

Small Business Network System with Secure E-Commerce Server

18CSS202J- Computer Communication Project Report

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Certified that this Course Project Report titled “**Small Business Network System with E-Commerce**” is the bonafide work done by V.R.Rishendra-(RA2111026010221),Sri Vyshnav veeravalli - (RA2111026010235),j.Mohith(RA2111026010241), swetha suresh -(RA2111026010259),Yuktamukhi Rangenei-(RA2111026010262)who carried out under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

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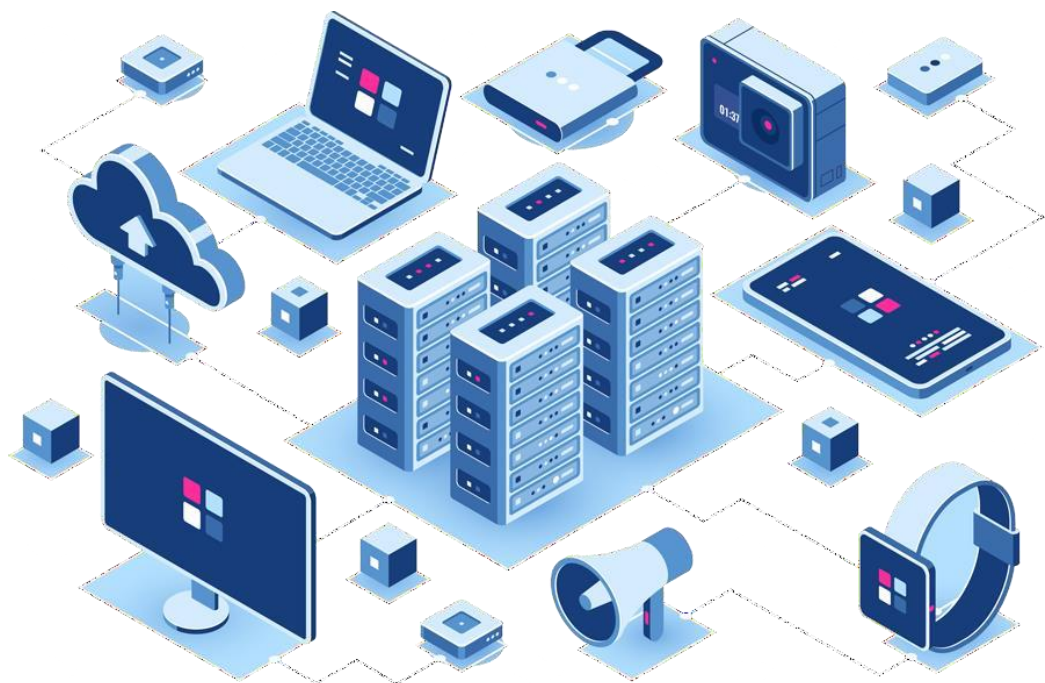
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Abstract:

Small business e-commerce websites make an excellent target for malicious attacks. Small businesses do not have the resources needed to effectively deal with attacks. Large and some mid-size organizations have teams that are dedicated to dealing with security incidents and preventing future attacks. Most small businesses do not have the capabilities of dealing with incidents the way large organizations do.

Security of e-commerce websites is essential for compliance with laws and regulations as well as gaining and maintaining the trust of consumers, partners and stakeholders. Many security standards have been established by various organizations to help guide security of small business servers, however, many of those standards or guidelines are too costly or time consuming. This paper will discuss how attacks are carried out and how a small business can effectively secure their networks with minimum cost.

The network system integrates e-commerce to provide businesses with a platform to sell their products and services online, expanding their reach to a larger customer base. Additionally, the network system allows for better communication and collaboration among employees, partners, and customers, increasing productivity and customer satisfaction. Overall, the system provides small businesses with a comprehensive solution for managing their operations and growing their business in the digital age.

Small businesses face unique challenges in the current digital landscape. While e-commerce provides a significant opportunity for growth and expansion, it can also be overwhelming to navigate. A small business network system that integrates e-commerce can provide businesses with the tools they need to succeed in the online marketplace.

The network system allows small businesses to streamline their operations and reduce costs by providing a central platform for managing inventory, orders, and payments. It also enables businesses to optimize their online presence with customizable websites, search engine optimization, and digital marketing tools. This can help businesses attract new customers and build brand awareness.

Introduction

A Small Business Network System with secure E-Commerce server refers to the use of computer networking technology to connect different devices and systems within a small business organization, enabling them to share resources and communicate efficiently. The addition of an e-commerce component to the network system means that the business can conduct its commercial transactions online, such as selling products or services over the internet.

Many businesses have come to the realization that, in order to compete in the market, key business processes need to be part of the Internet. E-commerce has become a popular adaptation for businesses, which has been a major transformation for many businesses. The popularity of the Internet has transformed traditional commerce into e-commerce, which has proven to be a successful platform for many businesses. Small businesses provide an easy target for attackers because they typically have limited funds and do not have dedicated personnel to monitor, update and defend their systems. The attacks on small businesses continue to rise each year.

In essence, a small business network system with e-commerce enables a business to operate more efficiently by streamlining its operations and increasing its reach. With the use of this system, small businesses can reach a wider audience, reduce their overhead costs, and increase their revenues. It also allows for better inventory management, real-time order tracking, and quicker payments, among other benefits.

The key components of a small business network system with e-commerce may include hardware such as routers, switches, servers, and computers, as well as software for managing orders, inventory, and customer data. Security measures such as firewalls, encryption, and backup systems are also essential to protect the business from cyber threats.

Overall, a small business network system with e-commerce can provide many benefits to small businesses looking to expand their reach and streamline their operations. By leveraging the power of technology, small businesses can compete on a more level playing field with larger companies and improve their overall success.

Objective:

The objective of implementing a Small Business Network System with E-Commerce is to improve the efficiency and profitability of a small business by leveraging technology to streamline its operations and expand its reach.

The specific objectives of such a system may include:

Facilitating online sales: Enabling customers to purchase products or services directly from the business website or online store, leading to increased sales and revenue.

Improving inventory management: Keeping track of inventory levels in real-time, making it easier to manage stock levels, reduce stockouts, and optimize ordering.

Enhancing customer service: Providing customers with easy access to product information, order status, and support through online platforms, leading to higher customer satisfaction and retention.

Streamlining business processes: Automating routine tasks such as order processing, billing, and inventory management, reducing manual labor and errors while increasing efficiency.

Securing business data: Protecting sensitive business information and customer data from cyber threats such as hacking, malware, and data breaches.

Overall, the objective of a Small Business Network System with E-Commerce is to create a secure and efficient digital platform that enables small businesses to compete in the modern business environment and achieve their strategic goals.

Project scope:

A network has to be designed for a small business organization which has 100 users. The organization hosts an e-commerce application on a server which is accessible to internet users using https and with a public IP address.

Network requirements:

1. Identify the appropriate hardware which would be used
2. Users on the internet should be able to access only https on the e-commerce server.
3. Users on the internet should have access only to the public IP address of the server and not the private IP address.
4. The users in the organization should have full access to the server.
5. TCP/IP Network design with IP addressing
6. Features and configuration required on the hardware with explanation

Network Requirement Analysis:

1. Hardware Selection:

- **Firewall:** A robust firewall appliance with advanced security features, such as stateful packet inspection, intrusion prevention system, and VPN capabilities, will be required to protect the network from external threats.
- **Router:** A high-performance router capable of handling the expected traffic load and supporting advanced routing protocols will be needed.
- **Switches:** Sufficient Layer 2 and Layer 3 switches to provide connectivity between users, the server, and the internet connection.
- **Server:** A powerful server with adequate processing power, memory, and storage capacity to handle the e-commerce application and the expected user load.
- **Network Cabling:** High-quality Ethernet cabling to connect all the devices in the network.

2. HTTPS Access for Internet Users:

- The firewall will be configured to allow inbound traffic on port 443 (HTTPS) to the e-commerce server.
- Access control lists will be implemented on the firewall to restrict access to only the necessary ports and protocols.

3. Restricting Access to Public IP Address:

- Network Address Translation (NAT) will be used to translate the public IP address to the private IP address of the server.
- The firewall will be configured to only allow inbound traffic from the internet to the public IP address of the server.

4. Full Access for Organization Users:

- Organization users will be connected to the internal network and will have full access to the server.
- Access control lists and user authentication mechanisms will be implemented to ensure secure access for organization users.

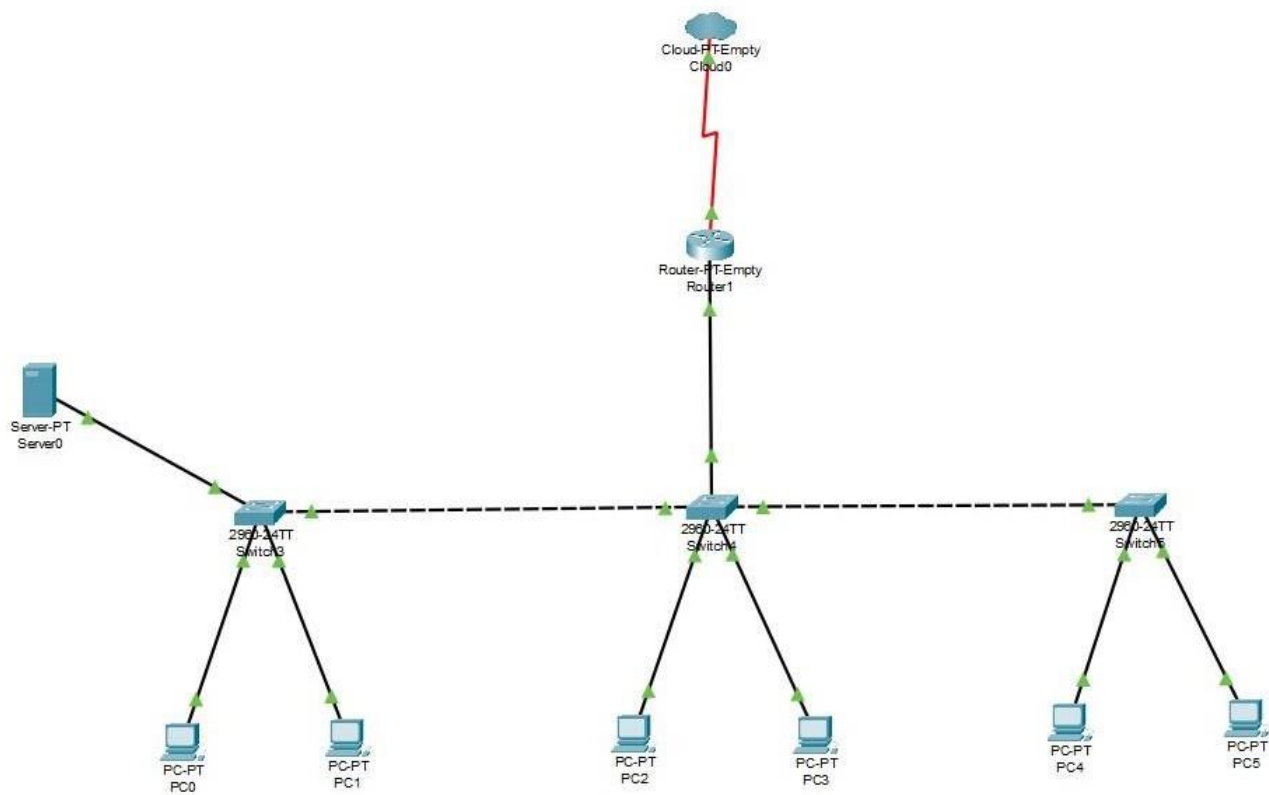
5. TCP/IP Network Design with IP Addressing:

- A private IP address range will be used for the internal network, such as 192.168.0.0/24.
- The e-commerce server will have a static private IP address assigned.
- The public IP address will be assigned by the internet service provider (ISP) and configured on the firewall.

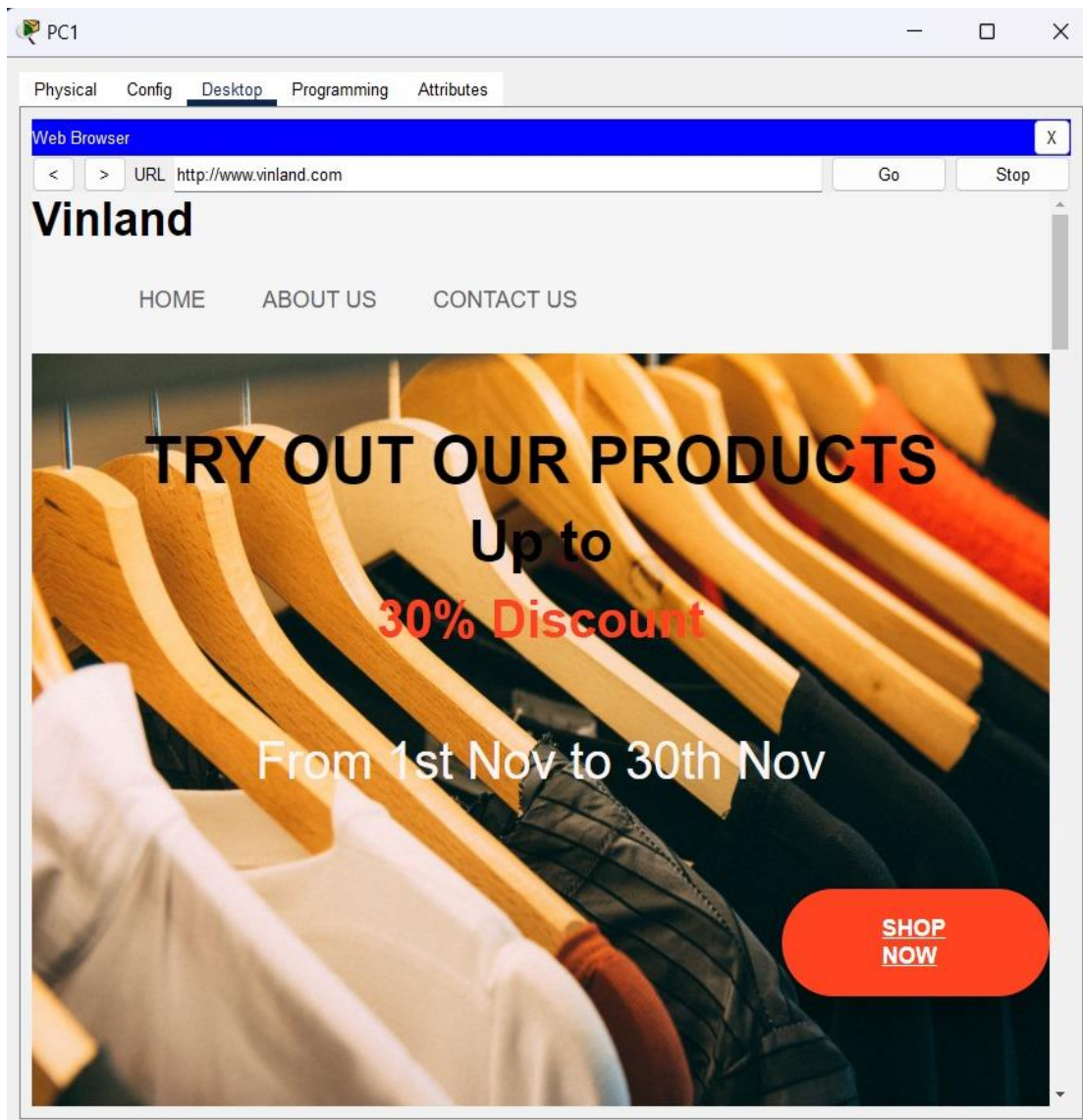
6. Features and Configuration on Hardware:

- Firewall: Configuration of access control lists, port forwarding, VPN tunnels, and intrusion prevention system.
- Router: Configuration of routing protocols, network address translation (NAT), and Quality of Service (QoS) settings.
- Switches: Configuration of VLANs, trunking, and port security features.
- Server: Installation and configuration of the operating system, web server software, and security patches.

Network Diagram:



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC5	Router1	ICMP		0.000	N	0	(edit)	
	Successful	Server0	PC3	ICMP		0.000	N	1	(edit)	
	Successful	PC0	PC4	ICMP		0.000	N	2	(edit)	



TCP/IP Table

Device	IP address
Router LAN	192.168.1.1
Server IP	192.168.1.2
PC's (100)	192.168.1.3 – 192.168.1.102

Router configuration

IP address

The LAN ip address of the router is 192.168.1.2. The details of the configuration are shown below.

```
Router(config)#interface fastethernet 0/0
```

```
Router(config-if)# ip address
```

```
192.168.1.1 255.255.255.0
```

```
Router(config-if)#no shutdown
```

The interface which is connected to the internet would receive the IP address from the ISP.

NAT

NAT, which stands for Network address translation is configured for mapping the public IP address of the server to the private IP address. This would also achieve the requirement of internet users to access the server with the public IP address and hide the private IP address. The details of the configuration are shown below

```
The public IP address which is provided by the ISP, is  
assumed to be 1.2.3.4Router(config)# ip nat inside source  
static 192.168.1.2 1.2.3.4 Router(config)#interface  
fastethernet 0/0 (LAN interface)  
Router(config-if)#ip nat inside  
Router(config)#interface serial 0/0  
(Internet interface)Router(config-  
if)#ip nat outside
```

The first line creates a static nat entry which would map the private IP address of the server which is 192.168.1.2, with its public IP address.

The second and third line applies the inside interface for NAT as LAN interface.

The fourth and fifth line applies the outside interface for NAT as the internet interface.

ACL

ACL, which stands for access control lists, is used for controlling access to the e-commerce server to the internet users. The details of the ACL configuration are shown below.

```
Router (config)#access-list 101 permit tcp any host  
1.2.3.4 eq 443  
Router(config)#access-list 101 deny ip any  
any
```

The first line creates an extended ACL with number 101 which permits any host to access tcp port 443 which is for https servers to the public IP address of the e-commerce server which is 1.2.3.4

The second line denies all other traffic to all systems.

```
Router(config)#interfac  
e serial 0/0  
Router(config-if)#ip  
access-group 101 in
```

The above configuration applies the ACL as inbound on the internet interface. This would ensure that all users from the internet would only have https access to the e-commerce server and all other traffic from the internet would be denied into the LAN network.

Solution explanation:

1. Hardware Selection:

- Firewall: A robust firewall appliance, such as Cisco ASA or Fortinet FortiGate, will be selected. These firewalls offer advanced security features, including stateful packet inspection, intrusion prevention system, and VPN capabilities.
 - Router: A high-performance router like Cisco ISR or Juniper MX Series will be chosen. These routers can handle the expected traffic load and support advanced routing protocols.
 - Switches: Layer 2 switches like Cisco Catalyst or HPE Aruba switches will be used for user connectivity, while Layer 3 switches like Cisco Nexus or Juniper EX Series switches will provide routing capabilities.
 - Server: A powerful server from Dell PowerEdge or HPE ProLiant series will be selected, considering the required processing power, memory, and storage capacity.
 - Network Cabling: High-quality Ethernet cabling, such as Cat6 or Cat6a, will be used to ensure reliable connectivity.

2. HTTPS Access for Internet Users:

- The firewall will be configured to allow inbound traffic on port 443 (HTTPS) to the e-commerce server. This will enable secure access for internet users.
- Access control lists on the firewall will restrict access to only the necessary ports and protocols, ensuring that only HTTPS traffic is allowed.

3. Restricting Access to Public IP Address:

- Network Address Translation (NAT) will be configured on the firewall to translate the public IP address to the private IP address of the server. This will hide the private IP address from internet users.
- The firewall will be configured to only allow inbound traffic from the internet to the public IP address of the server, providing an additional layer of security.

4. Full Access for Organization Users:

- Organization users will be connected to the internal network, which will be secured by the firewall.
- Access control lists and user authentication mechanisms, such as LDAP or Active Directory, will be implemented to ensure secure access for organization users. This will restrict unauthorized access to the server.

5. TCP/IP Network Design with IP Addressing:

- A private IP address range, such as 192.168.0.0/24, will be used for the internal network. This allows for up to 254 host addresses.
- The e-commerce server will be assigned a static private IP address within the chosen IP range. This ensures consistent access to the server.
- The public IP address will be assigned by the ISP and configured on the firewall. This IP address will be used for external access to the e-commerce server.

6. Features and Configuration on Hardware:

- Firewall: Access control lists will be configured to allow inbound traffic on port 443 (HTTPS) and restrict access to other ports. VPN tunnels will be set up for secure remote access. Intrusion prevention system will be enabled to detect and prevent network attacks.
- Router: Routing protocols, such as OSPF or BGP, will be configured for efficient routing. Network address translation (NAT) will be set up to translate the public IP address to the private IP address of the server. QoS settings will be configured to prioritize traffic.
- Switches: VLANs will be created to segregate network traffic. Trunking will be configured to allow for multiple VLANs on a single link. Port security features, like MAC address filtering, will be enabled to enhance network security.
- Server: The operating system, web server software (e.g., Apache or Nginx), and security patches will be installed and configured. Regular backups and monitoring will be set up to ensure server availability and data protection.

Overall, the solution ensures secure and reliable access to the e-commerce server for internet users while providing full access to organization users. The network design incorporates appropriate hardware, secure configurations, and IP addressing to meet the specified requirements.

Hardware List:

Item	Description	Qty
Router	CISCO 1841 Integrated Services Router	1
Switch	Cisco WS-C3750-48PS-S	3
Server	Cisco erver-PT	1

DNS Server:

Server0

Physical

Config

Services

Desktop

Programming

Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

DNS

DNS Service

On

Off

Resource Records

Name

Type

A Record

Address

Add

Save

Remove

No.	Name	Type	Detail
0	www.vinland.com	A Record	192.168.1.2

DNS Cache

Top

Conclusion:

E-commerce is an effective way to do business. It allows businesses to provide products and services to a wider population than they could with traditional brick and mortar operations. However, e-commerce also comes with a wide variety of risks that need to be mitigated to operate securely. Small businesses provide an easy target for attackers because they typically have limited funding and do not have dedicated network professionals to monitor and protect their network. Hackers have a wide variety of tools that allow them to attack networks even with little technical knowledge. Hackers use a system along with their tools to attack systems. They first need together as much information as possible about the target system, scan for open ports, scan for vulnerabilities and then conduct their attack. Along with technical attacks, some attackers might try physical attacks through social engineering and gain access to the business servers by pretending to be someone they are not.

Small businesses need to take as many precautions as possible to protect their systems, even if it means spending extra money to do so. There is really no way of completely securing a network, but there are ways to minimize the chances of becoming a victim. Limiting the chances of becoming a victim is better than trying to repair the damages after an attack, which may not be repairable. Attacks come in many forms, so it is imperative to ensure that as many security measures are put in place as possible. The implementation of various security measures is important for the protection of family, business continuity and national security. With the possible outcomes of an attack on a network, businesses should take network security very seriously and properly protect their systems.



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