

# **Payment Systems Developments and Architecture: Some Background**

Over the past year or so, the Reserve Bank has been examining the architecture and governance of Australia's payment systems and the range of payment products offered in Australia. This interest reflects the recognition that, in the medium term, the efficiency of the Australian payments system depends, in part, on the ability of the system to deliver a wide range of payment services at reasonable cost. The Bank's work to date has focused on two related issues. The first is whether the development of payment products in Australia has been keeping pace with that abroad. The second is the implications of having a number of Australia's payment systems based on bilateral technical and business linkages.

This note summarises a number of observations from this work and has been prepared as a background document for discussions with the ABA/APCA joint research project group. It is not meant to be exhaustive, but rather to serve as the basis for discussion.

## **1. Product Developments**

Overall, the Bank recognises that Australia has a creditable record in terms of payments system innovation. Australia was one of the first countries to develop a national PIN-based EFTPOS system, it has a sophisticated electronic bill presentment and payment service, and Australian financial institutions offer extensive internet banking facilities to their customers. Australian consumers also have universal access to the ATM network, and financial institutions can provide cardholders with a single card that can be used for ATM, debit and credit transactions. By international standards, Australia has a relatively efficient payment system that meets the needs of most businesses and consumers reasonably well.

Notwithstanding this record, there are a number of payment products being developed or introduced overseas which seem to offer consumers and businesses additional options to those generally available in Australia. The following sections summarise some of these products and describe what we understand to be the status of related developments in Australia.

### **1.1 Business Products**

There have been a number of recent developments overseas which appear to have improved the efficiency of electronic payments for business customers, particularly by upgrading the interface between the payments system and business accounting systems and facilitating better opportunities for straight-through processing for business-to-business (B2B) payments.

Two basic models have emerged: the first extends the format of the payment message to include more data, while the second links payment data, usually electronically, to another transfer of information between business partners.

### *Extended message formats*

Including additional remittance data within the payments message has been successfully achieved in a number of bulk electronic payments networks. In 2004, the Electronic Payments Network (EPN) in the United States introduced a new message format for credit transfers relating to B2B payments. The EPN STP 820 message has ten fields dedicated to remittance information, including the invoice number and a field for describing any adjustments made to the invoice amount. The European Payments Council has also introduced a new format for credit transfers within the Single Euro Payments Area (SEPA) which has around 60 different fields as well as space for up to 140 characters of 'free text.' Sweden's Dataclearing system has also extended its credit transfer message format to allow an additional 50 characters of remittance data.<sup>1</sup>

### *File connections*

The second approach associates the payment instruction with another exchange of data between business partners. In the United States, FedACH, the Federal Reserve's automated clearing house, has developed software specifically for this purpose. It allows users to attach a separate electronic data interchange (EDI) remittance message, containing information such as invoice and purchase numbers, to a standard ACH message.<sup>2</sup> The United States National Automated Clearing House Association (NACHA) has also passed a rule that all financial institutions receiving corporate ACH transactions are required to pass additional information to their corporate customers upon request.<sup>3</sup>

In the United Kingdom, both BACS and the new FasterPayments service provide a remittance field which can be used to associate payments with related accounting information.<sup>4</sup>

While linking data to the payment assists reconciliation of general ledger accounts to cash management accounts, it does not usually allow straight-through-processing (STP) of transactions unless the various business partners have agreed upon standard data definitions. In Scandinavia, this has been achieved by banks jointly developing a common standard, known as Finvoice, for electronic invoicing of B2B transactions. The Finvoice standard allows e-invoice files be exchanged through banks in eXtensible Markup Language (XML) format using standardised definitions for the remittance data. In addition to STP, it allows:

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<sup>1</sup> Other examples include Taiwan's retail payments system, FISC and the Interbank Express payment system run by the Saudi Arabian Monetary Authority. Refer "Introduction to EDI Transfer of Bank of Taiwan", <http://www.bot.com.tw/English/EServices/ServiceIntro/InformationServices/edi.htm> and "Business-to-Business ePayments Scheme Rules, Regulations & Message Formats" July 1, 2004. (This and other web references within this document were verified on September 21, 2006.)

<sup>2</sup> "FedEDI Brochure", March 2001 <http://www.frb services.org/Retail/pdf/FedEdiBrochure.pdf>

<sup>3</sup> "Payment Advice Internet Delivery (PAID) Fact Sheet" <https://fmsapps.treas.gov/paid/PAIDfaq.asp>

<sup>4</sup> "Faster Payments in the UK: What Do Corporates Need to Know?" Marcus Hughes, 25 July 2006. <http://www.gtnews.com/article/6423.cfm>

- the recipient to view the invoice in a traditional format using their internet browser;
- businesses to issue electronic invoices; and
- payment to be made without re-keying invoice details.

E-invoicing systems based on the Finvoice standard are now operating in Sweden, Norway and Denmark.<sup>5 6</sup>

In Australia, the format of messages in the electronic payment system used for many business-to-business payments – the direct entry system – has remained largely unchanged since the 1970s. It allows only 18 characters for users to add their own supplementary information after critical details, such as account numbers and the payment value, are included.

Some Australian financial institutions and other third-party providers are offering customers a service which associates the payment with other data supplied in a separate file. An identifying code is included in the 18-character ‘free text’ field within the direct entry message and referenced in the related accounting information which is sent separately to the business receiving the payment. The code can then be used to reconcile payments against general ledger accounts. However, there is no standardisation of this approach across the industry, and fully automated reconciliation processes can be difficult to implement.

The limited flexibility of the direct entry system has been raised by a range of business organisations in discussions with the Bank, and was discussed in a recent report by the Department of Communications, Information Technology and the Arts (DCITA) on the future of electronic payments markets in Australia.<sup>7</sup> The majority of businesses surveyed for this report indicated that they wished to make and receive more electronic payments, rather than use cheques, which they recognised as more expensive. Businesses receiving payments reported that the most significant issue they faced was that there was not enough information in direct entry payments to reconcile accounts.

The issue of upgrading the direct entry system to better serve business customers was considered by the Australian Payments Clearing Association (APCA) in 2001. While it was agreed that enhancements to the message standard would represent an improvement to existing arrangements, most financial institutions concluded that there was an insufficient business case to justify upgrading the system at that time.

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<sup>5</sup> Financial Solutions, January 2005

<sup>6</sup> “Banking Technology in Finland”, The Finnish Bankers’ Association, January 2004  
[http://www.pankkiyhdistys.fi/sisalto\\_eng/upload/pdf/Banking\\_Technology.pdf](http://www.pankkiyhdistys.fi/sisalto_eng/upload/pdf/Banking_Technology.pdf)

<sup>7</sup> *Exploration of Future Electronic Payments Markets*, Department of Communications, Information Technology and the Arts, June 2006.

## ***Bill Payments***

Electronic bill payment services are already well established in many countries. These have developed more rapidly than business-to-business payments products as fewer details are necessary to reconcile payments against accounts receivable data. The most recent development in customer-to-business payments has been Electronic Bill Presentment and Payment (EBPP) systems which allow customers to view and pay their bills over the internet, rather than receiving a bill by post.

The simplest form of EBPP enables the customer to view bills and make payments directly at the biller's own website. This has become popular amongst utility providers and telecommunications companies. An alternative model, which consolidates bills across multiple billers, requires a third party providing a website at which different bills can be viewed and paid.

Consolidator EBPP systems which leverage existing internet banking arrangements have been relatively successful. A good example is CheckFree<sup>8</sup> in the US which is available to the customers of over 1000 financial institutions via their internet bank, and allows bills from more than 750 billers to be viewed and paid online. CheckFree has also formed a joint venture with Voca, the direct entry system processor, to offer an EBPP service, called OneVu,<sup>9</sup> in the United Kingdom. EBPP systems have also been developed in a number of Asian countries. For example, in Korea, the Internetgiro system can be used to view a wide selection of bills online and to pay bills using the standard giro payment options. In Singapore, vPOST is a consolidator EBPP system offered by Singapore Post, allowing users to view bills from approximately 40 billers.

In Australia, the market for bill payment services provides consumers with a number of options, with BPay, Australia Post and more recently BillExpress competing for market share. In 2004, both BPay and Australia Post extended their electronic bill payment offering to a full EBPP service. Customers can now receive and pay their bills electronically for 14 billers with BPay and 36 billers at Australia Post. Very recently, there have been several new players enter the bill payments market. These include Acreis, a service which allows the customer to aggregate all bills into one monthly payments, and Controlabill, which is marketing direct debit bill management software to banks.

### **1.2 'Online Debit'**

In a number of countries, consumers shopping on-line can choose a payment option that automatically links details of the transaction – the price and merchant's account details – to their internet banking facility. This option (sometimes referred to as 'online EFTPOS', although no card is actually used) allows a real-time, authorised payment to be made to the merchant, without using a credit card or scheme debit card. The process is relatively simple. Customers selecting the online debit option at the

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<sup>8</sup> "E.Bill Place" <http://www.ebillplace.com/cda/ebillplace/index.html>

<sup>9</sup> "OneVu E-Brochure" [http://www.onevu.com/pdf/OneVu\\_brochure.pdf](http://www.onevu.com/pdf/OneVu_brochure.pdf)

merchant's website are switched to their bank's internet website. After logging in, the customer is prompted to authorise the transaction. A message from the bank, confirming the successful transaction, is then automatically relayed back to the merchant.

This form of payment offers benefits to customers and merchants. The customer is able to make a payment from an account accessible by internet banking and does not have to provide account details to the merchant. The merchant is not exposed to the fraud risks associated with accepting credit cards online and generally pays lower merchant service fees on these transactions. Online debit also allows the merchant to sell goods and services to those consumers who do not have a credit card. (While scheme debit cards also allow online purchases to be made from a deposit account, their use raises the same issues as for credit cards, namely: confidentiality; merchant service fees; and fraud.)

Online debit is available in Austria,<sup>10</sup> Canada,<sup>11</sup> the Czech Republic,<sup>12</sup> Denmark,<sup>13</sup> Finland,<sup>14</sup> Germany,<sup>15</sup> India,<sup>16</sup> Japan,<sup>17</sup> Korea,<sup>18</sup> Malaysia,<sup>19</sup> the Netherlands,<sup>20</sup> Singapore<sup>21</sup> and Sweden.<sup>22</sup> In the United States, NACHA is currently testing similar technology.<sup>23</sup> These products are at various stages of development: the Canadian system, Interac Online, was launched in the second half of 2005 and has 32 merchants signed up;<sup>24</sup> the Dutch version, iDeal, (October 2005) already has more than 1 500

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<sup>10</sup> "The EPS Online Transfer" [http://www.iww.uni-karlsruhe.de/reddot/download/04\\_Martin\\_Giretzlehner\\_Austria\\_Raiffeisen\\_eps.pdf](http://www.iww.uni-karlsruhe.de/reddot/download/04_Martin_Giretzlehner_Austria_Raiffeisen_eps.pdf)

<sup>11</sup> "Interac Online" <http://www.interaonline.com/>

<sup>12</sup> "Payment Gate" [http://www1.zivnobanka.cz/en/netbanka/payment\\_gate.html](http://www1.zivnobanka.cz/en/netbanka/payment_gate.html)

<sup>13</sup> "eDankort eCommerce – Online Banking" [http://www.iww.uni-karlsruhe.de/reddot/download/05\\_Jorgen\\_Brinch\\_Dankort\\_.pdf](http://www.iww.uni-karlsruhe.de/reddot/download/05_Jorgen_Brinch_Dankort_.pdf)

<sup>14</sup> *Survey of developments in electronic money and internet and mobile payments* Committee on Payment and Settlement Systems <http://www.bis.org/publ/cps62.pdf>

<sup>15</sup> "Giropay – the new online payment system for the future" [http://www.iww.uni-karlsruhe.de/reddot/download/07\\_Matthias\\_Hoenisch\\_DSGVO\\_giropay.pdf](http://www.iww.uni-karlsruhe.de/reddot/download/07_Matthias_Hoenisch_DSGVO_giropay.pdf)

<sup>16</sup> ICICI Bank [http://www.icicibank.com/pfsuser/icicibank/online/shopping/online\\_shopping.htm#](http://www.icicibank.com/pfsuser/icicibank/online/shopping/online_shopping.htm#)

<sup>17</sup> "Japan Cardnet Provides Next Generation Payment Solutions" [http://www.fujitsu.com/downloads/INTSTG/customersuccess/CSCardnet\\_final\\_wlogo.PDF](http://www.fujitsu.com/downloads/INTSTG/customersuccess/CSCardnet_final_wlogo.PDF)

<sup>18</sup> "Payment Gateway (PG) Service" [http://www.kftc.or.kr/english/business/set\\_igiro.html](http://www.kftc.or.kr/english/business/set_igiro.html)

<sup>19</sup> "Financial Process Exchange (FPX)" [http://www.meps.com.my/products\\_services/meps\\_fpx.html](http://www.meps.com.my/products_services/meps_fpx.html)

<sup>20</sup> "Online Payment Services" [http://www.rabobank.com/content/corporates/payment\\_services/iDEAL.jsp](http://www.rabobank.com/content/corporates/payment_services/iDEAL.jsp)

<sup>21</sup> eNETS <http://www.nets.com.sg/enets/>

<sup>22</sup> "The Swedish Financial Market 2005" Sveriges Riksbank <http://www.riksbank.com/pagefolders/21065/finansmarkneng.pdf>

<sup>23</sup> "NACHA to Test Bank-Provided Online Authentication and Private Payments" NACHA Press Release, 15 March 2006

<sup>24</sup> "Where can I use Interac Online?" [http://www.interaonline.com/consumers\\_where.php?page=1](http://www.interaonline.com/consumers_where.php?page=1)

merchants;<sup>25</sup> eNets (April 2002) in Singapore is offered by around 150 merchants;<sup>26</sup> and the Finnish system (pre 2001) is used by more than 500 merchants.<sup>27</sup>

These products have typically emerged from the collaboration between a number of financial institutions, or from a central organization representing financial institutions (Table 1). Canadian and Dutch banks we spoke to felt that merchants were looking for a universal solution, which serviced customers regardless of where they held their bank account.

In Australia, there is no widely available ‘online debit’ facility. An independent company has launched an on-line debit product called POLi, but has achieved little market penetration to date.

**Table 1: Development of Online Debit Systems**

		Group of banks	Individual banks	Central organization/ bank-owned organisation	Private firm
<b>Australia</b>	POLi				✓
<b>Austria</b>	Eps	✓			
<b>Canada</b>	Interac Online			✓	
	UseMyBank				✓
<b>Canada/US</b>	Secure-ebill				✓
<b>Czech Republic</b>	NetBanka Payment Gate		✓		
<b>Denmark</b>	eDankort	✓		✓	
<b>Finland</b>	<i>bank specific</i>		✓	✓	
<b>Germany</b>	Giropay	✓			
	Pago Online Bank Transfer				✓
<b>India</b>	<i>bank specific</i>		✓		
<b>Italy</b>	BankPassWeb			✓	
<b>Japan</b>	Net Debit				✓
<b>Korea</b>	Bankpay PG			✓	
<b>Malaysia</b>	FPX			✓	
<b>Netherlands</b>	iDeal	✓			
<b>Portugal</b>	MBNet	✓			
<b>Singapore</b>	eNets			✓	
<b>Sweden</b>	<i>bank specific</i>		✓		
<b>United States</b>	NACHA pilot			✓	

### 1.3 ‘Virtual Wallets’ and ‘Proxy Cards’

In some countries, alternatives to online debit have been developed.

In Italy, for example, the BANKPASSWeb system allows customers to pre-register their debit (and credit) card details with the service provider in what is called a ‘virtual wallet.’ When making a payment at a registered merchant the customer is

<sup>25</sup> “iDEAL” [http://www.iww.uni-karlsruhe.de/reddot/download/06\\_John\\_Holsberg\\_Rabobank\\_Ideal\\_presentatie.pdf](http://www.iww.uni-karlsruhe.de/reddot/download/06_John_Holsberg_Rabobank_Ideal_presentatie.pdf)

<sup>26</sup> eNETS <http://www.nets.com.sg/enets/>

<sup>27</sup> “Electronic Payment Systems Observatory Newsletter” February 2001 <http://epso.intrasoft.lu/papers/ePSO-N05.pdf>

re-directed to this wallet, where they receive a summary of the order, and select a payment instrument to complete the transaction.

Another example is the Portuguese MBNet system which also requires customers to pre-register their details. Upon registration, they are given a code, or 'proxy card', which they can use to make payments at registered merchants.

Both systems have signed around 120 merchants but also enable customers to make payments at non-registered merchants, by creating a one-off virtual card number, which is valid only for a specific transaction.

#### **1.4 Chip and PIN Developments**

Another area where there has been significant change overseas is in the adoption of chip technology in payment systems.

Chip migration programs have been underway for some time in Europe, Asia and other areas worldwide, motivated by rising fraud costs. EMV<sup>28</sup> is commonly used as the finance industry standard for chip cards and chip-capable terminals. To promote the introduction of these standards, liability shifts have been introduced by the credit card schemes under which the non-EMV party becomes liable for any fraud that takes place on their system. In the Asia Pacific region the liability shift became effective on January 1, 2006.

Japan, Taiwan and Malaysia have the most advanced chip migration programs in the Asia Pacific region. Migration for credit cards is now complete and other point-of-sale systems will follow shortly. A number of other countries – Hong Kong, India, Indonesia, Pakistan, the Philippines, Singapore and Thailand – are expected to have migrated their credit card systems by early 2007.

China, Korea and New Zealand are not expected to migrate until 2008 or later. The Beijing Olympics is providing some impetus for the Chinese market to move; Korea has some level of chip penetration via the K-Card and at least one New Zealand acquirer is able to process transactions on foreign chip cards using chip technology.<sup>29</sup>

In North America, the Canadian EFTPOS/ATM system, Interac, is planning to be able to process chip transactions by the start of 2007. By contrast, there seems to be little impetus for chip migration on either credit or debit cards in the United States.

In Australia, progress towards chip migration has also taken place and the pace of change is being accelerated as banks react to the change in liability for fraud that came into effect in Australia at the beginning of 2006. However, while individual banks have their own conversion programs, at this point there is no timetable for industry-wide chip migration in Australia.

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<sup>28</sup> Developed by Europay, MasterCard and Visa.

<sup>29</sup> "First end to end chip transaction" 5 April 2006 media release by ETSL and MasterCard.

While most national chip migration programs have been introduced in response to growing fraud levels, chip infrastructures have also been used to develop innovative payment applications, including prepaid cards, contactless transactions and mobile phone payments.

### *Prepaid Cards*

The most basic prepaid cards use magnetic stripe technology on a non-reloadable card, for example retail gift cards; however more advanced systems are now being developed overseas which utilise chip technology. Examples of chip-based prepaid systems include Proton in Belgium, the K-Card in Korea and Chipknip in the Netherlands.

Prepaid cards are also becoming more widely used in health and welfare applications. After Hurricane Katrina, the American Red Cross used magnetic stripe prepaid cards in distributing benefits; and in Australia, Centrelink also distributes emergency benefits cards which allow funds to be accessed through the ATM network. In Singapore, the Network for Electronic Transfers (NETS) is trialling a government-based benefit smart card which is preloaded with welfare coupons.<sup>30</sup> Other countries where payment social security benefits are provided on a smart card include Austria,<sup>31</sup> France and South Africa.

### *Contactless Cards*

Contactless card technology is in use in many parts of the world, including Australia, in closed environments such as building access, toll collection and transit systems<sup>32</sup> and is now extending into payments applications.

One successful prepaid card system using both chip and contactless technology is the Octopus Card in Hong Kong. It began as a closed application for the transit system but its payment applications have been extended significantly and now include:

- payment at parking meters and vending machines;
- transactions at retail outlets such as convenience stores, supermarkets, fast-food restaurants and service stations; and
- ticketing, payphones, photocopying and charitable donations.

The Octopus card is reloadable at special ATMs or over the counter, via credit card or from a bank account. There are over 14 million cards on issue and the system processes over 9 million transactions per day.<sup>33</sup>

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<sup>30</sup> “One Card Many Uses” [http://www.ps21.gov.sg/Challenge/2005\\_05/service/one.html](http://www.ps21.gov.sg/Challenge/2005_05/service/one.html)

<sup>31</sup> “Austria launches Health Insurance Card Pilot” <http://europa.eu.int/idabc/en/document/3691/353>

<sup>32</sup> Examples include Smartrip card (Washington DC), Chicago Card (Chicago), GTA Card (Toronto), Sucia Card (Japan), Navigo Card (Paris), Oyster Card (London) and T-Money (Korea).

Both MasterCard and Visa have developed cards which combine contact and contactless interfaces. MasterCard has developed PayPass, which is being issued in the US and a contactless MasterCard is being trialled in Australia.<sup>34</sup> Chase issues a contactless Visa card in the US under the name 'blink' and Wells Fargo is also planning to issue a contactless Visa card later this year; these cards can be used at more than 30 000 locations. 'Visa Wave' is being trialled in Malaysia and Taiwan.<sup>35</sup> American Express also issues a contactless card called ExpressPay in the US.<sup>36</sup>

### *Mobile Phone Payments*

The potential to integrate payment instruments with mobile phones has been recognised for some time and internationally a number of 'm-payment' products have emerged which use mobile phones in different ways. Of these, the combination of contactless chip technology with mobile phones appears to be most successful.

M-payments which use contactless technology are now operating in a number of countries; in Japan, m-payments can be used to purchase a variety of transport tickets and retail goods.<sup>37</sup> Indeed, the Mobile Payment Promotion Council has been established in Japan to promote standardisation across the different m-payment schemes. In Korea, m-payments are also widely available and the payments and telecommunication industries are working towards greater standardisation. In the US, MasterCard is incorporating the PayPass chip into mobile phones in a trial in Dallas.

## **2. Payment System Architecture**

The second broad issue is the implications for the evolution of the system of the relatively heavy reliance of Australia's retail payments systems on bilateral technical and business arrangements.

### **2.1 Types of payment systems**

Traditionally, payment systems have been categorised as either bilateral or centralised. In a bilateral system, institutions can participate either directly or indirectly. Direct participants exchange payment messages directly with one another, with each participant having a separate physical link to every other direct participant. In some bilateral systems, negotiations are also required with each direct participant

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<sup>33</sup> "Statistics, The numbers tell a compelling tale"

<http://www.octopuscards.com/corporate/why/statistics/en/index.jsp>

<sup>34</sup> "Commonwealth Bank unveils "Tap N Go" payment technology", Commonwealth Bank press release, 5 April 2006

<sup>35</sup> "Visa Wave" [http://www.visa-asia.com/ap/au/cardholders/cardsservices/visa\\_wave.shtml](http://www.visa-asia.com/ap/au/cardholders/cardsservices/visa_wave.shtml)

<sup>36</sup> "expresspay – use expresspay and keep moving"

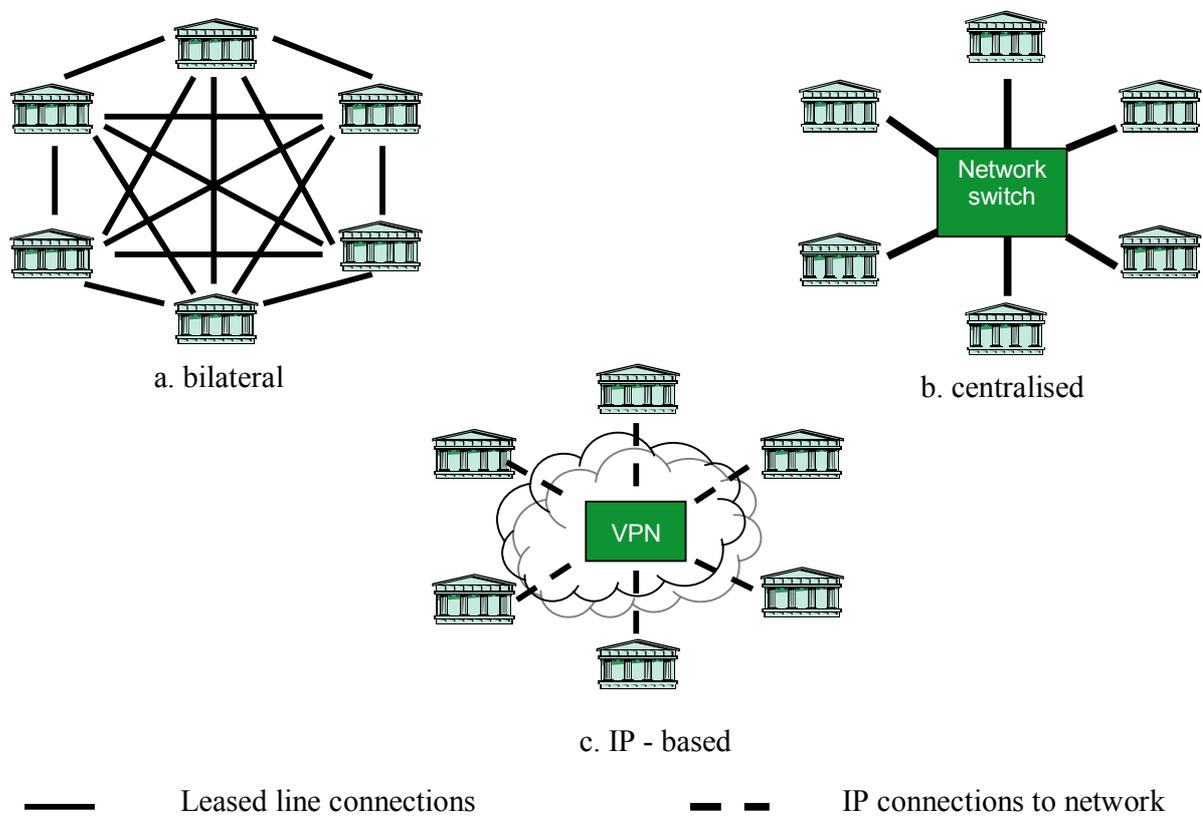
<https://www124.americanexpress.com/cards/loyalty.do?page=expresspay>

<sup>37</sup> "Global Information Inc. Mobile Payment Report" <http://www.gii.co.jp/english/ek32279-mobile-payment.html>

about technical details relating to the actual physical connection and business arrangements such as interchange agreements. Indirect participants enter the system as a ‘customer’ of a direct participant, who passes their messages to other direct participants.

In contrast, in centralised systems, participants pass payment messages to one another through a central entity or ‘switch.’ These centralised networks are structured so that each participant only needs one physical connection into the system. Details of the technical arrangements need only be negotiated with the one, central entity, and there are no bilateral contracts between the participants.

**Figure 1: Payment Systems Network Structure**



Recently, partly as a result of greater use of internet protocol (IP) technology, the traditional distinction between these two types of systems has become somewhat blurred. It is now possible, for example, to have a hybrid system in which participants pass messages bilaterally over a private network. Such an arrangement makes it easier to obtain some of the benefits of centralisation – only one connection into the network is required – while still allowing messages to be passed directly between individual participants. Many centralised systems have also adopted IP technology, but still route messages through a central entity which forms part of the payment network.

In Australia, the EFTPOS system, the ATM system and the direct credit and direct debit systems are all bilateral networks, operating through a series of bilateral links and contracts between direct participants, while the credit card systems and the BPAY network operate under the centralised model.

This heavy reliance on bilateral systems is unusual by international standards, with centralised systems being far more common. Examples of centralised systems include: the direct entry system, Voca, in the United Kingdom; Interpay in the Netherlands; the Electronic Payments Network in the United States; and the international credit card schemes. Most of the bilateral systems in Canada and Finland have moved to a hybrid model with a single point of entry to the network.

## **2.2 Some issues with Bilateral Systems**

There are pros and cons associated with bilateral systems.

On one hand, bilateral linkages may be the quickest, and perhaps the only feasible way, to establish a particular payment system. If, for instance, it is difficult to get multiple institutions to agree to establish a comprehensive system, an alternative is for two institutions to agree to exchange payments and provide services to customers that have accounts with either of them. If a third institution subsequently wishes to join, it can establish a link to each of the first two institutions. This can be a practical way for a system to expand, allowing tailored technical connections for each pair of institutions. Both the ATM and EFTPOS systems in Australia essentially developed in this way. Given the structure of the Australian banking system and the technology available at the time, this was arguably a sensible way to proceed.

On the other hand, bilateral arrangements can pose two particular challenges once the system matures. The first is that access can become quite difficult if more than a handful of links need to be established. The second is that the number of bilateral links may make the system difficult to update or renovate.

Obtaining access to a network based on bilateral linkages can be more difficult and expensive than obtaining access to a system with a single point of access, particularly when there are a significant number of existing participants. In some cases, a new institution must reach an agreement to exchange payment data with each of the existing participants and establish links with them. This can be a costly exercise, especially if each connection has to be individually tailored and negotiated. In Canada, concerns about access to the bilateral ATM/EFTPOS system, Interac, led to intervention by the competition authority. To satisfy the competition authority's requirements, the technology used to connect to other participants was standardised so that if a new entrant sought access, it needed to effectively build only one interface to the system, not many. Access is also facilitated by having a common interchange fee so that negotiations over these fees could not frustrate entry.

Under certain circumstances, bilateral arrangements can also make it difficult to update or to improve the technology used by the system. This issue is more likely to arise if there is not an entity with responsibility for promoting the interests of the system and for making sure that the system is operating as efficiently as possible.

Without such an entity, it can be difficult to make collective decisions and agree upon a timetable for renovation of the system.

This issue of how systems are improved over time is, of course, not unique to bilateral systems. In a number of countries, concerns have been expressed about the pace of innovation in centralised systems. One specific issue that has been identified is that if the system is owned by the existing participants and operates on a not-for-profit basis, the incentive to innovate may be less than under other arrangements.

In the United Kingdom, a key recommendation of the Cruikshank report was to separate responsibility for the rules governing systems from their day-to-day operations. The rules would be agreed by the participants, while operation of the system would become contestable, with the threat that another processor could regularly bid for the business. In December 2003, BACS Limited separated into two companies – BACS Payment Schemes Limited (BPSL), and Voca. BPSL, as the payment scheme, is a membership based, not-for-profit organisation that determines the system's rules. Voca, the system operator, is an independent, for-profit company. Voca has a contract to provide payment processing for BPSL until December 2010, when BPSL has the option to renew the contract, or give the business to another processor. Broadly similar changes have taken place in the ATM/EFTPOS networks in Canada (Acxsys and Interac) and the Netherlands (Currence and Interpay).

### **2.3 Developments in Architecture in Australia and Overseas**

In Australia, there has been little change to the ATM, EFTPOS and direct entry systems since inception. There has been some adoption of IP technology but on a relatively small scale and largely unco-ordinated across the industry. Some Australian financial institutions have made bilateral agreements to move from the older style point-to-point connections to internet-based connections to exchange payments messages, while a number of others have developed proprietary networks for communicating with indirect participants to whom they offer services.

In contrast, in many equivalent systems overseas there has been considerable change, most notably in the adoption of IP-based networks for operating payment systems. For example, in 2000, the Dutch system, Interpay, migrated its debit card system to an IP system, I-Connect. The Spanish retail payments network, SNCE, migrated in 2001<sup>38</sup> and the French SIT network in 2002.<sup>39</sup> In 2003, Voca introduced NewBACS for direct entry transactions in the United Kingdom; in 2004, the Portuguese ATM network Multibanco began its migration programme;<sup>40</sup> and in 2005, the German retail system, RPS, began to operate through SWIFTNet.

In the US and Canada, retail networks moved to internet technology over the same period. Interac launched its Interbank Member Network (IMN) for ATM and EFTPOS transactions in 2002, while the Electronic Payment Network (EPN) and the

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<sup>38</sup> SNCE brochure; ECB Blue Book 2001

<sup>39</sup> 2003 BIS Red Book

<sup>40</sup> SIBS Annual Report 2004

FedACH system – both automated clearing houses for retail payments – were upgraded in 2004/05.<sup>41</sup> In Asia, the Korea Financial Telecommunications and Clearings Institute (KFTC) adopted an IP network in 1999, while Singapore, Hong Kong, Taiwan and Malaysia were all operating retail payment networks using IP technology by 2000.

International payment systems have also moved to IP-based networks. Both Visa and MasterCard introduced virtual private network (VPN) solutions for their credit card networks in the early 2000s and the SWIFT network, which provides messaging for both wholesale and retail payment systems, migrated at around the same time.<sup>42</sup>

The additional flexibility and data capability of IP-based networks have provided opportunities for the development of new products. Examples include business-to-customer (B2C) and business-to-business (B2B) payment products which have been developed using the KFTC network in Korea and the e-mail funds transfer product, Certapay, which provides a similar service to PayPal, but operates through the Interac network in Canada.

IP technology has also been used to provide more flexibility to access arrangements for customers. In the UK, for example, the direct entry system BACS, has provided a service which provides customers with secure and direct online access over the internet to the network to track and view payment files.<sup>43</sup> Recently, SWIFT also announced new arrangements for corporate access.<sup>44</sup> The new corporate category allows qualifying corporates to join closed user groups which previously were open only to financial institutions. This allows SWIFTNet messages and files to be transferred directly between corporates and/or financial institutions.

### **Possible Issues for Discussion**

The Reserve Bank's work to date examining product and architecture developments in both Australia and overseas has raised a number of issues that appear worthy of further consideration. Amongst these issues are the following:

- i. Are there situations in which co-ordination between participants in a payment system will deliver a better outcome than each participant 'going it alone'?
- ii. Is co-ordination necessary for network innovation (as opposed to some types of product innovation)?

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<sup>41</sup> Electronic Payments Network press release "EPN Launches Efficient, Secure and Cost-Effective Method For Connecting To The Nation's Largest, Private ACH Network", 12 January 2005

<sup>42</sup> VISA press release "Visa Launches Initiative to Boost Flexibility and Capacity of Global Processing System *VisaNet Distributed Processing Solution to Create Platform for Local Innovation and Global Growth*", 20 June 2001

<sup>43</sup> Refer details of the BACSTEL-IP programs on the BACS website <http://www.bacs.co.uk/BPSL/corporate/presscentre/keyfacts>

<sup>44</sup> SWIFT press release "SWIFT AGM overwhelmingly approves new corporate category", 15 June 2006

- iii. What arrangements best facilitate projects where co-ordination is required?
- iv. What are the alternative arrangements for promoting and developing the existing bilateral payment networks in Australia?
- v. Is there a case for further access reform to Australia's bilateral systems?