Chapter 3
Introduction to Network Security

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ABSTRACT

Writing a chapter on network security is something like writing a brief introduction to flying a commercial airliner. Dissimilar, data communications of the past, today's networks incorporate varied devices that handle the data because it passes from the sender to the receiver. The first question to address is what we mean "network security". Network security consists of the provisions and policies adopted by a network administrator to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources. A generic definition of security is "freedom from risk or danger and safety". However it is not only human errors that can cause problem to network security, problems can also be caused by natural forces like fire breakouts, earthquakes, floods lightning etc. The ways network administrators think about securing networks has been changed by an increasingly dynamic and technically challenging risk environment. Security is an assessment of risk. Secure environments are designed and developed through an intentional effort.

INTRODUCTION

A computer network or just a network could be an assortment of connected computers. Two or a lot of computer systems are thought about as connected, if they will send and receive information from one another through a shared access medium. The communication entities in a computer network are typically called *principles, subjects or entities*. These principals will be additional divided into users, hosts and processes.

- A user could be a human entity, to blame for its actions in a computer network.
- A host is associate degree available entity inside a computer network. Every host incorporates a distinctive address inside a network.
- A method is associate degree instance of associate degree viable program. It's employed in client / server model, so as to tell apart between the consumer and also the server processes.
- A client method could be a method that creates requests of a network services.
- A server method could be a method that gives a network services.

In order to formalize the method that networking is performed, network reference models are developed, that cluster similar functions into abstractions called layers. Every layer's functions will communicate with a similar layer's functions of another network host. On a similar host, the functions of a selected layer have interfaces to speak with the layers bellow and on top of it. This abstraction simplifies and properly defines the mandatory actions for networking.

The *International Standards Organization (ISO)* and *Open Systems Interconnection (OSI)* reference models outline seven network layers, further as their interfaces. Every layer depends on the services provided by its intermediate lower layer all the method all the way down to the physical network interface card and also the wiring. Then, it provides its services to its immediate higher layer, all the far to the running application. The network layers within the *ISO/OSI reference model* are the subsequent (from all-time low to highest): 1) The Physical Layer 2) the info Link Layer 3) The Network Layer 4) The Transport Layer 5) The Session Layer 6) The Presentation Layer 7) the applying Layer. A lot of details on network reference model will be found in Models and stratified Protocol Organization.

Each reference model wants a collection of network protocol so as to implement the functions of every layer. Generally, a network protocol could be a well-defined specification that permits network hosts to speak in a very explicit and predefined ways that. From a degree of read, protocols outline the "syntax" of the communication. By properly combining protocols in protocol stacks, the layers of network reference models will be enforced and permit network communication. It must be noted that not all protocol suites embrace all the seven layers of the ISO/OSI model. The foremost standard protocol suite, the *Transmission Call Protocol / Internet Protocol (TCP/IP)*, has 5 layers. There are not any presentation and session layers; the functions of those layers are incorporated within the layers on top of and below. Though elaborated description of the TCP/IP is given elsewhere, it's vital to grasp however it works, so as to grasp network security.

A network is taken into account as a wired or mounted network if the access medium is a few reasonably physical cable affiliations between the computers, like a copper or a fiber optic cable. On the opposite hand, a network is taken into account as a wireless network, if the access medium depends on some reasonably sign through the air, like RF communication. A network can even be divided in keeping with its geographical coverage. Looking on its size, a network will be a private space Network (PAN), an area space Network (LAN), a Metropolitan space Network (MAN), or a large space Network (WAN).

It appears that each different day there's a story within the newspapers a couple of electronic network being compromised by hackers. In fact, not too earlier the *Department of Defense (DoD)* was the victim of a prosperous hacker raid; hackers were able to penetrate DoD computers throughout a two-week amount before they were detected. Fortuitously, the computers contained solely non-classified personnel and payroll data, therefore national security wasn't vulnerable.

More recently, Yahoo, Amazon.com, eBay, and a few different standard *World Wide Web (WWW)* sites were targets of what seems to possess been a coordinated "denial-of-service" attack. Throughout a

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