IBM

Wireless Payments –
Money out of Thin Air?

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business

Contents

Executive summary

Wireless Commerce – the buying and selling of goods, any time, anywhere – is a key growth area of wireless e-business. Organisations are realising that there are many win-win scenarios, for their customers and business partners, using the latest technology to enact convenient and secure purchases 'over the air'. Wireless Payment, the ability to initiate and/or confirm a payment transaction from a wireless device, is the key element of Wireless Commerce.

As the leading provider of wireless e-business solutions, with a pedigree of supplying the major players in the wireless commerce domain, IBM has a lot to offer this market.

This year, networks will become useful for wireless e-business because advances in technology enables them to carry larger amounts of data quicker than before. As enterprises realise the possibilities of wireless e-business, so the availability of robust, proven Wireless Payment solutions will become even more important. By the time we reach the world of 3rd Generation networks, service providers and retailers will need to have sophisticated wireless payment mechanisms in place to enable consumers to pay for the content which they download.

This White Paper is intended for the wide community of IBM customers, business partners and suppliers. It sets out IBM's approach to the important new market of Wireless Payment, by discussing the main players and technologies, their diverse needs, and the value of alliances. It explains how IBM creates Wireless Payment solutions using a combination of software, services and techniques proven in thousands of customer projects around the world.

To discuss Wireless Payment please contact your local IBM representative.

Chapter 1

Setting the scene

The rapid and widespread adoption of the mobile phone has been the most significant shift in consumer use of technology in recent years. In Europe and Japan practically every home has one and North America is not far behind. The adoption of the Internet has been even more rapid and the potential combination of the two, the Mobile Internet, is offering possibilities for business on an unprecedented level.

The recent period of frenzied activity for Network Service Providers, handset manufacturers and system integrators is a convincing indication that the Mobile Internet is becoming an important issue for business. The ability to service new and existing customers, wherever and whenever they want, makes mobile e-businesses much more attractive to consumers and more competitive in the marketplace. With forecasts suggesting that in the near future, more people are likely to have access to the Internet from mobile devices than from PCs, the 'wireless option' is being considered seriously by most organisations.

Many businesses are already embarking on 'multi-channel' strategies, which enable their customers to choose the most convenient route to their desired service. These channels include shops, call centres, Interactive Digital TV, the Internet and now, the Mobile Internet. This multi-channel infrastructure must include the mobile option if the organization is to reach all of its customers - existing and new, and the services provided must include Wireless Payment to enable people to buy what they browse at the moment when they want to buy it. Wireless payment is a great enabler of the impulse purchase.

While the possibilities for Wireless Payments on the Mobile Internet are very attractive, until recently delivery of applications on the Mobile Internet itself has not met expectations. In early 2001, the volume of data transactions over wireless networks was still only a very small percentage of total network traffic. The fundamental reason for this is that performing data transactions over today's GSM networks is not a simple task. Many applications on WAP phones are not as easy to use, or as quick as the consumer has been led to expect.

Mass market adoption will only happen when these problems have been resolved, as the success of SMS has shown. The network connectivity and devices that are available now are ideally suited to the use of SMS, and consequently there has been an explosion in use. Growth of 500 percent or more is predicted for 2001.

There has been widespread experimentation with simple WAP applications. Over the last two years, many banks in Europe have piloted wireless banking services, for basic retail and wholesale transactions. Balance enquiry, bill payment and statements are offered to those customers who own a WAP phone – and know how to use it. Some banks offer a share dealing service. Very few have provided payment mechanisms through the phone itself, but there are some pilot schemes running in Europe. The example frequently cited is the ability to purchase drinks from vending machines using a mobile phone. Pilot schemes for parking are also running in some Nordic countries.

Security issues
Slow connections and user unfriendly devices have limited the adoption of wireless applications in general, but for wireless payment schemes in particular the more serious barrier is security. Before we see mobile financial transactions in significant numbers, security issues will have to be addressed to the satisfaction of all stakeholders. Consumer attitudes will have to be managed. In the same way that people were loath to use the Internet in its early years for financial transactions (the danger of having one's credit card number stolen was very real) so the same perceptions may inhibit wireless commerce.

But a breakthrough on security may be in sight. There are a number of industry groups, like MeT, Mobey, GMCF and Radicchio that are addressing the needs of the market for secure wireless payment systems. Ericsson has recently announced the development of a phone that is compatible with the widely praised MeT payment protocol. This proves that this initiative is making real progress, but the security and network infrastructure needs to be in place for these devices to be suitable for widespread use.

The networks
The networks, however, are improving. After a period of hype the industry will see some step changes in the second half of 2001. Although

commercial availability has been delayed by testing and the lack of handsets, GPRS networks are now physically in place across much of Europe. We believe that GPRS will provide the necessary impetus to kick-start the mass adoption of wireless e-business and Wireless Payment.

We are about enter a world of always-on connectivity, using colour, icon driven handsets that operate at speeds of up to five times faster than today's GSM networks. The fact that the roll out of third generation wireless networks may not occur until 2003 or 2004, is not seen as a significant delaying factor, for the purposes of this paper.

Portals
The deployment of portals is considerably enhancing the end user's experience of the mobile Internet. We have seen the emergence of early wireless portals such as BT's Genie and Vodafone's Vizzavi. These have been used largely to provide information either via WAP or through simple SMS alerts although with minimal added value. While these portals may help to reduce churn they are not yet revenue generating. This will inevitably be required if Service Providers and enterprises are to stay profitable.

We will see the emergence of true multi-channel portals. The end-user will want to be able to conduct financial transactions with the same quality of service from any of his devices irrespective of location. This means providing access from mobile phones, PDAs, fixed PSTN lines, automobiles and through interactive digital TV. While the majority of transactions will be through mobile networks there will also be a need to provide Wireless LAN and Bluetooth connectivity and solutions. The end-user will expect simple solutions to the security issues of authentication, authorisation, non-repudiation, integrity and synchronisation. For example, the end-user will need to be sure that he is not accidentally debited for an incomplete transaction as a result of a dropped connection.

Today, a completely open globally accepted wireless payments mechanism is some way off – but equally well it is not yet required. However, as we have seen, the wireless world is about to change and by the end of 2001 there will be a need and a demand for integrated wireless payment solutions. We expect a phased approach to the delivery of such

solutions, driven by customer demand, the value propositions created by the service providers and enterprises and the rate of development of the various technologies involved.

The rest of this paper will firstly provide a definition of wireless payments and then look at how IBM is building solutions for its customers to implement within the timescales to meet market demands.

Chapter 2

What are wireless payments?

We define wireless payments as:

A Wireless Payment is the ability to initiate and/or confirm a payment transaction from a wireless device. The payment can be either:

- An immediate transfer of value from buyer to seller in exchange for goods or service (we refer to this as the 'pre-pay' transaction)
- A promise to transfer value from buyer to seller in exchange for goods or service (we refer to this as the 'post-pay' transaction).

The components of a Wireless Payment transaction are shown below.
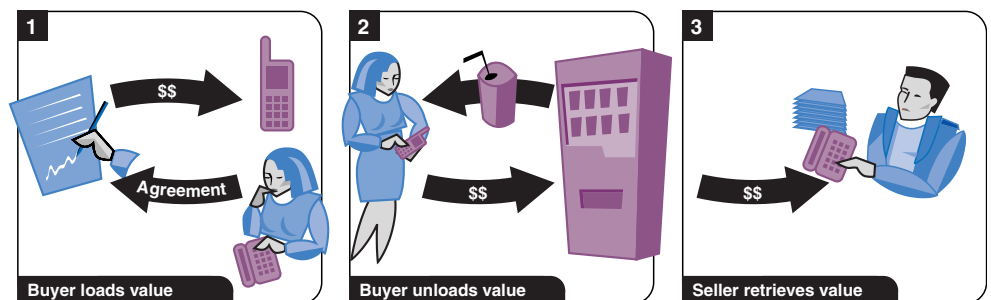
Buyer Loads Value: the Buyer enables their device (s) to transact a wireless payment, by entering into an agreement with a Financial Authority. A Mobile Phone (Cell Phone) is used in the illustration, but any device that has an embedded processing capability, such as a PDA, an Internet connected home appliance (e.g. refrigerator) or an embedded automotive system is included. Value may be e-cash, a credit/ debit agreement, an e-ticket, or a pre-loaded 'draw down' agreement. The Buyer is shown loading value at a PC terminal through an e-commerce site, but kiosks or mobile e-commerce sites are alternative methods of loading value. The buyer can also load a trusted token which may be used to sign the promise to pay for goods. This is analogous to putting a credit card in a wallet. A virtual credit card.

Buyer Unloads Value: the Buyer exchanges value, or a promise to pay, for goods or services. In a wireless environment, the possibilities are wider than just using a mobile phone to get a can of soft drink from a vending machine. Key considerations are how and where the Buyer unloads value. The 'pre-pay' and 'post-pay' methods defined above are included. A tollbooth/toll road, a point of sale device in a store, a kiosk (including an airline or hotel check in counter) and an e-commerce site (which may be accessed from a PC or a Wireless device), or another wireless device are locations where the transaction can occur. The transaction may also be with an online shopping site, where the buyer browses using a phone, then promises to pay for goods with the virtual credit card in the phone.

Seller Retrieves Value: the Seller must be able to realise the transaction value as currency in an account. This will either be directly (in the pre-pay case) or after an elapsed time, via some intermediate Billing authority in the case of a post pay agreement.

2.2 Open and Closed Payment Communities

Transacting a wireless payment can have relatively straightforward or complex logistical implications, depending on the nature of the 'payment community'. There are two main types of community, as described below.

In a Closed Community, sometimes called a Walled Garden – the Buyer, Seller and Billing Authority form a binding agreement to exchange value for goods or services only within their community. In the limit, there could only be one seller, who also acts as Billing Authority. Examples would include the EZ-Pass road toll system in New York and the Mobil's Speedpass gasoline purchase systems in the US, both of which reduce costs and improve customer convenience. The payment tokens are valid only at acceptance points owned by the community, and the acceptance points do not recognise other forms of payment.

There are hundreds of other examples, such as tokens in amusement parks and, employee vending schemes. Because they are small schemes, they have little influence on global standards. However the trends to banking consolidation – where one bank may have 100 million customers, and huge loyalty schemes, may mean that a single community initiative will have sufficient numbers to impact on the wider world.

In an Open Community, the key attribute is widespread acceptance of the payment method. Open Community schemes are very convenient for the consumer because they can trust that their payment method will be accepted everywhere. Credit cards most closely resemble this ideal. They are the result of risk sharing agreements 'intra-bank' and between the banks and merchants. They typically have a widely recognised brand, which reassures all stakeholders.

For this to happen in wireless commerce, similar agreements are required, and a way of verifying the consumer and authenticating the electronic payment device is necessary. This implies that the Buyer, Seller and Billing Authority must trust each other. Digital certificates are recognised as a secure way of engendering trust. In an open community, every potential point of sale, and every potential payment device must be able to access these trusted certificates. This requires an extensive, secure network of trusted authorities and protocols, known as Public Key Infrastructure (PKI). It has to be global and it has to be wireless. Global Wireless PKI is some way off.

However, if the merchant has an online shopping site that accepts promises to pay over the Internet, then this may be adapted to accept promises to pay from mobile devices. This scenario brings the concept of mobile payment much more immediate because the merchants do not need to make major changes to their systems, and suitable phones will soon be available.

Given that there are closed communities with a large enough population, the critical mass to set their own standard, and that open communities require large investment and complex business and trust models to support their complex infrastructure, it is likely that the most significant short and medium term wireless payment opportunity is in the walled garden.

2.3 Wireless transaction models
The use of a new generation of embedded computer devices is extending the potential of solutions for e-business. Businesses can radically reduce their costs (by allowing employees to make transactions and access information at their point of need) or to increase revenues by reaching new market sectors and increasing the ease of end user access to their e-business application.
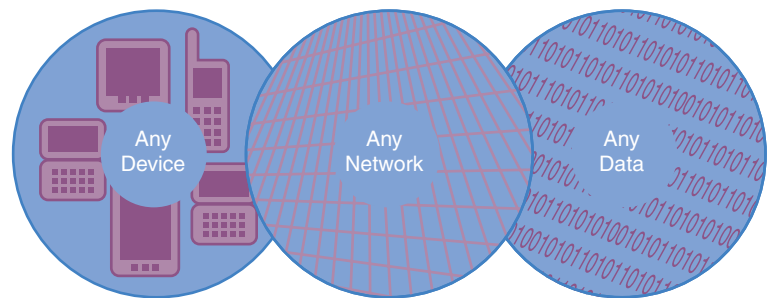
- Always on, always available
- Reduced complexity to user
- Secure, reliable, scalable

The goal is to achieve reliable, scalable and secure e-business solutions by connecting any device with any data through any network.

Since the capabilities of the devices and networks are evolving quickly – enhancing the richness and usability of applications – this adds to the complexity of the Wireless Payments challenge.

The transaction may be initiated from many different device types, which in turn have different processing and communication capabilities, as defined in Table 2-1 below.

Table 2-1: Payment device considerations

Device types	Device capability
Mobile Phone (Cell Phone)	Bluetooth enabled?
Personal Digital Assistant	IR enabled?
Two Way Pager	WAP enabled?
Embedded Automotive System	What variant? (1.1, 1.2...)
New Device Type (e.g. WebPad)	WIM present?
Set Top Box / Interactive TV	Cellular communication enabled?
Games Console	Network? (BT, Vodafone, DT, . .)
Wearable PC	Protocol? (GSM, CDMA, i-mode, 2.5G, 3G)
	Wireless LAN connected?
	Embedded Software? (EPOC, JVM, PalmOS …)
	Smart Card & Type? (SIM; Capability, Dual Slot)
	Biometric or enhanced Security?

Different communications media may be involved in making the transaction, depending on the capability of the initiating device and receiving machine. This could involve a message sent between the device and the machine using Wireless LAN, BlueTooth, or Infrared as a local (or 'peer to peer') transmission mechanism.

Alternatively, the device may use a cellular network to communicate the payment transaction via the network service provider. The characteristics of this transmission media (information transmission bandwidth, transaction security) will depend on the type and generation of network that is used. The 2.5 and 3rd generation networks will provide the 'always on' nature of a packet switched network, coupled with increased information transmission bandwidths.

Engineering a mobile payment system that will operate over all types and generations of cellular network is a complex task that IBM addresses using the product WebSphere* Everyplace Suite (WES) as the infrastructure backbone of the solution.

Table 2-2: Acceptance device considerations

Device types	Device capability
Toll booth/toll road	Bluetooth enabled?
Vendingmachine	IR enabled?
Point of Sales Device	WAP enabled?
e-commerce site	What variant? (1.1, 1.2, …)
Mobile e-commerce site	WIM present?
Kiosk	Cellular communication enabled?
Mobile phone	Network? (BT, Vodafone, DT, . .)
	Protocol? (GSM, CDMA, i-mode, 2.5G, 3G)
	Embedded software variant & capability
	LAN connected?
	Another device?

There are many transaction types that must also be considered part of the Wireless Payments, as defined in the Table 2-3.

Table 2-3: Transaction types

Transaction type	Examples
Goods	Vending machine purchases, fuel purchase, items of shopping at a retail outlet
Services	Parking fees, road or bridge tolls
Banking	Bill payment, movement of funds between accounts, share trading
Ticketing	Travel Tickets; Cinema, concert or sporting events
Others	loyalty card

So there are many different transaction types, and devices, and payment models which need to be considered for the Wireless Payment system. The next section will discuss the main players who are wrestling with these challenges, and in some cases, each other.

Chapter 3

Who are the main players in Wireless Commerce?

There are three main groups of actors on the wireless commerce stage. Network Service Providers, Financial Institutions and Retailers (or Merchants). The differing requirements of these groups leads to a natural tension, but for wireless commerce to become a reality, they have to work with each other. There is a large supporting cast who are set to benefit from wireless commerce. ISPs, Web hosting firms, smart card suppliers and the device manufacturers all have an important role to play, but it is the Network Service Providers and Financial Institutions and Retailers who must take the lead.

Network Service Providers

This segment comprises the network operators. Vodafone, France Telecom, Telecom Italia, Sprint, Telstra are all examples. These groups have a number of positive features that could support a move into the wireless payments space.

- They own the networks.
- They have the means to identify who is using their network.
- They have the billing systems to charge consumers for their services.
- They own the relationship with the mobile phone user.

As voice services become a commodity, Network Service Providers are examining ways in which their revenue can be protected and increased. Value added offerings like location based services and payments are two of the potential growth areas.

Network Service Providers therefore have the technology to support a payment system, and the business imperative to fuel such an initiative, but they are less strong in several areas.

- They do not have Regulatory Approval. Organisations must be approved by payment regulators in order to process payments. A Network Service Provider must pass a series of regulatory tests – in practice become a Bank – in order to support payments. In Europe, however this situation may change by April 2002, as a result of the European Parliament and Council Directive 2000/46/EC

(of September 2000) which requires EU Member States to adopt national laws facilitating 'electronic money institutions' (EMI). The 'waiver' provisions of this Directive could result in certain mobile operators and others being authorised to engage in limited management of electronic bank accounts for their customers and to make payments in electronic money, even though they might not meet the main requirement under the Directive (i.e. that normally only authorised credit institutions should be permitted to act as EMI).

- They do not have a trusted brand for Banking Services.
  The Telecommunications market is volatile, and fortunes of its participants vary. Network Service Providers face an uphill struggle in convincing consumers that they are as solid as banks.

- They have little experience of Financial Risk Management.
  Although there is a risk there will be delinquent mobile phone users, the real risk to the Network Service Providers is low because the credit agreement is actually with the shop where the contract was signed. And what has been lost? Air time that would otherwise have been unused. In moving into payment for goods, Network Service Providers are entering a riskier business, where the expertise lies with banks and retailers.

Network Service Providers are an essential player in any wireless payment solution. They are unlikely to be the only player unless they gain regulatory approval, (and to date none have applied), or avoid the regulations by operating in a closed system, a 'walled garden'. There have been a number of industry rumours implying that several major Network Service Providers were doing just that, but in order for open wireless commerce to become a reality, they need regulatory diligence, a trusted brand and a means of managing the increased risks – attributes more commonly associated with Financial Institutions.

Financial Institutions

This segment includes traditional retail banks, and those new entrants which are providing retail banking services – Virgin and Tesco for example. It also includes Card Issuers – VISA and Mastercard. Almost all Card Issuers are Banks, who offer their customers a branded card like VISA or Mastercard. The vast majority of storecards are managed on behalf of retailers by Credit Companies like GE Capital and HFC, so they too are included in this segment.

On the face of it, the challenges facing traditional retail financial service providers make their market a hard place to do business. Their customers have become increasingly disloyal in the deregulated age and they use the services out of necessity not choice. The margins are dropping but the cost base is rising, and competition from an aggressive newcomer is an everyday fact of life rather than an unusual diversion.

The Banking Industry response to these conditions is to offer what they term 'relationship management' services. They offer a large variety of financial products, and make them available via a wide range of channels, including Digital TV and mobile phones. They understand that the more products they sell to their customers, the less the customers are likely to look elsewhere. The number of products purchased is an excellent indicator of the health of a relationship with the client. This is why it is standard practice to shower new customers with debit cards, credit cards, chequebooks, and a welcome pack of attractive offers.

So, why would a bank be interested in providing a Wireless Payment solution? The answer is twofold.

- Wireless Payment is an opportunity for banks to strengthen the customer relationship by offering every payment channel demanded by the client. To provide total relationship management, they must offer a complete portfolio.
- They stake their claim to a new payment channel. It is desirable to process as much of the payment as possible. If they do nothing, their role will be reduced to a single bulk transaction once a month to pay the payment systems provider. This may sound like a standard credit card payment, but most consumers have a credit card from their own bank. This means the bank still earns merchant fees, benefiting at the corporate level, while the retail bank processes the bulk payment each month. If the bank does not provide a wireless payment facility, then the consumer's merchant fees go to the competition.

How well placed are banks to provide wireless payments systems?
Banks understand risk management, and they have the regulatory approval to take care of customers' money. They also have a trusted brand and this is a major asset in lowering the consumer's perception of financial risk in a new product area.

But they do not own, nor do they have a desire to own, the network, or the devices from which customers will initiate Wireless Payment. Contrast this with traditional banking channels such as a branch, where the bank is the consumer's first touchpoint or an ATM, where the devices belong to the Bank.

In the wireless world, the first logo the customer sees is the device manufacturer, followed by that of the network operators, and then the brand of their wireless ISP. This makes it difficult to highlight the bank's brand.

Banks are also limited in their ability to support billing of large volumes of small transactions. This is strength of the Network Service Providers.

Whilst it is an oversimplification to suggest that Banks need the Network Service Providers' networks and billing, just as much as the Network Service Providers need the Banks' brand and regulatory approval, there is an opportunity to negotiate a balanced alliance, if both parties leave their natural suspicions outside of the debate.

There is also another key segment to consider –- the Retailers.

The Retailers
Banks and Network Service Providers understand the value of customer retention. They learnt this from Retail Sector, which, ever since the first 'Christmas Club' loyalty scheme, has been applying the lessons of customer relationship management with varying degrees of success.

The retail sector includes any merchant who provides goods and service to the consumer market place. It includes major retail chains, shopping mall management, and online 'e-tailers' such as Amazon, e-Bay and any of the other tens of thousands of merchants who conduct business on the Internet.

The growth of storecard and loyalty schemes indicates the Retailers' desire to own as much of the customer's transaction as possible.

Why is wireless payment of value to Retailers?
Wireless payment is attractive to retailers because it makes the customer transaction convenient, quicker, and location independent, encouraging

impulse payments. It can also be made more secure than credit/debit card payment because of the stronger cardholder verification (using PIN to open the device and authentication of the payment mechanism and using PIN to enable the transaction).

The combination of impulse buy and pre-payment has great applicability to the youth market, where the buyers are too young for credit cards and spend less time rationalising payment decisions.

Both the customer and retailer can profit from these benefits in a number of related ways.

- Less time is spent queuing, and the retailer benefits because there is greater throughput of customers – as customers aren't wasting time.
- It also extends the reach of the merchant beyond the physical confines of the shop, and standard opening hours. For example, if I see an advertisement and am reminded to buy some goods, why should I visit the shop? As a retailer, I want to target special offers at particular customer sub-segments, and I can do this very effectively via a mobile device. If I am also able to accept payment at the moment of 'prompting', I increase my chances of inducing the customer to buy, because I am making it easier to do so.
- It allows the retailer to know where and when a customer wants to buy – invaluable information with which to plan special targeted offers and service improvements.
- In the shop itself wireless payment helps reduce the amount of IT furniture surrounding the Point of Sale.
- Increased security reduces the risk to the Merchant of processing a fraudulent transaction.
- Vendors who use remote Point of Sales and kiosks – (such as fuel stations, parking meters, online entertainment, travel tickets, vending machines) benefit because there is no cash in the machine, and consumers do not need loose change in order to buy the service.

Elsewhere in this White Paper we have defined the various methods of wireless payments. Network Service Providers, as providers of the network, and Banks, as underwriters of the transaction, are essential members of the cast, but it is in the Retail sector, where most of the

acceptance devices for current payment methods reside. This is where the impact of wireless payment will be felt most keenly.

Retailers are used to bearing the brunt of technological change. When smart cards were first introduced to Europe for payments, it was the Retailers who had to re-equip the Point of Sale (POS) equipment with secure hardware in order to accept the new cards. Europay, Mastercard and VISA (EMV) have been negotiating smart card payment standards for nearly 10 years, and it is only recently that the Retail sector has begun to upgrade its systems to EMV standards. Given that it has taken so long to agree the payment standards, it is unlikely that new wireless payments systems will be accepted unless they conform to the same standards.

None of the mobile phones in use today conform to EMV standards for card authentication, which can require powerful processing capability. If the concept of carrying your credit card in your phone, which can then be used via Bluetooth or IR, to transact with a POS device is to be adopted widely, then, either the mobile phone has to be upgraded, or the standards have to be modified. It is probably easier to change the technology than change a standard, so open payment via EMV in your phone is unlikely in the near future. It may also require a limited wireless PKI, which as discussed in section 2.2 is unlikely in the near future.

Online retailers are well placed to accept mobile payments because they do not need to modify POS equipment. If they accept virtual credit card payments via secure sessions today, then by modifying the payment software to accept payments from wireless devices, they can accept payment from hand held devices in the near future. At CeBIT fair 2001, Nokia and Ericsson demonstrated this on their phones, and IBM showed it on its WorkPad PDA.

The closed community approach, therefore, could have appeal to retailers, who can begin to realise some of the benefits of wireless payments, without waiting for new devices or standards. Shopping malls have great potential as 'walled garden' payment areas. As a tactical move, mall owners could consider a scheme whereby regular shoppers can collect their wireless payment devices at the entrance in the same way as supermarket scanners are collected today. The difference is

that once the customer returns the scanner to its holster, they can pay 'through the air' as they leave the store, avoiding the check out queues.

Each of the key players has a differing set of requirements that can work to the others' mutual advantage if they choose to cooperate. What they all share is the need to act quickly for competitive advantage. In the next section we examine the components that can be combined to provide wireless payment solutions to each of the key segments.

Chapter 4 Wireless Payments solutions components

Solutions for Retail, Finance and Network Service Providers
We will focus on solutions for three of the value chain participants: Merchants, Financial Institutions, and Service Providers. Consumers are key to all of them, but typically are not the implementers of these solutions. In each case, IBM WebSphere Everyplace Suite, and optionally IBM WebSphere Portal Server are key solution components. IBM WebSphere Commerce Suite is targeted at Merchants, but includes software that is targeted to both Financial Institutions and Service Providers.

We use the terms 'Retailers' and 'Merchants' Interchangeably. There is a glossary at the end of the section.

Below is a diagram that depicts which Mobile Payment solution components would be provided to each Value Chain Participant. Core solution elements are highlighted, and the other solution elements are optional.
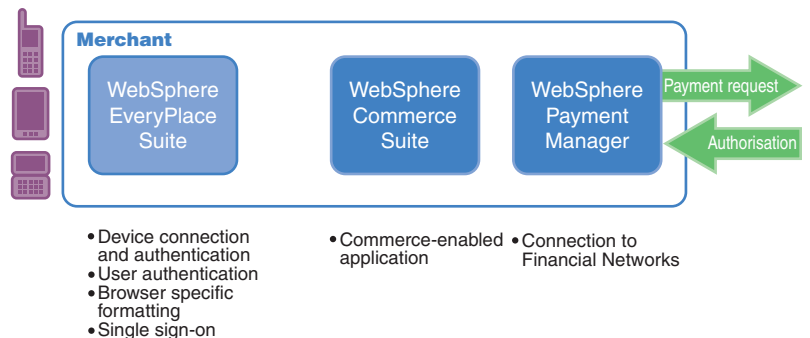
Wireless Payments solutions summary
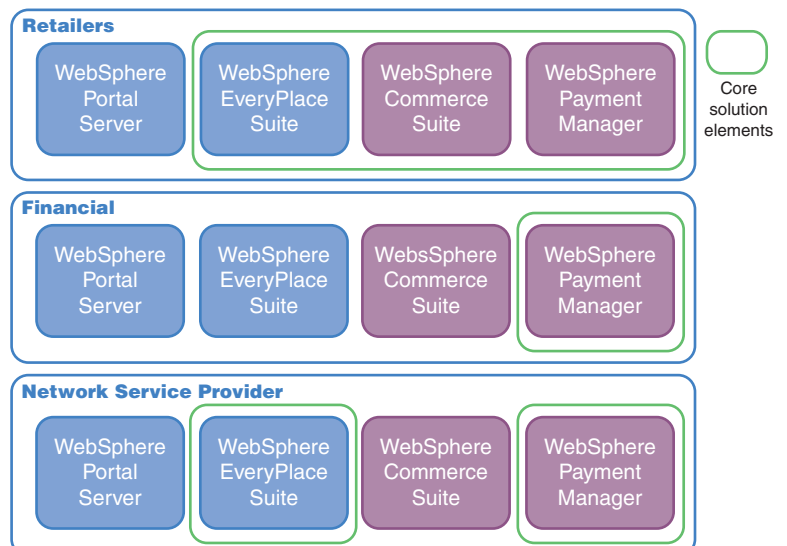
Retailers

IBM's core payment offering for Merchants is WebSphere Commerce Suite (WCS), typically coupled with WebSphere Payment Manager. In its most basic form, WCS enables merchants to create websites that allow consumers to purchase goods and services with a variety of payment channels. WebSphere Payment Manager is responsible for making the payment channel connections to various and multiple Financial Institutions.

These commerce-capable websites can be easily extended to wireless devices by using WebSphere Everyplace Suite (WES), which provides necessary user and device authentication, network, and device support. Adding WebSphere Portal Server (WPS) enables multiple applications, including those built around WebSphere Commerce Suite (WCS), to be incorporated into a multi-device portal interface that supports personalisation.

Merchant mobile payments

Merchant

| WebSphere EveryPlace Suite | WebSphere Commerce Suite | WebSphere Payment Manager |

Payment request

Authorisation

- Device connection and authentication
- User authentication
- Browser specific formatting
- Single sign-on

- Commerce-enabled application

- Connection to Financial Networks

To extend WebSphere Commerce Suite applications to wireless phones, WCS apps can be recreated in WML for WAP phones, and in HDML for phones using the OpenWave browser. Alternatively, WebSphere Transcoding Publisher can be used to convert the existing WCS application into the appropriate markup language. In the WML case, IBM would use the WAP gateway included in WebSphere Everyplace Suite, and in the HDML case, the OpenWave HDML gateway is required. In either case, the gateway can reside at the Merchant site, or at the Service Provider site.

WebSphere Transcoding Publisher can be used to convert into additional markup languages to support delivery of applications to

additional devices, including PDAs using Palm, Epoch, and PocketPC operating systems and associated browsers.

WebSphere EveryPlace Suite provides the capability to support multiple gateways with a single authentication mechanism, thereby allowing devices requiring different gateway products to authenticate through a single mechanism. Simply put, WebSphere Everyplace Suite offers a single-sign-on capability, across multiple applications, and across multiple devices.

The Merchant can also choose to implement WebSphere Portal Server, and deliver many different applications to wireless devices in addition to those created with WebSphere Commerce Suite.

Retail payments portal scenario
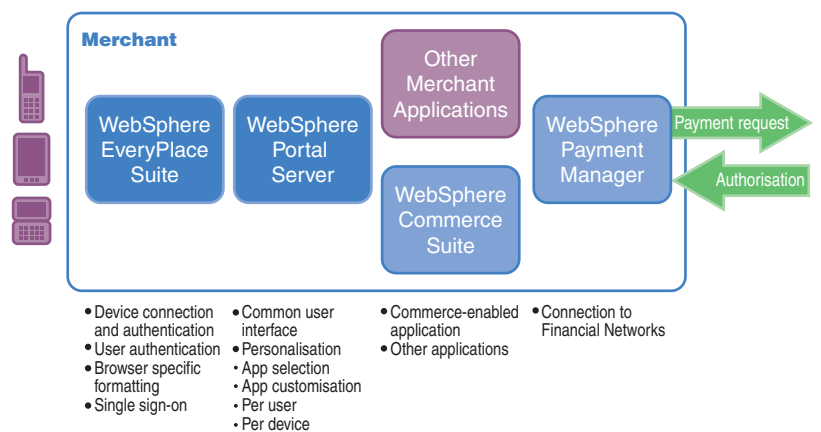
This solution will allow the consumer to access a variety of Merchant-supplied applications on the device of the consumers' choice. If the Merchant wishes, the consumer can also personalise each application.

Financial Institutions

IBM's core payment offering for Financial Institutions is WebSphere Payment Manager. It connects to a payment gateway and allows the Financial Institution to receive payment transactions from merchants using WebSphere Commerce Suite. WebSphere Payment Manager can be used at the Financial Institution to redirect payment transactions to other Financial Institutions.

Financial Institution mobile payments
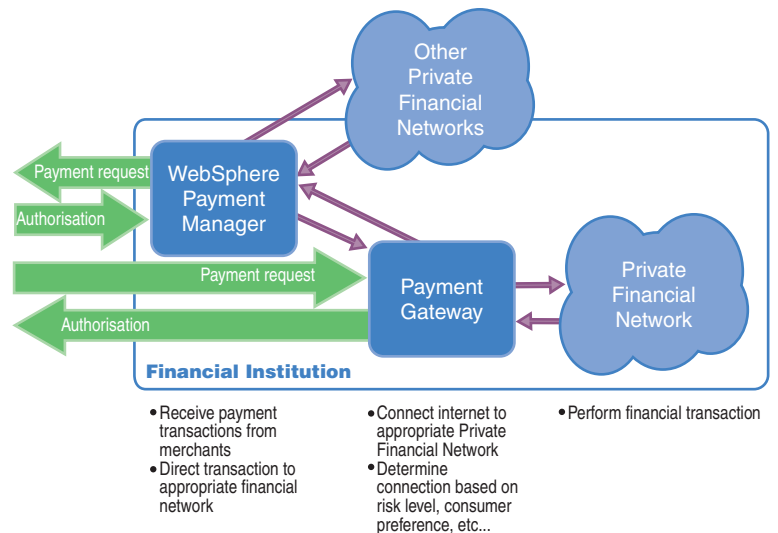
As in the Merchant discussion, Financial Institutions could use WCS to enable consumers to purchase goods and services offered by the Financial Institution. The Financial Institution could use WebSphere Everyplace Suite, and optionally WebSphere Portal Server to enable consumer-banking applications to be made available on a variety of wireless devices.
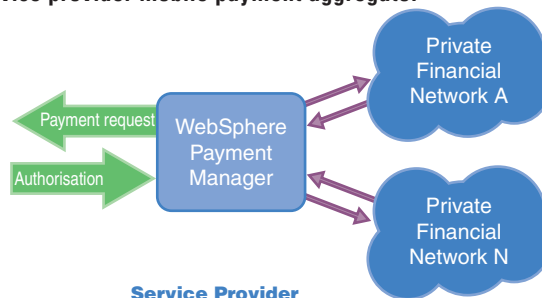
Service Providers

Service Providers are typically interested in one of three areas involving payment:

Providing payment services to enterprises

WebSphere Payment Manager can be used to receive payment requests from a variety of sources and redirect them to an appropriate payment gateway. WebSphere Payment Manager can be installed separately from WebSphere Commerce Suite, allowing a service provider to act as a 'payment aggregator' for multiple WCS installations.

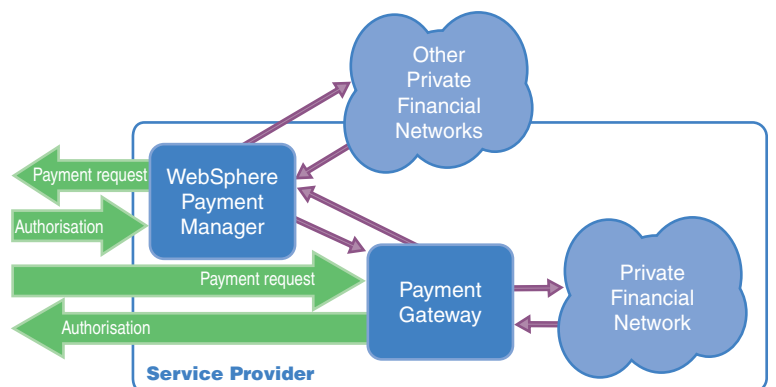**Service provider mobile payment aggregator**

Service Provider

- Receive payment transactions from merchants
- Direct transaction to appropriate financial network
- Determine connection based on risk level, consumer preference, etc...
- Perform financial transaction

Providing an alternative payment channel

Through a custom services engagement, WebSphere Payment Manager can be configured to drive an existing billing system, such as that operated by a Service Provider. For example, this would allow a telecommunications service provider to bill a consumer for transactions involving goods and services to a monthly phone bill. WebSphere Payment Manager can be configured to drive multiple payment channels, switching between them according to a set of criteria, including consumer risk assessment, transaction value, and others. This would allow the Service Provider to direct billing to different billing channels based on factors of the Service Providers' choice.

Service provider alternative mobile payment channel
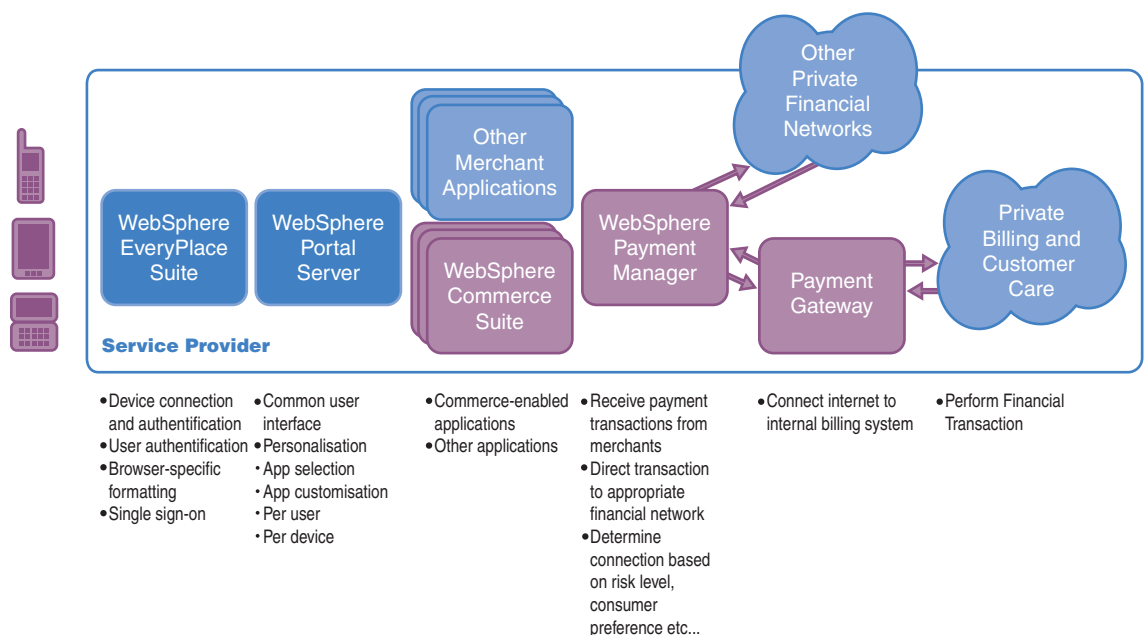

Service Provider

- Receive payment transactions from merchants
- Direct transaction to appropriate financial network
- Determine connection based on risk level, consumer preference, etc...
- Connect internet to internal Billing System
- Perform Financial Transaction

Offering payment services as part of an overall suite of application services
A potential business model for service providers would have them host large numbers of WebSphere Commerce Suite applications on behalf of many merchants, providing mobile access to these applications and others via WebSphere Everyplace Suite and WebSphere Portal Server, and providing a payment channel which drives the billing system of the Service Provider as well as more traditional payment channels.

Service provider mobile payment portal

Service Providers can deliver WCS applications, along with any other applications, through this portal model, providing a single point of access and authentication for all applications, along with the ability to personalise those applications. This can be accomplished with WebSphere Portal and WebSphere Everyplace Suite.

IBM has a comprehensive platform which meets the needs of the key segments. We also work with a number of business partners who provide niche payment applications based on the WebSphere product suite.

In the next section we explain how IBM's approach balances two apparently conflicting needs – to act quickly, yet provide a reliable solution that will last beyond the short term.

Chapter 5 Delivering Wireless Payment solutions

The Engagement Model

IBM has developed the Engagement Model from many years experience gained in delivering projects using new technology. It is our standard way of delivering Wireless e-business projects, used throughout the corporation in all geographies. The Engagement Model is designed to deliver quantifiable business benefit to our customers with manageable delivery & technology risk. The Engagement Model, which is shown in Figure 4-1 below and will be outlined in this section - will be our standard way of delivering Wireless Payments Projects.
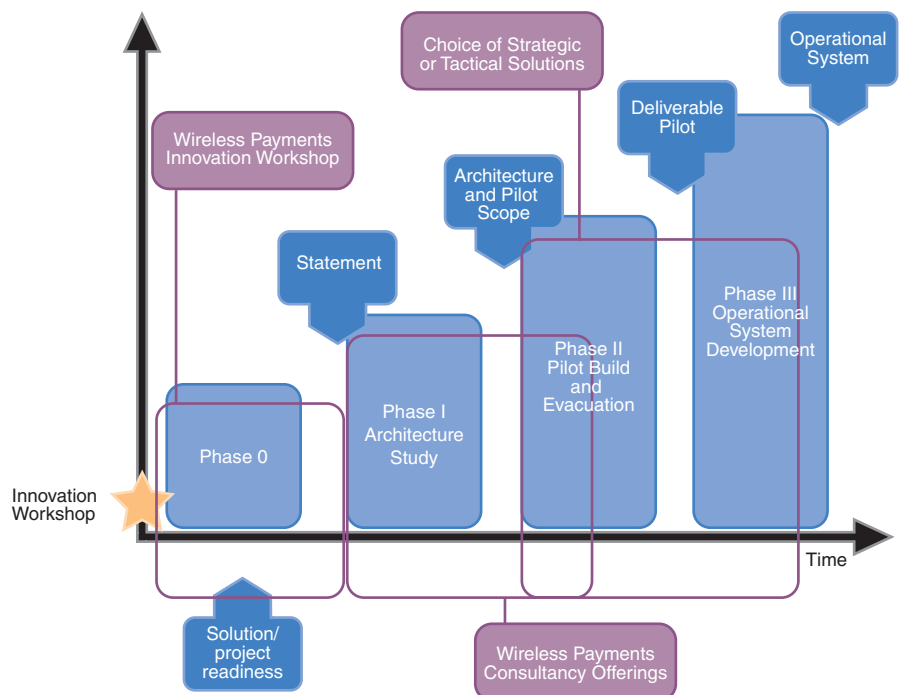
Our standard Engagement Model is augmented to deliver the Tactical or Strategic Solution

We begin at Phase 0 by offering either an Innovation Workshop or a Solution/Project Readiness Workshop, which allow us to scope the business problem/challenge we jointly need to address and start working on the solution architecture, at a high level. We also start to quantify business benefit at this stage. We choose between these two modules as follows:

The Innovation Workshop is for customers who, for example, come to us saying "this Wireless Payments technology looks really interesting, I would like to use it to improve my customer retention, but I'm not sure how".

The Innovation Workshop is a two day facilitated workshop, where teams from IBM and the customer come together to work out which business challenge should be addressed using Wireless e-business, how we are going to do this, and what quantifiable business benefit will result.

The customer provides a team which understands their business challenge and their technical infrastructure. We provide a team which understands the technology and how this has added benefit in other customer situations, ideally in parallel industries.

In the first part of the workshop we create as many ideas as possible about how the technology can be used to improve our customers business. We then agree assessment criteria for idea prioritisation. Using these criteria, we 'down select' the many initial ideas into a few (two or three are ideal) that best meet the criteria.

We then document the selected ideas as the output from the Innovation Workshop. These would then form the input to the Solution/Project Readiness Workshop.

The Solution/ Project Readiness Workshop is used if the problem space is relatively well defined. They may be asking us, "We have an existing Internet ticketing application and want to extend this to include Wireless Ticketing from a WAP phone and a Palm Pilot".

Again, we adopt a facilitated workshop approach to explore in more detail their business challenge and consider alternate solution

approaches. Based on an objective analysis of the pros and cons of each alternative approach, we will select the best solution for our customer.

We exit the workshop with a clear, documented and agreed understanding of the business problem to be solved, the top-level architecture to be adopted and the outline business benefit to be achieved. We call this the "Problem/Solution Statement," which in turn forms the input to the Architecture Study phase.

If both IBM and the customer are in full agreement, we can begin to design the Solution Architecture and agree on the scope of a pilot project via a series of interactive workshops. During this phase, we also refine the business benefit.

In the next stage, we build a pilot system, with the aim of proving that the expected business benefit can be achieved. We build and evaluate the pilot, all the time documenting the lessons learnt and refining our understanding of the customer's requirement.

Following on from a successful pilot build and evaluation, we would then plan and build the operational system for our customer using classical software & systems engineering methodologies.

Finally, at IBM we hope that we have an appealing proposition for all our key segments areas, and these are summarised below.

Segment	Why IBM?
Network Service Providers	Our payments solutions are based on the same platform that is used by many leading Network Service Providers to support wireless devices. It is massively scalable, and allows personalisation and content handling. Wireless payment can be added to the platform as another service.
Finance Institutions	We have more experience and skills than any other provider to the finance space, backed up with alliances with leading device suppliers. We have mobilised over 30 European banks, and understand how to deliver solutions that retain the client's relationship with the Bank, in an open network.
Retailers	IBM is the leading supplier of e-commerce solutions to the retail sector. We understand how to mobilise these solutions, and we understand the needs of the other players in wireless e-commerce. We have start up solutions with which Retailers can pilot wireless solutions.

Conclusion

Wireless Payment is a complex solution that requires the integration of a number of industry players. Like any growth area there are many ingenious technologies offered by a range of innovators. There are many industry standards groups, each of which have a slightly different take on the needs of the market. It is not clear which of the approaches will win, or indeed if there will be a single winner.

At the same time there are compelling business reasons for each segment to initiate a wireless payment project – but where do they start?

IBM's answer to the needs of the mobile e-business sector provides the ability to react quickly, while thinking ahead. The Engagement Model allows rapid deployment (typically three months) of a pilot solution, while at the same time helping to plan for the full scale deployment of the Wireless Payment solution. This approach achieves an early win for our clients, which is often an important benefit when embarking on complex projects in a new area. This process is called the Engagement Model. It is being used to great effect in thousands of project across the world, and it is available for the Wireless Payment segment.

This white paper has presented a detailed overview of wireless payments. However it is a very broad and complex topic and we would be happy to discuss any aspect in more detail. Please contact your local IBM representative.

Glossary

3G
Third generation. The generation of wireless technology. Multimedia 3G networks transmit wireless data up to 2 megabits per second, making the integration of voice, data and video possible.

Bluetooth
Technology specification created for short-range (up to 10 metres) wireless connection using low-cost transceiver chips to be embedded in mobile PC's, smart phones and other portable devices. Provides three voice and data channels via one-to-one connection with built-in encryption and verification.

CDMA
Code Division Multiple Access. An efficient network technique which transmits simultaneous signals over a shared portion of the spectrum. CDMA phones are noted for their excellent call quality and long battery life.

EPOC
An operating system used in a variety of mobile phone devices.

Gateway
A combination of hardware and software that enables two different types of networks to be linked.

GPRS
General Packet Radio Service. GPRS permits faster Internet access and continuous connectivity.

GPS
Global Positioning System. A constellation of satellites communicating with GPS devices in planes, ships, automobiles and handheld devices to provide instantaneous latitude, longitude, altitude, time and bearing information 24 hours per day.

GSM

Global System for Mobile Communication. Digital cellular or PCS standard used throughout the world, and the primary standard in Europe and south east Asia.

HDML

Handheld Device Markup Language. A specialized version of HTML designed to enable wireless pagers, cellphones and other handheld devices to obtain information from Web pages

iDTV

Interactive Television. The convergence of digital television and internet capabilities, such as home shopping.

Java

A high-level programming language that works on virtually any computer.

JVM

Java Virtual Machine. An operating environment for Java Programs.

Location-based Services

Also known as I-commerce - indicates the ability to get information relative to a specific locale, such as locations of ATMs, restaurants and other businesses, weather, or driving directions from a mobile device.

Microbrowser

A web browser designed for small display screens on smart phones and other hand-held wireless devices.

Mobile e-business

This is about extending existing e-business through the use of mobile devices to derive added value and ultimately shareholder return on investment. Sometimes described as m-commerce, pervasive computing (PvC) or wireless.

Palm-OS

The operating system used in Palm Pilot and IBM WorkPad devices

PCS
Personal Communication System. Digital wireless communication systems based on the same principles as cellular systems, but usually operating in a different frequency range and with smaller cell sizes than cellular systems.

PDA
Personal Digital Assistant. A small, hand-held device that offers functions such as address book, calendar and e-mail - an electronic organiser.

PocketPC
A hand-held Windows-based computer that runs the PocketPC operating system (formerly Windows CE).

SIM
Subscriber Identity Module. A smart card inserted into GSM phones that contains the user's telephone account information.

Smart Phone
A smart phone enables connection to the Internet so users can access e-mail, faxes, voicemail, web pages and other files.

SMS
Short Message Service. Electronic messages on a wireless network, such as those used in two-way paging.

UMTS
Universal Mobile Telecommunications System. The major standard for 3G Networks.

WAP
Wireless Application Protocol. The open industry standard for mobile Internet access.

WIM
Wireless Identity Module. A Smartcard in a phone which is used to authenticate the user to the application that is based on the server.

Wireless LAN
Local Area Networks using radio transmission to allow wireless access up to about 100 metre distance, through walls.

WML
Wireless Markup Language. An XML language used to specify content and user interface for WAP devices.

XML
eXtensible Markup Language. This markup language, a streamlined version of SGML, is regulated by WC3 (the World Wide Web Consortium). XML can create more advanced links than HTML.