Unit-3

Protecting E-commerce Assets

- **P**rotecting electronic assets that comprise the electronic commerce system is necessary to grow strong.
- The electronic world have to deal with viruses, worms and destructive programs whose goals are to disrupt, delay communications and information flow between consumers and producers.
- Security protection must be developed to provide consumers with confidence in the online systems with which they interact and conduct business.
- Thus, any organization concerned about protecting electronic commences assets should have a protection policy. A security policy is a written statement describing:
- **Which assets to protect and why they are being protected?**
- **Who is responsible for that protection?**
- **Which behaviours are acceptable and which are not?**

The security policy is a living written document which is reviewed and updated at regular intervals.

A security policy should fulfill some basic requirements, which are the following:-

- **Secrecy:** It refers to preventing unauthorized persons from reading messages and obtaining credit card numbers or confidential information.
- **Integrity:** It refers to ensuring that communication received has not been changed. For this, enclose information in digital envelope so that computer can automatically detect messages that is changed.
- **Availability:** It refers to ensuring access to a resource. It provides delivery assurance for each message segment so that messages cannot be lost.
- **Key management:** It provides secure distribution and management of keys needed to provide secure communication.
- **Non-repudiation:** It provides end to end proof of each message's origin and recipient.
- **Authentication:** It securely identifies clients and servers with digital signatures and certificates.

Thus organizations must protect assets from unauthorized disclosure, modification, destruction.

Protecting Intellectual Property

- They are intangible assets whose value is represented not by a touchable object, but by what that asset represents.

- For eg, trademark protects integrity of a business.
- As e-commerce increases, the risk that others may copy the look and feel of your website, some of its features or content also increases.
- There may be unauthorized use of intellectual assets. Many parts of your website may be protected by different types of (IP) rights.

For example:

- E-commerce systems, search engines or other technical Internet tools may be protected by patents or utility models.
- Software, including text based HTML code used in websites can protected by copyright, patents.
- Creative website design, content, such as written material, photographs, graphics, music and videos may be protected by copyright.
- Databases can be protected by copyright.
- Business names, logos, product names, domain names may be protected as trademark.
- Computer generated graphic symbol, screen displays, GUI protected by industrial design law.
- Hidden aspects of your website like confidential graphics, programs and user manuals can be protected by trade secret law.

Protecting Client Computers

- Client computers must be protected from threats. Active contents can be one of the most serious threats to client computers.
- Threats can hide in Web pages, downloaded graphics, and plug-ins, E-mail attachments etc.
- Anyone can read and interpret cookie data. Cookies contain private information that can include credit card data, passwords, and login information. It does not harm client machines directly but potentially could still cause damage.

Client Computer are protected using:

- Digital certificates
- Browser protection
- Antivirus software
- Computer forensics expert
- Privacy

1.Digital certificates:-

A Digital certificate is an encrypted and password-protected file that contains sufficient information to authenticate and prove person's or organization's identity.

A digital certificate contains the following information:

- The certificate holder's name, address, and email.

- A key that “unlocks” the digital certificate, thereby verifying the certificate’s authenticity.
- The certificate’s expiration date or validity period.

Thus:

- Digital certificates provide assurance to clients and servers that the participant is authenticated.
- A digital certificate is an electronic equivalent of an identification card.
- A digital certificate verifies that a user or web site is who it claims to be.

2.Browser protection:-

- Microsoft Internet Explorer browsers are equipped to allow the user to monitor active content before allowing it to download.
- When a user downloads web page and runs programs that are embedded in them, browsers give the user a chance to confirm that the programs are from a known and trusted source.

3.Antivirus software:-

- A virus is software that attaches itself to another program and can cause damage when the host program is activated.
- A worm is a type of virus that replicates itself on the computers that it infects.

- Worms can spread quickly through the internet.
- Antivirus software is a defense strategy.
- Application service providers (ASPs), like Critical Path and Message Click supply e-mail services to companies to remove e-mail virus problems.

4.Computer forensics expert:-

- A computer forensics expert is an individual hired to access client computers to locate information that can be used in legal proceedings.
- Computer forensics is used for the collection, preservation, and analysis of computer-related evidence in order to find individuals that carried out the crime.
- Computer forensics experts protect client computers from e-mail viruses by disabling these electronic mails.

5.Privacy:-

- The privacy problem exists because of the existence of cookies.
- Cookies contain private information that can include credit card data, passwords, and login information.
- The best way to protect your privacy is to disable cookies entirely.

Protecting E-commerce Channels

- Protecting e-commerce channels means protecting assets while they are in transit between client computers and remote servers.
- Providing channel security includes channel secrecy, guaranteeing message integrity and ensuring channel availability.
- Channel secrecy can be ensured by the use of a secure channel. A secure channel will provide three things for the user:- authentication of those involved in the communication, confidentiality of the information exchanged in the communication and integrity of the information exchanged in the communication.
- Protocols can be used to establish and use a secure communication channel between two applications exchanging information.

Protecting E-commerce Servers

- The physical place where all the e-commerce transactions occur is at the Server level.
- The server can be viewed as the central repository which consists of the actual website which displays your products and services, the customer database, and the payment mechanism.

There are two issues that relate to security of servers- Security of the information stored on the server and protection of the server itself.
There are three categories in protecting an e-commerce server from attack:

- **The location of the server.**
- **The configuration of the operating system.**
- **The configuration of the web-server.**

Steps for securing location of server

- Web servers should be located in a controlled environment. Co-located servers should be in separate areas to ensure physical security.
- Firewalls should be configured to only allow access to e-commerce servers through ports 80 and 433.
- All other unnecessary services on the server should be shut down.

Steps for securing operating system are:

- Turn off all unnecessary services.
- Conduct a vulnerability scan before putting a server into production.
- Install all the latest updates available.
- Configure system to comply with organization's policy.

Steps for securing configuration of server

- Vulnerability scans should be conducted regularly in order to ensure server security.
- Never run a web server as administrator because if an intruder compromises the service, they will have root privileges.
- Scripts should not be visible to the public to protect the code and pointers to other servers.

Ensuring Transaction Integrity

- Transaction integrity ensures that any unauthorized user's modification to the message can be detected. The modification includes insertion, deletion, substitution or changes to given message.
- Integrity involves guarding against improper information modification or destruction and includes ensuring comprises timely, accurate, complete, and consistent data.
- The information must not be manipulated in any way, either through electronic errors or human intention.

Ensuring Transaction Integrity in E-commerce

Integrity violation may occur whenever a message is altered while transiting between the sender and receiver.

For ensuring transaction integrity two algorithms are applied to message.

These are:

1. Hash function

2. Digital signature

A strong hashing function ensured that data modification does not go undetected. And by then digitally signing the hash value, one can ensure that the hash can be trusted.

So, the hash function and digital signatures should be applied to a message for ensuring transaction integrity.

1.Hash functions:-

- Hash functions are effective tools to help maintain integrity.
- A hash function is a process where a data message is passed through an algorithm, which can be considered as a formula or a series of mathematical steps to achieve a particular task.
- Applying hash functions to a data message results in a number which is substantially smaller than the data message, and is called hash value.
- **It uses no secret key.**
- **The message digest it produces cannot be inverted to produce the original information.**
- **The algorithm and information about how it works are publicly available.**

- **Hash collisions are nearly impossible.**

MD5 is an example of a hash algorithm

2.Digital signature:-

- An encrypted message digest is called signature. A purchase order accompanied by digital signature provides identification of sender and assures the merchant that the message was not altered.
- Thus, in order to ensure the security of electronic transactions, developing countries are using a framework called digital signature.
- A digital signature is an electronic signature that can be used to authenticate the identity of the sender of a message or signer of a document, and possibly to ensure that the original content of the message or document that has sent is unchanged.
- Digital signatures are easy and can be automatically time-stamped.

Electronic Payment System

- In an e-commerce environment, payments take the form of money exchange in an electronic form and are therefore called electronic payments. Electronic payments (e-payments) are an integral part of e-commerce.

- An electronic payment system is a system of financial exchange between buyers and sellers in an online environment that is facilitated by a digital financial instrument such as encrypted credit card numbers, electronic cheques backed by a bank.

Characteristics of electronic payment system

1.Acceptability:- The payment infrastructure should not only be robust but also accessible to a wide range of consumers and sellers of goods and services.

2.Reliability:- Users and businesses want a payment system that is reliable because availability of services & smooth running of enterprise depend on availability successful operation of payment infrastructure.

3.Security:- Digital currency should be stored in a form that is resistant to replication and tampering. Also, it should offer protection from intruders trying to tap it to unauthorized use, when transmitted over internet.

4.Usability:-The user of payment should be able to use it as easily as real currency. For this payment system should be well integrated with existing applications.

5.Scalability:-The payment system infrastructure should be scalable, to be able to handle the addition of new users and merchants. It should be able to offer the same performance and cost per transaction overheads with a growing number of customers and transactions.

6.Privacy:-This characteristic refers to the desire of users to protect their privacy, identity and personal information. In some transactions, the identities of the parties could be protected by anonym it.

7.Applicability:-Applicability of a payment system is defined as the extent to which it is accepted for payments. Debit cards and credit cards have high applicability, one can pay with them in different places.

8.Convertibility:-Users should be able to transfer money from electronic payment systems to another accepted money from i.e. receive it in cash, or transfer to a bank account.

9.Traceability:-Traceability indicates how easy it is to trace money flows and sources of funds that are going through a payment system and used for purchases. In electronic payment systems, money can be traced by records that are kept of payment activity.

10.Trust:-Trust refers to the degree of customers confidence that their money and personal information will be safe, and that all parties involved will not act against users' interests. Users need to trust that payments will be bot be stolen or misused.

11.Flexibility:-Payment systems should be in a position to accept several forms of payment rather than limiting the users to a single form of currency.

12.Efficiency:-Efficiency here refers mainly to the cost overheads involved in operation of digital payments. Cost of payment per transaction should be negligible.

Comparison of Electronic Payment System with Traditional Payment System:-

E - payments	Traditional payments
Direct transactions through internet	Cannot transact without human intervention
Use technology for communication	Require humans to enable communication and processes
Have advanced security measures in place	Are risky to manage and prone to theft
Can be instantly withdrawn and deposited online	Can be instantly withdrawn and deposited online
Multiple options for payments	Limited payment options
Low operational costs	High operational costs
Easy to track transaction status	Less transparency on status and tracking
Automated payment reconciliation	Manual reconciliation with sizable documentation

Types of Electronic Payment System are:

- **Electronic cash**
- **Electronic wallets**
- **Smart cards**
- **Credit cards**
- **Debit cards**
- **Charge cards**

Electronic cash

- The e-cash transaction is more efficient and therefore less costly than other methods thereby meaning lower prices for consumers. Transferring electronic cash on the internet costs less than processing credit card transactions.
- E-cash transfers occur on the internet, which is an existing infrastructure and user existing computers.
- E-cash is a secure and convenient alternative to bills and coins. This payment system complements credit, debit, and charge cards and adds conventional convenience.
- E-cash usually operates on a smart card and has an embedded microprocessor chip stores cash value and the security features that make electronic transaction secure.
- E-cash transactions usually require no remote authorization or personal identification number (PIN) codes at the point of sale. This is because e-cash is transferred directly from the customer's desktop to the merchant's site.

Process of creating electronic cash:-

- The process begins when a consumer creates a random serial number that he sends to the bank issuing the electronic cash.

- The bank uses the consumer's random serial number along with the bank's digital signature and sends the random number, electronic cash and digital signature as one package to the user.
- The consumer can now spend the electronic cash, which is digitally signed by the bank. When the consumer spends the e-cash and the merchant passes it along to the issuing bank, the bank validates the electronic cash because it contains the bank's digital signature.
- However bank can't determine identity of spender. It only knows that electronic cash is genuine.

Electronic Wallet

An electronic wallet, also called a digital wallet, is a piece of software that allows a user to make an electronic payment with a financial instrument.

An e-Wallet serves many purposes:

- It provides security and encryption for the user's personal information and for the actual transaction.
- It keeps a database of user-inputted information (shipping address, billing address, payment methods, and other information).
- It authenticates the consumer through the use of digital certificates and other encryption methods.

- The software component that a consumer uses to make purchases electronically is referred to as an electronic wallet.
- The wallet allows customer to store information on his desktop, eliminating need to continually refresh information such as customer name, shipping and billing address, and payment information.
- Electronic wallet is an encryption software that store payment information like a traditional wallet.
- The e-wallet component is downloaded to a user's computer and in which the user stores credit card number and other personal information.
- While shopping using e-wallet, a user can perform one-click shopping with e-wallet automatically filling necessary information. Credit card companies like VISA and Master Card offer e-wallet services.
- An eWallet, serving the functions similar to a physical wallet, holds credit cards numbers, electronic cash, owner identification, and owner contact information and provides that information at an e-commerce site's checkout counter.
- Electronic wallets give customers the benefit of entering their information just once, instead of having to enter their information at every site with which they want to do business.

- The eWallet is an electronic payment system that operates like a carrier of e-cash and information, in the same way, a real-world wallet function. The aim is to give shoppers a single, simple and secure way of carrying currency electronically.

The procedure for using an e-Wallet is:

1. Download a wallet from merchant's website where you intend to shop. The special form requires the buyer to fill in some personal information.
2. Fill in the personal information such as your credit card number, name, address, and phone number, an address of shipment.
3. When you are ready to buy, click on wallet button and the buying process is fully executed. Billing information is filled out automatically.

Smart card

Smart card is a thin, credit card-sized piece of plastic that contains a half-inch-square area that serves as the card's input\output system. This is its sinter face with the outside world, and handles a variety of applications.

Following are the uses of smart card:-

- A smart card is used to provide users with the ability to make a purchase. It contains stored value the cardholder can spend at retailers.

- It is used to hold cash, ID information.
- The smart card is used in transaction processing. It could be loaded with cash value in ATM machines and used as a credit card.
- It is used to authenticate an individual's claim of personal identification using various authentication approaches.
- A smart card is used to provide encryption and decryption of messages to ensure security, integrity, and confidentiality.

Application of smart card

1.Telecommunications:- Smart cards are widely used in the telecommunications industry. A SIM card is an example of a card. It contains necessary information to access the network.

2.Identification:-Smart cards are used in universities for their official student identification card. Students use this card to access certain facilities and events.

3.Government:- Smart cards are gaining importance with government agencies around world. They are used to control areas of access for government employee.

4.Financial:- Financial institutions were one of the first to adopt smart cards for various application. There are several common uses of smart cards within the industry,

including electronic purses, credit and debit cards, and payment associations,

5.Health care:-Health care systems have employed smart cards to reduce service costs associated with the health care industry.

6.Loyalty:- Retailers use a loyalty card to capture customer information and better cater promotions processes to them.

7.Transportation:-Contactless smart card technology is gaining acceptance in the transportation industry throughout the world. Delhi Metro Rail Corporation (DMRC) also provides smart cards to the customers.

Credit Cards

- Credit cards are another popular form of payment systems.
- They allow consumers to extend their purchasing power. As a result, these cards are often used for large purchases, when the customer might not have enough cash on hand to complete the transaction.
- A credit card is a small plastic card that has a magnetic strip on the exterior. The magnetic strip carries some form of encoded information about the card number and may be encrypted making it difficult for potential thieves to decode or copy the information onto other cards. A card reader is

required to read as well as write the information to the magnetic strip.

- Traditionally, the credit cards were used as off-line means of payment. But today, with the growth of internet users, they have been widely accepted as online payment mechanisms as well.
- Today, credit cards are dominant form of payment on web. Their electronic nature allows consumers stores to pay and receive payment immediately.

Characteristics of Credit Cards

1.**Alternative to cash:-** A credit card is a better alternative to cash. It removes the worry of carrying various currencies to pay at the different trade counters. The risk of money theft is also reduced.

2.Credit limit:-The credit cardholder enjoys the facility of a credit limit set on his card. This limit of credit is determined by the credit card issuing entity (bank) only after analysing.

3.Facilitates payment in domestic and foreign currency:-A credit card gives its holder a unique facility to make payments either in domestic currency and also in foreign currency as per requirement.

Using this feature, a credit cardholder can easily make payments to merchants present in any corner of the world.

4.Record keeping of all transaction:-Credit card issuing entities like banks keep complete record of all transactions made by their credit cardholders. Such a record helps these entities to raise appropriate billing amounts payable by their cardholders.

5.Regular charges:-Regular charges are basic routine charges charged by the credit card issuing entity on the usage of a credit card by its cardholder. The regular charges are primarily classified into two types- annual charges and additional charges.

6.Grace period:-The grace period is referred to those minimum numbers of additional days within which a credit card holder has to pay his credit card bill without any incurring interest or finance charges.

7.Additional charges for delay in payment:-The credit card payment is supposed to be made within due date as mentioned on bill of a credit card. If payment is not done on time, then a credit-card issuer charges some additional costs, which are due to delay in payment.

8.Service tax:- Service tax is included in total amount charged to credit cardholder. This mandatory service tax imposed by the government also increases the final end cost bared by a credit cardholder.

9.Bonus points:- Credit card providers also give bonus points on the financial value of the transactions compiled by their customers.

10.Gifts and other offers:-After crossing pre-determined number of bonus points, accumulated bonus points are redeemed either by converting them into gifts, cash back offers, or any other similar offers.

Charge Card

- A charge card is like a credit card without the option to pay your balances off over time. With a charge card, you must pay the entire balance in full every month.
- Charge cards provide all the benefit of a credit card-convenience, rewards, fraud and purchase protection, etc. Without the freely available opportunity to overspend and go into debt.
- Charge cards are similar to credit cards except they have no revolving credit line. Users of charge cards can use them to pay for purchases just like regular credit cards.
- The card issuer extends a line of credit but this only given for the set period of time. A charge card is meant to be paid off in full every month.
- Charge cards are the least well-known e-payment methods. Like credit cards, they allow consumers to instantly borrow money to make day to day purchases, often come with reward points or extra

like concierge services and allow users to keep tabs on their spending.

- Charge cards are least well-known e-payment methods. Like credit cards, they allow consumers to instantly borrow money to make day to day purchases.
- Charge cards do not have credit limits, so theoretically you can charge as much as you want until the issuer decides enough is enough. That's because, despite the lack of a credit limit, charge cards do have what is referred to as a shadow limit or the upper boundary of your capacity to charge.
- Charge cards generally have annual fees because of the lack of interest income for issuer. If monthly charge card payment isn't made in full, cardholders face late fees and their cards may be canceled.
- With a charge card, you are granted more purchasing power with no pre-set spending limit. While your spending is not unlimited, your purchases are approved based on a variety of factors, including your credit record, account history, and personal resources.
- However, users have to be careful about how much they spend. Though there's no pre-set limit, their purchases will be monitored, and if they keep racking up huge expenses, their card could be

blocked by the issuer if it believes that the user does not have the capacity to repay.

Charge cards provide rewards, benefits, keep the tab on spending, etc.

- **Rewards:** The charge cards provide a way to obtain good rewards-typically cash back or rewarded points- in exchange for spending. For example, the American Express Gold Charge Card reward 1 point for every Rs 50 spent.
- **Benefits: O**ther benefits, especially insurance benefits, are also common. For example purchase protection, extended warranty cover, personal travel accident cover, travel inconvenience and emergency card replacement etc.
- **The caveat of charge card:** This ensures that in case of a credit card, you cannot be tempted to keep postponing the payment and so, end up with a huge bill after a few months because of the high-interest rate. No matter how big the bill of your charge card, you will have no choice but to pay it.
- **No interest rates:** There are no interest rates with charge cards. As long as the cardholder pays back balance in full every month, they do not have to pay interest. However, if cardholders fail to clear their monthly balance, they need to pay late fee.

Advantages of Charge Card:-

- Charge cards lead to card debt problems as they need to be paid off in full every month.
- Many users find it easier to budget responsibly with a charge card as they are expected to pay back what they owe on a monthly basis and cannot borrow for extended periods.
- This kind of card may not be given a set credit limit making it easier for cardholders to buy expensive items as they need to.
- Most cards come with additional rewards, discount schemes or perks for their users such as club services and various insurance plans.

Disadvantages of Charge Cards:

- Some users find it hard to stick with program and spend more than they can afford to pay off.
- Charge cards are usually reserved for an individual with a good\high credit rating.
- Some of the premium cards with best deals cannot be applied for and are given out on an invitation-only basis.
- These products can charge high annual fees and additional charges for some types of card use.
- Not paying off what has been spent every month can lead to the addition of late payment charges or cancellations.