Hotel Network Implementation Project

A Comprehensive Network Infrastructure Design & Implementation

Network Architecture

Core Configuration

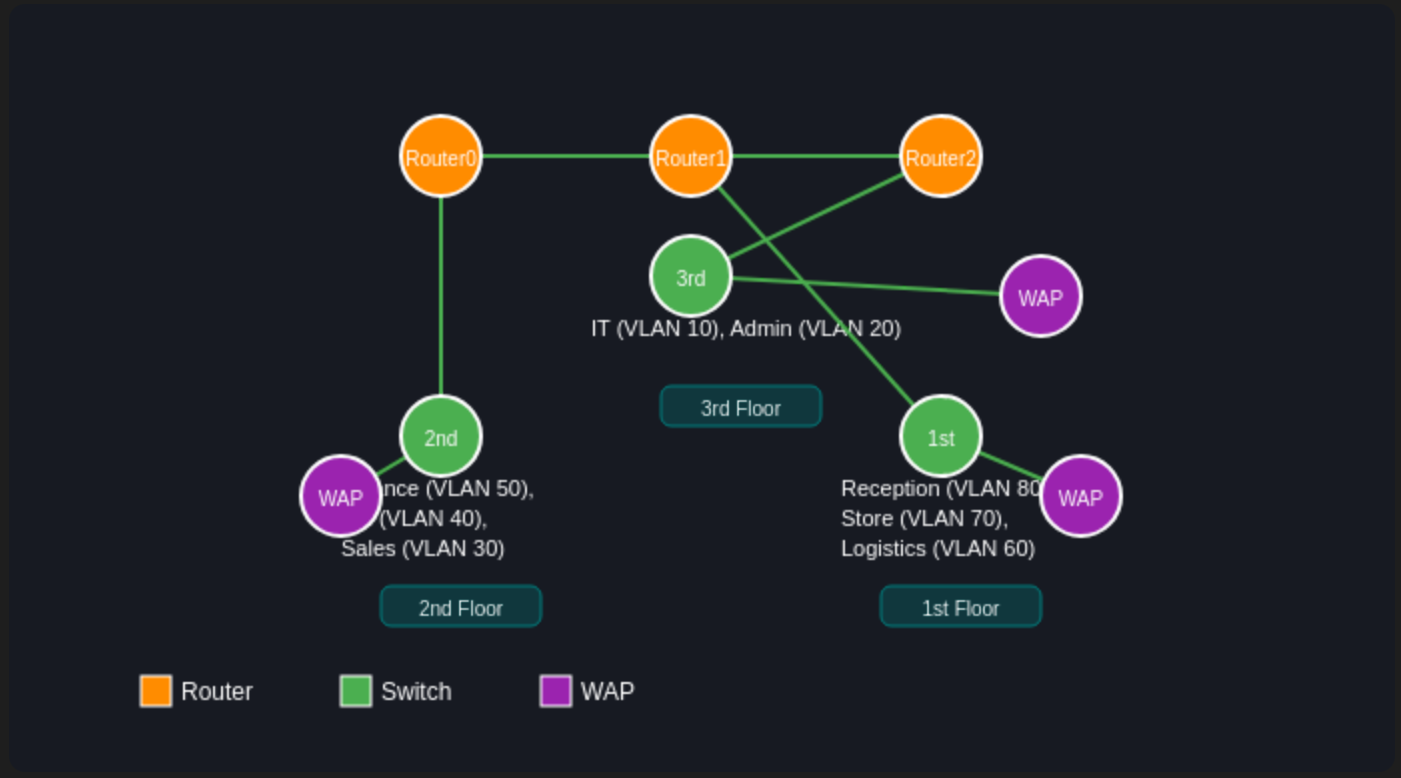
Security Implementation

Testing & Verification

Networking Project | 2025

Network Design & Architecture

Physical Topology



Network Approach: Hierarchical design with three routers placed in the IT department (3rd floor), interconnected via serial DCE cables.

Device Placement: Three routers in IT department, one switch per floor, WAPs for wireless coverage, with devices like PCs and printers in each department.

VLAN and IP Addressing Scheme

Floor	Department	VLAN ID	Network
1st Floor	Reception	80	192.168.8.0/24
	Store	70	192.168.7.0/24
	Logistics	60	192.168.6.0/24
2nd Floor	Finance	50	192.168.5.0/24
	HR	40	192.168.4.0/24
	Sales	30	192.168.3.0/24
3rd Floor	Admin	20	192.168.2.0/24
	IT	10	192.168.1.0/24

Key Design Elements

- **Network Segmentation:** Departments isolated into distinct VLANs
- **Inter-Floor Connectivity:** Routers connected via serial DCE cables
- **Wireless Integration:** WAPs on each floor for guest and staff

Core Network Configuration

Inter-VLAN Routing

Implemented "Router on a Stick" model with multiple sub-interfaces per floor.

```
Router(config)# interface GigabitEthernet0/0.80
Router(config-subif)# encapsulation dot1Q 80
Router(config-subif)# ip address 192.168.8.1 255.255.255.0
Router(config-subif)# exit
```

OSPF Routing Protocol

Dynamic routing protocol for efficient route advertisement across the hotel network.

```
Router(config)# router ospf 1
Router(config-router)# network 192.168.8.0 0.0.0.255 area 0
Router(config-router)# network 192.168.7.0 0.0.0.255 area 0
Router(config-router)# network 10.10.10.0 0.0.0.3 area 0
```

DHCP Server Configuration

Each router configured as DHCP server for its respective floor VLANs.

```
Router(config)# ip dhcp excluded-address 192.168.8.1 192.168.8.10
Router(config)# ip dhcp pool RECEPTION_POOL
Router(dhcp-config)# network 192.168.8.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.8.1
```

Wireless Network Setup

WAPs deployed on each floor with SSIDs mapped to departmental VLANs.

WAP Configuration

- SSID broadcast per floor
- VLAN association

Integration Benefits

- Network segmentation
- Seamless wired/wireless

Key Configuration Benefits

- Efficient inter-VLAN communication
- Dynamic route discovery
- Automatic IP configuration
- Floor-based wireless networks

Security Implementation

SSH Security Configuration

Security Benefit: Encrypted communication channel for remote management

Implementation Method: RSA encryption with local user authentication

SSH Configuration Steps:

```
// Set domain name
Router(config)# ip domain name vicmodernhotel.com
// Generate RSA keys
Router(config)# crypto key generate rsa modulus 1024

// Configure VTY lines
Router(config)# line vty 0 4
Router(config-line)# transport input ssh
Router(config-line)# login local
```

Security Impact: Prevents unauthorized access and command interception

Port Security Implementation

Target: IT-dept switch port Fa0/1

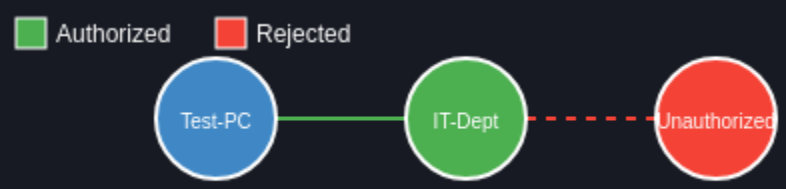
Protected Device: Test-PC

Port Security Configuration:

```
// Enter interface mode
Switch(config)# interface FastEthernet0/1
// Set access mode
Switch(config-if)# switchport mode access
// Enable port security
Switch(config-if)# switchport port-security
// Set maximum MAC addresses
Switch(config-if)# switchport port-security maximum 1
// Set violation mode
Switch(config-if)# switchport port-security violation shutdown
```

Sticky MAC Address Method:

```
// Enable sticky learning
Switch(config-if)# switchport port-security mac-address sticky
// Connect Test-PC
// MAC address learned
// Connect unauthorized device
// Port enters shutdown state
// Security breach detected
```



Security Impact: Prevents unauthorized devices from accessing critical network segments

Testing & Verification

1 Connectivity & Routing Verification

- Executed ping tests between departments and floors
- Validated inter-VLAN routing functionality
- Confirmed OSPF route advertisement

Success

2 DHCP Functionality Check

- Configured hosts to obtain IP addresses dynamically
- Verified IP configuration on devices
- Tested connectivity to default gateway

Success

3 SSH Remote Access Verification

- Used Test-PC in IT department to connect via SSH
- Tested access to all three routers
- Validated secure administrative access

Success

4 Port Security Validation

- Connected Test-PC to IT-dept switch port Fa0/1
- Learned MAC address via sticky method
- Tested unauthorized device connection resulting in port shutdown

Success

Project Summary

The Hotel network project successfully implemented a scalable, secure, and fully functional network infrastructure across three floors and multiple departments. Testing confirmed efficient inter-VLAN routing, OSPF dynamic routing, DHCP address allocation, and effective security measures.