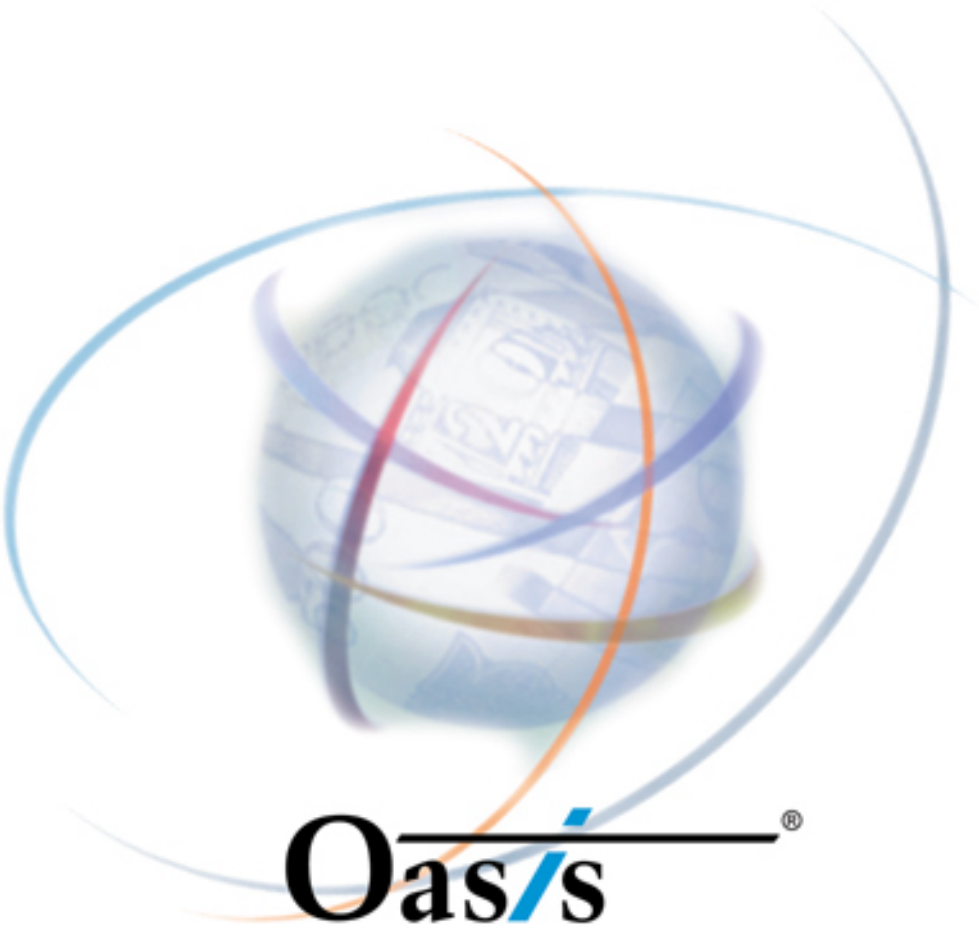
White Paper

Mobile Banking: No Wires, No Worries, New Customers



Oasis Technology Ltd. produced this publication.

Comments are welcome and should be sent to:
Oasis Technology Ltd.
100 Sheppard Avenue East
Suite 1200
Toronto, Ontario
M2N 6N5
Canada

Overview

Your banking customers are on the move. You've provided them with convenient, round-the-clock access to essential banking transactions and services, but can you keep up with the mobile, global revolution that is changing consumer behaviour around the world? Mobile communications devices with fully-enabled Internet browsers – mobile phones, PDAs, and pagers – are revolutionizing the way ePayments and financial transactions are performed over wireless networks and the Internet. The challenge? To win further loyalty from your banking customers, you need to extend your full range of services across a wide range of mobile, wireless devices without impacting your current infrastructure and the delivery channels it currently supports. Wireless networks, mobile gateways, WAP (Wireless Application Protocol), and WML (Wireless Markup Language) all play an important role in bringing your mobile banking strategy to market. But there's good news: if you have an Internet banking solution already in place, you can make the mobile leap quickly, and with minimal impact to your business.

Introduction

In addition to established traditional channels, including branch banking and ATM banking, most major banks in today's market now offer Internet banking as an extension to their existing array of services and conveniences. It's a convenience that continues to grow in popularity as consumers and businesses become increasingly "wired" in their pursuit of integrated financial services management. No Internet trend moves at a real-world pace. This is certainly true of Internet banking, which has evolved beyond the "early adopter" stage and is now in a stage of accelerated growth marked by mainstream consumer acceptance, growing transactional capabilities and one-stop, personalized financial services management.

For wired consumers and businesses, the next phase in this evolution is wireless – mobile banking that is available anytime-anywhere from "always-on" mobile devices like mobile phones and Personal Digital Assistants (PDAs). With the proliferation and cost-effectiveness of the mobile delivery channel, banks have a built-in delivery mechanism that can offer services and 24 x 7 access regardless of where the customer happens to be. Unlike PC-based Internet banking, mobile banking provides banks with the unprecedented opportunity to reach their customers in an unrestricted environment. The big benefit for banks? Higher customer satisfaction and loyalty, more transaction-based fee revenue, lower cost of ownership, and an integrated customer relationship management channel.

Mobile Internet versus Internet

Mobile banking is, of course, still dependent on the Internet as a delivery network. That said, there are some critical differences between Internet and mobile banking services. The most notable of these is the Internet user experience via the mobile interface versus the Internet experience via standard devices like PCs and laptops. As mobile devices are limited to a tiny percentage of screen real estate, customers will place less emphasis on surfing/browsing and

become transaction-focused customers responding to "push" messages that reflect proximity as well as buying patterns. Pull-based consumer interactions, such as those conducted via fixed-network devices like PCs, will ultimately decline in usage as push messaging becomes even more sophisticated.

Short transmissions of key data – whether an important stock quote, an announcement of the latest Harry Potter novel hitting the shelves or a notice informing the consumer that The Rolling Stones are due to arrive at a local concert venue – are ideal for the mobile browsing experience. From the point of notification to user action, the smaller the "click" quotient the better. Indeed, "one-click" purchase processes are now commonplace through established e-tailers using mobile phones as their latest customer sales channel.

Industry drivers like Nokia are emerging not only as providers of wireless devices and networks, but as barometers of consumer behavior. A recent survey indicated that consumers' most frequently performed transactions include personal financial management services, messaging/e-mail and portfolio management, or local, contextually appropriate services such as urban navigation, restaurant guides and weather forecasting. As many of these "on-demand" services will be driven by customer mobility, many customers will come to regard this information as essential – a natural information and services resource that accelerates their decision-making process.

The consensus is that consumers will be willing to pay for these extended services. Ultimately, financial institutions that offer these services to augment their core transaction set will be the winners, with larger revenue streams and loyal, returning customers.

Mobile Customers, Mobile Choice

Within the mobile delivery channel, consumers and businesses will not be constrained by a single device choice, either. Generally, no universal mobile device will emerge as the "single device" that will meet every customer's needs. While mobile phones are the most ubiquitous of these, industry attention will focus more on mapping application requirements to the right mobile access device. For example, short messages and simple transactions will likely dominate on WAP-enabled phones, while data collection will likely center around more functional Palm-type devices. Delivery and dispatching will continue to evolve as a form of industrial or "ruggedized" handheld customized for specific business applications. Unsurprisingly, mobile choice is also driven by user preference.

According to Meta Group, by 2003 integrated billing and presentment will be viable for both B2C and B2B environments, integrating electronic commerce, personalization, and CRM solutions across touch points. Internet portals and retail financial e-providers will offer aggregated financial services (identity/wallet management, personal finance management, multi-instrument marketing, payment, etc.), with consolidated models promoting biller brands ultimate winner.

Consequently, mobile computing will alter the way CRM is utilized in organizations and extend it to a much wider audience. More affordable devices mean a greater range of options for a wider community of users (those who could not previously afford access). The data collected from larger, economically diverse audiences will be direct marketing gold to financial institutions that have a reliable CRM infrastructure already in place. With a greater range of data available – and

more of it – financial institutions will also need to consider altering or redesigning CRM applications to support the exponential increase in available information from their entire multi-channel delivery system.

How Financial Institutions Should Prepare

A financial institution's IT organization should begin to put the pieces in place for a multi-channel architecture in anticipation of the evolution and rollout of mobile computing technologies. They need to specify a common platform(s) for all delivery channels that include hardware operating system and synchronization capabilities and, equally important, a common set of security standards that will provide clear guidance in determining what types of applications can be deployed reasonably, prudently and quickly. The mobile delivery channel will not be the last that financial institutions will need to accommodate to drive future growth. A forward-looking multi-channel strategy will help to provide the flexibility and agility required to incorporate the delivery channels of tomorrow.

Market Opportunity

According to Prudential Volpe Technology Group, the financial services market consists of over USD 30 trillion in assets. With this much market at stake, it's no surprise that online penetration has broken in a big way. The huge rise in Internet brokerage in the e-financial services market, as well as the increasing presence of online banking, bill payments, and real-time online investment advice, signals the arrival of the next phase of financial services management. The new breed of solutions – financial portals and services exchanges – represent a huge opportunity for legacy-driven institutions hoping to make inroads into the exploding financial services market.

According to Merrill Lynch, by 2002 there will more than 1 billion mobile subscribers worldwide. Leading Asian and European markets currently have mobile penetration rates exceeding 50%, compared to just 31% in the U.S. and 22% in Canada. Customers with mobile web connections will comprise the fastest-growing group of mobile users. The Yankee Group estimates that there will be a global total of 200 million web-enabled smart phones by 2005, which accounts for approximately 20% of the mobile subscriber base. Echoing this trend, Nokia estimates that by the year 2002 mobile phones will eclipse PCs as the Internet device of choice. As the pace of growth continues, the drive to build enhanced mobile devices to support a wider array of applications will be unprecedented.

Security and Consumer Decision Making

The role of the consumer cannot be underestimated in determining the market opportunity for mobile banking. Security continues to be the biggest barrier to exchanging financial and personal data over the Internet. Coupled with mobile device investment and the ongoing mastery of new models for managing money in the mobile world, this gives some consumers pause before making the leap. Financial service providers have an enormous opportunity to address consumer hesitations by creating "sticky" online portals and one-stop financial management centres that include personalization and one-to-one marketing opportunities. Even dynamic customer recognition can go a long way to appeasing the anonymity that some users face in the online financial management world.

For global financial institutions, seizing the market opportunity depends on a number of factors. Incorporating the mobile delivery channel into an integrated channel delivery strategy is essential for success, but given the legacy technology investments facing most established global financial institutions, this can often be a costly integration proposition. Once a flexible channel architecture is in place, supported by an open-platform technology philosophy, financial institutions will also reap the benefits of an enhanced CRM solution that will help to further solidify customer relationships by offering the right products and solutions at the right time.

The improved availability of consumer data will also help to speed transaction processing cycles and automate the more time-consuming customer interactions, including form completion and other cumbersome application processes that would otherwise be a deterrent for the mobile consumer. Extending the banking services infrastructure into the e-financing domain will also help to keep customers satisfied with a consistently up-to-date range of financial management services.

The ePayment Proposition

All in all, traditional financial management will be transformed in the banking industry, and ePayment software and application providers will be a driving force in bringing the market to fruition. Many recent financial management trends, including bill payment and presentment, pose enormous opportunities for the ePayment technology enablers that can help e-finance providers and more traditional financial institutions get a first-mover advantage in bringing bill payments to mobile banking customers. With the adoption of EBPP, mobile banking providers will again create the added value that will keep their mobile banking solution sticky.

With the growing volumes of B2B and B2C eCommerce, pegged to hit USD 1.3 trillion by 2003 (IDC), there will also be tremendous opportunities for both issuing and acquiring banks to support mCommerce growth. For acquiring institutions, open ePayment technology will play a key role in sustaining the predicted increases in mCommerce growth worldwide. Issuing institutions, on the other hand, can offer convenient virtual card issuing solutions that some see as a future de facto payment standard in eCommerce and mCommerce transactions by alleviating security concerns in both the B2C and B2B space.

These mCommerce payment facilities can also be easily integrated into e-finance and banking portals, and will really begin to accelerate as mobile telephony continues to merge with card payment trends, including the rapid growth in smart card enabled mobile handsets. This convergence of technologies will enable financial institutions to support both their real-world and virtual credit instruments while retaining customers at every stage of the mobile evolution.

New Trends: Smart Card Mobile Banking

Smart card integration will also likely play a vital role in driving new security standards for mobile banking, one which is based on existing banking relationship card models. By incorporating smart cards into the mobile banking equation, Internet banking customers will have a convenient, secure storage mechanism for retaining proprietary customer information, payment instructions, PIN numbers, and, in the most advanced scenario, digital signatures (verified by a trusted third party) and private keys for PKI-based security. Smart cards also provide the

opportunity to build an incremental revenue stream by providing an ideal platform for extended applications and services. The emergence of multi-application relationship cards is destined to have an enormous impact on the mobile banking environment, alleviating security concerns while driving customer loyalty.

In conjunction with the ongoing evolution of wireless networks – from voice-based 2G networks to data-based 2.5G networks – the confluence of service delivery and technical innovation will drive a fundamental reconsideration of the mobile delivery channel as the leader in incremental revenue, and ultimately, incremental profit generated by a growing mobile subscriber base. According to Meta Group, mobile devices will outnumber traditional PCs by 2003.

Huge increases in bandwidth and more affordable devices (<$100) are driving this trend, which is destined to impact the B2C market in a big way, especially among segments of the population that formerly could not afford PCs and other computing devices. A future trend will see financial institutions, retailers and carriers all vying for "prime portal position" with consumers. What's at stake? Subsidizing device acquisition costs in return for increased customer loyalty. Given increasingly short device replacement cycles, this will prove to be a very attractive proposition for consumers.

Despite all of the attention surrounding future dominance of wireless, currently, fewer than 5% of financial institutions have actually enabled their banking applications for wireless users. It is expected that this will grow to 10%-15% within 1-2 years, and 25%-35% in 2-3 years. The challenge is very simple: financial institutions that fail to enable wireless extensions during the next 12-18 months risk losing customers to competitors that do.

Technology and Security

For global financial institutions, the question is not simply one of "mobile" or "traditional" channels. To ensure growth of consumer and corporate banking market share, a multi-channel delivery scenario incorporates customers' preferred channels for banking and provides an application framework for migrating to new channels as they come online. The mobile delivery channel is the latest of these and is preceded historically by branch banking, call centres, ATMs and Internet banking.

Multi-channel delivery also facilitates customer relationship management by integrating more seamlessly within customers' preferred business processes and financial management practices. Mobile networks can bring banks to a new level of service delivery by integrating completely and ubiquitously with every facet of customer life, and the financial management decisions that are made at strategic points en route.

The good news for financial institutions is that if there is already a flexible channel infrastructure in place that supports Internet banking, making the investment to mobile doesn't represent a technology leap that even approaches the chasm between the real world and the virtual world. Meridien estimates that technology outlays required to implement a mobile solution range between USD 200,000 and 300,000 for the average institution, since the technology investments represent enhancements and modifications rather than ground-floor solutions.

Mobile networks provide the following competitive advantages:

- ***Always-on, 24 x 7 access***
  Mobile networks will provide the ability for consumers to be transaction-ready, much in the way cable access has facilitated online PC access and reduced consumer dial-up delays.

- ***Advanced penetration of mobile networks***
  2G (second generation) networks already cover more than 90% of the population in the western world, and this number is growing steadily.

- ***Personalization***
  Through SIM (Subscriber Identity Module) cards, mobile customers have a specific profile that enables customized functionality that directly reflects the way they want to transact business over mobile devices. Through the convenient addition of a multi-application relationship card, mobile customers will also have a built-in platform for a host of other application services, including security keys, virtual credit cards, and other customized payment instruments.

- ***Rapid evolution of global protocols such as WAP (Wireless Application Protocol)***
  This enables the communication channel between computers and mobile devices. The WAP component essentially provides the facility for reformatting data for display on wireless handsets.

- ***Faster Data Processing Speeds***
  Increases in bandwidth and data transmission speeds makes mobile data services efficient and cost-effective in a real-time environment.

- ***Security***
  In addition to aforementioned smart-card security, mBanking transactions can be protected by a private key stored on the SIM card. Effectively, the mobile phone can become a wireless wallet to protect proprietary purchase and financial information.

The Technology Proposition

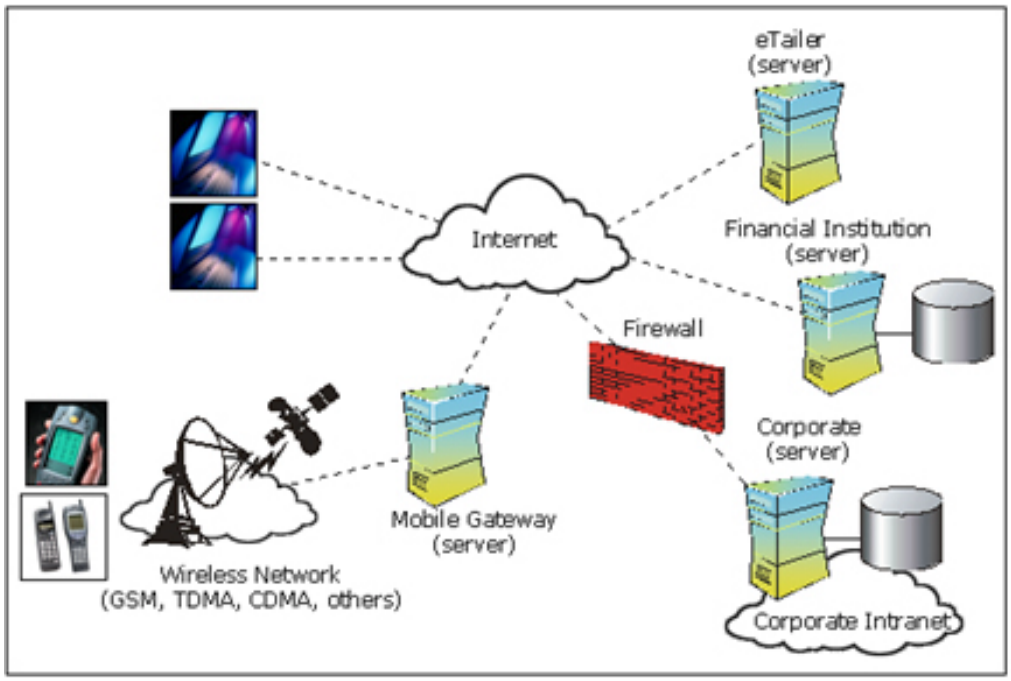
To enable mobile banking and mobile commerce implementations, both server side and device side components are required. The primary challenge on the technology side is to ensure that Internet-transmitted data and display information is optimized/converted for wireless networks through WAP gateways and is reformatted for final display on consumers' wireless handsets.

Server Side

In general terms, the server side components are required by application providers, wireless networks, and hosting financial institutions. The server hosts a corporate *application gateway* and *reformatter* to make it possible to convert screen information for display on mobile devices. *Network gateways* are also essential for connecting TCP/IP corporate networks to wireless networks that provide greater bandwidth.

Device Side

On the mobile device side, mobile users must have handsets that support *mobile browsers*, known as "microbrowsers" or appropriate user interfaces to support other handheld wireless computing devices, such as Palm Pilots, PDAs running Microsoft CE, etc. Through *network gateways*, users provide a connection to the transport layer that pushes relevant data and screen display information. *Interpreters* ensure that data delivered in standard formats (HTML, WML, XML, etc.) can be converted for presentation on a microbrowser or other display interface.



On the consumer side, the most important piece of this equation is the mobile microbrowser that is embedded in wireless-enabled mobile phones. Current providers like Phone.com are currently leading the market in this area, but the big challenge for financial institutions is the ownership of embedded portals that wireless subscribers will see every time they use their phone.

Currently, wireless carriers own this market, so it's essential for banks to accelerate their alliance strategy with carriers and technology providers alike. This provides both consistent access to the wireless consumer and the ePayment technology needed to support the mobile banking channel on the infrastructure side. Without these alliances in place, financial institutions will find it difficult to make inroads in providing a mobile banking channel and competing effectively against more nimble e-finance portals that are already eroding market share by providing faster time-to-market with the financial services mobile consumers demand.

Security in the WAP Environment

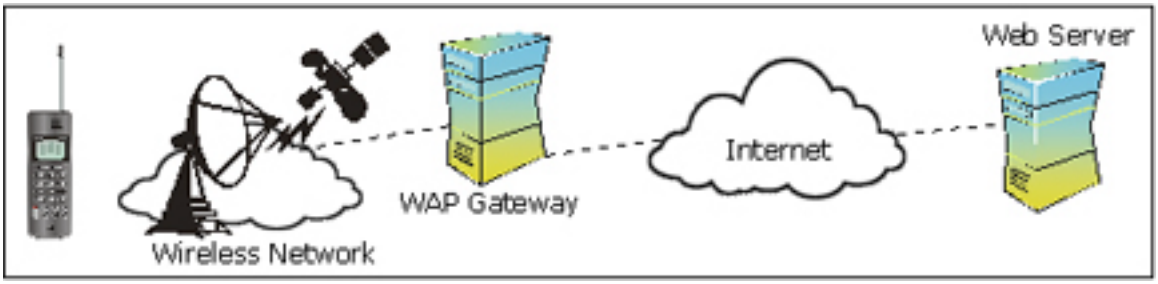
Just as security continues to be a barrier for Internet purchases and online financial management, so too is it a foremost concern in a wireless environment. To ensure success as a transactional device – which is exactly how the latest generation of mobile handsets are positioned in the industry – security standards will continue to play the leading role in swaying consumer

confidence and downplaying the omnipresent fear of fraud. The senders and recipients must both have confidence that the information they transfer arrives securely and in confidence.

PKI (Public Key Infrastructure) technology provides a security solution that is superior to standard SSL in that it protects both the integrity of the data stream in addition to verifying the participants engaging in a private, confidential transaction. In simplest terms, PKI involves private and public keys shared between two parties engaging in a secure transaction. A third element, the digital certificate, is signed by a third-party certificate authority.

How a PKI-based transaction works:

1. The sender encrypts his message containing confidential information with his private key – only he/she possesses this key and it is never transmitted over the Internet or subjected to compromise during transmission.
2. The user's encrypted information is sent to the receiving party. To ensure that the private key used to encrypt the data remains integral, it is never sent with the message.
3. The receiving party uses something called a public key, which enables the recipient to "unlock" the data contained in the message. This could be a financial service instruction or other proprietary information. The public key ensures that the message has not been tampered with in any way.
4. The receiving party cannot alter the message without indicating that it has been tampered with or mimic the encrypting capabilities of the sender's private key. In order to read the sender's message, the public key must be transmitted to the recipient, but never along with the encrypted data.



In this scenario, if the user's handset is equipped with a smart card reader (which is an increasing trend), the private key could be downloaded from the smart card onto the mobile phone. This obviates any potential security risk that could be introduced when a public key is distributed online. Multi-application relationship cards/smart cards are also efficient storage centres for virtual credit cards, debit cards, and other payment instructions, providing a more tightly integrated personal device. WAP/SMS phones, however, could also exploit the inherent wallet-like functionality of the SIM card to enable the mobile device with a similarly secure repository for storing the private key and other confidential user information.

Conclusion

In effect, PKI encryption will help to turn the mobile phone into a fully functional banking device, a multi-application relationship device (augmented with smart card application richness), and a secure wallet for storing additional information and instructions.

As a personal extension of the user, mobile phones will ultimately play a defining role in bringing the most affordable channel – for both consumers/businesses and banks alike – into mainstream usage. By riding the wave of convergence between wireless telephony and increasingly portable personal financial management solutions, financial institutions will be ideally positioned to capture customer data, drive their loyalty programs and ensure incremental revenue in the future.

Introducing the mobile delivery channel into an integrated multi-channel strategy is a challenge that will have lasting benefits in the future, providing financial institutions with a "channel readiness" that enables quick response to emerging consumer trends. As in most successful initiatives in the worlds of eCommerce and mCommerce, partnership with the right technology players is critical. These relationships will help to bring the mobile banking channel to maturity, as the solution that best combines convenience, security, portability, application richness, and the flexibility required to bring new products and services to market quickly.

As global financial institutions are discovering today, the infrastructure requirements can be challenging, but not nearly so challenging as trying to retain banking customers that are moving into the wireless age, with or without their trusted service providers.

About Oasis Technology

Oasis Technology Ltd. delivers leading mCommerce, Internet and real-world ePayment software products to Internet and traditional banks, e-tailers, retailers, and processors in more than 70 countries worldwide. Today, Internet payment systems powered by Oasis software process more than four billion transactions annually. Oasis Internet payment software products are designed for end-to-end payment processing throughout the entire payment lifecycle, bridging the virtual and real worlds of electronic payments. The company's international client base includes ABN Amro, American Express, The Bank of Montreal, Citibank, Credicard/Redecard Brazil, Diners, Europay, Golden Card (China), MasterCard and Visa International. With corporate headquarters located in Toronto, Canada, the company also operates offices in Kuala Lumpur, Malaysia, Miami, Florida and San Jose, California, and supports an extensive network of international distributors and sales representatives. Oasis is ISO 9001 registered. Visit Oasis online at www.oasis-technology.com.