

FUNDAMENTALS of COMPUTER NETWORKS

Lecture 15.2: Network Security (Part 6)

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Objectives/Outline

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- Briefly discuss VPNs and firewalls

Outline

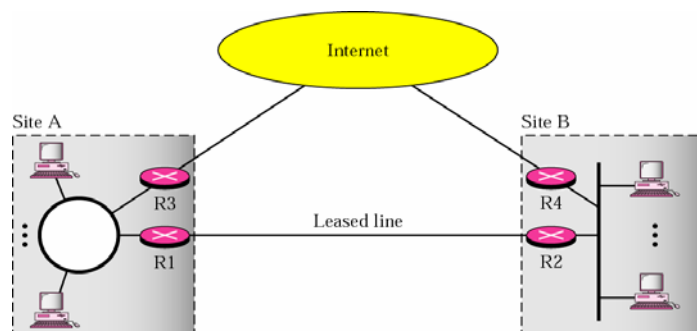
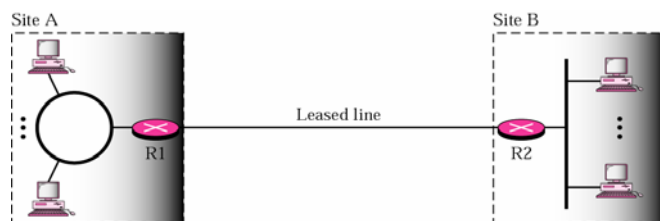
- VPN
- Firewalls

Private Network (Ch. 31.5)

- A private network is designed for use inside an organization to allow access to shared resources and at the same time provide privacy
- There are two related terms
 - Intranet – a private (LAN) network that uses the Internet model; however access is limited to users inside the organization; they use application programs defined for the Internet such as HTTP in addition to file servers, print servers, etc
 - Extranet – the same as intranet with one major difference that some resources may be accessed by specific users (such as authorized customers) outside the organization but under the control of the network admin

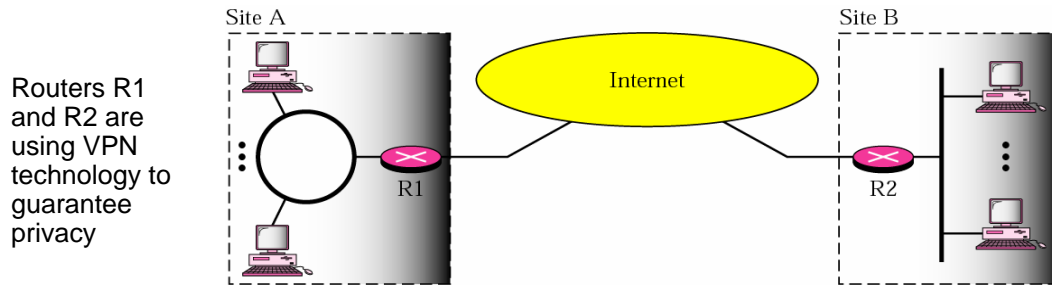
Achieving Privacy

- a. A small organization will have only a single isolated LAN;
- b. A large organization will have several sites that will be connected using a private WAN (e.g. leased line)
- c. Using hybrid network
 - Allows organization to have its own private network (for intra-communication) and at the same time can access the global Internet (to the rest of the world)



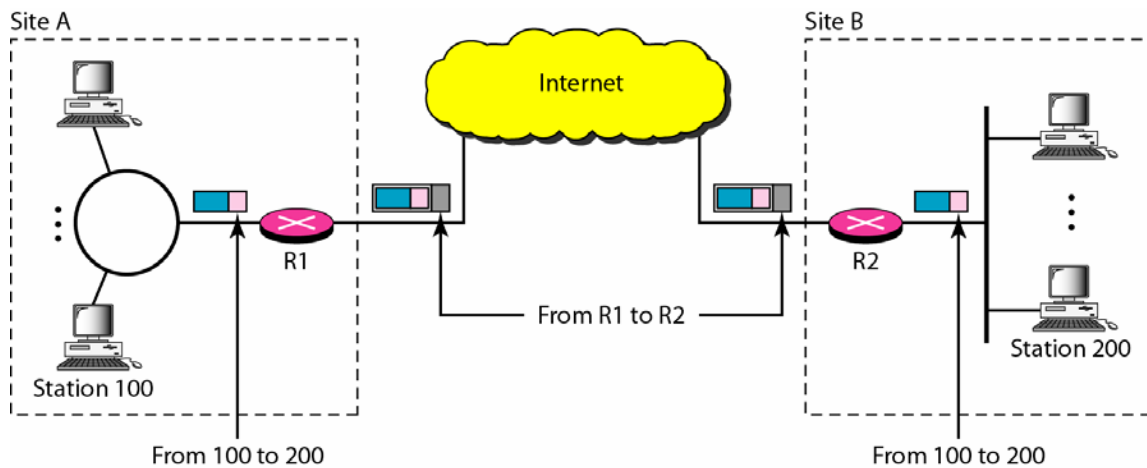
Achieving Privacy (cont'd)

d. Using VPN



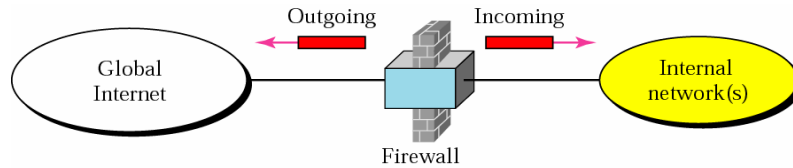
- Virtual Private Network (VPN) is a technology that is gaining popularity among large organizations that use the Internet for both intra- and inter-organization communication but require privacy in their internal communication
- VPN creates a network that is private but virtual (because it does not use real private WAN)
- VPN technology uses IPSec in the tunnel mode to provide authentication, integrity and privacy

Addressing in VPN



Firewalls (Ch. 31.4)

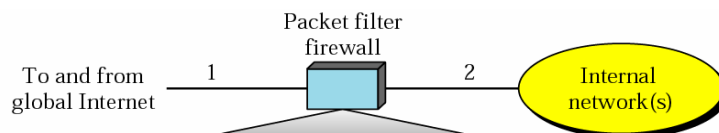
- A firewall is a device (usually a router or computer) installed between an organization's network and the rest of the Internet to control access to the organization's network by filtering exchanged packets.



- Examples of what a firewall can do
 - A firewall may filter all incoming packets destined for a specific host or a specific server such as HTTP
 - It can deny access to a specific service
- Firewalls can be classified as: packet-filter firewall and proxy-based firewall

Packet-Filter Firewall

- It is a router that uses a filtering table to decide which packet must be blocked based on the information in the network layer and transport layer headers (source and destination IP addresses, source and destination ports, type of protocols TCP or UDP)



According to this table:

Incoming pkts from network 131.34.0.0 are blocked (* means any)

Incoming pkts destined for TELNET service are blocked

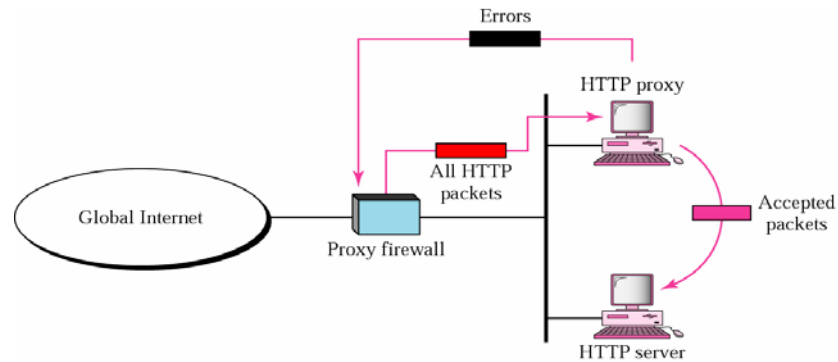
Incoming pkts destined for host 194.78.20.8 are blocked

Outgoing pkts destined for HTTP server are blocked

Interface	Source IP	Source Port	Destination IP	Destination Port
1	131.34.0.0	*	*	*
1	*	*	*	23
1	*	*	194.78.20.8	*
2	*	80	*	*

Proxy-Based Firewall

- It is used to filter a message based on its information content at the application layer
- The firewall first submit the message to a proxy computer (also called application gateway) to be checked then if accepted it will be forwarded to the destination



- Example
 - An organization may want to implement the following policies regarding its web pages: “only Internet users who have previously established business relations with the company can have access”

Where to go next ...

- There several other courses that you can take beyond this fundamental networking course to cover more advanced topics such as the following
 - Network Security
 - Network Management
 - Local Area Networks
 - High Speed Networks
 - Mobile Computing
 - Internet Protocols and Client/Server Programming
 - Web Applications and E-Commerce
 - Computer Network Design
 - Multimedia Networking
 - Computer Network Performance
 - Simulation and Modeling of Computer Networks
 - Distributed Systems
 - etc

The End !!

Good luck in the final and wish you success in your life. Dr. EL-ALFY