



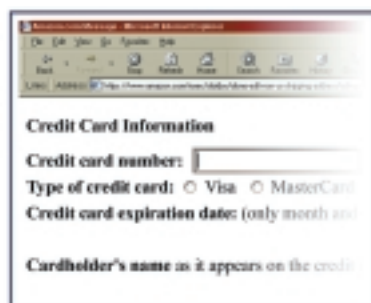
Originally designed as an international computer network for academic scientists to exchange information, the Internet has become an everyday essential business tool for millions of users all around the world, and the basis of the latest retail revolution: electronic commerce (e-commerce). This new form of buying and selling also requires a secure, internationally-accepted and convenient means of payment. Proton-based smart cards offer high security, proven convenience, and international interoperability via compliance with CEPS (the Common Electronic Purse Specifications).

E-commerce:

Privacy, security, traceability & reliability

The phenomenal success of early-starter virtual shops, such as amazon.com, the on-line book, CD and video store, and e-Bay.com, the on-line auctions site, show that there is a vast world-wide market for shops open 24 hours a day, 365 days a year, accessible through any Internet PC by tens of millions of potential customers: the total e-commerce market value has been estimated at USD 25 million (EUR 23 million) in 1999, rising to USD 1,000,000 million (EUR 925.000) by 2003.

However, there are problems to be overcome if the market is to develop fully. Some customers are wary of using the system because of a perceived lack of data privacy, the high levels of card fraud, the difficulty in tracking orders, and their inability to distinguish legitimate merchants from rogues. Proton-based smart cards can help overcome all of these problems.



A typical interface for credit card payments: not the ideal solution

The e-commerce revolution has been slowed by the lack of a secure means of payment that can be used over open networks like the

Internet. The current de facto solution, magnetic stripe credit cards, is far from ideal: card details often have to be transmitted uncoded and can be intercepted, either in transit or after arrival, and current fraud levels are unacceptably high.



E-commerce: typically 1% of credit card transactions but 50% of credit card fraud

PRIVACY

Proton-based smart card transactions are anonymous: the cardholders' names and account numbers are never transmitted: the cards are identified by secret numerical codes to enable auditability.

SECURITY

The Internet is an open network: anyone can use it and anyone can abuse it. Thus any Internet payment system must be highly secure.

The information exchanged between a Proton-compatible smart card reader and the retailer's payment terminal is encoded and does not contain account numbers or PINs. The secret keys that encode and decode the information are in the card reader and the terminal, which means they are protected against attacks originating in the network or the PC.



More and more web sites are accepting payment by Proton smart cards, attracted by their high level of security.

Digital signatures are safer than hand-written ones: the encryption keys remain on the card where they are impossible to duplicate. Thus even if the encrypted information were to be intercepted by an unauthorised third party, it would be indecipherable and thus commercially useless.

Smart cards offer the security that e-commerce shoppers and merchants have been looking for. The information in the chip's memory is protected by integral encryption circuits. When a transaction is performed, the card and the terminal mutually authenticate each other's digital signatures before information can be exchanged. Smart cards have already helped to drastically reduce fraud in ordinary credit and debit card retail transactions: they can now do the same for e-commerce transactions, using credit, debit or e-purse applications.

TRACEABILITY

Proton-based smart card transactions are fully traceable and auditable, allowing cardholder, merchant and card issuer to trace transactions in case of a dispute or query.

RELIABILITY

An Internet merchant who accepts payments by Proton-based smart cards must have a bank account to

receive payments and a terminal with the correctly-authorized connections to the host system to process payments. These requirements tend to deter rogue fly-by-night merchants and mean that cardholders can have confidence when paying with Proton-based cards.

Over thirty-five million Proton-based cards are in use around the world. The Proton technology has been licensed in 25 countries, where over 300,000 terminals have been installed, which have been used to perform transactions worth over nine-hundred-and-thirty million

US dollars (EUR 1 billion). The Proton technology is thus both technically proven and, more importantly, already trusted by millions of cardholders.

Smart cards can be made personal to the cardholder and can be used at any PC (with a card-reader), smart phone, web phone, mobile phone or other Internet access device to which the cardholder has access, thus drastically improving portability compared with software-based Internet payment solutions. They can contain credit, debit or e-purse applications, or a combination.



Banksys' C-ZAM/PC: a chip card reader for internet payments and e-purse reloads.

A gateway to multiple applications

Proton-based cards can also be used for non-payment Internet applications, such as **issuing digital certificates** or **encoding information** to make transactions secure. They can also be used to **identify cardholders** to gain access to Internet services, such as home banking. Proton-based cards can also be used to **secure access to certain databases or servers**, so that, for example, confidential information can be exchanged between remote offices of the same company, or customer orders placed via the Internet can be correctly identified for pricing etc. Away from the actual PC itself, Proton-based cards can be used as identification cards for **securing physical access to rooms or buildings**.



CASE STUDY: BELGIUM

The Proton technology has been used for Internet transactions in Belgium for some time. At the moment, its use is limited to transactions within Belgium, and below the 5000 BEF (USD 135, EUR 125) load ceiling imposed by the card issuers.

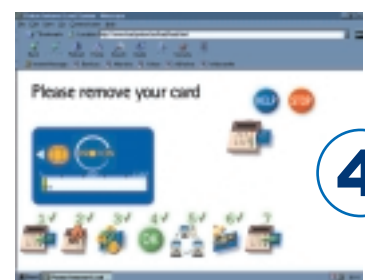
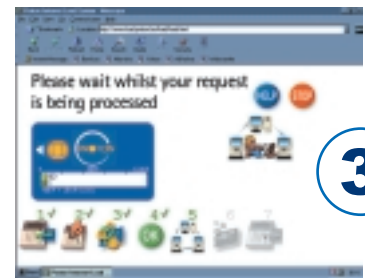
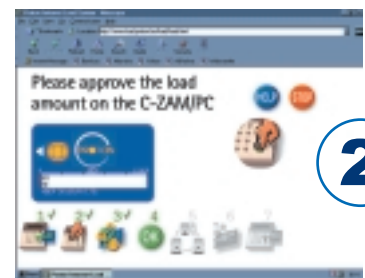
There are already over 20 Internet shops which accept Proton payments. The Belgian Proton licensee,

Banksys, is also a leading terminal manufacturer and has developed the first Proton-compatible portable card reader for use with a PC, the C-ZAM/PC. This unit can be attached via the serial port or the keyboard interface to any PC connected to the Internet. It performs the authentication checks with the merchant's terminal and has a display for the amount to be approved by the cardholder, and a keypad for entering a PIN if required. It is sold in electrical stores and can be attached to any PC.

Proton cards can be reloaded over the Internet via a special web site in a few seconds. Cardholders can then use the value stored on their cards for making payments in both the "virtual" world and in the real world at, for example, shops, car parks, payphones, cinemas and vending machines.

Internet payments can be made in a matter of seconds using a Proton card and a card reader: there is no number or code to enter: the cardholder merely checks the amount entered by the merchant and displayed on the card reader and presses the "OK" button if it is correct.

Banksys has also adapted its payment terminals for use by Internet merchants and "virtual shopkeepers", enabling them to accept Proton card payments and then easily to perform "collections" of transactions into their bank accounts, just like any other POS terminal owner.



Reloading a Proton card over the Internet is easy: insert the card in the chip card reader, enter the PIN code (fig. 1), enter the amount you wish to load (fig. 2), the money transfer will then take place (fig. 3); all that's left to do is retrieve the card (fig. 4) and... spend the money.

The future is already here

Not surprisingly in a high-tech sector like this, things are evolving quickly. Almost every aspect of Internet use is experiencing change. Traditional dial-up connections using telephone lines are being challenged by ISDN, cable and satellite networks; traditional PC access is set to be supplanted by mobile phones (such as the

Motorola StarTac model shown below), smart phones (e.g. Maestro Smart from Belgacom and Europhone from CPS), web phones (like the Alcatel Web Touch One® phone) and satellite television; paid-for Internet Service Providers are being challenged by free-access providers with advertising banners, and previously-free information-

providing sites are starting to make small charges for access or for information. Proton World is working with leading partners from many of these sectors to ensure that the Proton technology remains compatible with the latest hardware and software, and that new applications, more convenient for cardholders, are developed.

▼ Alcatel Web Touch One® phone



▲ A Motorola StarTac dual-slot mobile phone, showing the SIM card and a Proton card: a hand-held ATM!



▶ Mobile telephony: an increasingly important Internet access mode



▶ CPS Europhone, a smart phone

