

**APPENDIX 09: RBNZ'S ARTICLE NEW  
ZEALAND'S PAYMENT LANDSCAPE - A  
PRIMER**

# Bulletin

# New Zealand's Payment Landscape: A Primer.

Lydia Dudson, Liam Gillies, and Amber Wadsworth

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# New Zealand's payment landscape: A primer

Lydia Dudson, Liam Gillies, and Amber Wadsworth<sup>1</sup>

## Abstract

*Payments are a feature of our day-to-day lives and critical to the smooth functioning of our economy. Yet few understand the details of how payments are supported and executed in Aotearoa New Zealand. This is in part because information on the payment process and New Zealand's payment landscape has been difficult to access and piece together. This article provides an accessible overview of the payments process and the systems and services required to carry out a payment end-to-end in New Zealand. It introduces the five essential steps to processing an electronic payment and describes the interconnecting systems, services, and instruments that carry out and support these five steps in the back- and front-end of New Zealand's payments landscape.*

## 1 Introduction

Payments are the ebb and flow of money. Increasing attention is being given to the global evolution in payments, to which New Zealand is not immune, and our unceasing demand for better, smarter, and faster payments. The study of payments has been thrust into the spotlight. However, few understand the ins and outs of New Zealand's payments and due to their complex and interconnected nature, creating one view of the payments landscape is challenging. In addition, payment systems and services have many elements and vary between countries.

The Reserve Bank of New Zealand's (Reserve Bank) role in the payment landscape is multi-faceted. It operates, participates in, regulates and supervises core payments systems. It has also recently taken on the role as steward of money in New Zealand and has an interest in supporting and ensuring money and payments systems are efficient and reliable, and support innovation and inclusion.

This article goes behind the scenes on New Zealand payment landscape and provides a baseline view of the key underlying processes, services, systems, and instruments needed to complete electronic payments in New Zealand. It explains:

- The payment process and a high-level overview of the payment landscape (section 2);
- The role, governance arrangements, and access requirements of New Zealand's back-end payment arrangements (section 3); and
- New Zealand's front-end instruments, gateways and services, and their connections (section 4).<sup>2</sup>

## 2 Overview of payments and the payment landscape

A payment occurs when funds are transferred in exchange for goods or services. Most electronic payments are conducted with privately-issued electronic money, i.e. the funds issued by financial institutions to transaction accounts. However, the Reserve Bank issues electronic money to authorised financial institutions in its Exchange Settlement Accounts. These funds are used to

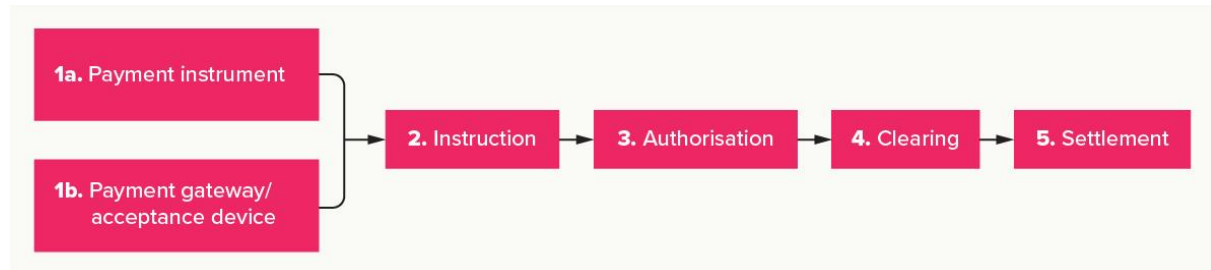
<sup>1</sup> The authors are grateful to Bella Di Martina-Bevan, Marty Cohen Cubitt, Tim Duston, Tobias Irrcher, Elizabeth Prasad, Adam Richardson, Andrew Rodgers, Makoto Seta and Ben Waterreus for their comments. The views including any errors presented in this article are the authors' own.

<sup>2</sup> Evaluating the performance of the payments landscape or any particular system is outside of the scope of this primer.

support settlement of payments (section 33.1) and support central bank functions such as issuing cash and implementing monetary policy.<sup>3</sup>

Electronic payments occur over five steps: initiation, instruction, authorisation, clearing, and settlement (Figure 1).

**Figure 1: The payment process**



1. Interaction between a payment instrument and a payment gateway/ acceptance device – To initiate a payment, a payer requires a payment instrument (i.e. a card, bank payment or e-money within mobile wallet) and a payment gateway/acceptance device that will recognise this instrument i.e. a card terminal at the point of sale (PoS) or receiving mobile wallet.
2. Payment instruction – Upon completing the first step of presenting a payment instrument to a payment gateway or device, a payment instruction can be generated. This typically involves an instruction from the payer to an entity holding funds on behalf of the payer (i.e. a bank) to transfer funds to the payee.
3. Authorisation – Once an instruction has been sent, the payer’s funds holder must authorise that the payer has the correct amount of funds available to make the payment and the authority to approve it. This includes checking that there are no restrictions on the account or account holder that prohibit the payment.
4. Clearing – If the payment is authorised it can be cleared. Clearing is the process of ensuring the payment information is correct and passing it on for final settlement. The Committee on Payments and Market Infrastructures (CPMI) defines clearing as “The process of transmitting, reconciling and, in some cases, confirming payments prior to settlement, potentially including the netting of transactions and the establishment of final positions for settlement.”<sup>4</sup> The payment message must be checked to ensure it follows clearly defined rules so that the payment instruction is standardised and easily recognised.
5. Settlement – If the payment is cleared then it can be settled. Settlement denotes the final exchange of funds from the payer to the payee. The CPMI defines settlement as “the irrevocable and unconditional transfer of an asset or financial instrument, or the discharge of an obligation by the financial market infrastructure (FMI) or its participants in accordance with the terms of the underlying contract.”<sup>5</sup> Final settlement is a legally defined moment.

To complete the payments steps listed above, a number of interconnecting systems, services and products are required. These systems, services and products are provided by a range of different entities. Collectively, the interconnections of these entities and arrangements are referred to as the

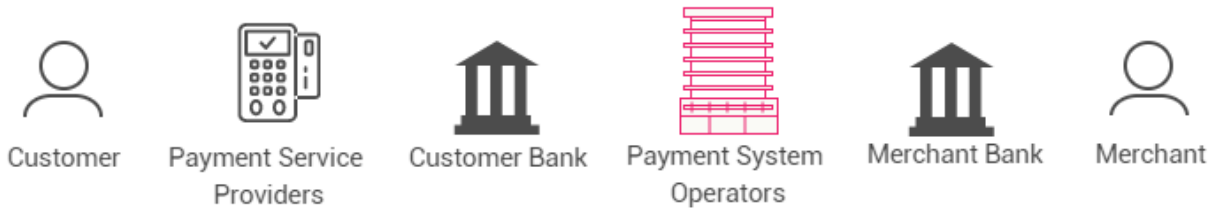
<sup>3</sup> RBNZ (2021).

<sup>4</sup> Committee on Payments and Market Infrastructures (CPMI) (2016).

<sup>5</sup> CPMI (2016).

payment landscape. For illustration, Figure 2 depicts a handful of these entities. Their interactions are illustrated further throughout this article.

**Figure 2: Entities in the payment landscape**



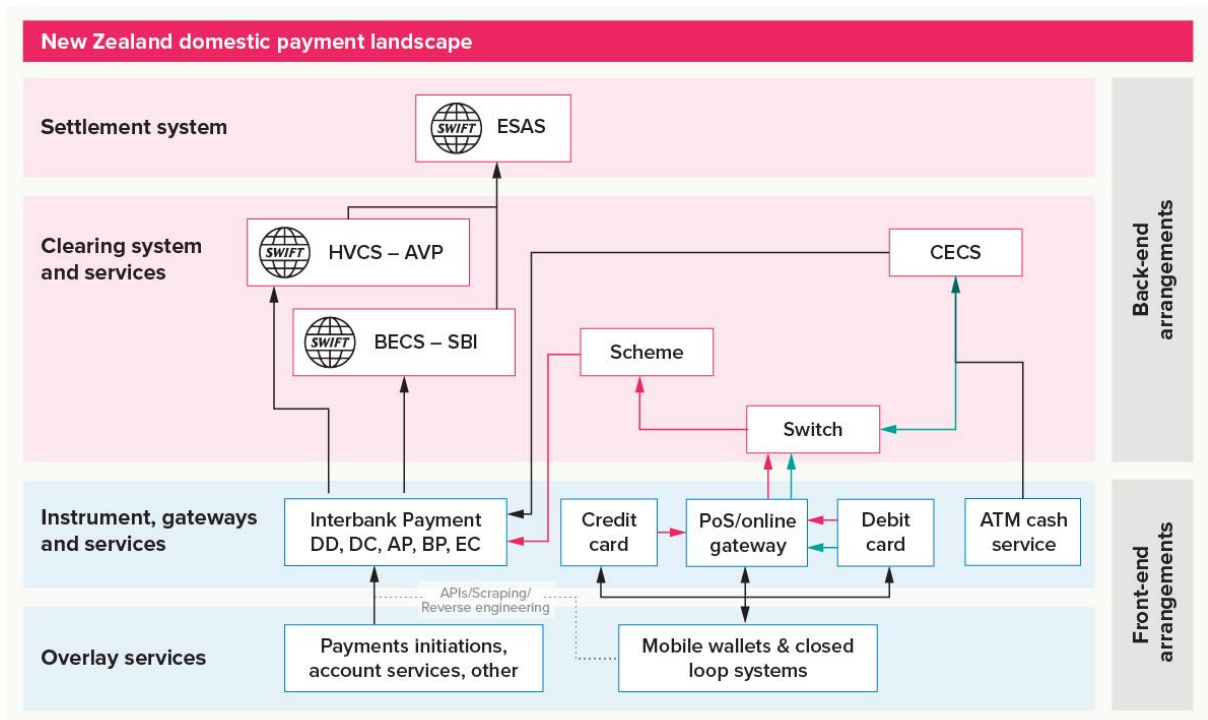
Source: Authors' elaboration.

The payment landscape can be separated into the back end and the front end.

- i) The **back-end arrangements** comprise switches, card schemes and clearing and settlement systems to facilitate the clearing and settlement of payments.
- ii) The **front-end arrangements** comprise payment instruments, gateways, and overlay payments services that consumers, merchants and others engage with when making and accepting a payment.

Figure 3 shows the interconnections between the back and front-end of the payments landscape at a high level. Primarily it shows that payments are initiated in the front-end by a range of services, instruments and gateways; and ultimately processed in the back-end by a smaller number of key systems and services. It also shows that front-end arrangements are split into those that connect directly to back-end arrangements, and overlay services that rely on other front-end services and systems

**Figure 3: The New Zealand payment landscape**



Source: Payments NZ and authors' elaboration. Note: DD = Direct debit, DC = Direct credit, AP = Automatic payment, BP = Bill payment, EC = All other electronic payments

The lines in Figure 3 denote links between systems, services or gateways. The green lines refer to links between EFTPOS systems (section 4.2) and the pink lines describe links between card schemes (section 4.2).

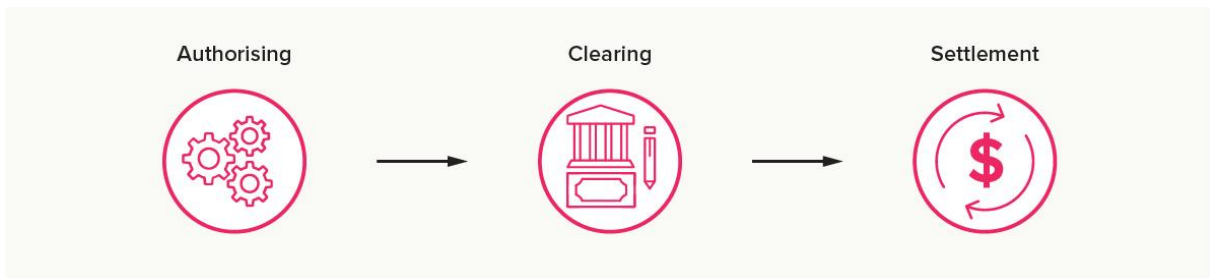
The rest of this article describes the front and back-end arrangements that exist in New Zealand in more detail. It describes what systems and services exist in each part, who operates and controls these arrangements, and how they connect with other parts of the system to deliver end-to-end payments.

### 3 Back-end arrangements

The back-end payment arrangements can be thought of as the ‘behind the scenes’ of payments. It is made of systems, services, and rules, standards and procedures, which participants of the payment landscape and their payment information must use and follow for a payment to be completed. End users, such as the general public and merchants, do not directly interact with these systems and services.

The core components of the back-end systems comprise a settlement system, clearing systems, payment switches and card schemes.

**Figure 4: High-level schematic of the back-end of the payment landscape**



#### 3.1 Settlement

All interbank transactions in New Zealand are settled via our Exchange Settlement Account System (ESAS). ESAS therefore underpins the flow of funds in our economy. It ensures that banks and other financial institutions can settle transactions between themselves in a safe and efficient manner. Without an interbank settlement system, the only electronic payments possible would be between customers and merchants who are customers of the same financial institution or entity. Hence, ESAS sits at the apex of the payment landscape (Figure 3).

ESAS is owned and operated by the Reserve Bank and participants of ESAS are authorised financial institutions, such as banks. The Reserve Bank also provides an account for the Crown to facilitate the Government’s own banking arrangements.<sup>6</sup> Participants are issued an electronic form of central bank money called reserves in their Exchange Settlement Accounts,<sup>7</sup> therefore all interbank settlement is conducted in central bank money which carries a lower credit risk (relative to money issued by commercial banks).

ESAS is a real time gross settlement system (RTGS), this means it settles payment obligations as they are received (in real-time) without netting the obligations of participants. In practice,

<sup>6</sup> Wolyncewicz (2013).

<sup>7</sup> ESAS services are supported by two firms, Datacom and Nexi (formerly SIA/Perago).

payments are settled from every participant’s account in order of priority (having been assigned a priority ranking by either the payer or the ESAS system). This optimises liquidity, allowing time-critical payments to be made first.<sup>8</sup> In addition, the settlement of payments in ESAS is final and irrevocable. Once a payment has been settled, the value is credited or debited to the accounts of the payer or payee customers of the bank or financial institution.

The real-time and final settlement in central bank money features of ESAS reduce settlement risk, that is, the risk that a payer institution will fail to meet its payment obligation to a payee institution. It also means that once a payment has been settled it cannot be reversed, an important feature should a financial institution collapse and try to reverse payments it has already made. Because financial institutions rely on receiving money owed from other institutions to fulfil their other obligations, real-time and final settlement in ESAS reduces systemic and financial risks.

Due to its systemic importance, participation in ESAS is only granted to financial institutions who meet requirements regarding the soundness and efficiency of the financial system, have a legitimate business interest, and demonstrate a lack of reputational risks to the Reserve Bank.<sup>9</sup> ESAS is a Designated Settlement System. Designation provides enhanced legal protection to the finality of payments, as a liquidator will not be able to challenge settlements made through the payment system in the case of a participant’s insolvency.<sup>10</sup> Finally, holding an ESAS account is a prerequisite to participating in New Zealand’s clearing systems.

**Table 1: Access requirements for ESAS participation**

Membership	Access requirements <sup>10</sup>
<p><b>ESAS participants</b></p> <p>(Current ESAS account holders include several registered banks, the Reserve Bank, CLS Bank and New Zealand Depository Limited)</p>	<p>When deciding on an application for an ESAS account, the RBNZ considers whether:</p> <ul style="list-style-type: none"> <li>• the applicant fits the definition of financial institution in the Reserve Bank Act 1989;</li> <li>• providing an ESAS account to the applicant might detract from the soundness or efficiency of the financial system;</li> <li>• a legitimate business interest can be served by access to an ESAS account; and</li> <li>• providing an ESAS account would adversely affect the reputation of the RBNZ.</li> </ul>

Source: Authors’ elaboration, RBNZ.

### On-us settlement

There is one exception to using ESAS for settlement. When a customer and a merchant are transacting from accounts at the same institution, settlement (and clearing) simply involves that institution debiting and crediting the customer and merchant’s respective accounts. This is referred to as an ‘on-us’ payment. On-us payments are not processed through clearing and settlement systems because they do not need to route from one financial institution to another.

<sup>8</sup> RBNZ (2020).

<sup>9</sup> More information on ESAS access can be found on our [website](#). The access policy and requirements are currently in review.

<sup>10</sup> DeSourdy (2004).



## 3.2 Clearing systems

Clearing systems serve two functions:

1. To calculate settlement obligations between system participants; and
2. To format and exchange payment information between the payer's and payee's financial institutions.

Sending and receiving well-structured payment information ensures participants know what payments are made, their value, and who the payer and payee is. New Zealand has multiple clearing systems, each with a different purpose.

- i. **Bulk Electronic Clearing System (BECS)** – BECS governs how most **retail payments** like electronic credits (e.g. direct credits, bill payments, automatic payments) and direct debits are exchanged between participants.
- ii. **High-Value Clearing System (HVCS)** – HVCS governs how high-value and time critical payments, such as house settlements, which are made using the 'Same-day Cleared Payment' (SCP) payment instrument.<sup>11</sup>
- iii. **Consumer Electronic Clearing System (CECS)** – CECS governs how EFTPOS and ATM payments are processed.

Each clearing system sets out the rules, standards and procedures for exchanging payment information and for defining settlement obligations for relevant payments types. Clearing systems are not technology infrastructures, but are a set of standardised set of requirements that participants must follow to exchange and settle payments. The clearing systems are managed by an industry-owned organisation called Payments New Zealand (Payments NZ). HVCS and BECS use the SWIFT<sup>12</sup> messaging service and infrastructure.

### Bulk Exchange Clearing System (BECS) and Settlement Before Interchange (SBI)

The BECS rules and procedures govern certain retail payment instruments with the settlement of those payments occurring via SBI. Together, BECS and SBI govern how direct debits and electronic credits (such as direct credits and bill payments) are transferred from the payer's bank (**issuer**) to the payee's bank (**acquirer**).

Examples of BECS rules include the format payment information should be in and how processing or payment issues between participants are resolved. A participant's BECS payment instructions are grouped together and aggregated into bulk lists, or batches, based on the payment destination (i.e. on a bilateral basis) and then netted multiple times a day.<sup>13</sup> This netted 'batch' forms the payment instruction exchanged in Figure 5.

SBI is the arrangement used to exchange payment instructions between participants that use SWIFT. SBI also provides an added benefit of legal settlement before funds are exchanged, further reducing settlement risk in the payment landscape. To elaborate, SBI removes the risk that Bank B credits their customer's account on the basis of payment instructions that are yet to be settled in

<sup>11</sup> A SCP is a payment instrument that cannot be revoked, dishonoured or reversed and are available for immediate use.

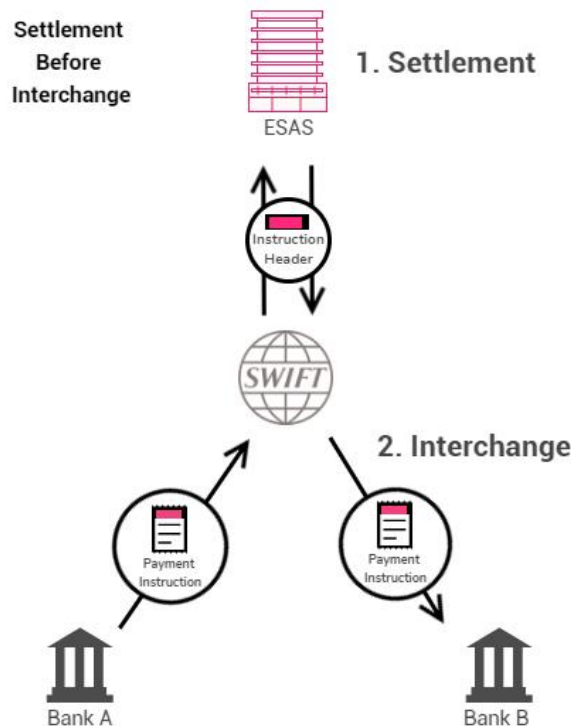
<sup>12</sup> The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is a global financial messaging system which provides a highly standardised and reliable messaging network domestically and globally. The network is used to send payment information through a standardised set of codes that can be recognised by all SWIFT users.

<sup>13</sup> Bilateral netting arrangements refer to the netting of payments from Bank A to Bank B and vice versa. Should Bank A owe Bank B \$100, and Bank B owe Bank A \$40, then under a bilateral netting arrangement the only owing amount would be from Bank A to Bank B of \$60.

ESAS (where the payment of funds between banks actually occurs) and Bank A becomes unable to settle their obligations.

The SBI process is set out in Figure 5. The payment instruction is sent from Bank A to the SWIFT interface. SWIFT then sends only the header of the payment instruction (e.g. the net total amount to be paid and to who) to ESAS, which settles the payment. The payments are netted bilaterally via SBI, and the net positions are settled in ESAS on a real-time gross basis (i.e. they are not further netted in ESAS). Once ESAS has confirmed settlement, SWIFT releases the complete payment instruction, including individual payments to be debited and credited to Bank B's customers, to Bank B. This aspect of settlement can be referred to as interchange.

**Figure 5: Settlement Before Interchange process**



Source: Authors' elaboration

Payments NZ is the service administrator of both BECS and SBI. Full access to BECS (including SBI) can be granted to participants who meet the access requirements in Table 1. An alternative access approach is for settlement-only participants who enter into an agency agreement with a full participant to clear payments via SBI indirectly, but settle their own obligations in ESAS. Participants of BECS and SBI must also meet prudential requirements.

**Table 2: Access requirements for BECS and SBI participation**

Membership	Access requirements
<p><b>Full BECS participants</b> Can settle payments via BECS and ESAS. Such members are also members of the SBI closed-user group.<sup>14</sup></p>	<ul style="list-style-type: none"> <li>Must be SBI participants. Depending on the projected volume of BECS interchange, the participant may require a specific type of SWIFT connection.</li> </ul>

<sup>14</sup> The SBI closed-user group refers to the group of financial institutions who are participants of SBI.

Membership	Access requirements
<b>Settlement-only BECS participants</b> Can settle payments via ESAS but enter into an agency arrangement to indirectly access the SBI closed-user group.	<ul style="list-style-type: none"> <li>• Must have an agency arrangement with an SBI participant.</li> </ul>
<b>All BECS participants</b>	<ul style="list-style-type: none"> <li>• Must have access to an ESAS account to send, settle and receive payments.</li> <li>• Must have a SWIFT Business Identifier Code (BIC) and access to a distinguished name<sup>15</sup> that can be used for SBI.</li> <li>• Must pass a set of tests specified by Payments NZ.</li> </ul>
<b>SBI participants</b>	<ul style="list-style-type: none"> <li>• Must have a SWIFT Business Identifier Code (BIC) and access to a distinguished name.</li> <li>• Must have an ESAS account to send, settle and receive payments.</li> </ul>

Source: Payments NZ.

### High Value Clearing System (HVCS)

High value or time critical **wholesale** and retail payments, such as property settlements, follow the rules, standards, and procedures of the HVCS. HVCS is typically used for three purposes: financial institution to financial institution wholesale payments; completing the domestic interbank leg of a cross border payment, and same-day cleared payments (SCP). HVCS sets a per-transaction fee that makes it unsuitable for most high-volume, low value payments. Although there are no rules governing the minimum value for HVCS payments or other fees or costs for use.

Examples of the rules and procedures prescribed by HVCS include the required payment information, the format of information, and the length of processing time.

HVCS uses the SWIFT messaging service to send individual payment messages between members of the Assured Value Payment (AVP) group to facilitate clearing. Payments are cleared on a per payment message basis rather than grouped together and netted with other payments.

Access to the HVCS is governed by Payments NZ, while access to AVP is governed by the Reserve Bank.

Table 3 describes the access requirements for both HVCS and AVP participation. There are also prudential requirements for access.

<sup>15</sup> A distinguished name is used to uniquely identify an entity that sends or receives messages over SWIFTNet.

**Table 3: Access requirements for HVCS and AVP participation**

Membership	Access requirements
HVCS participants	<ul style="list-style-type: none"> <li>• Must have an ESAS account to send, settle and receive payments.</li> <li>• Must be a SWIFT user. Depending on the projected volume of HVCS interchange, the user may require a specific type of SWIFT connection.</li> <li>• Must be members of the AVP closed-user group.</li> <li>• Must pass a set of tests specified by Payments NZ.</li> </ul>
AVP participants	<ul style="list-style-type: none"> <li>• Must meet ESAS access requirements set by the RBNZ. Participants automatically receive access to AVP when they are granted access to ESAS.</li> </ul>

Source: Payments NZ.

### Consumer Electronic Clearing System (CECS)

CECS clears debit chip and pin, and EFTPOS card-based retail payments. It sets the rules for how the payment information is processed from the cardholder's account, typically through a POS device, and into the merchant's bank. This way, the payer's bank (cardholder's bank) and the payee's bank (merchant's bank) know how much to debit and credit their respective customer's accounts. Payment information managed by CECS passes through a switch (section 4.2) and the clearing and settlement of the interbank payment occurs through BECS and ESAS respectively.

In addition, CECS sets rules, procedures, and standards that govern the attributes of payment instruments (e.g. magnetic stripe or chip and pin cards), the switch, technical formats of clearing messages, and POS device security and registration. CECS rules do not apply to card scheme payments (section 4.3).

**Table 4: Access criteria for CECS and issuing participant participation**

Membership	Access criteria
All CECS participants	<ul style="list-style-type: none"> <li>• The applicant must participate in SBI directly or via an agency arrangement.</li> </ul>
Issuing CECS participants Issuing participants can provide CECS-compatible payment cards such as EFTPOS cards.	<ul style="list-style-type: none"> <li>• The applicant must have a unique issuer identification number (IIN).</li> </ul>

Source: Payments NZ.

### 3.3 Switches

The processing of CECS payments is supported by payment switches. A switch is a messaging network used to facilitate payment instruction and authorisation across multiple entities. For example, a switch provides the messaging between the payer and payee's bank and the POS device or online payment gateway to enable a payment to be instructed and authorised. The two prominent switches in New Zealand are Worldline (formerly Paymark) and Verifone, with Worldline processing the majority of POS payments.

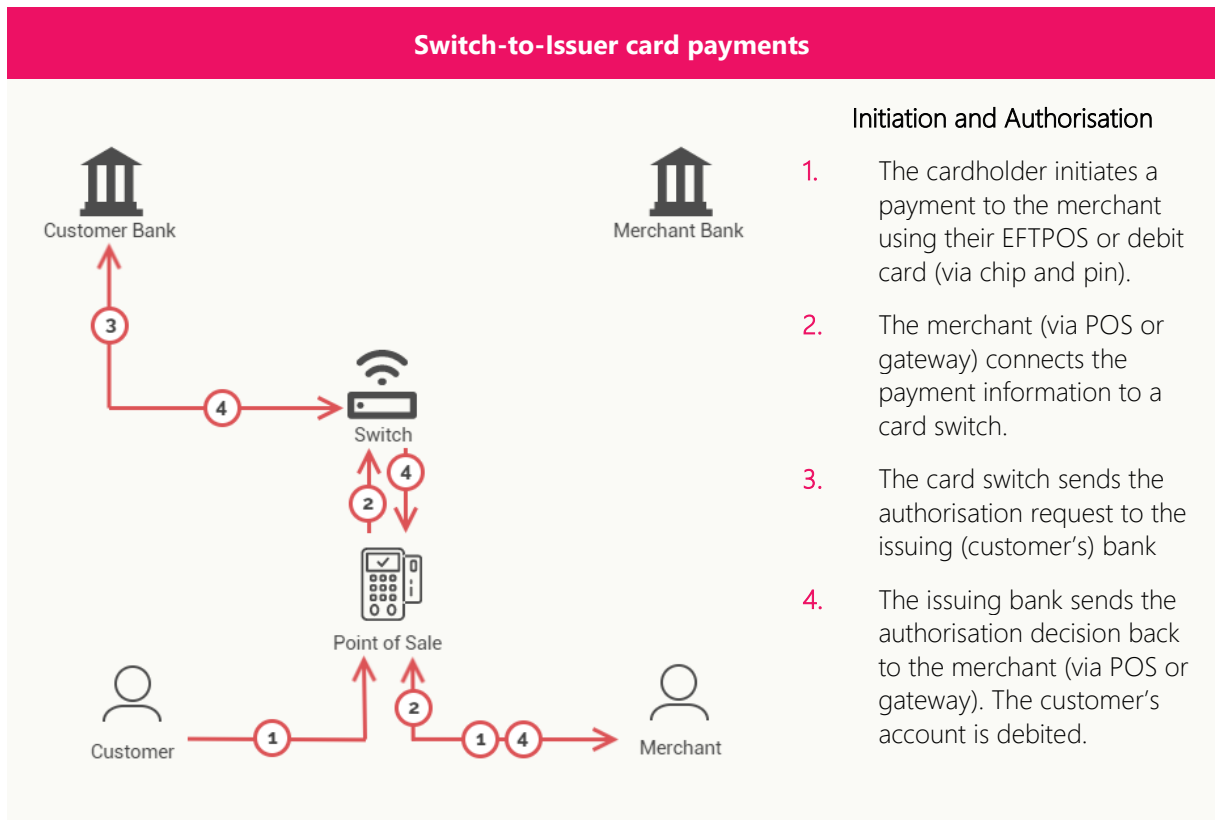
A switch provides switch-to-issuer and switch-to-acquirer payment processing for card payments. The issuer is the entity which issues the card, in most cases this is a bank. The acquirer is the receiving entity of the card payment, generally a bank. When an EFTPOS or chip and pin scheme debit card is used to make a payment, the authorisation request for the payment is sent from the switch to the issuer (switch-to-issuer) before the payment can be cleared, and settled.

By industry design, there is no centrally managed fee or interchange fee charged for switch-to-issuer transactions over the EFTPOS network. This means merchants do not pay transaction based merchant service fees for accepting EFTPOS card payments, though they do pay fixed fees, for example, for the rental of the terminal. The issuing bank pays a fixed fee for each payment.

A switch-to-issuer payment is shown in Figure 6 to illustrate the steps discussed so far. This follows the payment from customer initiation with their card at a POS to final settlement where the merchant’s bank is credited. The end user, the customer, will only see the POS acceptance and their bank account balance.

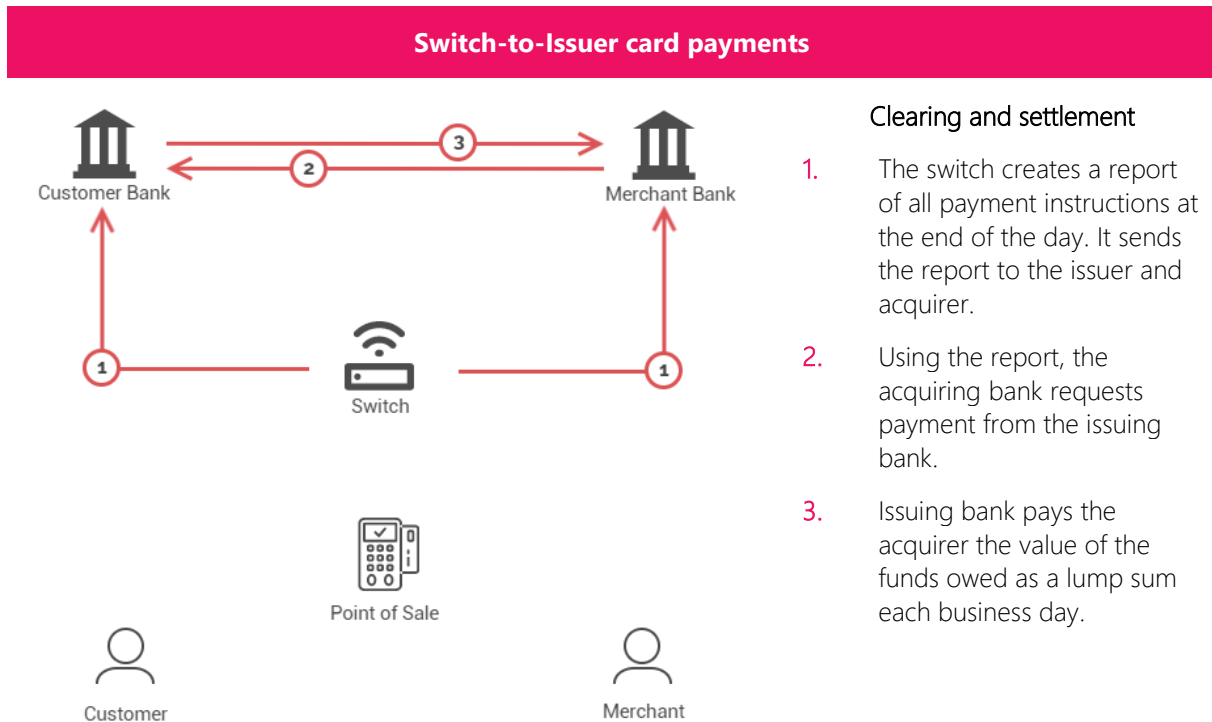
Payments made using credit cards (i.e. issued by Visa or Mastercard) or contactless payments alongside the switch-to-acquirer process provided by the switch are discussed in section 3.4.

**Figure 6: Switch-to-issuer payment process**



**Initiation and Authorisation**

1. The cardholder initiates a payment to the merchant using their EFTPOS or debit card (via chip and pin).
2. The merchant (via POS or gateway) connects the payment information to a card switch.
3. The card switch sends the authorisation request to the issuing (customer's) bank
4. The issuing bank sends the authorisation decision back to the merchant (via POS or gateway). The customer's account is debited.



Source: Authors' elaboration.

### 3.4 Schemes

Card schemes refer to the network underpinning and enabling brand-issued credit and debit cards.

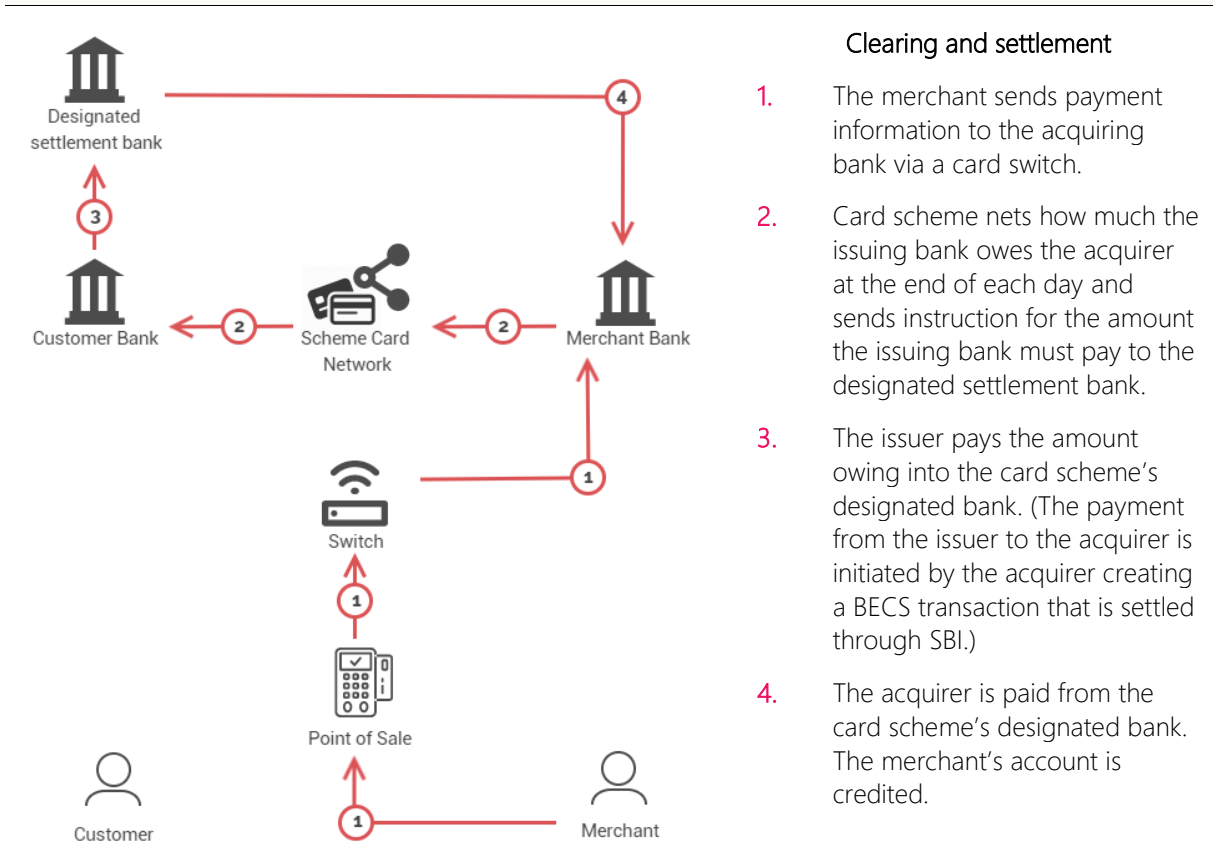
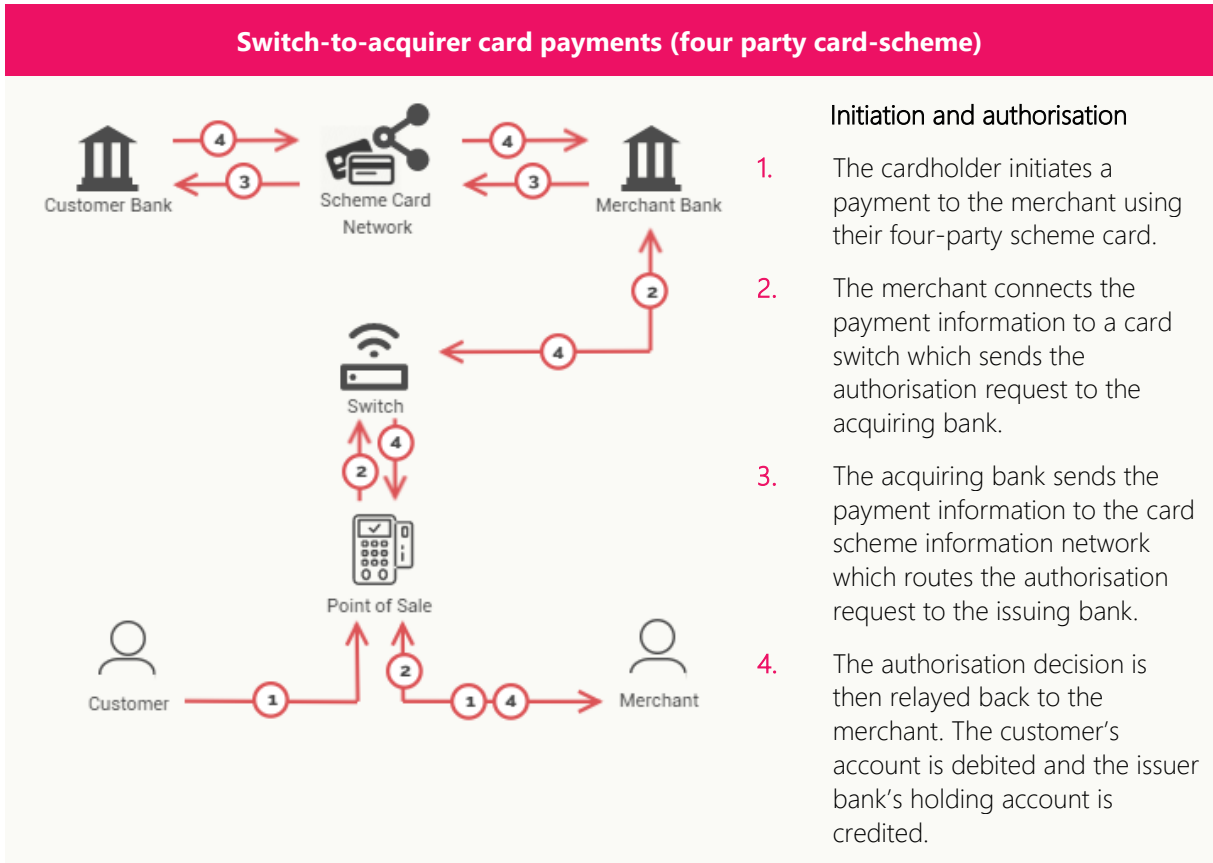
There are two types of card schemes: four-party card schemes, and three-party card schemes.

1. Four-party card schemes involve four parties in addition to the card scheme: the cardholder, the merchant, the issuer, and the acquirer. These schemes support both credit and debit cards (section 4.1) and are also referred to as open schemes. Visa, Mastercard, and Union Pay International are four-party card schemes.
2. Three-party card schemes involve three parties including the card scheme: the cardholder, the merchant, and the scheme – which also acts as both the issuer and the acquirer. For example, a three-party credit card is issued by the scheme (issuer) and repayments on card transactions are made to the card scheme (acquirer). These schemes are also referred to as closed schemes. Diners Club, Farmlands, and American Express are examples of three party card schemes.

Card schemes provide the messaging services needed to enable the payment instruction, authorisation, and clearing. The one exception is four-party scheme debit card payments that are initiated at POS via chip and pin - these payments are processed as a switch-to-issuer transaction (section 3.3). All other scheme debit payments (i.e. online and contactless debit card payments) are processed using the scheme network.

Figure 7 provides a high-level overview of a four-party card scheme. It illustrates how the process would work in a per-transaction basis, however in practice the card scheme actually clears and nets the transaction over the course of a certain period (usually a day) before passing them on to be cleared and settled through the interbank process (described in sections 3.1 and 3.2).

Figure 7: Switch-to-acquirer card payments<sup>16</sup>



Source: Authors' elaboration.

<sup>16</sup> For an illustration of how a three-party card scheme payment is processed, refer to Appendix A.

Depending on what type of scheme payment is initiated, the fee model differs. Four-party card schemes charge both the issuing bank and the acquiring bank fees for the use of their network. Interchange fees, charged by the issuer to the acquirer, are also charged for scheme payments. The acquirer recoups the cost from the merchant, along with a margin, via a merchant service fee.<sup>17</sup>

Schemes also set rules regarding the acceptance of their cards for merchants. For example, merchants that choose to accept a scheme card must accept all cards within that scheme including the premium cards, even if they carry higher fees.

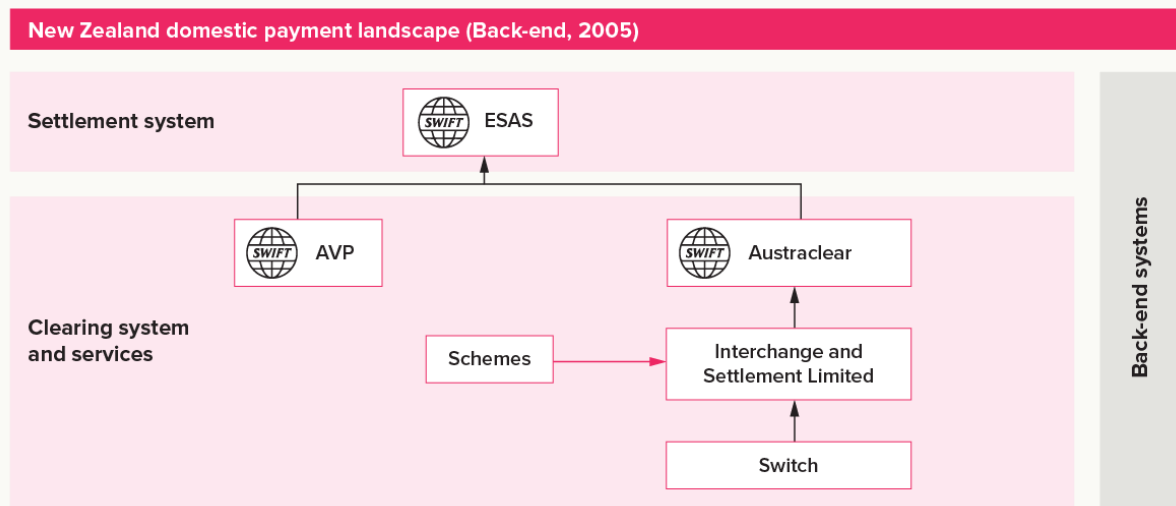
The Retail Payment System Act 2022, administered by the Commerce Commission, sets a cap on the size of the interchange fee charged by the issuing bank to the acquiring bank. The Retail Payment System Act also provides broader authority to the Commerce Commission, for instance, to set scheme fees and access requirements.

**Box A: A history of the New Zealand’s clearing and settlement systems**

Since the introduction of ESAS in 1998 there has been a number of changes to the back-end systems that have adapted the New Zealand payment landscape.<sup>18</sup>

The introduction of ESAS shifted the New Zealand payment system from a deferred net settlement basis, where payments were interchanged first and then settled the following morning, to the RTGS basis. To take advantage of the RTGS capability, new clearing systems were necessary. The resulting back-end landscape of the payment system as of 2005 is depicted in Figure B.A.1.

**Figure B.A.1: The New Zealand back-end landscape in 2005**



Source: Stinson & Wolyncewicz (2003), Authors’ elaboration

In 2005, all interbank retail payments were processed by Interchange and Settlement Limited (ISL) and then settled in ESAS via Austraclear (now called NZClear). At this stage, retail payments were still interchanged (credited to the end receiver) before settlement which exposed participants to settlement risk.

<sup>17</sup> See MBIE (2020) for a discussion on card scheme business models and fees.  
<sup>18</sup> For information on how the system operated prior to ESAS refer to Tait (1992).



The New Zealand Bankers' Association (NZBA) had previously administered industry standards and policies before establishing Payments NZ, to whom they subsequently devolved their governance role in 2010.<sup>19</sup> With the establishment of Payments NZ, the rules governing payments were formalised into the CECS, BECS, HVCS, and the Paper Clearing System (PCS) which governed paper based payments such as cheques. PCS has since been disestablished with the progressive withdrawal of participants between 2020 and 2022. After establishing clearing systems, Payments NZ continued work on building a SWIFT-based retail payment system, SBI, to replace the ISL system. SBI was established in 2012.<sup>20</sup>

In 2015, SBI's rules were updated to address the speed and frequency that participants would submit payments into the SBI system. This changed bank participants' common payments practice of holding off sending payment instructions into SBI until later in the day, which lengthened the payments pipeline and broadened the value of unprocessed payments. The rule change required participant financial institutions to sweep their payments channels and submit payments hourly during SBI operating hours. Best practice guidelines further sped up payments processing by proposing that sending participants should submit payments, and receiving participants of electronic credits should post received payments into the customer's account, within 30 minutes.

More recently, the ESAS system was replaced with ESAS 2.0. The new system provides additional liquidity and a payment priority ranking service.<sup>21</sup> Next year, in 2023, SBI365 is expected to be introduced. This will shift inter-bank processing of retail payments, such as electronic credits and direct debits, from only being processed on business days, to every calendar day of the year. Also in 2022-2023, AVP's clearing message formats and protocols will adopt ISO20022 standard, a change globally mandated by SWIFT.

## 4 Front-end arrangements

The front end of the payment landscape comprise the systems, products, services and rules that the end user interacts with. For example, a consumer uses a card in a terminal at a shop or puts their card details into an online gateway. In general, the front-end arrangements support and facilitate payment instructions and authorisation, but they may also support other customer and financial services.

As shown in Figure 3, transaction accounts at financial institutions are foundational to most front-end payment arrangements. This is because most electronic payments are made using money issued by financial institutions, most consumers are issued debit cards that link to their transaction accounts, and most payment types are ultimately settled by an interbank transaction at some point in the process.<sup>22</sup>

The key components of the front-end arrangements are:

- Payment instruments – interbank transactions, cards and e-money (section 5.1);
- Payment gateways – service channel/access point: in-person (bank branch, POS, ATM) and online (internet or mobile platform) (section 5.2);

<sup>19</sup> DeSourdy(2004)

<sup>20</sup> Payments NZ & SWIFT (2013)

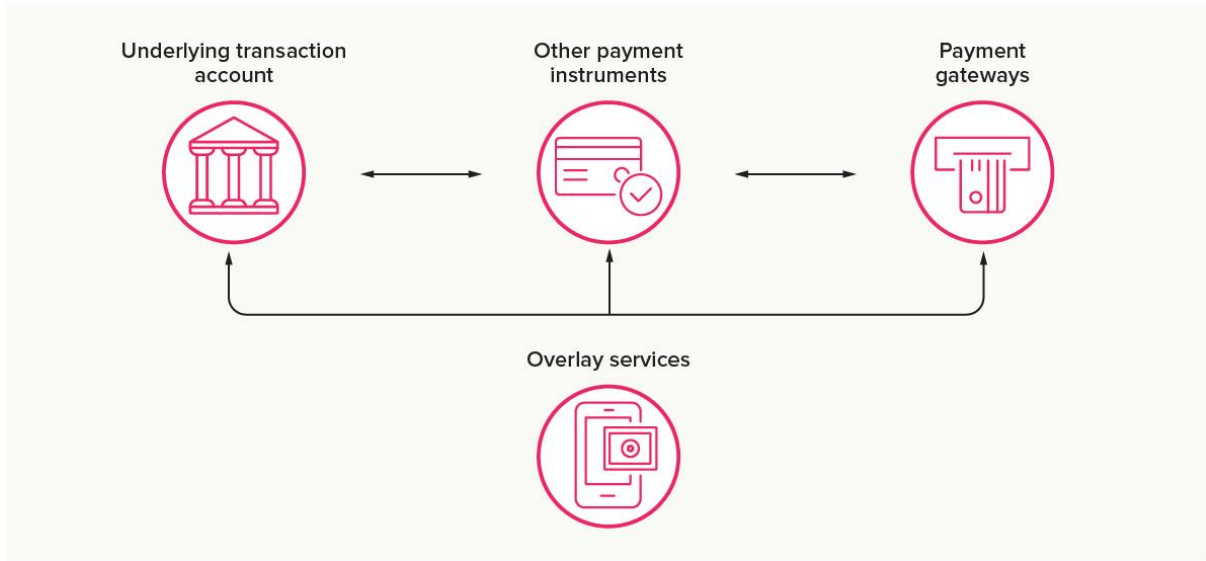
<sup>21</sup> RBNZ (2020)

<sup>22</sup> RBNZ (2021)

- Overlay systems services – contractual or card based services (including mobile wallets); and
- Closed loop systems (section 5.3).

A payment service provider (PSP) is a third-party company that assists businesses to accept a wide range of online payment methods, including cards, mobile wallets, and interbank. A PSP can enable merchants to accept a range of payments and connects them to the broader front-end and back-end payment infrastructures. A PSP may also be categorised as a card payment gateway and use or provide other overlay services (see below).

**Figure 7: Front-end of the payments landscape**



#### 4.1 Payment instruments

Payment instruments are used to instruct a transfer of value. Electronic payment instruments can be categorised into interbank payments, card instruments and e-money. Most payment instruments can be widely accepted and accessed, and processed by different services due to the interconnected nature of the payment landscape. Payment instruments that are only recognised by the issuer of the instrument (i.e. a gift voucher for a particular store) are addressed in section 4.4.

##### Interbank payments

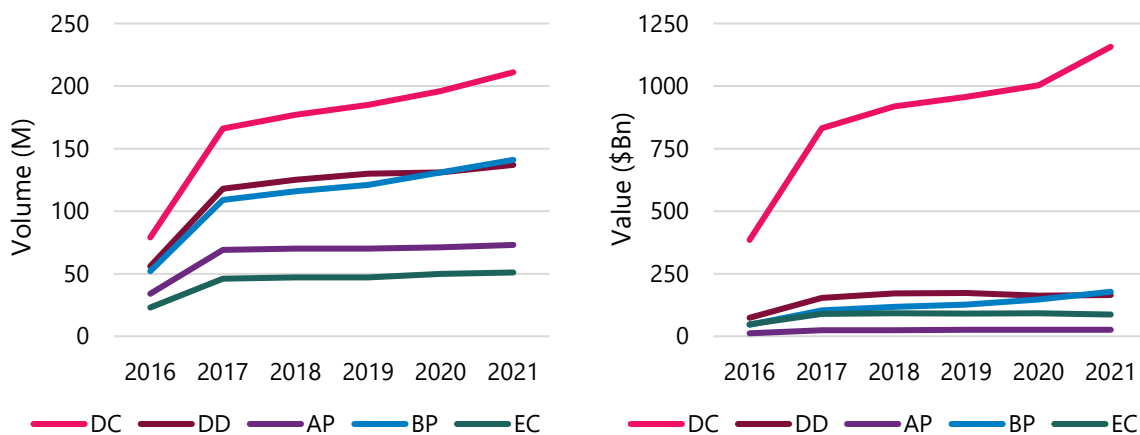
Interbank payments are generally conducted via mobile banking applications or internet banking and typically involve the customer sending payment instructions directly to their bank rather than indirectly via a payment gateway or overlay service (see section 5.3). Most interbank retail payments are cleared and settled through SBI and are governed by Payments NZ through the BECS rules.

There are two broad categories of interbank payments:

1. Payments that are 'pushed' by the payer (also referred to as electronic credit). These are initiated by the payer and 'pushed' from the payer to the payee and include three sub-categories:
  - i. Automatic payments which are fixed recurring payments.

- ii. Direct credits are one-off payments.
  - iii. Bill payments are also one-off payments and operate similarly to direct credits, but with additional functionality. For example, to link customer payments with their biller accounts and to support the biller’s payment reconciliations.
2. Payments that are ‘pulled’ by the payee (also referred to as direct debit). These are initiated by the payee and ‘pulled’ by the payer from the payee. Before a direct debit can be initiated, the payer must provide the payee with a mandate that allows for a one off or reoccurring payments to occur from their account. There are three sub-categories of direct debit initiators, each with different requirements and recourses:
- i. Standard direct debit initiator: Signed direct debit authorities are supplied to the payee’s bank.
  - ii. Preferred direct debit initiator: Obtain a signed direct debit authority but the direct debit initiator can electronically load the direct debit without providing the written authority to the bank.
  - iii. Paperless direct debit initiator: Preferred initiators that can set up a direct debit over the phone or internet without requiring a written signature.

**Figure 8: Bulk electronic payments cleared through SBI (volume and value)**



Source: Payments NZ. Note that DC = Direct credit, DD = Direct debit, AP = Automatic payment, BP = Bill payment, EC = other electronic credits.

### Card instruments

There are two categories of card instruments: EFTPOS cards and scheme cards. Card instruments refer to the physical card and the underlying funds accessed by that card. They are distinct from the underlying switch or card scheme detailed in sections 3.3-3.4, that are used in the payment processing.

### EFTPOS cards

EFTPOS cards, issued by commercial banks or financial institutions, give the user access to their funds in their bank accounts and use the EFTPOS network for processing.

There are 24 issuers of EFTPOS cards, with the rules for them set by Payments NZ’s CECS. EFTPOS has limited use for online payments and are trending towards lower use. Relative to scheme cards, EFTPOS cards have:

- less cardholder functionality, e.g. predominantly used for in-person payments and do not have contactless capability;
- less investment in their technology including security features;
- fewer incentives for cardholders to use them e.g. they do not earn reward points; and
- reduced commercial benefits for the issuing bank due to the issuing bank paying a switch fee rather than earning interchange fee revenue with scheme cards.

**Scheme credit and debit cards**

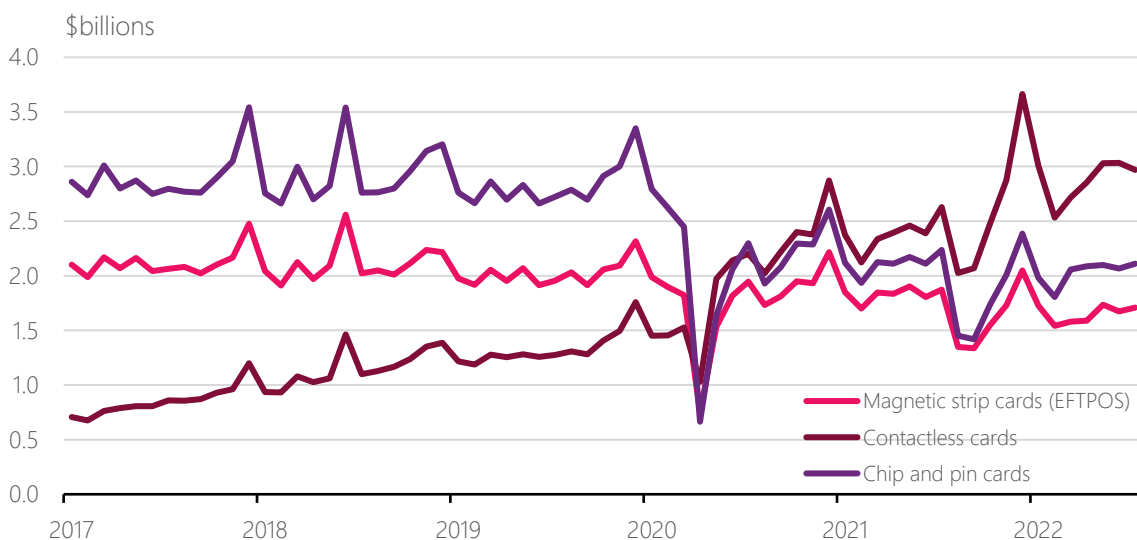
Scheme cards are issued by a bank or credit provider and rely on a card scheme such as Visa or MasterCard for initiation and authorisation services. There are 20 card issuers in New Zealand.

Credit scheme cards give the user access to credit issued by their bank or by a third party credit provider (i.e. a three-party card issuer). Debit scheme cards give the user access to their funds held in a bank account (similar to EFTPOS cards).<sup>23</sup>

Scheme credit and debit cards enable payment instruction via chip and pin or contactlessly at POS, they are also able to be used for online (card not present) payments. These cards have higher security than the magnetic stripe technology used by EFTPOS cards. For example, both chip and pin and contactless card technology use encryption to protect the cardholder data, chip and PIN also require a unique PIN to verify the cardholder.

In addition, payments initiated using contactless card technology are now more popular than chip and pin cards or EFTPOS magnetic swipe cards due to their ease of use, speed of instruction, and ability to avoid physical contact with high touch surfaces (a feature that became more relevant post-pandemic) (Figure 10)

**Figure 9: Value of card transactions by card technology type**



Note: Transactions refer to payments initiated using either contactless, chip and pin or EFTPOS (magnetic stripe) technology. Source: Payments NZ

<sup>23</sup> All credit cards are scheme cards, but debit cards can either be EFTPOS cards (as above) or scheme cards.

## E-money transfer

E-money is an electronic representation of funds held either on a piece of hardware (i.e. on a prepaid card) or on software (i.e. in a mobile wallet) that can be used for making payments to other parties outside of the e-money issuer.<sup>24</sup>

E-money is separate to funds issued by a commercial bank held in a transaction account. It refers to funds issued by a third party in exchange for either cash or commercial bank money. The e-money funds are held in an account managed by the issuer. For example, mobile wallets or prepaid cards (online or in person) accept commercial bank money and issue e-money within the wallet environment. Therefore, the method for loading e-money funds into the card or wallet may require either a bank account or a card. (See section 5.3: overlay services).

There are several types of e-money forms including funds held on online gift cards (i.e. GiftPay, Prezzy, Prezzy Card Online etc.) that can be used at multiple merchants and are recognised outside of the issuer of the funds. There are equally many types of mobile wallets that issue e-money including PayPal and GooglePay.

## 4.2 Payment gateways

Payment gateways allow merchants to accept electronic payments by facilitating the payment instruction and receiving the authorisation (or decline) of a payment. They are commonly used for online payments, as well as accepting payments with a credit card reader, POS system, or software integration. As such, payment gateways can broadly be categorised into 'in-person' acceptance, and online gateways.

### In-person card payment acceptance

In-person acceptance features hardware and software that the customer directly interacts with at bank branches, POS terminals, and ATMs.

POS terminals include card readers in stores, parking meters, and on public transport, each handling sensitive customer payment data. Payments NZ must approve a POS device, by assessing evidence that it complies with applicable international security standards, before it can be used. An approved device will be added to a device register, this register also manages the lifecycle of devices, including managing the removal of older POS devices. At the time of writing, there are 138 approved devices from 21 different manufacturers in New Zealand.<sup>25</sup>

ATMs allow card holders to withdraw bank deposits as physical cash. ATMs are privately owned and operated by banks, non-bank financial institutions, or independent ATM operators. Bank-owned ATMs are bilaterally connected to other banks and are governed by CECS. This enables a customer to use their card issued by one bank, at another bank's ATM, which is then cleared via the CECS rules and settled in BECS via SBI. Where a customer of a given bank uses that bank's ATMs, the transaction is 'on-us'.

### Online card payment gateways

Online payment gateways enable merchants to accept payments over a website or mobile app. These include accepting debit, credit or prepaid card payment when the card is not physically present at the point of interaction, or accepting mobile wallet payments. There are different types

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<sup>24</sup> A definition of e-money was introduced by the Committee on Payments and Settlement Systems (now CPPI) in CPSS (2001). Article 292 of the Directive 2009/110/EC of the European Parliament and Council of 16 September 2009 defines E-money as "electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment transactions [...], and which is accepted by a natural or legal person other than the electronic money issuer." Similar definitions are used by other institutions and authors including Dobler et. al. (2021) and Ehrentraud et. al. (2021).

<sup>25</sup> Payments NZ (2022).

of online gateways, in general these gateways provide technical solutions and services to enable a payment instruction and authorisation given a particular payment instrument.

To carry out their service, online gateways receive and collect customer payment data on behalf of merchants. This might include storing consumer card information to support consented repeat payments. In some cases, the gateway will tokenise this card information. Therefore, the management of processing and retaining any card information is an important part of ensuring the security of the online payment, and it protects card data that could be used to initiate fraudulent transactions. The security of card payment data is managed by global standards governed by The Payment Card Industry Data Security Standard (PCI DSS), which is an information security standard for organisation that handle branded credit cards from the major card schemes.

Different models exist in New Zealand for payment gateway providers. For example, a hosted gateway redirects the customer from the merchant's website or application to the payment processing environment. An 'integrated' gateway means the customer does not leave the merchant's website or application. Some gateways require the merchant to have a 'merchant account' to receive the funds from the card payments, whereas other gateways will direct the payment into the merchant's existing bank account. Finally, some payment gateways use a third party PSP to complete the payment instruction.

There is no easy way to determine the number of online gateways available in New Zealand. However, in the New Zealand market for online gateways processing card-not-present payments, Windcave (formerly DPS which owned the 'Payment Express' brand) is a key player.

### 4.3 Overlay services

Overlay services refer to the services that third parties can provide by building on top of existing front-end payment infrastructure and services. Overlay services might focus their business model on a particular aspect (or aspects) of the payments process, such as enrichment services or integrating the payments process with other areas of business activity.<sup>26</sup>

Many third-parties providing overlay services rely on other entities to gain access to customer consented data sharing or initiate payments. To provide these services, third-party providers such as mobile wallets and other fintechs must access customer data held by banks and gateways. They can access customer data in three ways: screen scraping (or permissioned data access), reverse engineering banking applications, or contractual agreements with commercial banks.<sup>27</sup> Alternatively, they can use credit or debit cards.

#### Services linked to a credit or debit card

Mobile wallets can store customer card details and use them to initiate payments. This can also be referred to as credential housing. Mobile wallets can house card credentials to initiate payments to other parties, or to the user's account within the wallet itself.

Card payments instructed via a mobile wallet can ensure data security by using tokenisation, which is a string of numbers cryptographically linked to the user's credit card numbers. To authorise the payment, the card issuer cross-references the string of numbers to their secure database to validate that the instruction came from the cardholder. This tokenisation technology ensures that

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<sup>26</sup> Unlike some other countries, New Zealand does not have any systems level overlay services such as an electronic bill payment and presentment system, or a PayID system that allows payers to more conveniently address their payments to identifiers other than a bank account, such as a mobile phone number.

<sup>27</sup> FintechNZ (2022).

the cardholder's sensitive card number is not transmitted online. For each transaction a one-time number is used that can only be used with the specific merchant.

Another example of an overlay service linked to a credit card is Buy Now Pay Later. This is a network that enables customers to purchase goods and services online, and pay them off over time. The Buy Now Pay Later network pays the merchant in full upfront (taking on credit risk) and then is reimbursed by the customer over incremental scheme card payments.

### *Case study: PayPal*

PayPal provides a mobile wallet that stores card credentials as well as issues e-money funds. Users can 'load money' into their PayPal account by paying with their scheme credit or debit cards. The funds are transferred from the issuer to PayPal's designated settlement bank account and the corresponding value in e-money is issued within the PayPal wallet. Payments to and from PayPal accounts are authorised, cleared and settled by PayPal as 'on-us' transactions. PayPal remits money to merchants' bank accounts using Westpac NZ as its local bank.

### **Services linked to a bank account**

Many overlay or third party services rely on accessing the customer's bank account. These services broadly fall into accessing the customer's account information, such as their balances or transactional history; or payments initiation actions.

Third-party services gain access to a customer's bank account data by either contractual agreements (open banking), or by using screen scraping or reverse engineering.

### **Contractual agreements and open banking**

Open banking is the term used to describe a framework that provides the ability for a customer to consent to access by a third party to the customer's financial data held by their bank. In the payments context, open banking can be used to allow a third party to access customer bank account data to instruct and authorise payments on their customer's behalf.

Currently, open banking requires a contractual agreement with the customer's bank and the third party. The access to customer data between the different entities is typically powered by the use of application programming interfaces (APIs) (Box B). APIs can be thought-of as building blocks which allow different systems (with different software languages) to be integrated. For example, a PSP may use APIs to access their customer's bank account information to provide payment instruction and authentication services.

Financial institutions and third parties must come to an agreement on the functions that are supported by the APIs and the terms of the contract. Such agreements can be lengthy to finalise as financial institutions and third parties may have different views of what is reasonable functionality provided by the bank APIs and also what are reasonable contractual terms. In New Zealand, the entity holding the data has ownership of that data, although this is under review.<sup>28</sup> Third party providers are better able to offer consumers services using open banking if they have access to multiple, if not most, financial institution data via APIs or other means.<sup>29</sup>

<sup>28</sup> In July 2021, Cabinet approved consideration of a consumer data right (CDR). The Ministry of Business, Innovation and Employment (MBIE) is leading this consideration and expects to introduce a CDR Bill to parliament in 2022. A CDR would require entities that hold consumer data such as financial institutions, to allow their customers to authorise third parties to access their data.

<sup>29</sup> FintechNZ (2022), API Centre Payments NZ.

**Box B: Application Programming Interface (API)**

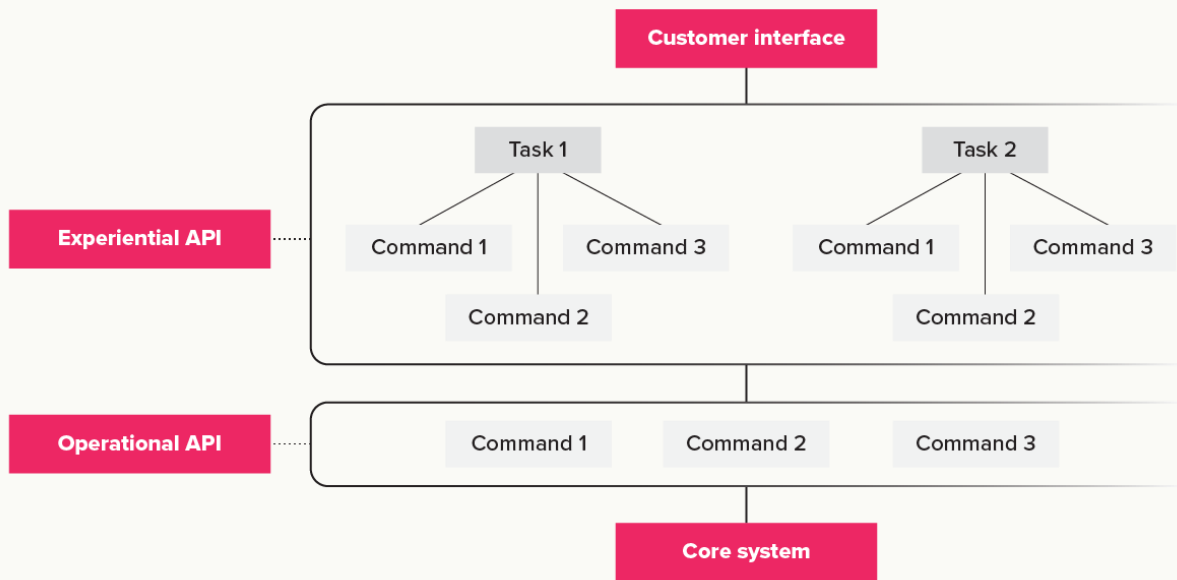
Commercial banks can facilitate interoperability between their core system, customer information and account access with third parties using APIs.

An API is a contract between two systems: it sets the terms and defines the communication between the systems; and enables one system to query or retrieve information from another system in a standard format, even though the systems have different software or different 'languages.'<sup>30</sup>

In the banking context, a basic 'operational' layer is built over the core system. This layer allows queries to the system that will return a standard response in a standard format. For example, it builds commands for credit checks, account balance checks, and income verification checks.

On top of this, an 'experiential' layer can be built. This layer combines a set of commands into a single task. The commands can be reused and combined in different ways to create different tasks, for example to initiate a mortgage or a personal loan, or set up a new bank account. This makes adding new banking products or customer functions easier and faster as the bank can reuse commands rather than building an entire new system as it would have in the past.

**Figure B.B.1: Diagram of an API**



**APIs in New Zealand**

In New Zealand, APIs can be either proprietary (i.e a bespoke API developed by particular financial institution), or industry standard APIs developed by the API Centre hosted within Payments NZ.

The API Centre's API standards support functionality for customer consented actions where:

- The customer authorises a consent for a third party to access specific account information in specified bank accounts for the duration of the consent (e.g. account balance or transaction history); and
- The customer consents for a third party to prepare and initiate a payment request, so that the

<sup>30</sup> Watson (2016).



customer can authorise that payment inside their bank's environment (e.g. in their mobile banking app).

The API Centre's payments initiation API standard also supports an Enduring Payment Consent. This establishes a variable reoccurring payment that does not require a customer to authorise every subsequent payment. The payment initiated by the third party can be immediately processed, so long as it is within the bounds of the customer's consent.

There is no requirement that banks build APIs, or that they use Payment NZ's standards if they do build APIs. Consequently, banks are at different stages of building APIs. At present two NZ banks have implemented the standardised APIs.

### Screen scraping and reverse engineering

The alternative route to accessing customer financial data for third parties is via screen scraping or reverse engineering.

Screen scraping generally involves accessing customer data via online banking websites. The user is required to enter their online banking login credentials into a web portal provided by a third party. This allows the third party service provider to send instructions to their bank on their behalf for example, to enable faster or more convenient online bank transactions. For example, Merco's POLi system uses the payer's internet banking one-off payment feature to make an online payment. POLi provides a payment gateway in the checkout section of a participating retailer's website. This gateway links to the user's internet banking log-in. The payee provides their log-in details to POLi and then POLi automatically brings up the payment page and populates the payment data fields. The user then instructs the internet banking payment and POLi provides the merchant with confirmation that a valid payment instruction has been made.<sup>31</sup> Although POLi has many use cases and participating merchants, by sharing their login credentials, customers are exposed to greater risks, for example, of their details being handled incorrectly or stolen.

Another example of services that use screen scraping in New Zealand is Windcave's account2account. This service allows merchants to accept online payments directly into the bank account.

Reverse engineering operates similarly to screen scraping but typically uses financial institution mobile apps. Services using reverse engineering can instruct continuous payments. However, like scraping, services that rely on reverse engineering require constant monitoring, as any changes or updates to the banks' web or mobile interface may interrupt the service. In addition, reverse engineering requires customer to share their mobile app login credentials which exposes them to greater risk. As an example, third party data aggregator Akahu uses reverse engineering of mobile apps to provide its services.

## 4.4 Closed loop systems

A closed loop system refers to when all aspects of a payments process occurs within the system – i.e. clearing and settling in that one system. It generally refers to money systems where only the issuer of the funds recognises or accepts the funds for payment. For example:

- Merchant-specific vouchers or gift cards

<sup>31</sup> POLi is provided as an option by other gateway providers such as PayStation and by web developers such as Musac and Zeald. POLi also provides plug-ins for shopping carts such as Magetto and PrestaShop. Over 4000 merchants use screen scraping services including The Warehouse, Mighty Ape, and Waka Kotahi. FintechNZ (2022)

- Gaming currency systems
- Loyalty points
- Transport cards.

Closed loop systems are typically small in size due to their limited network of users, as users must all be a part of the same system in order to make and receive payments on it.

## 5 Conclusion

A seemingly simple task at face value, payments follow a number of steps and processes before funds can be transferred from one to another. This primer provides an introduction to and an in-depth look at the systems, services, and instruments in New Zealand's payments landscape. It discusses the steps of a payment, dividing the process into the back-end arrangements used for clearing and settlement, and the front-end arrangements that support payment instruction and authorisation, as well as other customer and financial services.

Having outlined the journey taken from the interchange of funds through to the customer's initial payment instruction, readers of this primer should come away with an introductory understanding of Aotearoa New Zealand's payment landscape. This information has previously not been easy to locate, interpret, and fit together. However, understanding the payment landscape today helps us to shape the payment landscape for tomorrow.

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## Glossary<sup>32</sup>

**Acquirer:** Bank that receives a card payment.

**Authorisation:** The approval or consent given by an FMI participant (or a third party acting on behalf of that participant) in order to conduct a transaction, for example, transfer funds or securities.

**Back-end arrangement:** describes the payments systems, instruments or services that occur between payment system intermediaries needed to facilitate the clearing and settlement of payments.

**Card Scheme:** A network to support card payments, it develops the technology and card product features, and set the commercial model and rules.

**Clearing:** The process of transmitting, reconciling and, in some cases, confirming transactions prior to settlement, potentially including the netting of transactions and the establishment of final positions for settlement.

**Financial market infrastructure (FMI):** Systems and services that provide channels through which payments, securities, derivatives or other financial transactions are cleared, settled or recorded.

**Front-end arrangement:** The payments systems, instruments or services that the end user (consumer or merchant) interact with.

**Issuer:** An entity or bank that issues a payment card including the funds held or accessed by that card.

**Merchant:** A supplier of goods or services to consumer.

**Mobile wallet:** Software that stores card credentials or an electronic representation of funds (e-money).

**Payment gateway:** A terminal at the point of sale, or online e-commerce gateway that allows merchants to accept non-cash payment methods like cards.

**Payment service provider (PSP):** A third-party company that assists businesses to accept a wide range of online payment methods, including cards, e-wallets, and inter-bank account to account payments.

**Payment system:** A set of instruments, procedures, and rules for the transfer of funds between or among participants; the system includes the participants and the entity operating the arrangement.<sup>33</sup>

**Point of Sale (POS):** A device or terminal that allows merchants to accept payments in a bricks and mortar shop, or in person.

**Prepaid card:** Also called stored value card. Stores funds that have been issued by a third-party (non-bank) entity. These funds may be recognised widely (e-money) or only recognised by the issuer itself (such as a gift card to a particular store).

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<sup>32</sup> Where applicable, the CPMI glossary is used to define terms.

<sup>33</sup> Committee on Payments and Market Infrastructure (2016)

## UNCLASSIFIED

**Retail payment:** A payment by a consumer to a merchant for the supply of goods or services.

**Settlement:** The irrevocable and unconditional transfer of an asset or financial instrument, or the discharge of an obligation by the FMI or its participants in accordance with the terms of the underlying contract.

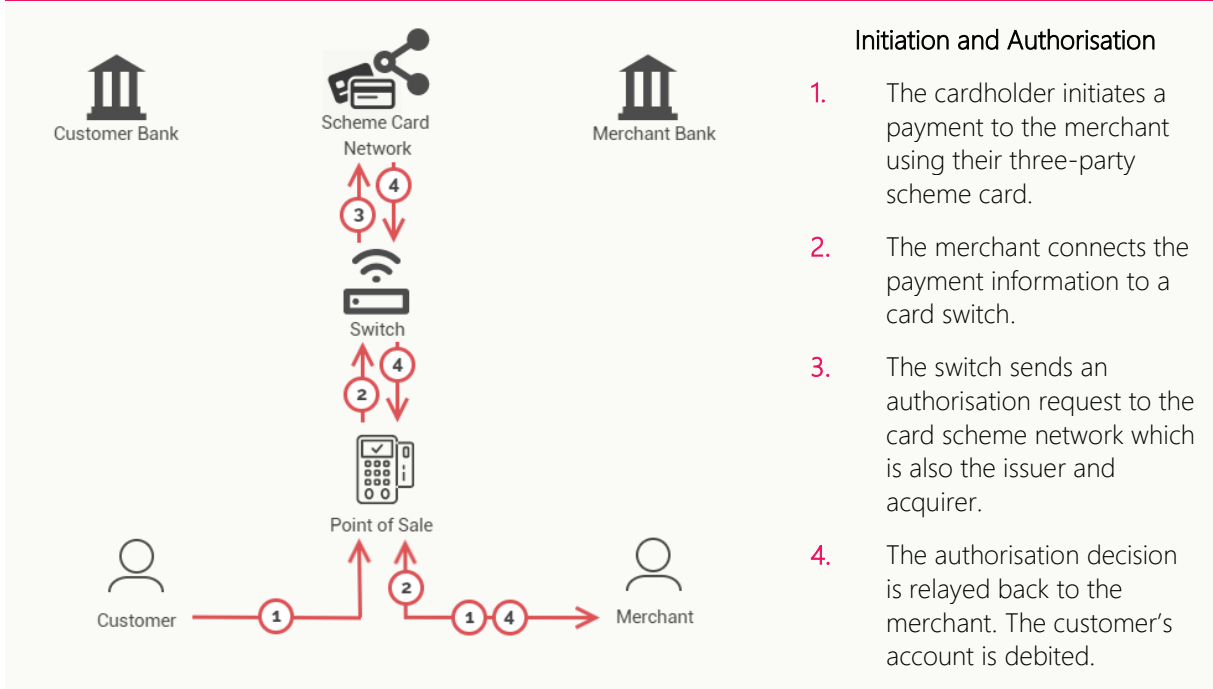
**Switch:** Messaging infrastructure that sends the payment information to the correct card issuer or acquirer to support payment authorisation and clearing.

**SWIFT:** The Society for Worldwide Interbank Financial Telecommunication. A member-owned financial messaging service used to securely communicate between financial institutions in a standardised, efficient, and reliable way.

**Wholesale payment:** Payments made between businesses or financial institutions.

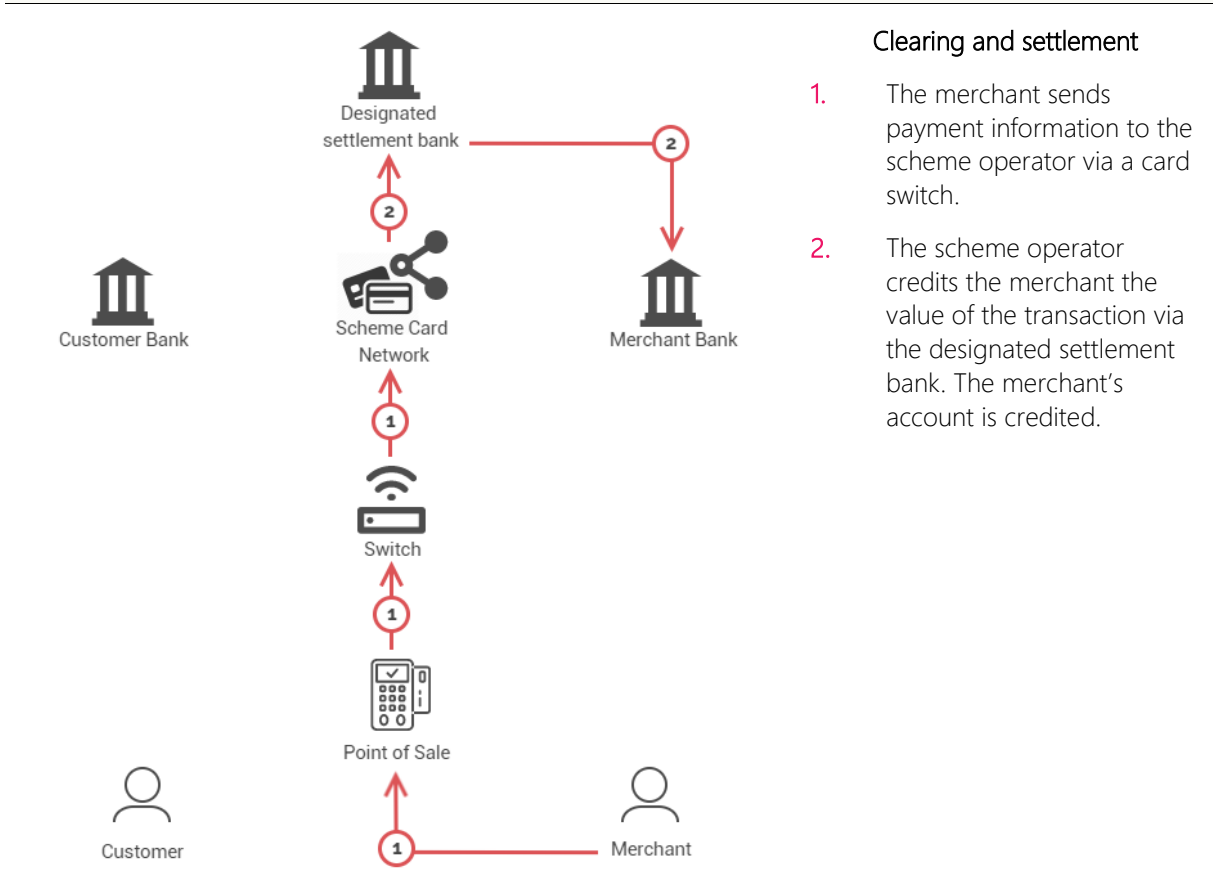
## Appendix – Three-party Card Schemes

### Three-party card schemes



#### Initiation and Authorisation

1. The cardholder initiates a payment to the merchant using their three-party scheme card.
2. The merchant connects the payment information to a card switch.
3. The switch sends an authorisation request to the card scheme network which is also the issuer and acquirer.
4. The authorisation decision is relayed back to the merchant. The customer's account is debited.



#### Clearing and settlement

1. The merchant sends payment information to the scheme operator via a card switch.
2. The scheme operator credits the merchant the value of the transaction via the designated settlement bank. The merchant's account is credited.