Understanding Real-time Payment Dynamics in Australia

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To address these shortfalls, real-time payments have been introduced by various central banks. Although real-time payment systems have been available for some time and present numerous advantages, their adoption in Australia is still limited. This paper provides an in-depth overview of Australia’s real-time payment network architecture, the New Payment Platform (NPP), including details of its service products and presents several use cases. While the aim is to inspire further innovations in the payment system utilising the NPP platform, the paper also examines the reasons for the limited adoption of real-time payments despite their clear advantages over traditional digital payment methods.
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Abstract. While digital payments have transformed e-commerce, they are not without drawbacks. The most noticeable issues arise from extended payment settlement times and the costs incurred from card fees, largely due to reliance on credit card payment networks. To address these shortfalls, real-time payments have been introduced by various central banks. Although real-time payment systems have been available for some time and present numerous advantages, their adoption in Australia is still limited. This paper provides an in-depth overview of Australia’s real-time payment network architecture, the New Payment Platform (NPP), including details of its service products and presents several use cases. While the aim is to inspire further innovations in the payment system utilising the NPP platform, the paper also examines the reasons for the limited adoption of real-time payments despite their clear advantages over traditional digital payment methods.

Keywords: digital payment · real-time payment · fast payment · New Payment Platform · NPP · PayId · PayTo

1 Introduction

Digital payments, also known as electronic payments, are systems that transfer digital money from one account to another using digital payment technology [14]. This technology refers to various methods of making electronic transfers of money. Technological developments have enabled innovation in digital payment methods, from traditional card payments to contactless mobile wallets and wearables, to QR codes [12, 22, 17]. Easy access to digital devices and internet connectivity has created a convenient pathway to digital payments [3]. The pandemic has reshaped payment preferences, driving a surge in digital payment methods, especially mobile wallets, which are projected to grow globally [10, 33].

Despite significant changes to the payment system technology, for many nations, the fundamental architecture of the payment system, which includes integration through third-party payment providers, has remained relatively unchanged for over two decades. It is vital that payment networks, that support the payment system, are primarily driven by corporate businesses like Visa or Master, which promote innovation on top of their network.
The current traditional payment system involves multiple intermediaries verifying the settlement processes that decelerate money transfers compared to the exchange of information which can occur almost instantly. One might question *why the movement of money is slower than the speed of the information transfer.* Considering today’s digital age, data globally can be transferred within seconds, yet traditional financial transactions often rely on intermediaries and may not settle for days.

### 1.1 Payment settlement time

The payment industry constantly innovates and enhances user experience by providing a variety of convenient options. However, the ability to settle business-to-business (B2B) and business-to-consumer (B2C) transactions depends on various clearing and settlement infrastructures. Unlike messages that transfer directly from sender to recipient, digital money must often pass through multiple hands. This includes the sender’s bank, the clearing house, and the recipient’s bank. Each intermediary can introduce delays. Card providers who profit from the transaction processing fees, dominate the clearing and settlement infrastructures landscape [31].

Credit card adoption and usage in most Western countries have been historically dominant. In most western countries, retail and business payment systems are dominated by credit card providers. The convenience offered by credit cards resonates with consumer-driven demand, thus supporting the dominance of the credit card industry over the payment system. Moreover, credit card companies often incentivise customers with rewards, cashback, and other benefits to keep the customers engaged [8]. As a result, businesses are compelled to use merchant terminals that are compatible with credit cards. Debit card transactions are often treated as credit card transactions because they utilise the same credit card processing systems.

Although consumers use debit cards to access their own funds, when making payments at a terminal enabled for credit card transactions, the transaction is processed through the credit card payment network. This means that even a debit transaction is routed through the system typically used for credit card transactions, including a processing fee. This raises the question: *Why does it cost money to use your own money?*

### 1.2 Payment cost-to-cost money exchange

Payment cost refers to the expenses as fees associated with financial transactions. Payment costs are based on the payment method of the service provider [15]. Card network providers typically charge a service flat fee of 3% regardless of based on credit or debit transaction. When making a digital payment with your debit card, the choice of network used to process the transaction can depend on the merchant provider. If the card network is Visa or Mastercard, the treatment of the transaction remains the same, regardless of type of the account (credit or debit).
Contactless payments such as payWave [35] and PayPass [13] use the same network as credit card transactions; therefore, a card surcharge is applied to that transaction regardless of card type such as credit or debit. For example, Aldi supermarket in Australia charges a 0.5% surcharge for contactless payments made with a Mastercard or Visa debit card [2]. Within the Queensland Department of Transport and Main Roads, all payments made with a credit or debit card incur a credit card surcharge [32].

Digital payments have gained wide adoption as a standard way in businesses. While digital payments offer convenience, transactions must go through network providers’ systems. Customers have no choice but to agree to the payment system network providers’ fee structure. Digital payments have many advantages, such as easy accessibility to funds 24/7 through online providers and are convenient to use. However, these benefits come with associated costs. Historically, banks have charged fees for providing safe custody of cash and maintaining security measures for cash storage in branches and ATMs. With technological advancements, banking transactions have become more automated, resulting in reduced human involvement and reduced physical branches for banks and ATMs [16]. Technological advancements have enabled more payment transactions to be carried out electronically, greatly benefiting the e-commerce industry. As more banking services have become electronic, the need for physical money has declined. While this reduces costs associated with the need for physical infrastructure, it increases costs related to network service. One such cost is the fee charged by payment network providers. Banks and Fintech companies often pass the payment network providers’ service charges to their customers [34].

1.3 Problem definition

In the evolving financial landscape, traditional payment and settlement systems present numerous challenges that hinder efficiency and transparency. These systems often incur delayed settlement times, with some transactions taking several days to complete, thereby posing cash flow challenges for businesses and individuals. Coupled with this is the issue of service charges. The involvement of multiple intermediaries in conventional systems often inflates the cost of transactions, with users sometimes unaware of the full extent of these fees, particularly in cases involving credit card surcharges. Furthermore, these traditional platforms frequently operate within a set of hours, leading to transaction delays if initiated outside of these time frames or during weekends. On the horizon, real-time payment systems promise real-time or near-real-time settlement at potentially lower costs [4, 27]. However, their effectiveness hinges on widespread adoption, interoperability with existing systems, stringent security measures against potential fraud, compliance with ever-evolving financial regulations, and, ultimately, the trust of businesses and consumers. The core issue lies in determining the viability and advantages of transitioning from established payment mechanisms to these emerging fast payment systems while acknowledging and addressing inherent challenges.

The main contributions of this paper include:
– A comprehensive overview of digital payments and their associated components.
– An in-depth exploration of the real-time payment system.
– A review of the Australian real-time payment system, NPP, and its architecture.
– Insights into the adoption of real-time payment systems in Australia.

Real-time payment systems (RTPs) usually emphasise the immediate transfer of existing funds, although credit mechanisms can be integrated. The practicality of using credit with RTPs depends on bank policies, system rules, and regulations. This research solely examines debit money, excluding credit money.

2 Real-time payment system

A payment system refers to a set of processes, technologies, and infrastructure that allows businesses and individuals to make financial transactions. This typically happens through a financial provider. The entities involved in a payment system are the payee, payer, banks, and payment network providers.

Banks are regulated financial institutions that provide various services, including payment services. In this research, we limit our focus to electronic payment services, also called digital payments. The current banking industry is a multi-million-dollar business that settles business transactions through its network and plays a crucial role in the functioning of the economy. Banks provide payment services through various network provider’s infrastructure, generally known as payment rail.

A payment rail is a network infrastructure that connects various financial institutions and provides a means for facilitating financial transactions. The most predominant payment rails include Mastercard, Visa, Discover, and American Express. Banks use payment rails as the underlying infrastructure to process, settle, and transfer funds for various types of financial transactions. The electronic card issued by a bank to its customers carries the label or logo of the network provider that the bank utilises as a payment rail. This label indicates that the card can be used within the network’s payment system, enabling customers to transact and transfer their funds through that specific payment rail.

2.1 Payment system workflow

Let us define the bank that debits an amount from the payer known as the issuer and the payee’s bank, which credits the amount on the receipt is the acquirer and the payment network provider as card network.

Fig. 1 shows a simplified transaction flow of a payment system that begins with the customer paying using a payment card at the merchant’s point-of-sale (PoS) system. The PoS machine sends the authorisation request to the acquiring bank [29], which then routes it through the card provider’s card network [9].

1 A bank or financial institution that processes credit or debit card payments on behalf of a merchant.
2 An organisation that facilitates payment card transactions.
Fig. 1. Simplified architecture of a card payment system.

to the issuer bank \cite{29}\textsuperscript{3} for approval. The issuer bank verifies the authorisation request, the customer’s account details, available funds, and other relevant factors. Based on this information, the issuer’s bank clears the transaction by approving or declining it. This response is then transmitted back through the card provider’s network to the acquiring bank and the merchant. The PoS prints a receipt if approved, and the merchant can provide the product. Otherwise, the merchant may decline the service or arrange an alternative payment method. After the transaction is completed, the acquiring bank initiates the settlement process through the card provider’s network to transfer the funds from the customer’s account to the merchant’s account.

2.2 Payment network provider

A payment network provider is a company or organisation that offers services related to processing payment transactions. They typically handle the technical aspects of payment processing, including managing the network infrastructure that facilitates transactions between various parties involved in the payment ecosystem. Additionally, payment network providers often implement security measures and fraud prevention mechanisms to protect against fraudulent activities and ensure the integrity of the payment network.

Visa and Mastercard are prominent payment network providers for electronic transactions among merchants, cardholders (users), and financial institutions. Banks issue cards to customers, embedding them with compatibility for Visa or Mastercard readers. Merchants employ card reader devices that connect to the Visa and Mastercard networks, enabling payment processing. It is important to

\textsuperscript{3} Bank that provides cards to consumers
note that, over the past five decades, the fundamental structure of the payment system, where banks keep their own ledger and payment network providers synchronise this ledger, has remained largely unchanged, except for advancements at the periphery, such as contactless payments.

The business model of payment network providers is to earn revenue through transaction fees. Transaction fees are typically a small percentage of the value of the transaction or a fixed fee value. These fees are generally referred to as surcharges and are typically charged to the acquiring bank by the payment network provider for using the service.

### 2.3 Payment surcharge

A payment surcharge is an extra fee that businesses can charge customers for using a digital payment system [34, 11]. It is the actual costs businesses incur to accept payment using the service of a payment network card provider [6]. Depending on the merchant agreement and card type, businesses are charged for using digital payment services. The amount it costs a business to process a payment will depend on factors such as the size of the business, the technology used to process payments, and the payment method. Small businesses may have higher processing costs than larger ones, and the cost to smaller businesses may be higher [1].

In theory, by adding surcharges to offset their expenses, merchants might reduce the prices of products and services for buyers. Some businesses decide not to charge payment surcharges. Instead, they factor the cost into the price of their goods and services, which would apply to all customers. Regardless of how the business recovers costs, the customer must bear the cost of using card payments [18]. The banks’ payment service, using this third-party card service, the burden of processing payments is no longer an overhead for banks; and for businesses, passing third-party service card fees to customers reduces their expenses. Customers have a choice of using their preferred payment type at their expense. Customers may prefer businesses which are not pass card surcharges during payment process. This became a challenge for small businesses that pass card surcharges directly back to their customers [24].

For Australian consumers, when dealing with businesses that use the Visa or Mastercard payment service, a possible alternative to avoid surcharges is to opt for cash payments. However, use of cash for day-to-day transactions has been declining in Australia for many years [16]. This trend has implications for all aspects of the cash system, including the mechanisms supporting cash distribution and accessibility. Notably, a majority of banks now host ATM services solely within their premises [28]. Moreover, many public ATMs, particularly those in shopping centres, levy a withdrawal charge.

### 2.4 Digital payment - discussion

Digital cards, such as credit or debit cards, provide convenience and ease of transaction for individuals and businesses. The use of digital cards is generally
viewed as a socially beneficial practice. The additional cost associated with digital card payments is often considered a convenience fee; thus, businesses recover the expenses of processing such payments. However, it is important to note that many customers may not fully comprehend the fact that they are essentially paying for the convenience of using their own money in electronic debit card payments.

Even though we migrated from cash to cheques and to digital payment, traditional payment still takes a day or longer to clear, and the speed of electronic bank transfers depends on a country’s banking infrastructure. Traditionally, they have been processed in large batches once or several times a day and did not process electronic payments at night or on weekends. This can have a significant effect on business, especially for small businesses that rely on receiving payments promptly to support their cash flow.

Countries worldwide are investing in their banking infrastructure to help money move faster, bringing the benefits of the digital economy to more people and businesses. As a result, an infrastructure has emerged called RTPs, also known as instant payments, faster payments or immediate payments. The rest of the paper refers to this as RTPs.

3 Real time payment system (RTPs)

RTPs refers to a payment system that transfers funds in real time and provides immediate availability of funds to its recipient. When an RTP transaction is authorised, the payer’s account balance is instantly deducted, and the recipient receives a confirmation of funds in real-time. While the settlement timing may vary between different payment schemes, it typically takes only a few seconds to complete.

RTPs payments are one of the most significant financial innovations in the past decade [5]. RTPs services enable financial institutions to offer efficient, instant payment services in real-time, either free of charge in some nations or with a small fee in others. These services have proven benefits in driving digital adoption, financial inclusion, and boosting small business economies, in many nations.

An important aspect of RTPs systems is the speed of settlement and its associated cost. Typically, a payee will take a day or more to receive funds using a traditional payment system network, while RTPs systems can execute transactions in real-time. Real-time payments use a different network rail facilitated by central bank partnerships, prioritising payment services and removing the intermediaries, which reduces the time and costs associated with settlements. Efforts to develop and provide RTPs networks vary across the globe. Most of the development is initiated by central banks collaborating with financial institutions, industry providers, and technology companies. These entities work together to develop and offer RTPs networks that are cost-effective and more convenient compared to traditional payment network providers such as Visa or MasterCard.
3.1 Functionalities: RTPs vs traditional payment

In traditional card payments, the payee’s point-of-sale (PoS) terminal initiates the payment transaction flow when a payer uses their card. The terminal sends the transaction details to the acquiring bank’s network, which then forwards them to the card provider (such as Visa or Mastercard). The card provider routes the transaction to the issuer bank for clearance. Once the issuer bank approves the transaction, the payer receives the product or service, and the acquiring bank initiates the settlement process.

In RTPs, the payment flow is reversed. The payer initiates the transaction to pay the payee and sends the payment details through the payer’s bank to the RTPs network. The network checks the payer’s credentials, verifies the payee’s details, and, if they exist, processes the settlement immediately on behalf of their bank. The payer is notified of the result, and the funds are transferred from the payer’s account to the payee’s account and to their relevant banks in real-time. The key distinction is that in traditional card payments, the payment communication flows from the payee to the payer through various intermediaries. Whereas, in RTPs, the communication flows directly from the payer to the payee, allowing for immediate settlement and notification of the transaction result. The payer authorises the payment, which is deducted from their account and made available to the beneficiary immediately through the real-time payment network.

3.2 Business model for RTPs

The business model of RTPs varies depending on the parties involved. Those initiated or overseen by the central bank or government prioritise broader societal benefits over direct revenue generation. In such instances, funding for the network’s development and operation may come from government budgets or financial support from the central bank. The systems that are developed through financial institutions’ partnerships may generate revenue through transaction fees for payments processed through the system.

In both cases, the main objectives of RTPs are to provide seamless payment services across participating financial institutions (banks). To achieve this, banks must integrate RTPs into their existing banking systems and offer their services to their customers. The entities that own and operate RTPs and their services differ in each country. A global RTPs tracker website4 by the World Bank aims to provide a consolidated and comprehensive overview of the status of implementation of RTPs worldwide.

4 RTPs in Australia

In 2012, the Reserve Bank of Australia (RBA) published strategic objectives for the Australian payment system and invited the industry to determine the most effective way to deliver payment services. In [26] response, an industry

committee proposed to develop a new, purpose-built payment infrastructure. In 2014, twelve institutions committed to fund and construct a new domestic payment infrastructure, launched in 2018 as New Payments Platform [25].

4.1 New Payments Platform

The New Payments Platform (NPP) is an open-access payment platform that enables Australian financial institutions to leverage their services of real-time, inter-bank payment service to their customers. The NPP platform supports financial institutions and service providers to develop overlay services on the NPP for innovative payment services to its end-users. NPP can be considered as or going to be Australia’s national payments infrastructure owned by a consortium of financial institutions and operated by NPP Australia Limited under the guidance of the Reserve Bank of Australia.

The architecture of NPP comprises three distinct layers: Governance, Functional, and Application. The governance layer provides strategic oversight and direction, encompassing policies, standards, and frameworks that guide the decisions of the systems. It delegates roles, responsibilities, and accountability mechanisms, ensuring compliance with both internal and external requirements. The functional layer, representing a distinct software stratum, delivers specific functionalities, translating the strategic directives from the governance layer into actionable processes and routines. The application layer comprises tools, software applications, and technologies designed to support and facilitate the functional processes.

While the governance layer determines why and what regarding strategic objectives and policies, the functional layer dictates how regarding processes and workflows. Meanwhile, the application layer equips the system with the technological tools required to implement those processes. The points below provide an in-depth look at various elements within each NPP’s composing layers.

- **Governance:** The governance layer comprises the governance organisation, the Australian Payments Plus (AP+), formally known as NPP Australia. It comprises thirteen financial institutions referred to as participants. Other parties can subscribe and pay a fee to be part of this network or be sponsored by one of the thirteen financial institutions.

- **Functional:** The functional layer consist of Fast Settlement Service, Basic Infrastructure and PayID Addressing Service.
  - Fast Settlement Service: The fast settlement service is operated by the Reserve Bank of Australia, clearing and settling RTPs transactions. All thirteen financial institutions have access to the service for balancing liquidity and maintaining ledgers.
  - Basic Infrastructure: The basic infrastructure is developed by SWIFT and based on the international messaging standard ISO 20022 [19] messaging construct which facilitates the exchange of messages between counterparties in a modern standard for routing messages.

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• Pay ID Addressing Service: This is a centralised addressing service, extending the ability to address payments through an identifier such as mobile numbers, ABN, etc.

  - **Application**: The application layer is referred as Overlay Services in the NPP ecosystem. These services sit on top of the NPP functional layer to facilitate faster payments. Current overlay services are *Osko* payment and *PayTo*.

Within the functional layer, the technical details of the ‘fast settlement service’ and ‘basic infrastructure’ are irrelevant to this research. These software services are already built, and only the functional aspects of these services are pertinent to this discussion. Therefore, the technical details about these services have been omitted. At a high level, with the NPP system, validation and confirmation of the payment instructions are undertaken before instructing the settlement layer; therefore, settlement can be carried out when cross-checking. Subsequently, the payer bank instigates settlement by sending settlement instructions to the NPP system. The instructions are processed by a functional layer in which the actual movement of funds between the bank accounts occurs in the NPP ledger on a 24/7/365 basis. In this process, the beneficiary bank can immediately post the funds to the beneficiary’s account.

### 4.2 PayID

PayID is a digital identifier unique to a user and serves as a link to their bank account. The identifier can be a phone number, email address, or Australian
Business Number (ABN). PayID can only be registered to the NPP network by a participating bank on behalf of its consumers\(^6\). Once registered, the PayID is recognised across all participating financial institutions within the NPP ecosystem. Users can use PayID to recognise themselves in the NPP network, regardless of which bank they have an account with, as long as those banks are part of the NPP ecosystem.

The main advantage of using PayID is that it simplifies the payment process. Instead of sharing bank details, such as the BSB code, account number, name, or bank name, users only need to share their PayID identifier. This makes the process of accepting and making payments more convenient and secure, as the sensitive bank account information remains private.

**A simple workflow illustration using PayID:** The payment process begins with the payer initiating the payment using the payee’s PayID through a banking channel, such as an online banking portal or mobile application. An enquiry is sent to the PayID addressing service, which returns the payee’s PayID account details and the legal account name associated with the PayID for the payer’s confirmation. Once verified, the payer’s institution sends a payment message, including all relevant transaction details, to the payee’s institution through NPP rails for confirmation. After the payee’s institution confirms its ability to credit the payee’s account through any NPP integrated services such as Osko, it initiates the settlement in real-time between both banks.

### 4.3 Osko payment

Osko by BPAY is the first overlay service on NPP in Australia. It is a payment service that allows consumers to transfer money almost instantly from one bank to another using PayID. Osko operates as an application built on top of the NPP rail, allowing for RTPs between different banks. Users can pay individuals or businesses using one of two identifiers: their PayID or their traditional account details (BSB and account number). The Osko service is widely used by banks for their pay-anyone feature, enabling customers to make instant payments to other parties. After processing payment using Osko, users may notice the Osko logo (Osko ◎) pop-up indicating that the transaction has been successfully completed.

### 4.4 PayTo

PayTo is an advanced payment system that addresses several limitations and challenges associated with traditional direct debit transactions. PayTo introduces a feature that lets both consumers and businesses customise payment parameters. Users can define consent for payment, select the source account, specify the payment amount, and decide the duration of the payment agreement. Consumers using PayTo enjoy greater control over their bank account payments.
and can oversee them securely through their current desktop or mobile banking interfaces. For businesses, the platform eliminates the unpredictability of bank account payments, reducing wait times for potential dishonours and cutting administrative expenses.

The PayTo payment system can be used for bills, memberships, and subscription services. It provides a broad, scalable, and secure solution for third-party payment initiation, including:

- Immediate notification of payment declines: Unlike the traditional system, where direct debit transactions might be dishonoured, and the concerned party might only find out much later, PayTo notifies billers immediately if a payment does not go through. This immediate feedback can prevent consumers from incurring fees associated with bounced or dishonoured debits.
- Centralised authority: PayTo operates with a centralised system, making it possible to modify payment details in real time. Any change a customer makes is communicated quickly, ensuring all involved parties are aware.
- Certainty for consumers: With PayTo, consumers no longer have to deal with the ambiguity of when their payments will be processed. This system ensures that consumers know exactly when their money will be deducted.
- Enhanced security: PayTo’s closed-loop solution prioritises security. Payment details, particularly sensitive ones like card expiration dates, remain confidential, reducing the risk of potential misuse or fraud.
- Efficient cancellation process: If a user wants to cancel a direct debit, the request is processed promptly with PayTo, ensuring the customer’s wishes are respected and implemented promptly.

Utilising the RTPs capabilities of the NPP and PayTo facilitates payments directly from bank accounts, accommodating both one-off purchases and regular recurring payments. Key features include instant settlement, immediate account validation, notifications, enhanced security, and integrated payment schedules. Moreover, it supports extensive transactional data. This service benefits various stakeholders: Organisations receive payments for goods and services more efficiently, businesses that outsource payroll get faster money movement, and FinTech entities can capitalise on rapid fund transfers.

**A simple workflow illustration of PayTo:** Consider the example of a real estate business. Traditionally, when such a business collects rent from their tenants, there is a waiting period of two to three business days before they can confirm whether a payment has been successfully processed. With the PayTo solution, real estate businesses have the capability to debit rents from the tenants’ bank accounts instantly. The real-time nature of this service ensures that if a payment fails, the business is notified without delay, eliminating the typical two to three-day waiting period. For tenants, this translates into immediate notification of the transaction’s status. In the event of a failed transaction, they can arrange for an alternative payment method promptly, thereby avoiding potential dishonour or overdraft fees imposed by their bank or service provider.
4.5 Difference Osko and PayTo

Using Osko payment, users can pay or get paid to their linked bank account, whereas PayTo enables a way to collect payments in real-time directly from another account. In other words, PayTo is a way for businesses or merchants to collect real-time payments from a user’s account. With PayTo, the business starts the payment process, and the user’s bank checks transaction details based on the pre-authorized PayTo agreement the user has signed. In other words, with Osko, the payer initiates the payment to the payee, whereas with PayTo, a payee can ask for payment from the payer’s account.

4.6 Potential benefits and use case of RTPs

As the financial landscape evolves, the potential benefits of RTPs come into sharper focus, offering transformative use cases that cater to modern demands.

**Peer-to-peer payment:** With Osko and PayID, the Peer-to-Peer (P2P) payment process becomes seamless and efficient. P2P payments can add convenience to everyday transactions, like splitting a bill or sending money to a friend or relative. There are a range of scenarios where P2P payment is very useful. As we move away from cash transactions, P2P payment become increasingly common and widely adopted.

**Payments for Day-to-Day use:** Currently, many individuals rely on their day-to-day earnings to cover immediate expenses such as groceries, petrol, and food. These average income earners typically work shifts and require quick access to their wages to meet their immediate needs. RTPs enables employers to pay wages instantly after completing the shift. This offers financial flexibility to users as they can immediately use the money they earned for their everyday expenses without relying on credit card providers.

**Payments for business transactions:** RTPs payments offer several advantages for a business to manage their cash flow effectively. Merchants will receive immediate settlement for point-of-sale transactions, allowing them to pay their suppliers promptly, ensuring a smoother supply chain process, paying wages and other business expenses quickly, and enhancing customer trust.

**Small business transactions:** For small businesses, the current Osko PayID has several benefits such as i) instant payments: allows small businesses to receive payments from customers almost instantly. ii) Cost-effective payment solutions: Transactions often have no or lower costs than traditional payment methods, making them cost-effective for small businesses and customers. Osko PayID is a valuable tool for small businesses, enabling them to offer their customers efficient and convenient payment options and improve their overall financial operations.
**Organisational benefit:** With the current payment system, businesses wanting to pay their employees must deposit the amount a few days ahead. For example, if the employees are to be paid on a Monday, the employer must deposit the amount on Wednesday or Thursday for the payment to be credited to the employees’ accounts. That requires a 4-day advance, including the weekend. During these 4 days, the money is not in the account of either the employer or the employee. However, with RTPs payment, the employer can automate the payment to be deducted on Sunday, Saturday, or Monday morning or evening. This way, the money is not floating around somewhere.

These use cases demonstrate how RTPs benefits both users and businesses by ensuring rapid and efficient access to funds, fostering a seamless financial experience for all participants. However, RTPs features need to be made available to users and businesses through banking channels and payment service providers.

4.7 Discussion

The two main features of instant and low or no-cost transactions attract the adoption of RTPs because it benefits business and their customers. RTPs services are easier for banks and other financial institutions to adopt and remove the development of technological burden. RTPs speeds up the payment process for domestic transactions. RTPs are already set up for cross-border payments between some countries [21]. CBDCs and stablecoins could be the technologies that will compete with RTPs to be the future of digital payment systems.

In most countries that successfully adopted RTPs, such as India, Brazil, and Thailand, central banking has been involved in developing the RTPs framework and providing regulatory oversight over the network. At the time of writing this paper, Australia’s RTPs, NPP, were and are in the hands of commercial banking participants. While Central banks oversee the regulation and operation of the network. A most attractive use case is peer-to-peer payments, in which people directly pay one another from their bank accounts via an app. This is extremely useful because it happens instantly at no cost (as of 2023). The features of PayTo make it easier and faster for people to pay bills, make payments on delivery or make payments on e-commerce marketplaces directly from their bank account. Several payment service companies are developing products integrating PayTo with business applications at a comparatively lower cost than traditional card networks.

5 Adoption of RTPs in Australia

A recent survey results from BIS [20] notes that 70% of central banks already have RTPs in place with varied degrees of success in adoption. The adoption has varied dramatically by country and who promotes it. One key factor that drives adoption is the involvement of central banks and mandatory banking partnerships to provide real-time service. The low transaction fee was another enabling factor for adoption.
A 2022 NPP roadmap report [23] shows that close to 89 million accounts can make or receive RTPs payments. NPP accounts for approximately 30% of account-to-account or push-based payment processes and an average of 100 million monthly transactions. By 2030, NPP is projected to become the preferred payment system for both consumer and business transactions.

As of 2023, most banks offer two types of Osko payment services: personal banking and business accounts. Osko payment has been integrated into banking apps as a standout feature for everyday financial activities. Users can easily access and utilise Osko’s features directly through their regular banking apps. However, RTPs applications such as Osko and PayTo are not widely available for business operations. For any business, the payment system they adopt needs to integrate seamlessly into their operations; otherwise, it might create operational inefficiencies, leading to potential errors or delays. One significant task for business accounting is payment reconciliation — ensuring that the amounts received match sales or invoices. Without integration, reconciling payments made via RTPs can become labour-intensive, increasing the potential for errors.

5.1 RTPs service providers

Several Australian companies are developing RTPs solutions for businesses, organisations and governments, offering various services such as PayID for businesses, PayTo for billers, and eCommerce accounting solutions.

Table 1. RTPs providers

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<tr>
<th>Name</th>
<th>Website</th>
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<td>Monoova</td>
<td><a href="https://www.monoova.com/">https://www.monoova.com/</a></td>
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The business model of these RTPs service providers primarily revolves around generating revenue through transaction fees. In many ways, they operate similarly to credit card providers (they leverage NPP rails instead of credit card rails). The service product could be banks offering bundled services, including a payment terminal, gateway, or e-commerce systems that integrate with existing sales systems belonging to third-party RTPs service providers. Some of these RTPs providers may also adopt a Software-as-a-Service (SaaS) [30] model, levying regular fees on businesses for platform usage. For end users, this prompts questions about whether the benefits of instant payments could be overshadowed by the costs associated with these services. Comparing the fee structures across various RTP service providers and benchmarking them against conventional credit card services is a topic worth exploring in future research.
5.2 Observations

It has been evident that many people use the Osko payment for personal transactions through their banking app; however, it is not present in business and merchants’ payment offerings to the best of our knowledge as of 2023. Recently, several news reports in the media have been about merchants struggling with the rise in costs and discussions about transaction fees. According to many small businesses, they cannot bear the card surcharge fee, so they pass it on to the customers. At the same time, they are worried that this factor may drive customers to merchants that do not charge a surcharge fee. The elephant in the room in this conversation is the transaction fee. Interestingly, none of the conversations about card payments or surcharges mentions Osko payments. Is this because the public and small businesses are unaware of it?

Why are small businesses not using Osko payment? : Let us assume that small businesses adopt digital payment methods due to customer demand. They subscribe to point-of-sale card terminals through their banking partner. In a society where card payments are predominantly used, it is challenging for businesses to make a change. In this situation, businesses have no incentive or benefit to transition to Osko unless there is a demand from the customer side. Additionally, there may be a lack of awareness or understanding of using the Osko feature for small businesses because Osko payment processes are not integrated into the PoS card terminals or gateway systems (as of 2023). Therefore, receiving payments using PayID is a manual process that involves providing the PayID to customers and ensuring the payment has been received. Without proper training or informational sessions, which small businesses might not have the resources to access, they may not see the value in offering it. This inertia and resistance to change are not uncommon, especially when businesses are content with their existing payment methods.

Use case for Osko payment system: small scale businesses: With some modifications to the banking apps, small businesses could utilise Osko payment for retail transactions. For P2P payments with Osko, users must manually exchange their PayID details. This manual process is time-consuming for businesses and can lead to errors. If banks could introduce a feature that allows the reading of PayID details from a QR code, and if merchants provided their PayID details by making it easier, such as a QR code, users could then use their existing banking apps to scan the code. This would auto-fill the merchant’s details, allowing users to simply enter the amount and make the payment. This method aligns with how many QR code-based mobile payments currently operate.

This simple and elegant solution allows small scale businesses to utilise digital payments without transaction fees. As of 2023, Osko payments are free for both the sender and recipient (there is no information about whether Osko for business payments includes a fee or not). Even though this seems like a straightforward solution, to the best of our knowledge, no banks currently offer this QR code
scanning feature, and none of the payment service providers are developing an app to offer this free service.

**Why banks are not promoting it?:** Banks have not been motivated to promote RTPs, primarily because their established infrastructure built around credit card rails has served them effectively for decades. This infrastructure provides them with predictable revenue streams, especially from transaction fees and associated services. Moreover, with its established clients and global acceptance, the credit card system offers banks a comfort zone that RTPs might disrupt. Thus, unless there is a distinct competitive advantage or a strong demand from their customer base, many banks do not see an immediate need to promote RTPs.

5.3 Consumer behaviour

Consumers’ adoption of RTPs has been somewhat tempered by deeply ingrained habits and the allure of credit card reward systems. Credit card companies have invested heavily in loyalty programs, offering points, miles, cashback, and other incentives that have become deeply embedded in the consumer psyche. These incentives encourage the continued use of credit cards and make them more appealing compared to newer payment systems that might not offer such perks. For many consumers, the immediate benefit of earning rewards outweighs the potential advantages of RTPs, such as faster transaction times. Additionally, the familiarity and trust built over years of using credit cards create a sense of comfort, making it challenging for RTPs to break this stronghold, even if they promise better efficiency or lower fees. The inertia in consumer behaviour, driven by the allure of credit card benefits and established trust in traditional systems, poses a substantial challenge to the widespread adoption of RTPs.

5.4 Strategic Drivers for the Adoption of RTPs

In the evolving financial landscape, RTPs presents a transformative approach to instant monetary transactions. However, their widespread adoption hinges on various strategic drivers. Among them are providing incentives, mandates from central banks, and leading by example at the government level. These are just a few examples, and there could be other strategies as well.

**Providing incentives:** Incentivising businesses and organisations to adopt RTPs can significantly accelerate their integration and usage across various sectors. Drawing from successful models like India, where the government introduced monetary incentives for businesses adopting digital payment, was a very successful strategy. Additionally, governments can collaborate with banks to offer special terms for businesses adopting RTPs. On the consumer side, discounts, cashback, or loyalty points can be offered to encourage the frequent use of RTPs for everyday transactions. By creating a financially advantageous environment
for businesses and consumers to use RTPs, governments can ensure quicker adoption and a smoother transition away from traditional payment systems.

**Central bank mandates:** Central bank mandates can significantly drive RTPs adoption. When central banks mandate the adoption of RTPs, it is a powerful catalyst to accelerate the integration and usage of these systems within the banking infrastructure. Central banks, being the primary monetary authorities, possess the leverage to enforce regulations and standards that the broader financial sector must adhere to. A mandate from the central bank signals the critical importance and urgency of RTPs implementation to the entire financial community. Such directives typically arise from modernising payment infrastructures, enhancing financial inclusion, improving transaction efficiency, and meeting consumer demands for immediate payment solutions.

**Government leads by example:** Government-led initiatives often set the tone for broader market transformations. By adopting RTPs for all its services, including welfare payments, the government can create a precedent and a model for other sectors to emulate. Given the substantial volume of transactions that governments handle daily, their adoption of RTPs can significantly raise the system’s visibility and familiarity among the general public. This, in turn, can build trust and ease concerns about the new system’s efficiency and reliability. When citizens experience the benefits of RTPs firsthand through government services, they are more likely to prefer it in other aspects of their financial transactions. This positive ripple effect can then facilitate a smoother transition for retail sectors to integrate and promote RTPs, as consumers would already be accustomed to the convenience and immediacy of such systems.

### 5.5 The Network Effect: How Adoption Challenges Grow with User Base

The network effect [7] is a phenomenon wherein a product or service gains its value as more people use it. Network effect poses adoption challenges with the RTPs. In the context of a RTPs, the platform’s value will grow as more individuals and businesses adopt and use it for their transactions. The PayID system can create value for a RTPs ecosystem by bringing users together under a unified identifier system. As more users join and utilise PayIDs for payments, the platform becomes more valuable due to the network effects. This is like how social media platforms, like Facebook or WhatsApp, become more useful as more people join, interact, and connect with each other.

The unique dynamic of adoption economics is that when a platform has few users initially, potential users may hesitate to adopt it. They are more likely to join if they see others using it, creating a positive feedback loop. This makes it crucial for new systems to achieve critical mass early on to establish a strong presence in the market. With sufficient adoption, new platforms can compete effectively. Therefore, RTPs systems must address the network effects challenge
by gaining traction and attracting a significant user base early. Establishing widespread adoption and acceptance of such systems among users and businesses is essential for the platform’s long-term success in the evolving landscape of digital payment systems.

Despite their advantages, RTPs faces significant challenges in the credit card market. Firstly, establishing an RTPs demands substantial infrastructure investment and presents integration complexities for businesses already aligned with existing payment workflows. The inertia of both consumers and merchants used to establish payment methods further hinders adoption. Interoperability is another concern, as RTPs needs seamless integration with e-commerce systems. Moreover, the loyalty programs of credit cards, combined with the need for intensive marketing to educate potential RTPs users, make the task of broad adoption even more daunting. While RTPs offers innovation and potential cost savings, breaking into a market dominated by established credit card systems is difficult.

In RTPs payment adoption, the distinction between credit and debit money plays a significant role in influencing the adoption rate. Most Western nations predominantly utilise credit money, relying on systems that lend consumers money in advance to be repaid later. In contrast, many Asian countries primarily operate on debit money, where transactions are conducted using funds that are already available in a consumer’s account. Given this context, integrating RTPs is comparatively easier in Asian countries than in Western nations, largely because the system aligns more closely with the region’s prevailing financial behaviours and structures.

5.6 RTPs and Blockchain

The digital payment landscape is rapidly changing, with various players ranging from centralised systems like RTP to the decentralised Defi ecosystems. While decentralised platforms grapple with changing regulations, centralised RTPs may enjoy a brief respite. However, if decentralised platforms gain significant popularity, the demand for decentralised payment systems will surge. To stay competitive, traditional RTPs will need to diversify their services, prompting them to adapt to this ever-changing financial environment.

Blockchain technology has emerged as a revolutionary solution to numerous challenges in the payments industry. Initially, the primary application of blockchain centered around disintermediation, essentially reducing the role of intermediaries in financial transactions, thus fostering greater trust in the system. Additionally, it promised to make transactions more cost-effective and faster. As the technology evolved, its potential in enabling real-time settlements became evident, streamlining processes and reducing transaction times, especially for cross-border transactions. A distinction worth noting is between public blockchains and enterprise or permissioned blockchains. While public blockchains are open to all, enterprise chains are customisable and can be fine-tuned to address specific organisational needs and challenges. Consequently, they are particularly adept at tackling issues related to privacy and security in financial transactions.
In essence, blockchain is suitability for redefining the payments landscape for decentralise ecosystem. The key to the success of these technologies is adoption, especially by retailers and businesses.

6 Conclusion

The benefit of real-time payment is very valuable; however, its full benefit may depend on the implementation of it through various financial institutions with the aim of providing maximum benefit to the end users. A significant portion of central banks have already implemented RTP systems, with their success in adoption being influenced by multiple factors. NPP’s projection as the go-to payment system by 2030 further strengthens the narrative of RTPs being a cornerstone in future financial transactions. However, while there is evident adoption of personal banking, its penetration into business operations remains limited. To achieve widespread acceptance across both personal and commercial sectors, the next phase for RTP systems will undoubtedly focus on addressing these operational challenges, ensuring they become an indispensable tool in modern finance.

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