**Task 6 - Introduction to VLAN use - VLAN trunking**

In this assignment two VLAN networks will be implemented. The virtual local area networks are used for separating a LAN into two (or more) distinct LANs, where the hosts of a will NOT be able to see the hosts of the other).

To enable them to communicate, a router will be required for network-level interconnection.

A key configuration parameter is to assign a label (VLAN ID) to each port of a switch that indicating which VLAN that port belongs to. The switch only transmits (layer 2) frames between interfaces of the same VLAN. The rest are forwarded to the router through another interface that must be must support VLAN Trunking.

VLAN trunking allows switches to forward frames from different VLANs to a single VLAN link called a trunk. This is done by adding additional header information that called a tag to the Ethernet frame. The process of adding this small header is called VLAN Tagging.

In this project we will use a C7200 Router and two vIOS-L2 switches (standard image for Cisco switch). Implement the following topology and follow the steps to configure it
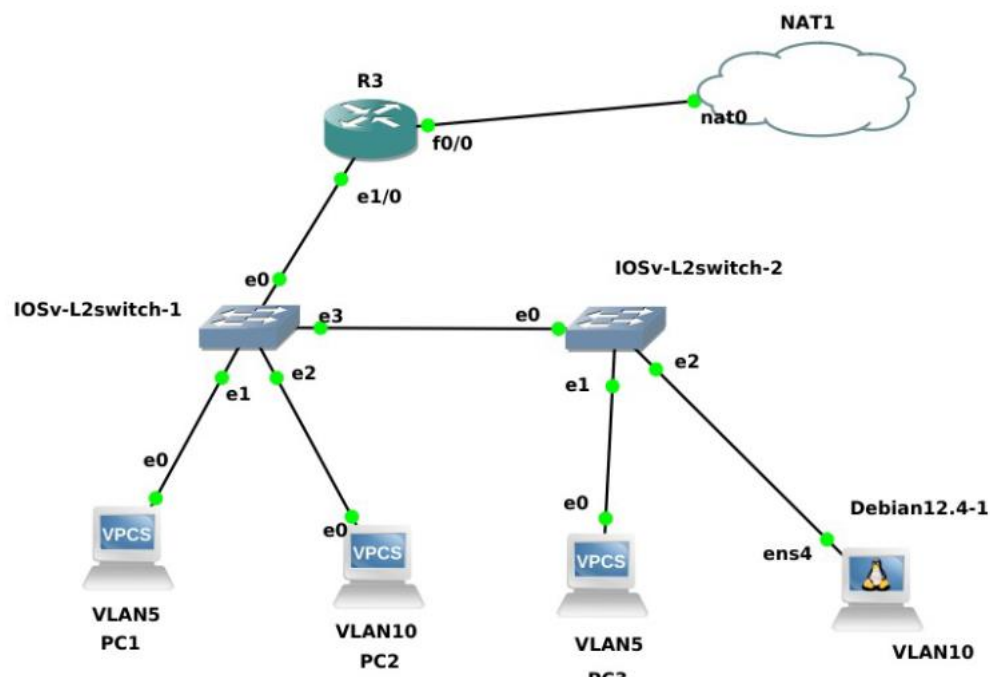
Cisco L2 Switch Introduction

To add and configure Cisco switches in GNS3, you must perform the following

steps:

- Download the vIOS-L2.vmdk file from eclass.

-Once you have downloaded the VMDK file, open the preferences window (Edit-> Preferences) in GNS3.

- Select QEMU VMS in the left pane and then click on the New button to open the QEMU VMS file.

add a new QEMU VM template.

- On the QEMU VM Name page, specify a name for this QEMU VM e.g. IOSv-L2 switch.

Click the Next button to continue.

- On the QEMU Binary and memory type page, select the appropriate binary depending on the type

of your system architecture

- Select New Image and select the vIOS-L2.vmdk image you downloaded.

- Modify the disk interface type to virtio. (it was observed that with the other interfaces no

programming commands are saved). Also increase the available memory to 512MB and

2 CPU cores (it boots and runs at higher speed).

L2 switch-1 configuration

Create two new VLAN ID and name them. As names use the (modified) AM as below: up1094545-> up1094545A up1094545B	enable conf t vlan 5 name up1094545A exit vlan 10 name up1094545B exit end wr
We define the VLAN and port mapping of the switch. The ports (interfaces) on this switch are called gigabitethernet. Therefore the interface: gigabitethernet 0/1 -> LABEL 5 gigabitethernet 0/2 -> LABEL 10 Each interface can be either trunk and carry frames from different VLANs or access and carry frames of a single LABEL. For interfaces to be defined as Trunk, they must the IEEE encapsulation standard must be enabled 802.1Q (dot1q). (See course slides). IEEE 802.1Q, often referred to as dot1q, is the networking standard that supports virtual local area networking (VLAN) in a network IEEE 802.3 Ethernet Network	enable conf t interface gigabitethernet 0/1 switchport mode access switchport access vlan 5 exit interface gigabitethernet 0/2 switchport mode access switchport access vlan 10 exit interface gigabitethernet 0/3 switchport trunk encapsulation dot1q switchport mode trunk exit interface gigabitethernet 0/0 switchport trunk encapsulation dot1q switchport mode trunk exit exit wr
Confirm the settings with the commands	show vlan id 5 show vlan id 10 or show vlan

L2 switch-2 configuration

Similarly to above, having regard to the topology given to you, what inteface is access (and on which VLAN) and which trunk.	<See L2 switch-1>
Confirm the settings with the commands	show vlan id 5 show vlan id 10 or show vlan

Configuration R1

To separate the VLANs, the router manages the ethernet 1/0 interface as interface

ethernet 1/0.5 and interface ethernet 1/0.10

The same IP address assignment/management, DHCP enable and NAT commands apply.

Follow the steps below

Enable, NAT outside and dhcp client on interface FastEthernet 0/0. Ensure that the interface gets an address.	<see previous exercises>
Enable ethernet interface 1/0	<see previous exercises>
Setting interface ethernet 1/0.5 For the configuration, in addition to the IP address to be we need to assign, we need to enable the 802.1Q standard. 802.1Q is the networking standard that defines virtual LANs (VLANs) on an Ethernet network. As the address and mask you will set, based on your 109545 registration number -> 109.45.45.1/25 (those students whose SI has zeros in the 2nd or 3rd position MUST modify accordingly)	enable conf t interface ethernet 1/0.5 encapsulation dot1q 5 <ανάθεση διεύθυνσης> exit exit wr
Setting up ethernet interface 1/0.10 Similar to above for the remaining IPs up to 109.45.45.255 and gateway the first available. Hint: you need to find the gateway and mask	<same as above>
Enable NAT inside on the ethernet interface 1/0.5	<see previous exercises>
Enable NAT inside on the ethernet interface 1/0.10	<see previous exercises>
Enable DHCP server on the interface ethernet 1/0.5	enable config t

As name in the pool use your registration number e.g. and AM=1094545 1094545-1DHCP	interface Ethernet 1/0.5 ip dhcp pool 1094545-1DHCP network <αριθμός υποδικτύου> <μάσκα> dns-server 8.8.8.8 default-router < διεύθυνση gateway> exit service dhcp exit
Enable DHCP server on the interface ethernet 1/0.10 As name in the pool use the number your registry number e.g. and AM=1094545 1094545-2DHCP	enable config t interface Ethernet 1/0.10 ip dhcp pool 1094545-2DHCP network <αριθμός υποδικτύου> <μάσκα> dns-server 8.8.8.8 default-router <διεύθυνση gateway> exit service dhcp exit
Set access list for NAT.	enable config t access-list 1 permit 109.45.45.0 0.0.0.255 ip nat inside source list 1 interface FastEthernet0/0 overload exit
Configure telnet access where the authentication will be done with login credentials local, i.e. by adding a new user with usernanme/passwd Add the new user with usernanme/passwd your registration number and priveleges level 15. (those students whose SI has zeroes in the 2nd or 3 position MUST use the one that resulting from the first three decimal places of the IP)	<see previous exercises>
Save settings	wr
Activate the terminals PC1, PC2, PC3 and Debian.	For PC1, PC2 and PC3 terminals run dhcp and save.

Questions:

- Show that R1 connected has access to the external network (ping / traceroute 8.8.8.8).

- On R1 run the show ip dhcp binding command and show the IP address assignments.

- On R1 run the show ip dhcp pool command and show the configuration of each dhcp pool/IP

addresses.

- On L2 switch-1 and L2 switch-2 run show mac address-table and show the tables

forwarding tables

- Show the IP addresses of all terminals (PC1, PC2, PC3 and Debian) and make sure that

they belong to the correct VLAN.

- Show that all terminals have access to the external network (ping / traceroute 8.8.8.8) and

that they have a working DNS with ping google.com

- From the debian terminal run traceroute to the other terminals and point them

results. How many steps does it take to reach a terminal on the same VLAN and how many on

terminal of a different VLAN?

(without the -n option, see (probably returning domain that exists. But the routing goes

within the gns3-network!).