,928	16,087	16,248	16,411	16,575
Bay of Plenty	-	-	-	748	2,374	4,333	7,037	11,116	11,338	11,565	11,796	12,032	12,273	12,518	12,769	13,024
Northland	-	-	-	91	282	515	836	1,221	1,348	1,375	1,402	1,430	1,459	1,488	1,518	1,548
Hawke's Bay	-	-	-	180	570	1,040	1,689	2,668	2,721	2,776	2,831	2,888	2,946	3,005	3,065	3,126
Taranaki	-	-	-	215	703	1,321	2,208	3,590	3,770	3,958	4,156	4,364	4,582	4,811	5,052	5,305
Manawatu-Whanganui	-	-	-	357	1,132	2,067	3,356	5,301	5,407	5,515	5,626	5,738	5,853	5,970	6,089	6,211
Nelson	-	-	-	121	378	689	1,119	1,768	1,803	1,839	1,876	1,914	1,952	1,991	2,031	2,071
Otago	-	-	-	1,077	3,383	6,114	8,311	15,378	15,532	15,687	15,844	16,002	16,162	16,324	16,487	16,652
Invercargill	-	-	-	52	167	306	499	793	813	833	854	875	897	920	943	966
Gisborne	-	-	-	33	103	188	307	488	500	513	526	539	552	566	580	595
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	35,000	90,000	160,000	295,000	485,000	775,000	808,332	838,471	867,668	897,943	929,337	961,894	995,656	1,029,671

Card sales

AT	-	-	-	52,264	51,546	88,218	125,095	191,614	22,925	21,986	22,146	23,032	23,953	24,911	25,908	26,944
GWRC	-	-	16,545	8,305	7,487	27,231	38,060	58,010	8,544	6,252	5,113	5,266	5,424	5,587	5,755	5,927
ECan	-	-	18,455	(9,514)	455	9,349	12,837	19,314	901	916	932	948	964	981	997	14
Waikato	-	-	-	1,072	2,205	2,719	3,699	5,521	153	155	156	158	159	161	162	164
Bay of Plenty	-	-	-	748	1,926	1,960	2,703	4,079	222	227	231	236	241	245	250	255
Northland	-	-	-	91	191	233	321	485	26	27	27	28	29	29	30	30
Hawke's Bay	-	-	-	180	390	470	649	979	53	54	56	57	58	59	60	61
Taranaki	-	-	-	215	488	618	887	1,383	180	188	198	208	218	229	241	253
Manawatu-Whanganui	-	-	-	357	775	935	1,289	1,945	106	108	110	113	115	117	119	122
Nelson	-	-	-	121	256	312	430	649	35	36	37	38	38	39	40	41
Otago	-	-	-	1,077	2,306	2,732	3,717	5,547	154	155	157	158	160	162	163	165
Invercargill	-	-	-	52	115	139	193	293	20	20	21	21	22	22	23	24
Gisborne	-	-	-	33	70	86	119	181	12	13	13	13	13	14	14	15
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	35,000	55,000	70,000	135,000	190,000	290,000	33,332	30,139	29,197	30,275	31,394	32,556	33,762	34,015

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Number of Transit card top-ups															
Update below based on file [TCO Inputs v7.3:https://infohub.nzta.govt.nz/otcs/cs.dll/link/50985917] Allocation based on Transit card trips by PTA															
AT	-	-	-	836,217	1,588,285	2,707,911	4,498,561	7,216,716	7,541,917	7,853,808	8,167,960	8,494,679	8,834,466	9,187,844	9,555,358
GWRC	-	-	264,723	397,599	494,756	840,005	1,384,905	2,207,806	2,329,012	2,417,703	2,490,234	2,564,941	2,641,889	2,721,146	2,802,780
ECan	-	-	295,277	143,056	174,361	292,539	476,377	750,356	763,138	776,139	789,361	802,808	816,485	830,394	844,541
Waikato	-	-	-	17,147	51,513	85,821	138,810	217,131	219,303	221,496	223,710	225,948	228,207	230,489	232,794
Bay of Plenty	-	-	-	11,971	36,321	61,109	99,819	157,687	160,840	164,057	167,308	170,685	174,099	177,581	181,132
Northland	-	-	-	1,452	4,318	7,264	11,866	18,745	19,120	19,502	19,892	20,290	20,696	21,110	21,532
Hawke's Bay	-	-	-	2,873	8,717	14,667	23,958	37,847	38,604	39,376	40,153	40,966	41,786	42,622	43,474
Taranaki	-	-	-	3,443	10,754	18,626	31,320	50,932	53,478	56,152	58,960	61,908	65,003	68,253	71,666
Manawatu-Whanganui	-	-	-	5,709	17,321	29,143	47,604	75,201	76,705	78,239	79,804	81,400	83,028	84,689	86,382
Nelson	-	-	-	1,943	5,777	9,719	15,876	25,080	25,582	26,093	26,615	27,148	27,690	28,244	28,809
Otago	-	-	-	17,227	51,753	86,221	139,457	218,143	220,324	222,508	224,753	227,000	229,270	231,563	233,879
Invercargill	-	-	-	837	2,553	4,317	7,085	11,248	11,529	11,811	12,113	12,416	12,726	13,044	13,370
Gisborne	-	-	-	526	1,572	2,657	4,362	6,924	7,097	7,271	7,456	7,643	7,834	8,030	8,230
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	560,000	1,440,000	2,448,000	4,160,000	6,880,000	10,993,814	11,466,649	11,894,184	12,308,360	12,737,831	13,183,179	13,645,009	14,123,949
Fare revenue (all services - excludes SuperGold free travel)															
AT	-	-	-	179,671,752	284,873,802	294,445,538	305,448,373	316,390,564	330,647,844	344,321,552	358,094,414	372,418,191	387,314,919	402,807,515	418,919,816
GWRC	-	-	26,753,259	85,429,169	88,739,074	91,338,269	94,033,850	96,793,190	99,510,716	102,247,016	105,000,354	107,775,215	110,575,985	113,402,705	116,256,996
ECan	-	-	29,841,011	30,737,293	31,273,247	31,809,345	32,345,589	32,896,607	33,457,016	34,026,973	34,606,645	35,196,194	35,795,792	36,405,608	37,025,815
Waikato	-	-	-	3,760,010	9,417,710	9,511,868	9,606,963	9,702,000	9,800,005	9,897,973	9,996,919	10,096,854	10,197,789	10,299,734	10,402,700
Bay of Plenty	-	-	-	2,573,884	6,510,647	6,640,846	6,773,646	6,909,100	7,047,260	7,188,182	7,331,921	7,478,534	7,628,079	7,780,616	7,936,205
Northland	-	-	-	327,737	837,140	862,252	888,118	914,755	942,199	970,462	999,572	1,029,556	1,060,439	1,092,248	1,125,013
Hawke's Bay	-	-	-	617,763	1,562,634	1,625,757	1,698,268	1,771,428	1,844,251	1,917,251	1,990,439	2,063,685	2,136,990	2,210,354	2,283,676
Taranaki	-	-	-	698,631	1,819,166	1,910,121	2,005,627	2,105,897	2,211,185	2,321,737	2,437,815	2,559,698	2,687,673	2,822,048	2,963,142
Manawatu-Whanganui	-	-	-	1,227,489	3,104,936	3,167,029	3,230,361	3,294,959	3,360,848	3,428,054	3,496,603	3,566,523	3,637,842	3,710,587	3,784,787
Nelson	-	-	-	402,740	1,039,732	1,039,104	1,039,888	1,040,678	1,041,468	1,042,258	1,043,048	1,043,838	1,044,628	1,045,418	1,046,208
Otago	-	-	-	3,777,530	9,461,594	9,556,190	9,651,728	9,748,218	9,845,670	9,944,095	10,043,502	10,143,903	10,245,308	10,347,728	10,451,174
Invercargill	-	-	-	178,288	453,191	464,520	476,151	488,033	500,233	512,737	525,553	538,690	552,156	565,958	580,105
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	56,594,270	309,402,285	439,071,873	452,538,964	467,146,021	481,983,677	502,713,401	521,457,116	539,615,148	558,443,731	577,968,391	598,215,635	619,212,999
Total revenue (all services - excludes SuperGold free travel)															
AT	-	-	-	513,347,862	813,925,143	841,272,966	872,709,636	903,973,039	944,708,126	983,775,864	1,023,126,898	1,064,051,974	1,106,614,053	1,150,878,615	1,196,913,760
GWRC	-	-	76,437,882	244,083,340	253,540,211	260,966,482	268,668,142	276,551,970	291,734,331	302,843,869	311,929,185	321,287,060	330,925,672	340,853,442	351,079,046
ECan	-	-	85,260,031	87,820,837	89,521,131	90,883,842	92,415,968	93,990,305	95,591,474	97,219,924	98,876,128	100,560,554	102,273,692	104,016,022	105,788,042
Waikato	-	-	-	10,742,884	26,900,740	27,176,765	27,448,465	27,722,872	28,000,015	28,279,924	28,562,627	28,848,156	29,136,540	29,427,811	29,722,001
Bay of Plenty	-	-	-	7,353,954	18,600,848	18,973,845	19,353,275	19,740,285	20,135,029	20,537,663	20,948,346	21,367,241	21,794,513	22,230,332	22,674,871
Northland	-	-	-	936,392	2,391,829	2,463,578	2,537,480	2,613,597	2,691,996	2,772,747	2,855,920	2,941,588	3,029,825	3,120,710	3,214,322
Hawke's Bay	-	-	-	1,765,038	4,464,668	4,553,952	4,645,020	4,737,907	4,832,651	4,929,288	5,027,856	5,128,396	5,230,947	5,335,549	5,442,243
Taranaki	-	-	-	1,996,090	5,197,618	5,457,488	5,730,348	6,016,849	6,317,672	6,633,534	6,965,187	7,313,422	7,679,067	8,062,995	8,466,119
Manawatu-Whanganui	-	-	-	3,407,111	8,871,247	9,229,603	9,414,169	9,602,423	9,794,440	9,990,295	10,190,066	10,393,833	10,601,676	10,813,677	11,029,922
Nelson	-	-	-	1,150,688	2,910,662	2,968,869	3,028,239	3,088,795	3,150,561	3,213,562	3,277,822	3,343,367	3,410,223	3,478,417	3,547,975
Otago	-	-	-	14,792,943	27,033,125	27,303,400	27,576,366	27,852,052	28,130,487	28,411,699	28,695,720	28,982,579	29,272,307	29,564,936	29,860,497
Invercargill	-	-	-	1,593,394	4,129,831	4,227,199	4,326,375	4,426,381	4,526,236	4,626,999	4,728,581	4,830,116	4,932,643	5,035,169	5,137,695
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	141,897,913	884,006,529	1,254,491,067	1,292,397,040	1,334,702,917	1,377,096,221	1,436,324,002	1,489,877,475	1,541,757,567	1,595,553,518	1,651,338,261	1,709,187,527	1,769,179,996

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Operating expenditure

Ticketing solution provider costs

Front office maintenance & asset management

Fixed charge for base asset management services
BPO asset management services Driver Console
BPO asset management services On-board Validator
BPO asset management services Ticket Vending Machine
BPO asset management services Ticket Kiosk
BPO asset management services Access Gate - Rail
BPO asset management services Platform Validator - Rail
BPO asset management services Platform Validator - Ferry
BPO asset management services Mobile Validator
BPO asset management services CSC Acceptance Device
BPO asset management services Inspection Device

section 9(2)(b)(ii)

Governance, relationship management, project management

Programme management / relationship management / governance
Project management / project administration / other administration costs
Subcontractor / Consortia member relationship and contract management

Business continuity & disaster recovery

Disaster Recovery
Business Continuity Planning Services

Integration & interfaces

Systems Integration
Ongoing integration responsibility

Operations & service delivery

Systems and Operational Administration
Event, Incident and Problem Management Services
Delivery Management
Database Management
Configuration Management
Network Administration
Operational Management Services
Service Delivery Management
Operational Change Management Services
Configuration Changes and Deployment
Operational Monitoring
Ticketing Incident Management
Information Systems Support Services
Revenue Protection Support Services

Finance, apportionment, charging

Financial Services
Fees and Charges Services
Back Office Financial Audit Support
Apportionment, Settlement, Reconciliation Operations
Payment Gateway Services

Other support, licenses, maintenance

Annual support and maintenance cost - licences
Annual support and maintenance cost - resources
Licensing Services
Application Support

Customer engagement services & training

Customer Engagement Services
Training Services

Reporting, data & analytics, compliance

Reporting and Data Services
Data Management Operations Services
Data Asset Management Services
Compliance and Risk Services

Hosting & storage

Hosting Services
Storage and Data Management Services

Other back office services

Procurement Services
Testing Services
Security Services
Ticketing Services

TSO transition costs (incurred by ticketing supplier to support transition)

TSO transition costs Resource Services Ecan
TSO transition costs Ticketing Services Ecan
TSO transition costs Consultancy Services Ecan
TSO transition costs Ad Hoc Implementation / De-commissioning Services Ecan
TSO transition costs TSO transition costs Training Services Ecan
TSO transition costs Consumables Supply Ecan
Subtotal Ecan

TSO transition costs Resource Services GWRC
TSO transition costs Ticketing Services GWRC
TSO transition costs Consultancy Services GWRC
TSO transition costs Ad Hoc Implementation / De-commissioning Services GWRC
TSO transition costs Training Services GWRC
TSO transition costs Consumables Supply GWRC
Subtotal GWRC

TSO transition costs Resource Services AT
TSO transition costs Ticketing Services AT
TSO transition costs Consultancy Services AT
TSO transition costs Ad Hoc Implementation / De-commissioning Services AT
TSO transition costs Training Services AT
TSO transition costs Consumables Supply AT
Subtotal AT

TSO transition costs Resource Services RC
TSO transition costs Ticketing Services RC
TSO transition costs Consultancy Services RC
TSO transition costs Ad Hoc Implementation / De-commissioning Services RC
TSO transition costs Training Services RC
TSO transition costs Consumables Supply RC
Subtotal Regional Consortium

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Total Ticketing Provider Costs

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Financial services costs

Merchant acquirer operating costs
 Program manager operating costs
 Retail network manager operating costs

section 9(2)(b)(ii)

TSO local ticketing costs (based on counterfactual)

TSO onboarding - AT
 TSO onboarding - GWRC
 TSO onboarding - Ecan
 TSO onboarding - Regional Consortium (RC)

Shared Services operating costs

SSO opex setup and ongoing cost
 Co-location
 SSO budget

Total operating costs**Capital expenditure****Ticketing solution provider costs****Design, build, test**

Central back office design
 Central back office build
 Central back office customisation
 Other central back office establishment services
 Central back office equipment
 Central back office licences
 Other central back office software and licences
 Integration to Financial Services Providers' systems
 Interactive Voice Response system (IVR)

Front office hardware

Driver Console
 On-board Validator
 Ticket Vending Machine
 Ticket Kiosk
 Access Gate - Rail
 Platform Validator - Rail
 Platform Validator - Ferry
 Mobile Validator
 CSC Acceptance Device
 Inspection Device

Front office hardware**Ticketing solution provider costs**

Financial Services

Merchant acquirer implementation costs

Re-procurement after 6 years

Re-procurement after 12 years

Transit card programme manager setup

Program manager implementation costs

Re-procurement after 6 years

Re-procurement after 12 years

Retail network manager setup

Retail network manager implementation costs

Re-procurement after 6 years

Re-procurement after 12 years

Financial services costs (MA, RNM, TCPM)

Shared service organisation establishment

SSO Establishment Planning

SSO Procurement (Est.)

SSO Legal Services (Est.)

SSO TSO Consultation & Comms

SSO Facilities leasing

SSO Facilities Fit-out - Gen

SSO Facilities Fit-out - CC

SSO Infrastructure install

SSO Recruitment & Training

SSO Operational Services Est.

SSO Reporting establishment

SSO Process & Document Est.

SSO BCP plan development & est.

SSO Systems - Ticketing Solution

SSO Systems - Financial Services

SSO establishment Contingency

Total Capital Costs (Nominal over 15 years)

section 9(2)(b)(ii)

Glossary

Terminology	Description
Account based ticketing	<p>Account-Based Ticketing is a ticketless way of allowing people to travel meaning they tap or scan using a secure token, linked to an account in the back office, to make a journey. The location and amount of taps calculates the fare, which is charged to the passenger post journey.</p> <p>The secure token fare media can be a smartcard, debit/credit card, mobile device, which is securely authenticated when read by an NFC device on-board a bus or at a train station platform or gate. The customer's account may also contain specific information such as pre-purchased travel products, age of the account holder, applicable concession information, etc. Fare calculation will combine this information for the actual payment, which is processed at the end of the day, ensuring the lowest possible fares are charged based on the customer's eligibility for concessions.</p>
AFC	Automated Fare Collection. Generic term referring primarily to the electronic payment aspect of public transport ticketing.
AIFS	Auckland Integrated Fares System. The identity under which AT HOP was procured.
API	Application Programming Interface
AT	Auckland Transport.
ATAP	Auckland Transport Alignment Project, brings together central government and Auckland Council to strategically align transport objectives and investment priorities for Auckland
AT HOP	Auckland Transport's multimodal public transport ticketing system, implemented from 2011.
AVL	Automatic vehicle locator: a device that makes use of the Global Positioning System (GPS) to enable an organisation to remotely track the location of its vehicle fleet by using the Internet.
Cardholder	A person (defined in the system or not) who has obtained a smartcard. In the payment industry, a cardholder is a non-consumer or consumer customer to whom a payment card is issued to or any individual authorised to use the payment card.
Clearing Operator	Responsibility for clearing of all the transactions and for revenue attribution to the applicable scheme participants.
Closed loop ticketing	An AFC solution accepting proprietary contactless travel cards that are only valid within a specific transit environment.
Contactless ticket	A paper ticket with an embedded chip and antenna that communicates wirelessly (i.e. contactless) with on-board devices to update the information stored on the chip according to the business and fare rules. Contactless tickets offer limited use (e.g. single ride, few hours) and therefore the contactless ticket is considered as a disposable smartcard.
Concession	Refers to a cardholder profile allowing discounts
Current Ticketing Systems	Legacy public transport ticketing systems in use by regional councils, due for replacement. Ticketing 'systems' imply proprietary ticketing systems operating in closed environments in isolation from each other.
Customer	The traveller or a party acting on behalf of a traveller that interacts with the ticketing solution during travel, ticketing, retail action or customer service. A person that interacts with the Transport Operator, the Transport Service Provider, or the Transport Concession Authority during travel, ticketing or

Terminology	Description
	ticketing management activities.
	The Customer role includes the role of Cardholder, Transit Account holder, as well as potentially the role of Payment Account holder in case of a payment relationship for topping up of a Transit Card account.
ECan	Environment Canterbury Regional Council.
Electronic Ticketing System	Semi-obsolete term relating to public transport ticketing (distinguishing from a 'manual' or 'paper-based' ticketing system).
EMV	Europay, MasterCard, Visa; a global standard applicable to contactless banking card systems.
ERP	Enterprise Resource Planning. In this context ERP is used to refer to the data and business intelligence-based activities and systems associated with the operation, management and planning of public transport services and public transport ticketing activities.
FAR	Funding Assistance Rate. NZTA funding support for the regional transport programmes of approved organisations.
GPS	Government Policy Statement (on Land Transport); sets out the results central government expects from investment in the land transport sector over a 10-year horizon.
GRETS	GW, RC, ECan Ticketing Solution. Title for regional ticketing solution development under the NTP that became the NTS in 2018 when Auckland joined.
GW	Greater Wellington Regional Council.
ILM	Investment Logic Mapping – a New Zealand Government Agency-supported process utilised in the development of the strategic business case for investment.
Integrated Fares	The property of a public transport network fare structure that enables consistent fares to be calculated between origins and destinations, irrespective of the route taken or transport modes used.
Integrated Ticketing	The ability to calculate and pay an integrated fare for a public transport journey made up of two or more 'legs'. Legs may be provided by different services/different operators/different transport modes, or permutations of all three.
Interim Ticketing Solutions	Two bus ticketing solutions necessary to meet the business requirements of regional councils, for the period until an NTS ticketing solution becomes available. <ul style="list-style-type: none"> (i) Snapper interim ticketing solution (for GW) replaces operator-provided ticketing systems and supports the introduction of PTOM bus services; (ii) RITS – Regional Integrated Ticketing Solution, was implemented for the Regional Consortium as a closed-loop tag-on/tag-off smartcard system for a period of 5 years with opportunities for contract extension.
Issuing bank	A bank that issues a credit or debit card for one of the four supported payment schemes, e.g. a New Zealand retail bank issuing a Visa™ or MasterCard™.
LGWM	Let's Get Wellington Moving: a joint initiative between Wellington City Council, Greater Wellington Regional Council and Waka Kotahi to support and shape Wellington city and region's growth while making it safer and easier for people to get around and to move more people with fewer vehicles.
MA	Merchant Acquirer – external contracted (by Project NEXT) provider of transit service usage card and payment (pre-) authorisation, and clearing.

Terminology	Description
Multi-tenanted	Multi-tenancy means that a single instance of the software and its supporting infrastructure serves multiple customers. Each customer shares the software application and also shares a single database. Each tenant's data is isolated and remains invisible to other tenants.
NEXT / Project NEXT	The project established under the NTP for the procurement of the National Ticketing solution and the development of the Detailed Business Case.
NFC	Near Field Communication. A wireless communication protocol, used predominantly in mobile 'phones, with potential for application to devices used in public transport fare payment.
NLTF	National Land Transport Fund - central government funding for investment in the land transport sector, defined in the GPS.
NLTP	National Land Transport Programme. Waka Kotahi's programme of ongoing investment in New Zealand's land transport system using NLTF.
NTP	National Ticketing Programme. Collaborative programme between all regional councils and NZTA, established in 2016 for the development of public transport ticketing solutions.
NTS	National Ticketing Solution. The end-to-end solution to provide public transport ticketing for New Zealand and comprising the core ticketing solution plus the separately contracted financial services and supported services
Open loop ticketing	An AFC solution accepting contactless branded payment cards from international card schemes like Visa, MasterCard, UnionPay international, American Express, Discover and JCB, e.g.: PayPass or PayWave", and includes a virtual card on a mobile device. Also, EMV-compliant transit cards will be issued to cater for unbanked customers.
PTA	Public Transport Authority – a regional or unitary council responsible for providing regional public transport services. The Land Transport Management Act 2003 (LTMA) requires regional councils and unitary authorities to establish and appoint members of regional transport committees.
PTOM	Public Transport Operating Model - partnering basis between regional councils and operators for procurement of public transport services.
Public Transport Ticketing	The function necessary for the payment of public transport fares and provision of the associated business support activities.
RC	Regional Consortium. A formal collaboration between 9 regional councils for the purposes of public transport ticketing system procurement. The Regional Consortium currently includes: Northland Regional Council; Waikato Regional Council; Bay of Plenty Regional Council; Taranaki Regional Council; Hawkes Bay Regional Council; Horizons (Manawatu); Nelson City Council/Tasman District Council; Otago Regional Council; and Invercargill City Council.
Revenue protection	Card/cardholder verification in order to avoid frauds and revenue loss (fare evasion) in an IFM system. (Also called inspection)
RITS	Regional Interim Ticketing Solution
RLTP	Regional Land Transport Plans. Statements by Regions on how they will optimise their land transport programmes.
RNM	Retailer Network Manager – external contracted (contracted by Project NEXT) provider of customer Transit Card retail services.
RPTP	Regional Public transport Plans. Plans by regions stating how they will deliver and optimise the public transport services.

Terminology	Description
RTI	Real Time Information is up-to-the minute information on when a bus or train service is due to arrive at your stop or station.
Smartcard	A plastic card with an embedded chip and antenna that communicates wirelessly (i.e. contactless) with devices to update the information stored on the chip according to the business and fare rules.
SP	Scheme Provider: Responsible for managing the overall scheme rules, ensuring all participants apply these and adhere to them, and responsible for on-boarding of new scheme participants.
SSO	Shared Service Operations – the organisation established by the participating Transport Service Owners to provide selected shared service operations on behalf of Transport Service Owners to ticketing service users. The Shared Service Operations will provide PTAs with co-ordinated operations management and change management, and support both TSO implementation and transition. Shared Service Operations will manage the ticketing and financial service contracts. The SSO handles the following roles:
Stored value	Money stored in smartcards.
SuperGold Public Transport Concession	The public transport travel concession administered by the Ministry of Social Development (MSD) with the NZ Transport Agency administering the public transport (PT) concession funded by the Ministry of Transport and implemented at a regional level to provide free travel on public transport for eligible persons according to a set of rules.
TCA	Transport Concession Authority – the organisation approved by the Transport Service Owner to authorise Customer concession applications and record individual customer concession entitlements in the ticketing solution. An example of a Transport Concession Authority is an educational institution. The TCA is responsible for performing the eligibility check for Customers that are entitled to the concession that is managed by the TCA.
TCO	Total Cost of Ownership
TCPM	Transit Card Program Manager – external contracted (contracted by Project NEXT) financial services provider of Transit Card services to Transport Service Owners, undertaking the issuing of cards (all form factors including virtual) and the managing of card funds.
Ticketing Solution	The means of collecting public transport revenue, either independently through use of a public transport ticketing system or collaboratively through participation in a public transport ticketing scheme.
TO	Transport Operator – the organisation that delivers operational transport services on behalf of the Transport Service Owner to the Customer utilising the ticketing solution. The Transport Operator is responsible for the accurate registering of Tag on and Tag off transactions for the modes of transport offered by the Transport Operator. In future it is possible that the Transport Operator could be a future transport offering such as a MaaS Transport Service Provider.
Token	An accepted form of authentication which could be a card, smartphone or proprietary device.
Total Mobility	The total mobility scheme assists eligible people with long term impairments to access appropriate transport to meet their daily needs and enhance their community participation by providing vouchers or electronic cards that subsidise the normal transport fare by 50% up to a maximum fare.
ToTo	Tag-on/Tag-off. The transaction event generated at the points a customer begins and ends a public transport trip, or enters and leaves the public transport network.

Terminology	Description
Transport Authority	The unit within a regional, unitary, or territorial authority responsible for local roads and public transport.
TSP	Ticketing Services Provider – the organisation contracted to provide Transport Service Owners and Transport Operators with the ticketing solution, solution implementation and operational services, and providing Customers with ticketing customer services on behalf of Transport Service Owners. The TSP handles the following roles:
TVMs	Ticket Vending Machines
Waka Kotahi	New Zealand Transport Agency

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