

Digital Money: A View from the United States

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The Institute for Technology Assessment (ITA) is a non-profit research and analysis organization made up of analysts formerly at the Office of Technology Assessment of the U.S. Congress, which was closed at the end of 1995. This note is drawn from a recent ITA report, "Digital Money: Industry and Public Policy Issues."

Retail electronic commerce – consumer buying over the Internet – is poised for explosive growth. Already one can order many items, from automobiles and computers to salmon and cigars, from vendors' Web pages. Information services and products, such as statistical data, news, and insurance can be both purchased and delivered electronically. But many potential customers and many would-be merchants hold back because of the lack of an adequate electronic payment system.

Americans are addicted to credit cards, which are accepted by almost all merchants and service providers. But credit cards have two great drawbacks in electronic commerce. Consumers fear that sending their credit card numbers over the Internet makes them too vulnerable to hackers or electronic thieves. Merchants don't want to accept credit cards for small purchases, since the merchant typically would have to hand over six percent of the value of sales under \$10 to the credit card company in fees.

Credit card companies are working hard to solve the first problem by developing better Internet security measures, like a new Secure Electronic Transaction protocol (SET) for encryption and authentication. But it is not yet clear whether SET will provide, or will be perceived by the public to provide, adequate security. Moreover, such protocols tend to slow down processing somewhat, an irritant to people who have become accustomed to nearly instantaneous electronic exchanges. The second problem, the lack of a convenient way to pay for very small purchases, is a barrier to what Internet enthusiasts have celebrated as a great potential benefit, the ability to conveniently buy and sell tiny but valuable bits of information—statistics, a recipe, lyrics to a song, a formula, or the kind of information for which one might consult a specialized encyclopedia.

One answer to both of these problems is digital money, currency that can be sent directly over electronic networks in the form of digital information. This includes both electronic tokens that can be stored on a computer hard drive and transmitted over the Internet as needed, and smart cards or hybrids of the two.

Several systems of electronic tokens have been developed and tested. Most are, in fact, like electronic credit cards with additional security, in that they create an intermediary or gateway between the Internet and a credit card company's authorization network. A customer uses a credit card to create an account with, for example, CyberCash or First Virtual Bank (FVB), receiving in return encrypted electronic tokens representing monetary value that may be spent over the Internet – provided, and this is the big problem at this time – the customer finds an Internet merchant equipped to receive the kinds of tokens she has bought, in return for something that she wishes to purchase.

Some other kinds of digital money function or will function like electronic checks. Special software allows the customer, using a secure card in her desktop computer, to generate a digitally signed payment instruction to her bank, and send it to an Internet merchant, who will digitally endorse it and send it to his bank. As with a paper check, the merchant does not get instant confirmation of the check's validity and must deliver the goods to the customer on trust.

Several versions of digital money are especially designed for making small, instantaneous purchases of information. One version is sold in the form of digital script bearing a serial number and expiration date, to authorized brokers who in turn sell it to customers by sending it to the customer's hard drive.

The same hurdle faces all of these and other systems still being developed. So long as there are a number of competing systems, it will be difficult for any one system to sign up enough merchants and enough consumers to provide the wide acceptance that is necessary for convenience and public trust.

The second major category of digital money is smart cards, but Americans are much less familiar with either stored-value or multi-functional smart cards than are European consumers. Here stored-value cards, except for those issued by some urban transit systems and by many colleges (for buying on-campus meals, making purchases in campus bookstores, using some electronic services, and a variety of other uses), are just being developed or deployed. Their acceptance was long delayed by the nearly universal acceptance of credit cards, supported by swift authorization networks provided by public telephone companies.

The most popular form of digital money in the long run, in the United States, could be a hybrid that allows monetary value to be loaded onto smart cards from customer bank accounts either through home-banking software on one's personal computer or through the nearly ubiquitous Automated Teller Machines. The money should then be usable either over the Internet, through point-of-sale terminals in stores, or in vending machines, fare machines, and public telephones. Such a system is not yet available, and again will face the big hurdle of establishing wide acceptability and utility.

Some enthusiasts want digital money to become "just like paper money," freely exchangeable between any two people rather than between pre-certified, licensed merchants and customers. This would require it to be portable and easily transferable, interchangeable, of indefinite duration, divisible, simple to use, and anonymous or untraceable. Others want digital money to have attributes that paper money lacks – it might be customized and conditional; for example, replaceable if lost or destroyed. Or parents might want to give children allowances in the form of digital money that could not be spent for tobacco, alcohol, or junk food.

While digital money is potentially especially useful for Internet micro-payments, at the other end of the size range it may also be a great benefit in company-to-company electronic transactions, or "Electronic Data Interchange" (EDI). The computerized exchange between corporations of product information, specifications, bids and offers, orders, and invoices dramatically lowers transaction costs for businesses that are linked in complex supply chains. The Federal government also is gradually shifting its contracting and procurement operations to EDI. But what has been missing from EDI, whether carried on through value-added commercial networks or over the Internet, is the final step – a way to complete transactions in real-time by electronic payment. The necessity of finding banks willing and equipped to provide the payment link and insure that trading partners are capable of meeting their obligations has been an impediment to the even more rapid spread of EDI. With mutual acceptance of digital money, there could be further savings of time and money and further encouragement of just-in-time production. In addition, acceptance by large corporations would encourage and perhaps subsidize the deployment of digital money in retail operations, just as corporate demand subsidized the rapid deployment of cell phones.

There are, however, a number of issues that must be resolved:

- Law enforcement issues: Digital money may be a real bonanza for money launderers. It will be much easier to send the dirty proceeds of the drug trade and other crimes through cyberspace than to smuggle them

across borders, or to hide them on a smart card rather than in the hold of a ship. U.S. banks, under Federal pressure for several decades, have become efficient in noticing and reporting suspicious customers and large cash transactions. Digital money vendors might not be as cooperative, at least initially.

- Anonymity or limited liability? Some digital money developers believe that consumers will want digital money to be "anonymous," or non-traceable, in the interest of privacy. Others believe that consumers will demand strict accountability and thus record-keeping, to limit their liability in case of loss, theft, network outages or hard disk crashes, fraud, or simply dissatisfaction with purchases. Law enforcement agencies want access to records when necessary to trace or to provide evidence of crime. The Internal Revenue Service fears that anonymous digital money could complicate the collection of taxes on income.
- The status of privately-issued currency: Money is assumed, in modern nations, to carry the full faith and credit of government and the banking system. Bank regulators are concerned about vague risks to the national payment system from vendor-issued money. The Federal Reserve Board (the "central bank" of the United States) is considering whether digital money will affect its ability to adjust the amount of money in circulation and curb inflation. Consumers may wonder whether they can trust digital money to retain its value, what would happen if a digital money issuer goes bankrupt before they have used their supply of tokens, and what if their favorite retailers decide to accept only another kind of digital money, or none at all.
- Will, or should, digital money systems be regulated, and how? In the United States, different kinds of regulations apply to different kinds of financial institutions, although these discrepancies are steadily being reduced. Developers or potential developers and vendors of digital money include not only banks, credit card companies, and consortia of these and other fi-

nancial institutions, but also telecommunications companies, software companies, and start-up entrepreneurs. At some point, some kind of regulation is likely, and may be demanded by developers themselves to provide a "level playing field."

So far, both Congress and government agencies or regulators have adopted a wait-and-see policy toward development of digital money. Federal Reserve Board Chairman Alan Greenspan has said that premature regulation could result in the creation of monetary instruments that neither consumers or merchants want. But all are closely watching the emergence of this new technology.

Bibliographic data

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