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SECURITY ISSUES IN e-COMMERCE

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ABSTRACT

E-commerce security is the protection of e-commerce assets from unauthorized access, use, alteration, or destruction. It is a part of the information security framework and is specifically applied to the components that affect e-commerce. Dimensions of e-commerce security are integrity, non-repudiation, authenticity, confidentiality, privacy, availability. Today's consumer is confronted by a maze of different online commerce opportunities, choices, and decisions, none of which were available or even fathomable 20 years ago. E-commerce is gaining momentum and acceptance; previously risky online activities such as banking are now considered safe and reliable, yet popular methods used to access sensitive information online present serious security risks.^[6] Most consumers accept terms and conditions too easily and without a second thought, compromising online anonymity and privacy. E-commerce isn't just increasing, it's evolving. The exponential rate of e-commerce growth has far surpassed mainstream security measures set in place to properly regulate online commerce and prevent consumer identity fraud. Every time a new e-commerce innovation is released, a new security risk is posed for consumers. To ensure the security, privacy and effectiveness of e-commerce, on one hand businesses should authenticate business transactions, control access to resources such as web pages for registered or selected users, encrypt communications and implement security technologies, while on other hand consumers need to be cautious and attentive to minute details.^[4]

KEYWORDS

e-commerce, information security.

1. INTRODUCTION TO e-COMMERCE

E-commerce (electronic commerce or ec) is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet. These business transactions occur either business-to-business, business-to-consumer, consumer-to-consumer or consumer-to-business. The terms *e-commerce* and *e-business* are often used interchangeably. The term *e-tail* is also sometimes used in reference to transactional processes around online retail.^[4]

E-commerce is conducted using a variety of applications, such as email, fax, online catalogs and shopping carts, electronic data interchange (edi), file transfer protocol, and web services. Most of this is business-to-business, with some companies attempting to use email and fax for unsolicited ads (usually viewed as spam) to consumers and other business prospects, as well as to send out e-newsletters to subscribers.

The benefits of e-commerce include its around-the-clock availability, the speed of access, a wider selection of goods and services, accessibility, and international reach. Its perceived downsides include sometimes-limited customer service, not being able to see or touch a product prior to purchase, and the necessitated wait time for product shipping.

2. PURPOSE OF STUDY

- Study the overview of e-commerce security
- Discuss the threats to e-commerce security
- Understand the tools for e-commerce security
- Understand the secure online shopping guidelines

3. e-COMMERCE SECURITY

E-commerce security is a part of the information security framework and is specifically applied to the components that affect e-commerce that include computer security, data security and other wider domains of the information security framework. Today, privacy and security are a major concern for electronic technologies. M-commerce shares security concerns with other technologies in the field. Privacy concerns have been found, revealing a lack of trust in a variety of contexts, including commerce, electronic health records, e-recruitment technology and social networking, and this has directly influenced users. Security is one of the principal and continuing concerns that restrict customers and organizations engaging with e-commerce. The e-commerce industry is slowly addressing security issues on their internal networks. There are guidelines for securing systems and networks available for the e-commerce systems personnel to read and implement. Educating the consumer on security issues is still in the infancy stage but will prove to be the most critical element of the e-commerce security architecture.^[1]

Security is an essential part of any transaction that takes place over the internet. Customer will lose his/her faith in e-business if its security is compromised.^[7] Following are the essential requirements for safe e-payments/transactions:

Confidentiality: Information should not be accessible to unauthorized person. It should not be intercepted during transmission.

Integrity: Information should not be altered during its transmission over the network.

Authenticity: There should be a mechanism to authenticate user before giving him/her access to required information.

Non-repudiability: It is protection against denial of order or denial of payment. Once a sender sends a message, the sender should not be able to deny sending the message. Similarly the recipient of message should not be able to deny receipt.

Encryption: Information should be encrypted and decrypted only by authorized user.

4. e-COMMERCE SECURITY THREATS

The direct threats to e-commerce servers can be classified as malicious code threats and transmission threats.^[3] Malicious or rogue programming code is introduced into the server in order to gain access to the system resources. Very often, the intent of malicious code attacks is to cause large scale damage to the e-commerce server. With transmission threats, the threats and risks can be classified as either as active or passive. With passive threats, the main goal is to listen (or eavesdrop) to transmissions to the server. With active threats, the intent is to alter the flow of data transmission or to create a rogue transmission aimed directly at the e-commerce server.

MALICIOUS CODE ATTACKS

Viruses and worms: A virus attaches itself to executable code and is executed when the software program begins to run or an infected file is opened. However, a worm does not need a host to replicate. Rather, the worm replicates itself through the internet, and can literally infect millions of computers on a global basis in just a matter of hours. Worms by themselves do not cause damage to a system like a virus does. However, worms can shut down parts of the internet or e-commerce servers, because they can use up valuable resources of the internet, as well as the memory and processing power of servers and other computers.

Trojan horses: A Trojan horse is a piece of programming code that is layered behind another program, and can perform covert, malicious functions. For example, your e-commerce server can display a "cool-looking" screen saver, but behind that could be a piece of hidden code, causing damage to your system. One way to get a Trojan horse attack is by downloading software from the internet. Make sure that whatever software is downloaded comes from an authentic and verified source, and that all defense mechanisms are activated on your server.

Logic bombs: A logic bomb is a version of a Trojan horse, however, it is event or time specific. For example, a logic bomb will release malicious or rogue code in an e-commerce server after some specific time has elapsed or a particular event in application or processing has occurred.

TRANSMISSION THREATS

Denial of service attacks: With a denial of service attack, the main intention is to deny your customers the services provided on your e-commerce server. This happens when a massive amount of invalid data is sent to the server. Because the server can handle and process so much information at any given time, it is unable to keep with the information and data overflow. As a result, the server becomes "confused", and subsequently shuts down.

Ping of death: With a ping of death attack, a massive data packet is sent to the server. As a result, the memory buffers of the e-commerce server are totally overloaded, thus causing it to crash.

SYN flooding: A SYN flood is a form of denial-of-service attack in which an attacker sends a succession of SYN requests to a target's system in an attempt to consume enough server resources to make the system unresponsive to legitimate traffic

Ip spoofing: The intent here is to change the source address of a data packet to give it the appearance that it originated from another computer. With ip spoofing, it is difficult to identify the real attacker, since all e-commerce server logs will show connections from a legitimate source.

5. e-COMMERCE SECURITY TOOLS

Firewalls: (for software and hardware): A firewall is a system designed to prevent unauthorized access to or from a private network. Firewalls can be implemented in both hardware and software, or a combination of both. Firewalls are frequently used to prevent unauthorized internet users from accessing private networks connected to the internet, especially intranets. All messages entering or leaving the intranet pass through the firewall, which examines each message and blocks those that do not meet the specified security criteria.

Public key infrastructure: A pki (public key infrastructure) enables users of a basically unsecure public network such as the internet to securely and privately exchange data and money through the use of a public and a private cryptographic key pair that is obtained and shared through a trusted authority.

Encryption software: Encryption software is software whose main task is encryption and decryption of data, usually in the form of files on (or sectors of) hard drives and removable media, email messages, or in the form of packets sent over computer networks. It is a very effective and practical way to safeguard the data being transmitted over the network. Sender of the information encrypts the data using a secret code and specified receiver only can decrypt the data using the same or different secret code.

Digital signature: Digital signature ensures the authenticity of the information. A digital signature is a e-signature authentic authenticated through encryption and password.

Security certificates: Security certificate is unique digital id used to verify identity of an individual website or user.

6. GUIDELINES TO SHOP ONLINE SAFELY

SHOP AT SECURE WEB SITES

A secure web site uses encryption and authentication standards to protect the confidentiality of information sent during web transactions. A secure web page can be identified using following guidelines:

1. The url of a secure webpage begins with the letters https
2. Ensure that the address bar has some element of green in it. Different browsers use different elements. Microsoft's internet explorer - background is shaded green. Apple's safari and google's chrome - https is shaded green
3. Look for a closed padlock. If that lock is open, you should assume it is not a secure site. Most web browsers display the 'lock' icon somewhere in the window of the browser. Microsoft's internet explorer displays a lock in the lower-right of the browser window. Mozilla's firefox displays the lock icon in the lower-left corner of the window. The lock is not just a picture. You can click or double click on it to see details of the site's security. This is important because some fraudulent sites are built with a bar at the bottom of the page to imitate the lock icon of your browser.

INVESTIGATE ABOUT THE WEB SITE BEFORE YOU ORDER

Avoid doing business with unknown *web sites*. If you are going to deal with a web site for the first time, do your homework before buying their products. Start business with an unknown website by ordering something inexpensive. This will help you judge the authenticity of the web site.

Reliable *web sites* should advertise their physical business address and contact number, either customer service or an order line. Call the phone number and ask questions to determine if the business is legitimate.

READ THE WEB SITE'S PRIVACY AND SECURITY POLICIES

Every reputable online web site offers information about how it processes your order. It is usually listed in the section entitled —privacy policy.^[8] Reputable companies will be open about how they collect data from you and what they do with it. Many now also belong to web-seal approval or trust mark programs that set out guidelines on the treatment of your information.

USE SAFE PAYMENT OPTIONS

Credit cards are generally the safest option because they allow buyers to seek a credit from the issuer if the product isn't delivered or isn't what was ordered.

^[9]Also, unlike debit cards, credit cards may have a limit on the monetary amount you will be responsible for paying if your information is stolen and used by someone else. Never send cash through the mail or use a money-wiring service because you'll have no recourse if something goes wrong. Don't forget to review return policies. You want a no-hassle ability to return items.

USE VIRTUAL CREDIT CARDS AS NEEDED

Virtual credit cards are temporary payment cards, and come in the form of a physical plastic card, or as a generated credit card number, and they're separate from your bank information.^[10] This type of disposable credit card payment method contains a pre-set spending amount, has a shorter-than-usual expiration date, and is equivalent to a regular credit card for most payments purposes. Virtual credit card payments are usually charged to your credit or debit card, rather than directly to your bank account, essentially offering an additional layer of protection. When you pay with a virtual credit card, your banking information remains separate from your individual purchase, thus ensuring if the card number is stolen, hackers cannot access your accounts or re-use the card fraudulently.

DISCLOSE ONLY THE BARE FACTS WHEN YOU ORDER

When making a purchase online, there is certain information that you must provide to the web merchant such as your name and address. Often, a merchant will try to obtain more information about you. They may ask questions about your leisure lifestyle or annual income. Be alert to the kinds of information being collected to complete the transaction. Make sure you think it is necessary for the vendor to request that information. Remember, you only need to fill out required fields on a vendors checkout form. Before providing personal or financial information, make sure you understand how your information will be stored and used. The information you provide is used to target you for marketing purposes. It can lead to "spam" or even direct mail and telephone solicitations. Don't answer any question you feel is not required to process your order. Often, the web site will mark which questions need to be answered with an asterisk (*).

KEEP YOUR PASSWORD PRIVATE

You will usually be asked for a password before you make an online payment. This is to help keep your personal details private.^[11] Make sure you use a strong password - one that is a combination of letters (upper and lower case), numbers and symbols. Never reveal your password to anyone. When selecting a password, do not use commonly known information, such as your birthdate, mother's maiden name, or numbers from your driver's license or social security number. Do not reuse the same password for other sites, particularly sites associated with sensitive information.

DON'T FALL FOR "PHISHING" MESSAGES

Phishing is the process whereby someone attempts to obtain your confidential information, such as your passwords, your credit card number, your bank account details or other information protected by the data protection act.^[12] A phishing attack can be in the form of an official looking email or instant message, maybe directing you to an official looking website, or it could be an official sounding phone call.

Recognizing a phishing attack

There are number of clues that may indicate an email or website is not genuine such as:

1. Suspicious email links. Try hovering your mouse over a link without clicking on it. If the address that pops up does not match the link address as it is written in the email, it's a clear indication of a phishing email.
2. A link to a genuine website which takes you somewhere else
3. Spelling or grammatical mistakes, inappropriate use of capitals or exclamation marks, formatting errors
4. A generic email greeting
5. Claims that you need to act immediately to prevent something bad from happening (for example, your account will be deleted or your email will be lost)
6. Requests for personal information, such as your password or bank account number

However, you should always be wary as some phishing attacks may be sophisticated and difficult to spot. You should refuse to disclose confidential information until you have checked to your own satisfaction that the request is justified and legitimate and has been made by a genuine person or organization.

There are various phishing filters, like smartscreen filter in internet explorer, which will help protect you from phishing sites by warning you when it detects a distrustful website.

ALWAYS PRINT OR SAVE COPIES OF YOUR ORDERS

Print and save records of your online transactions, including the product description, price, online receipt, terms of the sale, and copies of any email exchange with the seller.^[9] If you cannot print one off, take a screenshot as a form of proof of purchase. We recommend you print out or save a copy of the web page(s) describing the item you ordered as well as the page showing company name, postal address, phone number, and legal terms, including return policy. Read your credit card statements as soon as you get them to make sure there aren't any unauthorized charges. If there is a discrepancy, call your bank and report it immediately

TURN YOUR COMPUTER OFF WHEN YOU'RE FINISHED SHOPPING

Many people leave their computers running and connected to the internet all day and night. This gives scammers 24/7 access to your computer to install malware and commit cyber crimes. To be safe, turn off your computer when it's not in use.

FIND OUT ABOUT BILLING, GUARANTEES, CANCELLATION POLICIES, SHIPPING AND DELIVERY CHARGES BEFORE YOU BUY

You can look for following information:^[13]

1. Packaging costs, delivery costs etc
2. Whether you will be billed before or after delivery of the products
3. Whether you can track the item from the moment of purchase to arrival at your door - this will help alert you of any hiccups in the delivery
4. Whether the product comes with a guarantee or warranty for defects etc.
5. How you can return the product if it doesn't work or meet your expectations - look for information on the site about cancellations, returns and refunds. Print off a copy for future reference
6. Who will bear the cost of returning the item (postage, fees etc.)

KNOW HOW ONLINE AUCTIONS OPERATE

Online auctions connect buyers and sellers, allowing them to communicate in a bidding process over items for sale.^[13] For the most part, online auction sites are a safe way to exchange goods. But it makes sense to be cautious and aware.

Online auctions can be a lot of fun and can also help you find good deals. They also attract scammers. Scammers will often try to get you to deal outside of online auction sites. They may claim the winner of an auction that you were bidding on has pulled out and offer the item to you. Once you have paid, you will never hear from them again and the auction site will not be able to help you. Following are the guidelines for participating safely in online auctions:

1. Always conduct transactions within the auction website and avoid private contact with buyers or sellers-scammers will often use this ploy to 'offer a better deal'.
2. Keep printed and/or electronic records of all bids, item descriptions, emails to and from the seller, and transaction records or receipts.
3. If the website uses a feedback rating system, check all comments left by previous buyers and sellers.
4. Use a secure payment method.
5. Avoid money transfers and direct debit, because they can be open to abuse.
6. Consider using the insurance offered by the auction facility.
7. Check the information on auction websites to help potential buyers and sellers.
8. Take the time to read the information about ways to reduce the risk on the auction site and the terms and conditions of contracts entered into by bidders and sellers.
9. Learn a site's return policy, as it may be difficult to return merchandise bought at auction. It's critical to check the policy, because you may be required to follow the seller's refund policy, rather than that of the auction site.

BE AWARE OF DYNAMIC PRICING

Dynamic pricing is a blanket term for any shopping experience where the price of an item fluctuates frequently based on complicated algorithms.^[14] Some online retailers use dynamic pricing to engage in price discrimination by charging different prices to different consumers for identical goods or services. While online shopping enables consumers to easily compare prices, it also allows businesses to collect detailed information about a customer's purchasing history and preferences. Online stores can use that information to customize the prices they charge you.

Online merchants can easily implement dynamic pricing by placing cookies on a customer's computer which will track the user's past interactions with the site. By using this information, sites can customize their interactions based on your past activities. Online stores can read the cookies on your browser to determine what products or services you searched for and bought and how much you paid for them. This information helps them to predict how much you might they visit the issuer's site.

Shared wi-fi = unsecure wi-fi

As a rule of thumb, assume all shared wi-fi networks are unsafe for your sensitive data. Everything from an online bank statement to a gmail account can be compromised when surfing the web on a shared wi-fi network. It's nearly impossible to accurately gauge how secure a wi-fi network is, and thus it's best to err on the side of caution.^[15]

PROTECT YOUR ONLINE IDENTITY ON THE SOCIAL FRONT

Online purchasing is getting more and more social, with 50 per cent of web sales projected to occur via social media by 2015.^[15] Each time you join a new site through the "login with facebook" option, you're extending your online identity further. In fact, an abundance of sites will first prompt you to become a member not by email, but by connecting a social media account. Is it a direct connection? Technically, no. Will it be used to shape your online identity? Absolutely. Your social media presence defines your digital footprint to the point where companies are looking to use your social media identity to combat online payment fraud and your social signals to tackle identity fraud in the near future.

Once you realize that the majority of your online activity is interconnected, you can better defend yourself from making thoughtless choices that may endanger your data. Just like you shouldn't post something you don't want your employer to see on facebook, you also shouldn't post anything you don't want a hacker to see, like a picture of your driver's license or passport, anything with a home address and any snapshots that include a visible credit card or credit card number.

7. CONCLUSION

Day by day e-commerce is playing a very vital role in online retail marketing and the number of people using this technology is increasing in leaps and bounds all over the world. However the exponential rate of e-commerce growth has lead to numerous security risks for consumers. In present scenario, consumer needs to be very cautious while making any kind of online transactions or even surfing the internet.

Common mistakes that leave people vulnerable include shopping on websites that aren't secure, giving out too much personal information, and leaving computers open to viruses. In this paper we discussed e-commerce security issues, security threats and guidelines for safe and secure online shopping through shopping web sites. A consumer can very well secure his online shopping to some extent by religiously following the guidelines mentioned in the research paper.

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