Introduction to Networks v6
Case Study

Overview and Objectives

This case study allows students fully Design a complex network using skills gained throughout the course but build and configure only a prototype as seen in the following diagram, using Cisco Packet Tracer v7. This case study is not a trivial task. To complete it as outlined with all required documentation will be a significant accomplishment.

The case study scenario describes the project in general terms, and will explain why the network is being built. Following the scenario, the project is broken into a number of phases, each of which has a detailed list of requirements. It is important to read and understand each requirement to make sure that the project is completed accurately.

This case study requires the student to accomplish the following tasks:

- Create an efficient addressing scheme using VLSM for the given network requirement.
- Produce a topology diagram that meets Rockford PLC network requirement, using Cisco Packet Tracer v7 software.
- Correctly configure Network Devices with a basic configuration
- Correctly configure Manual IP Address for End Devices
- Correctly configure the remote network using static route
- Correctly configure default static route to access the internet
- Troubleshoot and test the connectivity between all devices
- Provide detailed documentation in a prescribed form, as listed in the deliverables section

Scenario:

Rockford PLC is a large company who specialise in the manufacture of several models of cars. The company has been actively new employees throughout the year. Rockford realises that to aggressively compete in its market, the company needs change to its infrastructure that will support new models of cars and Internet access, allowing them to increase their productivity and to follow market trends. Rockford wants to use the internet to gain clients and find new opportunities.

Rockford PLC needs a network to be designed and implemented; The main office occupies one building in Tripoli (headquarter); other branches are located at: Tripoli Centre, Tajur, Janzur.

- All host connections will be 100BaseTx connections (Fast Ethernet)
- All Uplink connections between router and switch will be 1000BaseTx connections (Gigabit Ethernet)
- All Serial connections between sites will utilize T1 (1544kbps), point-to-point connections

All four locations will use Static route and default static route process.

Although private addresses (RFC 1918) will be used, the company appreciates efficiency and address conservation in design. To minimize wasted address space, they have requested VLSM to be used when appropriate.

You are a junior network engineer and have been requested by a Rockford PLC to design an appropriate addressing scheme to fit their network requirements.
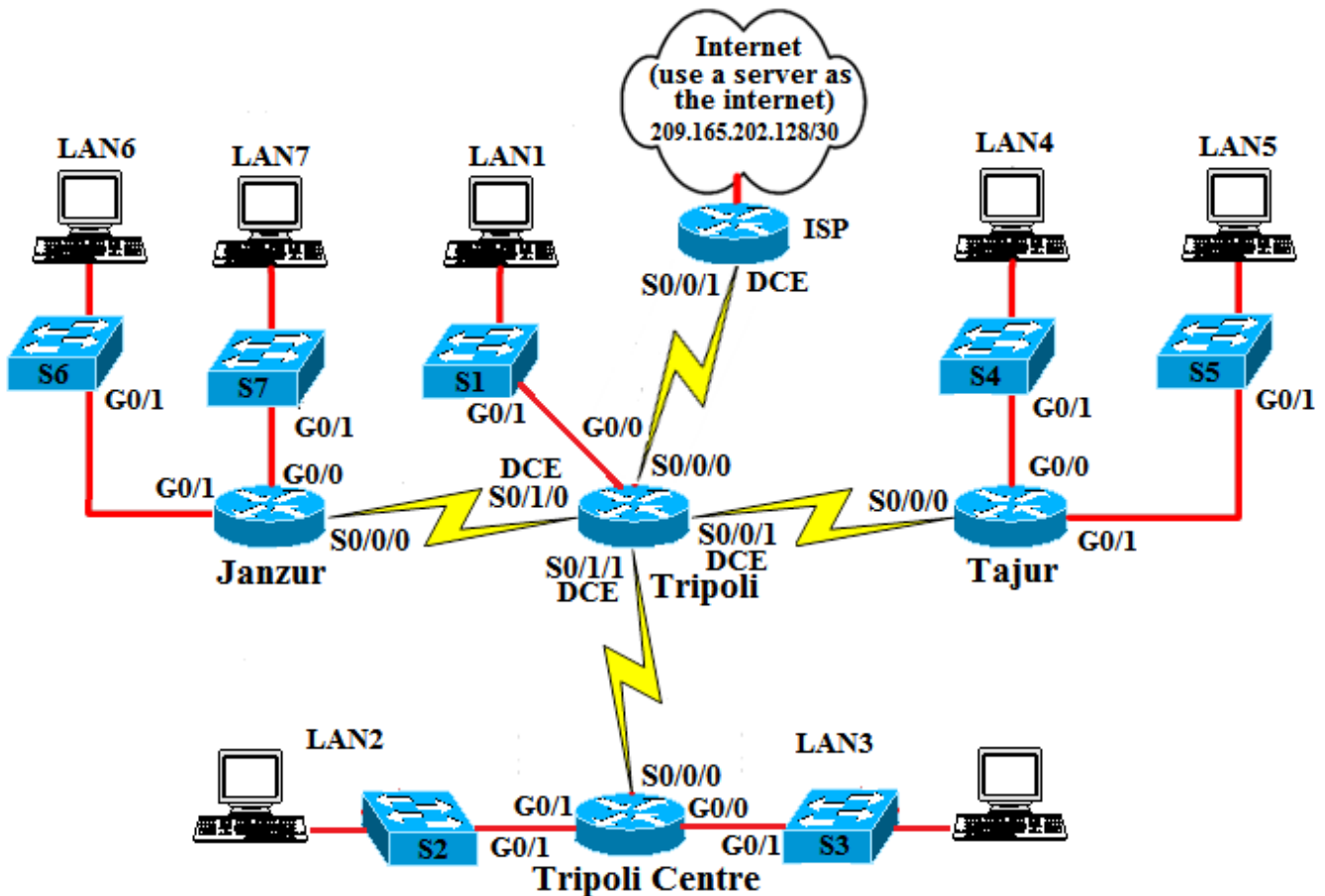
Phase 1: Addressing the WAN & LANs

Use the following instructions to complete Phase 1:
- Use **172.16.1.0/24** for internal addressing.
- Apply /30 subnets on all serial interfaces, using the last available subnet.
- Assign an appropriately sized subnet for Tripoli (headquarter) LAN (5 hosts at LAN1).
- Assign an appropriately sized subnet for the Tripoli Centre LANs (30 hosts at LAN2 and 30 hosts at LAN3).
- Assign the appropriately sized subnet to the Tajura LANs (60 hosts at LAN4 and 60 hosts at LAN5)
- Assign an appropriately sized subnet for the Janzur LANs (10 hosts at LAN6 and 10 hosts at LAN7).

- Use subnet 209.165.200.0/30 for connection to the ISP router from the headquarters at Tripoli
- Use subnet 209.165.202.128/30 for connection to the ISP router from the web server.
- Connect one PC per LAN (for testing purposes)
- Document the addressing scheme in tables, as following:

LANs		Network	Prefix
Tripoli	LAN 1		
Tripoli	LAN 2		
Centre	LAN 3		
Tajura	LAN 4		
	LAN 5		
Janzur	LAN 6		
	LAN 7		

WANs	Network	Prefix
Tripoli -to- Tripoli Centre		
Tripoli -to- Tajura		
Tripoli -to- Janzur		
Tripoli -to- ISP		

Device	Interface	IP Address	Subnet Mask	Default Gateway
Tripoli	S0/0/0			
	S0/0/1			
	S0/1/0			
	S0/1/1			
	G0/0			
Tripoli Centre	S0/0/0			
	G0/0			
	G0/1			
Tajura	S0/0/0			
	G0/0			
	G0/1			
Janzur	S0/0/0			
	G0/0			
	G0/1			
S1 (Tripoli)	VLAN 1			
S2 (Tripoli Centre)	VLAN 1			
S3 (Tripoli Centre)	VLAN 1			
S4 (Tajura)	VLAN 1			
S5 (Tajura)				
S6 (Janzur)				
S7 (Janzur)				
Host LAN1				
Host LAN2				
Host LAN3				
Host LAN4				
Host LAN5				
Host LAN6				
Host LAN7				
Web server(internet)				

Phase 2: Basic Router and Switch Configuration

Use the following instructions to complete Phase 2:

1. Configure each router with the following settings:
   - Configure **router name**
   - Console Password: **cisco**
   - Use telnet for management connections
     – Vty 0-4 password: cisco
   - Enable secret password: **class**
   - Banner MOTD: # Authorized Access Only#
   - encrypt all passwords
   - Configure the interfaces on all routers as documented in Phase 1
   - Use clock rate 64000 for serial "DCE" interfaces
   - Assign the first IP address available to routers
   - Configure descriptions in point-to-point interfaces:
     > **Link <*router1_name*> - <*router2_name*>**
   - Configure descriptions in LAN interfaces:
     > *LAN <LAN_name>*

2. Configure each switch with the following settings:
   - Configure Switch name
   - Enable secret password: **class**
   - Banner MOTD: # Authorized Access Only#
   - encrypt all passwords
   - Configure a switch to remotely manage.
   - Console password: **cisco**
   - Use telnet for management connections
     - Vty 0-4 password: **cisco**
   - Configure interfaces descriptions only that connected with routers:
     > *LAN <Router_name>*

3. Use chart to document the final addressing scheme.

Phase 3: Configuring static route and default static route

Use the following instructions to complete Phase 3:
   - Configure static route from headquarters at Tripoli Router to all Routers
   - Configure a static route from ISP router to headquarters at Tripoli.
   - Configure default static route from other locations routers to access the internet and remote networks.

Phase 4: Verification and Testing

Verify communication between various hosts in the network. Troubleshoot and fix any problems in the network until it works properly.

Phase 5: Documenting the Network

In order to support the network properly, documentation is required. Create documentation that is logically organized to make troubleshooting simpler:

- Tables (Charts) , such as Subnetting Table, IP Addressing Table, etc
- Comments at the top of each documentation file, such as Device name and type and The date of last modification
- show ip interface brief
- show ip route
- show interface <type_slot_port>
- show startup-config

Case Study Deliverables

The following items must be included in the final report:

- Summary of the Company and Network Requirements
- Discussion on the implementation of IP address and VLSM
- Discussion on the implementation of Routing
- Discussion on testing and verification strategies
- Recommendations for future network upgrades
- Produce a topology diagram, as shown in the figure above that meets Rockford PLC network requirement, using Cisco Packet Tracer v7 software.
- Tables (Charts) , such as Subnetting Table, IP Addressing Table, etc
- Equipment Table including quantity, make and model (Routers & Switches ONLY)
- Show Commands outputs and other commands to verify connectivity:
  - show ip route, show vlan, ping, telnet, Traceroute (tracert), etc.
- Router Configurations
- Switch Configuration

The documentation should be complete and should contain enough information to allow a third party to properly install, configure and troubleshoot the network without requesting additional information.

Hand in arrangement:

The deadline for submission of this Case Study is 15 days before final exam.