NETWORK & INFORMATION SECURITY

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Abstract

The terms network security and information security are often used interchangeably. Network security is generally taken as providing protection at the boundaries of an organization by keeping out intruders (crackers). Information security, however, explicitly focuses on protecting data resources from malware attack or simple mistakes by people within an organization by use of data loss prevention (DLP) techniques. Much attention has been focused on the security aspects of existing Wi-Fi (IEEE 802.11) Wireless LAN system. Pit flaws of WEP (wired equivalent privacy) are covered in this paper. And ORiNOCO and WPA (Wi-Fi protected access) solution are also discussed in that.

1. Computer Security - Why?

- information is a strategic resource
- a significant portion of organizational budget is spent on managing information
- there are many types of information
- have several security related objectives
    - confidentiality (secrecy) - protect info value
    - integrity - protect info accuracy
    - availability - ensure info delivery
- threats to information security
    - various surveys, with results of order:
    - 55% human error
    - 10% disgruntled employees
    - 10% dishonest employees
    - 10% outsider access

2. Network security concepts: Network security starts from authenticating the user, commonly with a username and a password. Since this requires just one thing besides the user name, i.e. the password which is something you 'know', this is sometimes termed one factor authentication. With two factor authentication something you 'have' is also used (e.g. a security token or 'dongle', an ATM card, or your mobile phone), or with three factor authentication something you 'are' is also used (e.g. a fingerprint or retinal scan). Once authenticated, a firewall enforces access policies such as what services are allowed to be accessed by the network users.[2] Though effective to prevent unauthorized access, this component may fail to check potentially harmful content such as computer worms or Trojans being transmitted over the network. Anti-virus software or an intrusion prevention system (IPS)[3] help detect and inhibit the action of such malware. An anomaly-based intrusion detection system may also monitor the network and traffic for unexpected (i.e. suspicious) content or behavior and other anomalies to protect resources, e.g. from denial of service attacks or an employee accessing files at strange times.

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Individual events occurring on the network may be logged for audit purposes and for later high level analysis. Communication between two hosts using the network could be encrypted to maintain privacy.

3. Information security: Information security means protecting information and information systems from unauthorized access, use, disclosure, disruption, modification or destruction.[1] The terms information security, computer security and information assurance are frequently incorrectly used interchangeably. These fields are interrelated often and share the common goals of protecting the confidentiality, integrity and availability of information; however, there are some subtle differences between them. These differences lie primarily in the approach to the subject, the methodologies used, and the areas of concentration. Information security is concerned with the confidentiality, integrity and availability of data regardless of the form the data may take: electronic, print, or other forms. Computer security can focus on ensuring the availability and correct operation of a computer system without concern for the information stored or processed by the computer. Governments, military, corporations, financial institutions, hospitals, and private businesses amass a great deal of confidential information about their employees, customers, products, research, and financial status. Most of this information is now collected, processed and stored on electronic computers and transmitted across networks to other computers. Should confidential information about a business' customers or finances or new product line fall into the hands of a competitor, such a breach of security could lead to lost business, law suits or even bankruptcy of the business. Protecting confidential information is a business requirement, and in many cases also an ethical and legal requirement. For the individual, information security has a significant effect on privacy, which is viewed very differently in different cultures. The field of information security has grown and evolved significantly in recent years. As a career choice there are many ways of gaining entry into the field. It offers many areas for specialization including: securing network(s) and allied infrastructure, securing applications and databases, security testing, information systems auditing, business continuity planning and digital forensics science, to name a few, which are carried out by Information Security Consultants This article presents a general overview of information security and its core concepts.

4. Security classification for information: An important aspect of information security and risk management is recognizing the value of information and defining appropriate procedures and protection requirements for the information. Not all information is equal and so not all information requires the same degree of protection. This requires information to be assigned a security classification. The first step in information classification is to identify a member of senior management as the owner of the particular information to be classified. Next, develop a classification policy. The policy should describe the different classification labels, define the criteria for information to be assigned a particular label, and list the required security controls for each classification.

Some factors that influence which classification information should be assigned include how much value that information has to the organization, how old the information is and whether or not the information has become obsolete. Laws and other regulatory requirements are also important considerations when classifying information. The type of information security classification labels selected and used will depend on the nature of the organization, with examples being: In the business sector, labels such as: **Public, Sensitive, Private,**

5. Basic principles:

Key concepts: For over twenty years, information security has held confidentiality, integrity and availability (known as the CIA triad) as the core principles of information security. Many information security professionals firmly believe that Accountability should be added as a core principle of information security.

Confidentiality: Confidentiality is the term used to prevent the disclosure of information to unauthorized individuals or systems. For example, a credit card transaction on the Internet requires the credit card number to be transmitted from the buyer to the merchant and from the merchant to a transaction processing network. The system attempts to enforce confidentiality by encrypting the card number during transmission, by limiting the places where it might appear (in databases, log files, backups, printed receipts, and so on), and by restricting access to the places where it is stored. If an unauthorized party obtains the card number in any way, a breach of confidentiality has occurred. Breaches of confidentiality take many forms. Permitting someone to look over your shoulder at your computer screen while you have confidential data displayed on it could be a breach of confidentiality. If a laptop computer containing sensitive information about a company's employees is stolen or sold, it could result in a breach of confidentiality. Giving out confidential information over the telephone is a breach of confidentiality if the caller is not authorized to have the information. Confidentiality is necessary (but not sufficient) for maintaining the privacy of the people whose personal information a system holds.

Integrity: In information security, integrity means that data cannot be modified without authorization. This is not the same thing as referential integrity in databases. Integrity is violated when an employee accidentally or with malicious intent deletes important data files, when a computer virus infects a computer, when an employee is able to modify his own salary in a payroll database, when an Unauthorized user vandalizes a web site, when someone is able to cast a very large number of votes in an online poll, and so on. There are many ways in which integrity could be violated without malicious intent. In the simplest case, a user on a system could mis-type someone's address. On a larger scale, if an automated process is not written and tested correctly, bulk updates to a database could alter data in an incorrect way, leaving the integrity of the data compromised. Information security professionals are tasked with finding ways to implement controls that prevent errors of integrity.

Availability: For any information system to serve its purpose, the information must be available when it is needed. This means that the computing systems used to store and process the information, the security controls used to protect it, and the communication channels used to access it must be functioning correctly. High availability systems aim to remain available at all times, preventing service disruptions due to power outages, hardware failures, and system upgrades. Ensuring availability also involves preventing denial-of-service attacks. In 2002, Donn Parker proposed an alternative model for the classic CIA triad that he called the six atomic elements of information. The elements are confidentiality, possession, integrity, authenticity, availability, and utility. The merits of the Parkerian hexed are a subject of debate amongst security professionals.

Authenticity: In computing, e-Business and information security it is necessary to ensure that the data, transactions, communications or documents (electronic or physical) are genuine. It is also important for authenticity to validate that both parties involved are who they claim they are.

Non-repudiation: In law, non-repudiation implies one's intention to fulfill their obligations to a contract. It also implies that one party of a transaction cannot deny having received a transaction nor can the other party deny having sent a transaction. Electronic commerce uses technology such as digital signatures and encryption to establish authenticity and non-repudiation.

6. **Risk management:** A comprehensive treatment of the topic of risk management is beyond the scope of this article. However, a useful definition of risk management will be provided as well as some basic terminology and a commonly used process for risk management. The CISA Review Manual 2006 provides the following definition of risk management: "Risk management is the process of identifying vulnerabilities and threats to the information resources used by an organization in achieving business objectives, and deciding what countermeasures, if any, to take in reducing risk to an acceptable level, based on the value of the information resource to the organization."[2] There are two things in this definition that may need some clarification. First, the process of risk management is an ongoing iterative process. It must be repeated indefinitely. The business environment is constantly changing and new threats and vulnerability emerge every day. Second, the choice of countermeasures (controls) used to manage risks must strike a balance between productivity, cost, effectiveness of the countermeasure, and the value of the informational asset being protected. **Risk** is the likelihood that something bad will happen that causes harm to an informational asset (or the loss of the asset). Vulnerability is a weakness that could be used to endanger or cause harm to an informational asset. A **threat** is anything (man made or act of nature) that has the potential to cause harm. The likelihood that a threat will use a vulnerability to cause harm creates a risk. When a threat does use a vulnerability to inflict harm, it has an impact. In the context of information security, the impact is a loss of availability, integrity, and confidentiality, and possibly other losses (lost income, loss of life, loss of real property). It should be pointed out that it is not possible to identify all risks, nor is it possible to eliminate all risk. The remaining risk is called *residual risk.*

A risk assessment is carried out by a team of people who have knowledge of specific areas of the business. Membership of the team may vary over time as different parts of the business are assessed. The assessment may use a subjective qualitative analysis based on informed opinion, or where reliable dollar figures and historical information is available, the analysis may use quantitative analysis. The ISO/IEC 27002:2005 Code of practice for information security management recommends the following be examined during a risk assessment:

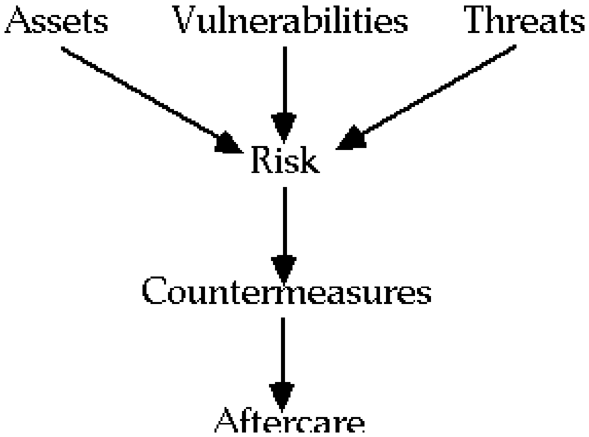
- security policy,
- organization of information security,
- asset management,
- human resources security,
- physical and environmental security,

- communications and operations management,
- access control,
- information systems acquisition, development and maintenance,
- information security incident management,
- business continuity management, and
- Regulatory compliance.

In broad terms the risk management process consists of:

1. Identification of assets and estimating their value. Include: people, buildings, hardware, software, data (electronic, print, and other), supplies.
2. Conduct a threat assessment. Include: Acts of nature, acts of war, accidents, malicious acts originating from inside or outside the organization.
3. Conduct a vulnerability assessment, and for each vulnerability, calculate the probability that it will be exploited. Evaluate policies, procedures, standards, training, physical security, quality control, technical security.
4. Calculate the impact that each threat would have on each asset. Use qualitative analysis or quantitative analysis.
5. Identify, select and implement appropriate controls. Provide a proportional response. Consider productivity, cost effectiveness, and value of the asset.
6. Evaluate the effectiveness of the control measures. Ensure the controls provide the required cost effective protection without discernible loss of productivity.

For any given risk, Executive Management can choose to **accept the risk** based upon the relative low value of the asset, the relative low frequency of occurrence, and the relative low impact on the business. Or, leadership may choose to **mitigate the risk** by selecting and implementing appropriate control measures to reduce the risk. In some cases, the risk can be **transferred** to another business by buying insurance or outsourcing to another business. The reality of some risks may be disputed. In such cases leadership may choose to **deny the risk**. This is itself a potential risk.



- use a risk management model to manage threat

7. **Controls:** When Management chooses to mitigate a risk, they will do so by implementing one or more of three different types of controls.

8. **Administrative:** Administrative controls (also called procedural controls) consist of approved written policies, procedures, standards and guidelines. Administrative controls form the framework for running the business and managing people. They inform people on how the business is to be run and how day to day operations are to be conducted. Laws and regulations created by government bodies are also a type of administrative control because they inform the business. Some industry sectors have policies, procedures, standards and guidelines that must be followed - the Payment Card Industry (PCI) Data Security Standard required by Visa and Master Card is such an example. Other examples of administrative controls include the corporate security policy, password policy, hiring policies, and disciplinary policies. Administrative controls form the basis for the selection and implementation of logical and physical controls. Logical and physical controls are manifestations of administrative controls. Administrative controls are of paramount importance.

9. **Logical:** Logical controls (also called technical controls) use software and data to monitor and control access to information and computing systems. For example: passwords, network and host based firewalls, network intrusion detection systems, access control lists, and data encryption are logical controls. An important logical control that is frequently overlooked is the **principle of least privilege**. The principle of least privilege requires that an individual, program or system process is not granted any more access privileges than are necessary to perform the task. A blatant example of the failure to adhere to the principle of least privilege is logging into Windows as user Administrator to read Email and surf the Web. Violations of this principle can also occur when an individual collects additional access privileges over time. This happens when employees' job duties change, or they are promoted to a new position, or they transfer to another department. The access privileges required by their new duties are frequently added onto their already existing access privileges which may no longer be necessary or appropriate.

10. **Physical:** Physical controls monitor and control the environment of the work place and computing facilities. They also monitor and control access to and from such facilities. For example: doors, locks, heating and air conditioning, smoke and fire alarms, fire suppression systems, cameras, barricades, fencing, security guards, cable locks, etc. Separating the network and work place into functional areas are also physical controls. An important physical control that is frequently overlooked is the **separation of duties**. Separation of duties ensures that an individual can not complete a critical task by himself. For example: an employee who submits a request for reimbursement should not also be able to authorize payment or print the check. An applications programmer should not also be the server administrator or the database administrator - these roles and responsibilities must be separated from one another.

11. **Confidential**.

- In the government sector, labels such as: **Unclassified**, **Sensitive But Unclassified**, **Restricted**, **Confidential**, **Secret**, **Top Secret** and their non-English equivalents.
- In cross-sectoral formations, the Traffic Light Protocol, which consists of: **White, Green, Amber** and **Red**.

All employees in the organization, as well as business partners, must be trained on the classification schema and understand the required security controls and handling procedures for each classification. The classification a particular information asset has been assigned should be reviewed periodically to ensure the classification is still appropriate for the information and to ensure the security controls required by the classification are in place.

12. **Access control:** Access to protected information must be restricted to people who are authorized to access the information. The computer programs, and in many cases the computers that process the information, must also be authorized. This requires that mechanisms be in place to control the access to protected information. The sophistication of the access control mechanisms should be in parity with the value of the information being protected - the more sensitive or valuable the information the stronger the control mechanisms need to be. The foundation on which access control mechanisms are built start with identification and authentication.

13. **Identification** is an assertion of who someone is or what something is. If a person makes the statement *"Hello, my name is John Doe."* they are making a claim of who they are. However, their claim may or may not be true. Before John Doe can be granted access to protected information it will be necessary to verify that the person claiming to be John Doe really is John Doe.

14. **Authentication** is the act of verifying a claim of identity. When John Doe goes into a bank to make a withdrawal, he tells the bank teller he is John Doe (a claim of identity). The bank teller asks to see a photo ID, so he hands the teller his driver's license. The bank teller checks the license to make sure it has John Doe printed on it and compares the photograph on the license against the person claiming to be John Doe. If the photo and name match the person, then the teller has authenticated that John Doe is who he claimed to be.

There are three different types of information that can be used for authentication: **something you know, something you have, or something you are.** Examples of *something you know* include such things as a PIN, a password, or your mother's maiden name. Examples of *something you have* include a driver's license or a magnetic swipe card. *Something you are* refers to biometrics. Examples of biometrics include palm prints, finger prints, voice prints and retina (eye) scans. Strong authentication requires providing information from two of the three different types of authentication information. For example, something you know plus something you have. This is called two factor authentication. On computer systems in use today, the Username is the most common form of identification and the Password is the most common form of authentication. Usernames and passwords have served their purpose but in our modern world they are no longer adequate. Usernames and passwords are slowly being replaced with more sophisticated authentication mechanisms. After a person, program or computer has successfully been identified and authenticated then it must be determined what informational resources they are permitted to access and what actions they will be allowed to perform (run, view, create, delete, or change). This is called **authorization**. Authorization to access information and other computing services begins with administrative policies and procedures. The policies prescribe what information and computing services can be accessed, by whom, and under what conditions. The access control mechanisms are then configured to enforce these policies. Different computing systems are equipped with different kinds of access control mechanisms - some may even offer a choice of different access control mechanisms. The access control mechanism a system offers will be based upon one of three approaches to access control or it may be derived from a combination of the three approaches. The non-discretionary approach consolidates all access control under a centralized administration. The access to information and other resources is usually based on the individuals function (role) in the organization or the tasks the individual must perform. The discretionary approach gives the creator or owner of the information resource the ability to control access to those resources. In the Mandatory access control approach, access is granted or denied basing upon the security classification assigned to the information resource. Examples of common access control mechanisms in use today include Role-based access control available in many advanced Database Management Systems, simple file permissions provided in the UNIX and Windows operating systems, Group Policy. Objects provided in Windows network systems, Kerberos, RADIUS, TACACS, and the simple access lists used in many firewalls and routers. To be effective, policies and other security controls must be enforceable and upheld. Effective policies ensure that people are held **accountable** for their actions. All failed and successful authentication attempts must be logged, and all access to information must leave some type of audit trail.

Firewalls: As we've seen in our discussion of the Internet and similar networks, connecting an organization to the Internet provides a two-way flow of traffic. This is clearly undesirable in many organizations, as proprietary information is often displayed freely within a corporate *intranet* (that is, a TCP/IP network, modeled after the Internet that only works within the organization). In order to provide some level of separation between an organization's intranet and the Internet, *firewalls* have been employed. A firewall is simply a group of components that collectively form a barrier between two networks. A number of terms specific to firewalls and networking are going to be used throughout this section, so let's introduce them all together.

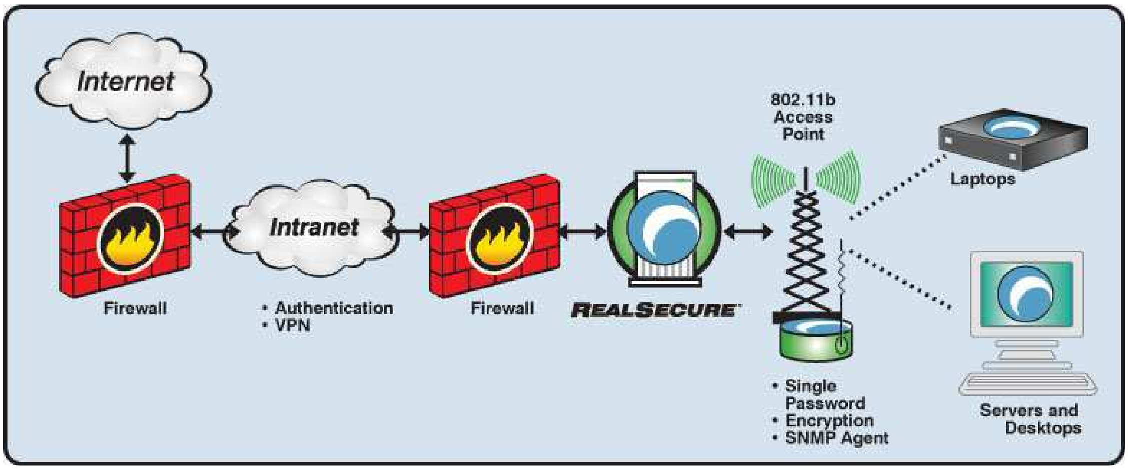
Bastion host: A general-purpose computer used to control access between the internal (private) network (intranet) and the Internet (or any other untrusted network). Typically, these are hosts running a flavor of the Unix operating system that has been customized in orderto reduce its functionality to only what is necessary in order to support its functions. Many of the general-purpose features have been turned off, and in many cases, completely removed, in order to improve the security of the machine.

Router: A special purpose computer for connecting networks together. Routers also handle certain functions, such as *routing* , or managing the traffic on the networks they connect.

Access Control List (ACL): Many routers now have the ability to selectively perform their duties, based on a number of facts about a packet that comes to it. This includes things like origination address, destination address, destination service port, and so on. These can be employed to limit the sorts of packets that are allowed to come in and go out of a given network.

Demilitarized Zone (DMZ): The DMZ is a critical part of a firewall: it is a network that is neither part of the untrusted network, nor part of the trusted network. But, this is a network that connects the untrusted to the trusted. The importance of a DMZ is tremendous: someone who breaks into your network from the Internet should have to get through several layers in order to successfully do so. Those layers are provided by various components within the DMZ.

Proxy: This is the process of having one host act in behalf of another. A host that has the ability to fetch documents from the Internet might be configured as a *proxy server* , and host on the intranet might be configured to be *proxy clients* . In this situation, when a host on the intranet wishes to fetch the <http://www.interhack.net/> web page, for example, the browser will make a connection to the proxy server, and request the given URL. The proxy server will fetch the document, and return the result to the client. In this way, all hosts on the intranet are able to access resources on the Internet without having the ability to direct talk to the Internet.

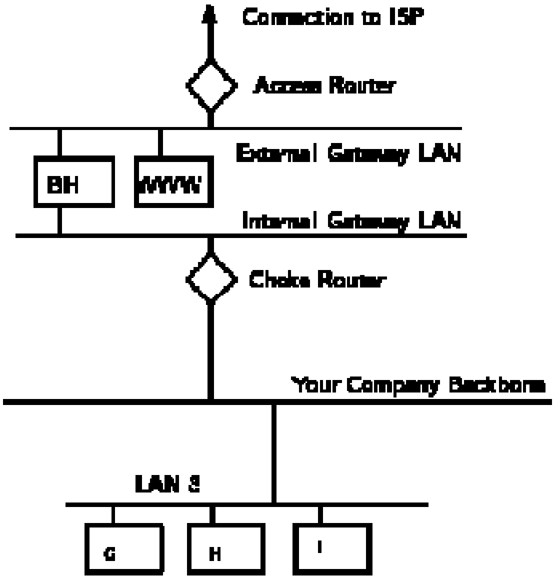


15. **Types of Firewalls:**

There are three basic types of firewalls, and we'll consider each of them.

Application Gateways: The first firewalls were application gateways, and are sometimes known as proxy gateways. These are made up of bastion hosts that run special software to act as a proxy server. This software runs at the *Application Layer* of our old friend the ISO/OSI Reference Model, hence the name. Clients behind the firewall must be *proxitized* (that is, must know how to use the proxy, and be configured to do so) in order to use Internet services. Traditionally, these have been the most secure, because they don't allow anything to pass by default, but need to have the programs written and turned on in order to begin passing traffic.

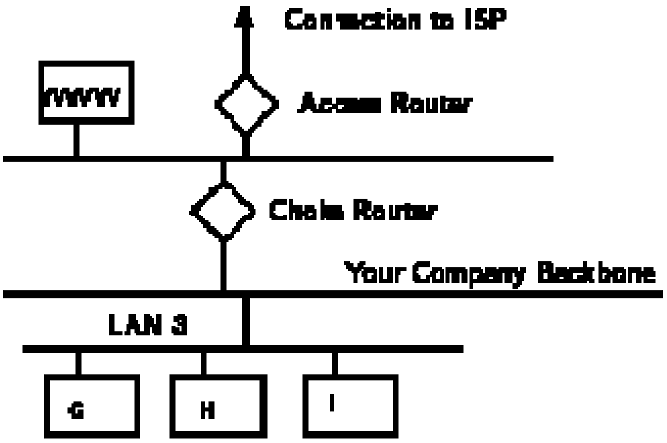
A sample application gateway.



These are also typically the slowest, because more processes need to be started in order to have a request serviced. Figure shows a application gateway.

16. Packet Filtering: Packet filtering is a technique whereby routers have *ACLs* (Access Control Lists) turned on. By default, a router will pass all traffic sent it, and will do so without any sort of restrictions. Employing ACLs is a method for enforcing your security policy with regard to what sorts access you allow the outside world to have to your internal network, and vice versa. There is less overhead in packet filtering than with an application gateway, because the feature of access control is performed at a lower ISO/OSI layer (typically, the transport session layer). Due to the lower overhead and the fact that packet filtering is done with routers, which are specialized computers optimized for tasks related to networking, a packet filtering gateway is often much faster than its application layer cousins. Figure shows a packet filtering gateway. Because we're working at a lower level, supporting new applications either comes automatically, or is a simple matter of allowing a specific packet type to pass through the gateway. (Not that the *possibility* of something automatically makes it a good idea; opening things up this way might very well compromise your level of security below what your policy allows.) There are problems with this method, though. Remember, TCP/IP has absolutely no means of guaranteeing that the source address is really what it claims to be. As a result, we have to use layers of packet filters in order to localize the traffic. We can't get all the way down to actual host, but with two layers of packet filters, we can differentiate between a packet that came from the Internet and one that came from our internal network. We can identify which network the packet came from with certainty, but we can't get more specific than that.

A sample packet filtering gateway



Hybrid Systems: In an attempt to marry the security of the application layer gateways with the flexibility and speed of packet filtering, some vendors have created systems that use the principles of In some of these systems, new connections must be authenticated and approved at the to application layer. Once this has been done, the remainder of the connection is passed down to the session layer, where packet filters watch the connection to ensure that only packets are part of an ongoing (already authenticated and approved) conversation are being passed. Other possibilities include using both packet filtering and application layer proxies. The benefits here include providing a measure of protection against your machines that services to the Internet (such as a public web server), as well as provide the security of an application layer gateway to the internal network. Additionally, using this method, an attacker, in order to get to services on the internal network, will have to break through access router, the bastion host, and the choke router.

Single Points of Failure: Many ``firewalls'' are sold as a single component: a bastion host, or some other black box that you plug your networks into to and get a warm-fuzzy, feeling safe and secure. *The term* and get a warm *``firewall'' refers to a number of components that collectively provide the security of the system.* Any time there is only one component paying attention to what's going on between the internal and external networks, an attacker has only one thing to break (or fool!) in order to gain complete access to your internal networks.

Secure Network Devices: It's important to remember that the firewall is only one entry point to your network. Modems, if you allow them to answer incoming calls, can provide an easy means for an attacker to sneak *around* (rather than *through)* your front door (or, firewall). Just as castles weren't built with moats only in the front, your network needs to be protected at all of its entry points.

Secure Modems; Dial-Back Systems: If modem access is to be provided, this should be guarded carefully. The *terminal server*, or network device that provides dial-up access to your network needs to be actively administered, and its logs need to be examined for strange behavior. Its passwords need to be strong -- not ones that can be guessed. Accounts that aren't actively used should be disabled. In short, it's the easiest way to get into your network from remote: guard it carefully. There are some remote access systems that have the feature of a two-part procedure to establish a connection. The first part is the remote user dialing into the system, and providing the correct user ID and password. The system will then drop the connection, and call the authenticated user back at a known telephone number. Once the remote user's system answers that call, the connection is established, and the user is on the network. This works well for folks working at home, but can be problematic for users wishing to dial in from hotel rooms and such when on business trips. Other possibilities include one-time password schemes, where the user enters his user ID, and is presented with a ``challenge,'' a string of between six and eight numbers. He types this challenge into a small device that he carries with him that looks like a calculator. He then presses enter, and a ``response'' is displayed on the LCD screen. The user types the response, and if all is correct, he login will proceed. These are useful devices for solving the problem of good passwords, without requiring dial-back access. However, these have their own problems, as they require the user to carry them, and they must be tracked, much like building and office keys. No doubt many other schemes exist. Take a look at your options, and find out how what the vendors have to offer will help you *enforce your security policy effectively*.

Crypto-Capable Routers: A feature that is being built into some routers is the ability to use session encryption between specified routers. Because traffic traveling across the Internet can be seen by people in the middle who have the resources (and time) to snoop around, these are advantageous for providing connectivity between two sites, such that there can be secure routes. See the Snake Oil for a description of cryptography, ideas for evaluating cryptographic products, and how to determine which will most likely meet your needs.

Virtual Private Networks: Given the ubiquity of the Internet, and the considerable expense in private leased lines, many organizations have been building *VPNs* (Virtual Private Networks). Traditionally, for an organization to provide connectivity between a main office and a satellite one, an expensive data line had to be leased in order to provide direct connectivity between the two offices. Now, a solution that is often more economical is to provide both offices connectivity to the Internet. Then, using the Internet as the medium, the two offices can communicate.

The danger in doing this, of course, is that there is no privacy on this channel, and it's difficult to provide the other office access to ``internal'' resources without providing those resources to everyone on the Internet. VPNs provide the ability for two offices to communicate with each other in such a way that it looks like they're directly connected over a private leased line. The session between them, although going over the Internet, is private (because the link is encrypted), and the link is convenient, because each can see each others' internal resources without showing them off to the entire world. A number of firewall vendors are including the ability to build VPNs in their offerings, either directly with their base product, or as an add-on. If you have need to connect several offices together, this might very well be the best way to do it.

17. Security management: Security Management for networks is different for all kinds of situations. A small home or an office would only require basic security while large businesses will require high maintenance and advanced software and hardware to prevent malicious attacks from hacking and spamming.

Small homes

- A basic firewall like COMODO Internet Security or a unified threat Management system.
- For Windows users, basic Antivirus software like AVG Antivirus, ESET

NOD32 Antivirus, Kaspersky, McAfee, Avast!, Zone Alarm Security Suite or Norton AntiVirus. An anti-spyware program such as Windows Defender or Spybot would also be a good idea. There are many other types of antivirus or anti-spyware programs out there to be considered.

- When using a wireless connection, use a robust password. Also try to use the strongest security supported by your wireless devices, such as WPA2 with AES encryption.
- If using Wireless: Change the default SSID network name, also disable SSID Broadcast; as this function is unnecessary for home use. (However, many security experts consider this to be relatively useless. http://blogs.zdnet.com/Ou/index.php?p=43)
- Enable MAC Address filtering to keep track of all home network MAC devices connecting to your router.
- Assign STATIC IP addresses to network devices.
- Disable ICMP ping on router.
- Review router or firewall logs to help identify abnormal network connections or traffic to the Internet.
- Use passwords for all accounts.
- Have multiple accounts per family member, using non-administrative accounts for day-to-day activities. Disable the guest account (Control Panel> Administrative Tools> Computer Management> Users).
- Raise awareness about information security to children.[5]

Medium businesses

- A fairly strong firewall or Unified Threat Management System
- Strong Antivirus software and Internet Security Software.
- For authentication, use strong passwords and change it on a biweekly/ monthly basis.
- When using a wireless connection, use a robust password.
- Raise awareness about physical security to employees.
- Use an optional network analyzer or network monitor.
- An enlightened administrator or manager.

Large businesses

- A strong firewall and proxy to keep unwanted people out.
- A strong Antivirus software package and Internet Security Software package.

- For authentication, use strong passwords and change it on a weekly/biweekly basis.
- When using a wireless connection, use a robust password.
- Exercise physical security precautions to employees.
- Prepare a network analyzer or network monitor and use it when needed.
- Implement physical security management like closed circuit television for entry areas and restricted zones.
- Security fencing to mark the company's perimeter.
- Fire extinguishers for fire-sensitive areas like server rooms and security rooms.
- Security guards can help to maximize security.

School

- An adjustable firewall and proxy to allow authorized users access from the outside and inside.
- Strong Antivirus software and Internet Security Software packages.
- Wireless connections that lead to firewalls.
- Children's Internet Protection Act compliance.
- Supervision of network to guarantee updates and changes based on popular site usage.
- Constant supervision by teachers, librarians, and administrators to guarantee protection against attacks by both internet and sneaker net sources.

Large government

- A strong firewall and proxy to keep unwanted people out.
- Strong Antivirus software and Internet Security Software suites.
- Strong encryption.
- White list authorized wireless connection, block all else.
- All network hardware is in secure zones.
- All host should be on a private network that is invisible from the outside.
- Put web servers in a DMZ, or a firewall from the outside and from the inside.
- Security fencing to mark perimeter and set wireless range to this.

18. Chinese hackers may have leaked out India's defense secrets:

New York: India's major missile and armament systems and diplomatic and security documents may have been compromised as Chinese hackers reportedly sneaked into top-secret cyber files of the Union defense ministry and missions around the world.

19. Conclusion: Information security is the ongoing process of exercising due care and due diligence to protect information, and information systems, from unauthorized access, use, disclosure, destruction, modification, or disruption or distribution. The never ending process of information security involves ongoing training, assessment, protection, monitoring & detection, incident response & repair, documentation, and review. This makes Information Security Consultant an indispensable part of all the business operations across different domains.

20. References

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