

DIGITAL CASH OR E-CASH

Digital Cash functions much like real cash, except that it is not on paper. The customer gets the money lying in his bank account to be converted to a digital code. This digital code is then stored on a microchip, a card, or on the hard drive of computer. It allows the payment to be made by transmitting a unique number (like serial number on real currency) representing a specified sum of real money, from one computer to another.

Key feature- like real cash, it is anonymous and reusable.

Similar to regular cash, e-cash enables transactions between customers without the need for banks or other third parties. When used, e-cash is transferred directly and immediately to the participating merchants and vending machines. Electronic cash is a secure and convenient alternative to notes and coins. It usually operates on a smart card, which includes an embedded microprocessor chip. The microprocessor chip stores cash value and the security features that make electronic transactions secure. Mondex, a subsidiary of MasterCard (Mondex Canada Association) is a good example of e-cash.

E-cash is transferred directly from the customer's desktop to the merchant's site. Therefore, e-cash transactions usually require no remote authorization or personal identification number (PIN) codes at the point of sale.

How a typical e-cash system works:

A customer or merchant signs up with one of the participating banks or financial institutions. The customer receives specific software to install on his or her computer. The software allows the customer to download "electronic coins" to his or her desktop. The software manages the electronic coins. The initial purchase of coins is charged against the customer's bank account or against a credit card. When buying goods or services from a web site that accepts e-cash, the customer simply clicks the "Pay with e-cash" button. The merchant's software generates a payment request, describing the item(s) purchased, price, and the time and date. The customer can then accept or reject

this request. When the customer accepts the payment request, the software residing on the customer's desktop subtracts the payment amount from the balance and creates a payment that is sent to the bank or the financial institution of the merchant, and then is deposited to the merchant's account. The attractive feature of the entire process is its turnaround time which is just a few seconds. The merchant is notified and in turn ships the goods.

Benefits of E-Cash

- It can be transferred over a telephone line or over the Web.
- The microprocessor chip maintains a private and up-to-date receipt of the card's transactions.
- E-cash can be locked onto the card's microprocessor chip with a code chosen by the customer. When locked, the cash value stored on the card and the card's transaction records cannot be accessed.
- When used, e-cash is transferred directly and immediately to the merchant, vending machine, or other participating organizations.
- Like cash, e-cash enables transactions between individuals without the need for banks or other third-party intervention

ELECTRONIC WALLET (E-WALLET)

Electronic wallets are very useful for frequent online shoppers and are commercially available for pocket, palm-sized, handheld, and desktop PCs. They offer a secure, convenient, and portable tool for online shopping. They store personal and financial information such as credit cards, passwords, PINs, and much more. To facilitate the credit-card order process, many companies are introducing electronic wallet services. E-wallets allow you to keep track of your billing and shipping information so that it can be entered with one click at participating merchants' sites. A popular example of an e-wallet on the market is Microsoft Wallet.

E-wallets can be used for micro-payments. They also eliminate re-entering personal

information on the forms, resulting in higher speed and efficiency for online shoppers.

PAYMENT GATEWAY

A payment gateway is a hosted software application that authorizes various e-money (such as debit card, credit card, internet banking, ACH: Automated Clearing House check payments etc.) payments between the payment portal (such as a website or mobile phone) and a card processor. A payment gateway can be thought of as an entrance to the credit card processor, in the same way that a gateway in a fence could be the entrance to a garden. The payment gateway is a remotely hosted software application that can allow businesses of all sizes and industries to process cards and internet banking requests. Payment gateway credit card processing solutions are not only used by online businesses, but also support mobile payment capabilities. It is a complete payment processing center that lets one manage his payment acceptance through any web enabled device.

- **What is a Virtual Merchant Account?**

A merchant account is a contractual agreement between a merchant and the bank or financial institution that processes its credit and debit card payments. A virtual merchant account (also known as an online merchant account) payment processing system lets merchants accept credit cards, PIN debit cards and checks through any internet connection with no physical terminal needed. It is an alternative to the physical point-of-sale (POS) terminal most commonly used in restaurants and retail markets. To transact sales online, one needs an internet merchant account, website, virtual shopping cart and payment gateway. Payment gateways use SSL (Secure Socket Layer) encryption to secure information that is passed between the customer and merchant. The same security measure is used between the merchant and the payment processor too. Encrypted sensitive information includes the cardholder's name, card number, expiration date and transaction amount.

- **How It Works?**

The customer selects what they want to purchase. The item(s) are added to a virtual shopping cart. At checkout, the shopping cart totals the items, add their value and

collects the customer's shipping and billing information. In one seamless process, the payment gateway captures the credit card data and encrypts it. It then transmits it securely to the customer's credit card processor. The processor then sends it on to the issuing bank for authorization. The online payment gateway performs three vital functions:

1. Authorization - Any purchase made with a credit or debit card via a payment gateway must first be authorized by the card-issuing bank. The gateway affords the user a secure link between the user and his credit card processor, who acts as an intermediary in the authorization process. The authorization is typically completed in just seconds.
2. Settlement - At the end of the day, the internet payment gateway is used to batch settle all transactions of the user and send them to your processor. The processor sorts them and passes them along to the correct issuing bank. Once the transactions are settled, the processor deposits the funds into the merchant bank account within a couple of days.
3. Reporting - Transactions are recorded and it can be viewed with the gateway reporting function. The user can review, print and download reports to his computer.

ELECTRONIC MONEY (E-MONEY)

It is the electronic medium for making payment. It includes credit card, debit card, smart card, EFT (Electronic Fund Transfer). It can be identified or anonymous, online or offline

- Types of E-money
 - i. (+I +L) Identified+ online. E.g. credit card, debit card.
 - ii. (+I-L) Identified + offline. E.g. American Express Traveller check, US Postal Money Order, payment by cheque
 - iii. (-I+L) Anonymous+ online. E.g. withdrawal from ATM, Purchase is made on spot for cash
 - iv. (-I-L) Anonymous+ offline E.g. deposit in ATM in one's own account, using credit card at merchant who doesn't have online connection to Visa/ Master card network.

Where,

Online- Denoted by (L) means-

- Done with the help of internet.
- Requires user to interact with bank through modem/ network to conduct a transaction with third party. With online option each transaction is verified and approved by issuing institution (such as bank) before payment is made.

Offline- Denoted by (-L) means

- User can conduct a transaction without directly involving with bank. Offline emoney requires no validation.

Identified- Denoted by (I) means

- Such transactions leave record which can be traced/ identified. You can identify the person who withdrew the cash. E.g. digital cash.

Anonymous- Denoted by (-I) means

- Such transactions leave no record thus they can't be traced/ identified. E.g. Paper money or cash.

- **Properties to consider in e-money transfer**

1) ACID test

- Atomicity- transaction must occur completely/ not at all. E.g. transfer savings of Rs. 500 to current account.
- Consistency- all parties involved in the transaction must agree to the exchange. E.g. while purchasing & selling goods online buyer must agree to terms & conditions like price put by seller, similarly, seller must agree to quality, warranty & timely delivery of goods.
- Isolation- each transaction must be independent of any other transaction. E.g. 2 shirts purchased for Rs. 1500 each are entered independently and not as shirt bought for Rs. 3000
- Durability- means how long transaction should stay/ end if customer changes his mind. E.g. till when a customer can cancel the order upon payment

2) ICES test

- Interoperability- ability to move forth & back between different systems. E.g. if filled wrong details then press back button & rectify the entry and then click proceed/ confirm.
- Conservation- means for how long money will hold its value over time & how easy money is to store & access. E.g. transaction recorded after payment/ ordering of goods and can be used for future reference.
- Economy- processing a transaction should be inexpensive & affordable. E.g. processing charges are Rs 10 or Rs 100 for goods worth Rs 1000.
- Scalability- ability of system to handle multiple users at the same time. E.g. Once you have started with e-banking transaction and due to many users operating the same bank at same time website is hanged then your transaction will not proceed nor will you get confirmation for payment, so you are confused whether payment is successfully made or not.

	ACID TEST				ICES TEST			
	Atomity	Consistency	Isolation	Durability	Interoperability	Conservation	Economy	Scalability
Cash	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Cheque	Yes	Yes	No	Yes	No	Yes	No	Yes
Credit Card	Yes	Yes	No	Yes	No	-	No	Yes

Secure Electronic Transmission (SET)

SET is a system for ensuring the security of financial transactions on the internet. SET protocol specifications were defined by the credit card industry to facilitate credit card purchases over the internet. It was supported initially by Mastercard, Visa, Microsoft, Netscape, and others. With SET, a user is given an electronic wallet (digital certificate) and a transaction is conducted and verified using a combination of digital certificates and digital signatures among the purchaser, a merchant, and the purchaser's bank in a

way that ensures privacy and confidentiality. SET makes use of Netscape's Secure Sockets Layer (SSL), Microsoft's Secure Transaction Technology (STT), and Terisa System's Secure Hypertext Transfer Protocol (S-HTTP). SET uses some but not all aspects of a public key infrastructure (PKI).

The privacy of messages in the SET payment environment is accomplished through encryption of the payment information using a combination of public key and private key algorithms. In general, public and private key cryptographic algorithms are the process of transforming readable text into cipher-text and back again. These algorithms are used together to encrypt the actual message contents with a short private key, which is distributed securely via the public-private key pair.

- **How SET works**

Assume that a customer has a SET-enabled browser such as Netscape or Microsoft's Internet Explorer and that the transaction provider (bank, store, etc.) has a SET-enabled server.

- 1) The customer opens a Mastercard or Visa bank account. Any issuer of a credit card is some kind of bank.
- 2) The customer receives a digital certificate. This electronic file functions as a credit card for online purchases or other transactions. It includes a public key with an expiration date. It has been through a digital switch to the bank to ensure its validity.
- 3) Third-party merchants also receive certificates from the bank. These certificates include the merchant's public key and the bank's public key.
- 4) The customer places an order over a Web page, by phone, or some other means.
- 5) The customer's browser receives and confirms from the merchant's certificate that the merchant is valid.
- 6) The browser sends the order information. This message is encrypted with the merchant's public key, the payment information, which is encrypted with the bank's public key (which can't be read by the merchant), and information that ensures the payment can only be used with this particular order.

- 7) The merchant verifies the customer by checking the digital signature on the customer's certificate. This may be done by referring the certificate to the bank or to a third-party verifier.
- 8) The merchant sends the order message along to the bank. This includes the bank's public key, the customer's payment information (which the merchant can't decode), and the merchant's certificate.
- 9) The bank verifies the merchant and the message. The bank uses the digital signature on the certificate with the message and verifies the payment part of the message.
- 10) The bank digitally signs and sends authorization to the merchant, who can then fill the order.

Advantages of SET: Some of the advantages of SET contain the following:

- Information security: Neither anyone listening in nor a merchant can use the information passed during a transaction for fraud.
- Credit card security: There is no chance for anybody to steal a credit card.
- Flexibility in shopping.

Disadvantages of SET: Its complexity and high cost for implementation.

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