

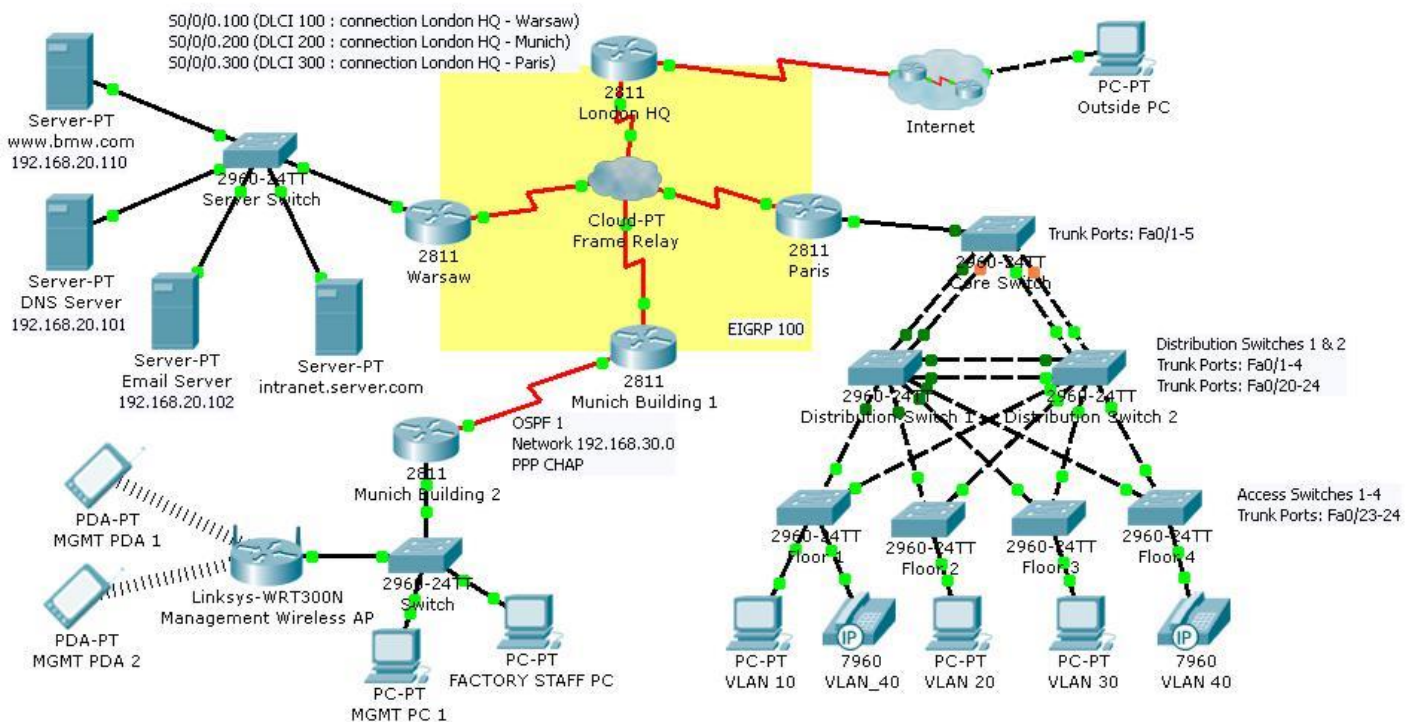
CASE STUDY FOR CCNA2 – Routing and Switching

Case Study Introduction

ARMAK Motor Company is one of the leading developer and distributor of Jeepneys not only here in the Philippines but also around the world. It has number of sites located around the globe. Their main offices are located in Europe & Eastern Europe and it is your task to complete their network configuration. As things stand there are four main sites:

- 1) **London HQ** - this site is the Hub of the Frame Relay Circuit and it is also the main point of connection to the public Internet.
- 2) **Warsaw** - this site contains the server farm for internal and external use. There are also some admin staff located who manage/monitor the servers to which they have direct contact.
- 3) **Munich** - this site houses the main manufacturing and car assembly factory. The site at Building 2 now contains the new modernised factory and Building 1 will be transformed into offices in the future. Within Building 2 site there are two VLANs, one for Management Staff, and the other for Factory Staff. There is also a Wireless Access Point from which management staff connect PDA's whilst they are on the factory floor. As things stand, there has been no development at Building 1 and it only houses the Frame Relay connection back to London_HQ.
- 4) **Paris** - this site house most of the administration staff and various departments. Since team such as Engineers, Marketing, & Factory Administrators are located here, then we must ensure 100% connectivity and redundancy. The offices consist of four floors, with each department on their own individual VLAN.

Topology:



IP Addressing Table

Device	Interface	IP Address	Subnet Mask
London_HQ	S0/0/0.100	192.168.10.1	255.255.255.252
	S0/0/0.200	192.168.10.5	255.255.255.252
	S0/0/0.300	192.168.10.9	255.255.255.252
	S0/0/1	200.200.100.1	255.255.255.0
Warsaw	S0/0/0	192.168.10.2	255.255.255.252
	Fa0/0	192.168.20.1	255.255.255.0
Munich_B1	S0/0/0	192.168.10.6	255.255.255.252
	S0/0/1	192.168.30.1	255.255.255.252
Paris	S0/0/0	192.168.10.10	255.255.255.252
	Fa0/0.10	192.168.10.33	255.255.255.224
	Fa0/0.20	192.168.10.65	255.255.255.224
	Fa0/0.30	192.168.10.97	255.255.255.224
	Fa0/0.40	192.168.10.129	255.255.255.224
	Fa0/0.99	192.168.10.161	255.255.255.224
Munich_B2	S0/0/1	192.168.30.2	255.255.255.252
	Fa0/0.32	192.168.30.33	255.255.255.224
	Fa0/0.64	192.168.30.65	255.255.255.224
Core Switch	VLAN 99	192.168.10.162	255.255.255.224
Distribution Switch 1	VLAN 99	192.168.10.163	255.255.255.224
Distribution Switch 2	VLAN 99	192.168.10.164	255.255.255.224
Floor 1 Switch	VLAN 99	192.168.10.165	255.255.255.224
Floor 2 Switch	VLAN 99	192.168.10.166	255.255.255.224
Floor 3 Switch	VLAN 99	192.168.10.167	255.255.255.224
Floor 4 Switch	VLAN 99	192.168.10.168	255.255.255.224

VLAN Information Table

VLAN Number	Network Address	VLAN Name	Port Mapping
10	192.168.10.32/27	ENGINEERING	Floor 1 Switch Fa0/1-5
			Floor 2 Switch Fa0/1-5
			Floor 3 Switch Fa0/1-5
			Floor 4 Switch Fa0/1-5
20	192.168.10.64/27	MARKETING	Floor 1 Switch Fa0/6-10
			Floor 2 Switch Fa0/6-10
			Floor 3 Switch Fa0/6-10
			Floor 4 Switch Fa0/6-10
30	192.168.10.96/27	FACTORY	Floor 1 Switch Fa0/11-15
			Floor 2 Switch Fa0/11-15
			Floor 3 Switch Fa0/11-15
			Floor 4 Switch Fa0/11-15
40	192.168.10.128/27	VOIP	Floor 1 Switch Fa0/16-20
			Floor 2 Switch Fa0/16-20
			Floor 3 Switch Fa0/16-20
			Floor 4 Switch Fa0/16-20
99	192.168.10.160/27	MANAGEMENT	All trunks

Step 1: Configuring Frame Relay in a Hub-and-Spoke Topology.

- a) Configure the Frame Relay core:
 - i. The PVC between London HQ and Warsaw uses DLCI 100
 - ii. The PVC between London HQ and Munich Building 1 uses DLCI 200
 - iii. The PVC between London HQ and Paris uses DLCI 300
- b) Ensure that the Serial0/0/0 interfaces on Warsaw, Munich Building 1, & Paris have all been configured for Frame Relay.

Step 2: Configure EIGRP routing within the Frame Relay Core.

- a) Configure London HQ and all spoke routers with EIGRP using the following requirements:
 - i. Use AS 100.
 - ii. Configure using only one network statement to summarize all internal routes.

Step 3: Configure OSPF routing between Munich Building 1 and Munich Building 2.

- a) Configure the WAN connection between Munich Building 1 & Munich Building 2 using the following requirements:
 - i. Use process number as 1.
 - ii. Use single area OSPF (area 0).
 - iii. Configure the network statements according to the addressing table given.
- b) Configure the WAN link to use PPP encapsulation and CHAP authentication. The CHAP password is **cisco**. The username is the hostname of the router.
- c) Redistribute EIGRP 100 subnets into OSPF 1 and vice versa.

Note: At times 'redistribution' within Packet Tracer does not work as planned; hence you may need to add Static Routes on London_HQ & Munich Building 1 routers to advertise the necessary links.

Step 4: Configure Static & Default Routing on Munich Building 1 Router.

- a) Configure a default route on Munich Building 1 router to forward any unrecognized traffic out of interface S0/0/0.
- b) Configure a default route on London_HQ router to forward and unrecognized traffic out of interface S0/0/1.
- c) Configure a static route on London_HQ router pointing towards network 192.168.30.0/24 going out of interface S0/0/0.200.

Step 5: Configure Warsaw router and LAN.

- a) Configure & activate the FastEthernet0/0 interface using the IP address given in the addressing table.
- b) Configure the Intranet Server with the following static IP addressing:
 - i. IP Address: 192.168.20.100
 - ii. Subnet Mask: 255.255.255.0
 - iii. Default Gateway: 192.168.20.1
 - iv. DNS Server Address: 192.168.20.101

Step 6: Configure VTP, Trunking, the VLAN Interface, and VLANs within the Paris LAN.

- a) Configure all Paris LAN switches with VTP

- i. Core Switch is the VTP Server (Domain Name: **CATC** / VTP Password: **LISBON**)
 - ii. Both Distribution Switches and Floor 1-4 Switches are VTP Clients within the same domain.
- b) Configure the appropriate interfaces in trunking mode and assign VLAN 99 as the native VLAN.
 - i. Use 802.1Q encapsulation for all trunk ports.
 - ii. Configure the VLAN interfaces and default gateways.
- c) Create and name the VLANs that are listed on the **VLAN Information Table**.
 - i. Create only the VLANs on the “Core Switch”.
 - ii. Ensure that all VLAN information propagates down to the access floor switches.

Step 7: Assign VLANs and Configure Port Security within the Paris LAN Switches.

- a) Use the **VLAN Information Table** to complete the VLAN requirements on Access Floor Switches 1-4:
 - i. Manually configure all access floor switch interfaces to be **access ports** for VLANs 10; 20; & 30.
 - ii. Manually configure all access floor switch interfaces to be **voice ports** for VLAN 40.
 - iii. Ensure that you assign VLANs to each of these interface ports.
- b) Use the following policy to establish port security on the access ports:
 - i. For Interfaces Fa0/1-5; Fa0/6-10; Fa0/11-15 for all access Floor 1-4 Switches:
 - a. Allow only one MAC address.
 - b. Configure the first learnt MAC address to ‘stick’ to the configuration.
 - c. Set all ports to shut down if there is any security violation.

Step 8: Configure Inter-VLAN Routing on Paris Router Fa0/0 interface.

- a) Configure & activate the Paris LAN interface for Inter-VLAN routing.
- b) VLAN 99 is the management & native VLAN.
- c) Within each VLAN network address, use the **first available address** as the default-gateway for that subnet.
- d) Ensure that the encapsulation is set to 802.1Q.

Step 9: Configure Spanning Tree (STP) for Paris LAN Switches.

- a) Configure Spanning Tree so that Data and Voice traffic are separated and prioritized over the two Distribution layer switches. Use the following criteria:
 - i. Make Distribution Switch 1 the Root for VLANs 1; 10; 20; 30; & 99 by configuring a priority level of 4096.
 - ii. Make Distribution Switch 2 the BACKUP Root for VLANs 1; 10; 20; 30; & 99 by configuring a priority level of 8192.
 - iii. Make Distribution Switch 2 the Root for VLAN 40 by configuring a priority level of 4096.
 - iv. Make Distribution Switch 1 the BACKUP Root for VLAN 40 by configuring a priority level of 8192.

Step 10: Configure DHCP for the Paris LAN.

- a) On the Paris Router configure four separate DHCP pools for the four access VLANs. Use the following criteria when creating these pools:
 - i. For VLAN 10:
 - a. Use the pool name ENGINEERING.
 - b. Use the network 192.168.10.32/27.
 - c. Exclude the first 10 address of this network.
 - d. Include the DNS server that is attached to the Warsaw LAN as part of the DHCP config.

- e. Configure the appropriate Gateway.
- ii. For VLAN 20:
 - a. Use the pool name MARKETING.
 - b. Use the network 192.168.10.64/27.
 - c. Exclude the first 10 address of this network.
 - d. Include the DNS server that is attached to the Warsaw LAN as part of the DHCP config.
 - e. Configure the appropriate Gateway.
- iii. For VLAN 30:
 - a. Use the pool name FACTORY.
 - b. Use the network 192.168.10.96/27.
 - c. Exclude the first 10 address of this network.
 - d. Include the DNS server that is attached to the Warsaw LAN as part of the DHCP config.
 - e. Configure the appropriate Gateway.
- iv. For VLAN 40:
 - a. Use the pool name VOIP.
 - b. Use the network 192.168.10.128/27.
 - c. Exclude the first 10 address of this network.
 - d. Include the DNS server that is attached to the Warsaw LAN as part of the DHCP config.
 - e. Configure the appropriate Gateway.

Step 11: Configure the PC's and IP Phones within Paris LAN.

- a) Configure all PC's & IP Phones within the Paris LAN. All devices should use DHCP.
- b) Ensure that all PC's & IP Phones receive and IP address information from within their own subnet.
- c) Troubleshoot as necessary if devices do not receive the correct IP address information.

Step 12: Configure Static & Dynamic NAT on London_HQ Router.

- a) Configure NAT on London_HQ router using the following requirements:
 - a. Armak Motor owns the 200.200.200.240/29 address space. The pool uses the addresses 200.200.200.241 through to 200.200.200.245 with a /29 subnet mask.
 - b. Allow only the addresses in the 192.168.0.0/16 address space to be translated. Use 1 for the Access List number.
 - c. The www.armak.com website at 192.168.20.110 is registered with the public DNS system with an IP address of 200.200.200.246. Configure the static mapping for this address.
- b) Once the NAT configuration is applied, ensure that the "Outside PC" is able to ping the internal www.armak.com website; as well as accessing the page via http.

Step 13: Configure Wireless Connectivity for Munich Building 2 LAN.

- a) Configure the Management Wireless AP so that it exists on the Management Staff VLAN within Munich Building 2. Use the following requirements for the "Internet Connection Type":
 - i. Use the Internet Connection Type as "Static".
 - ii. IP Address: 192.168.30.34
 - iii. Subnet Mask: 255.255.255.224
 - iv. Default Gateway: 192.168.30.33
 - v. DNS Server 1: 192.168.20.101
- b) Set the Wireless Credentials using the following:
 - i. Network Name SSID: MGMT-STAFF

- ii. Security Mode: WEP
 - iii. Key: 1234567890
 - iv. Ensure you save all configuration.
- c) Configure the “MGMT PDA 1” using the following requirements:
- i. Set the SSID: MGMT-STAFF
 - ii. WEP key: 1234567890
 - iii. IP Configuration: DHCP
 - iv. Ensure that the PDA receives an IP Address from the 192.168.100.0 pool.

Step 14: Test Connectivity

- a) From Paris LAN, all host PC’s should successfully ping intranet.server.com
- b) From Paris LAN, all host PC’s should successfully access the web page [http:// intranet.server.com](http://intranet.server.com)
- c) From Munich Building 2 LAN, all host PC’s and Management PDA’s should successfully ping intranet.server.com and access the webpage using the browser.
- d) All internal host devices should successfully ping one another.
- e) Ping from ‘Outside PC’ to www.armak.com server should be successful.
- f) Ping from ‘Outside PC’ to any internal host device should fail. Why?

Step 15: Documentation

Be able to document all configurations done starting from step1 until step 14. All outputs are to be printed in a Long Bond Paper, Courier New, 1.5 line spacing and 1” margin on all sides. Provide a cover page using this format

University of the Cordilleras
College of Information Technology and Computer Science

In partial fulfillment of the requirements for the degree
Bachelor of Science in Information Technology

A Case study in ITE 22 – Routing and Switchin

ARMAK MOTOR CORPORATION

By:
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