The IP Helper-Address Using Vlans

The following Lab will give you a good understanding of how you would segment your network using vlans, also how to create communications between vlans while securing that access through the use of access-list. As well you will learn what type of cabling you would use between devices.

The lab will also show how to configure the NAT protocols to provide translations between internal addresses to external addresses. The Lab will explain basic concepts of DHCP and DNS name resolution.

You will be backing up all your work to an TFTP Server, in case of any failures you could restore configuration’s or the routers IOS.



Step by Step instructions to configure the IP Helper-Address Vlans Lab

Step1: Configure the static IP addresses of the Servers.

DHCP: IP address 10.100.0.1

Mask: 255.255.255.224

Gateway: 10.100.0.30

DNS: 71.25.83.65

TFTP: IP address 10.100.0.2

Mask: 255.255.255.224

Gateway: 10.100.0.2

DNS: 71.25.83.65

External Web Server: IP address 71.25.83.65

Mask: 255.255.255.224

Gateway: 71.25.83.70

DNS: 71.25.83.65

Step2: Create the DHCP Scopes for the VLANs

Before you begin creating your scopes, edit the default scope and change the start address and subnetmask.

Vlan10: Pool Name: Vlan10

Gateway: 10.100.0.62

DNS: 71.25.83.65

Start: 10.100.0.33

Mask: 255.255.255.224

Max#: 12

TFTP: 10.100.0.2

Vlan20: Pool Name: Vlan20

Gateway: 10.100.0.94

DNS: 71.25.83.65

Start: 10.100.0.65

Mask: 255.255.255.224

Max#: 12

TFTP: 10.100.0.2

Vlan30: Pool Name: Vlan30

Gateway: 10.100.0.126

DNS: 71.25.83.65

Start: 10.100.0.97

Mask: 255.255.255.224

Max#: 12

TFTP: 10.100.0.2

Vlan40: Pool Name: Vlan40

Gateway: 10.100.0.158

DNS: 71.25.83.65

Start: 10.100.0.129

Mask: 255.255.255.224

Max#: 12

TFTP: 10.100.0.2

Vlan50: Pool Name: Vlan50

Gateway: 10.100.0.190

DNS: 71.25.83.65

Start: 10.100.0.161

Mask: 255.255.255.224

Max#: 12

TFTP: 10.100.0.2

Step2b: Configure the External Web Server

In the web server click the CONFIG tab, next click the DNS button.

In the Name field type the following: [www.udemy.com](http://www.udemy.com)

In the address field type the following: 71.25.83.65

Then click Add.

Verify by clicking on the desktop tab, then clicking on the Web Browser button.

In the address bar type FQDN [www.udemy.com](http://www.udemy.com) and you should resolve a web page.

Step3: Create and assign the vlans on the appropriate switches

CoreSwitch: >enable

#config t

(config)#hostname core

Core(config)#vlan 2

Core(config-vlan)#name IT\_DEPT

Core(config-vlan)#int range f0/1-5

Core(config-if-range)#switchport mode access

Core(config-if-range)#switchport access vlan 2

Core(config-if-range)#**do** wr

Core(config-if-range)#**do** sh vlan

Classroom10: >enable

#config t

(config)#hostname Classroom10

Classroom10 (config)#vlan 10

Classroom10 (config-vlan)#name CLR10

Classroom10 (config-vlan)#int range f0/1-5

Classroom10 (config-if-range)#switchport mode access

Classroom10 (config-if-range)#switchport access vlan 10

Classroom10 (config-if-range)#**do** wr

Classroom10 (config-if-range)#**do** sh vlan

Classroom20: >enable

#config t

(config)#hostname Classroom20

Classroom20 (config)#vlan 20

Classroom20 (config-vlan)#name CLR20

Classroom20 (config-vlan)#int range f0/1-5

Classroom20 (config-if-range)#switchport mode access

Classroom20 (config-if-range)#switchport access vlan 20

Classroom20 (config-if-range)#**do** wr

Classroom20 (config-if-range)#**do** sh vlan

Classroom30: >enable

#config t

(config)#hostname Classroom30

Classroom30 (config)#vlan 30

Classroom30 (config-vlan)#name CLR30

Classroom30 (config-vlan)#int range f0/1-5

Classroom30 (config-if-range)#switchport mode access

Classroom30 (config-if-range)#switchport access vlan 30

Classroom30 (config-if-range)#**do** wr

Classroom30 (config-if-range)#**do** sh vlan

Classroom40: >enable

#config t

(config)#hostname Classroom40

Classroom40 (config)#vlan 40

Classroom40 (config-vlan)#name CLR40

Classroom40 (config-vlan)#int range f0/1-5

Classroom40 (config-if-range)#switchport mode access

Classroom40 (config-if-range)#switchport access vlan 40

Classroom40 (config-if-range)#**do** wr

Classroom40 (config-if-range)#**do** sh vlan

Classroom50: >enable

#config t

(config)#hostname Classroom50

Classroom50 (config)#vlan 50

Classroom50 (config-vlan)#name CLR50

Classroom50 (config-vlan)#int range f0/1-5

Classroom50 (config-if-range)#switchport mode access

Classroom50 (config-if-range)#switchport access vlan 50

Classroom50 (config-if-range)#**do** wr

Classroom50 (config-if-range)#**do** sh vlan

Step4: Trunk the Ports on the core switch going to the other switches and the router

Core(config)#int range f0/19-24

Core(config-if-range)#switchport mode trunk

Core(config-if-range)#**do** wr

Core(config-if-range)#**do** sh int trunk

Step5: Configure Inter-Vlan communication

>enable

#config t

(config)#hostname AR2811

AR2811(config)#int f0/0

AR2811(config-if)#no shut

AR2811(config-if)#int f0/0.2

AR2811(config-subif)#encap dot1q 2

AR2811(config-subif)#ip address 10.100.0.30 255.255.255.224

AR2811(config-if)#int f0/0.10

AR2811(config-subif)#encap dot1q 10

AR2811(config-subif)#ip address 10.100.0.62 255.255.255.224

AR2811(config-if)#int f0/0.20

AR2811(config-subif)#encap dot1q 20

AR2811(config-subif)#ip address 10.100.0.94 255.255.255.224

AR2811(config-if)#int f0/0.30

AR2811(config-subif)#encap dot1q 30

AR2811(config-subif)#ip address 10.100.0.126 255.255.255.224

AR2811(config-if)#int f0/0.40

AR2811(config-subif)#encap dot1q 40

AR2811(config-subif)#ip address 10.100.0.158 255.255.255.224

AR2811(config-if)#int f0/0.50

AR2811(config-subif)#encap dot1q 50

AR2811(config-subif)#ip address 10.100.0.190. 255.255.255.224

Step6: The IP helper address

Even if you have configured inter-vlan connectivity the PC’s will not receive an IP address from the DHCP server do to the fact, they are on another broadcast domain. You will be configuring the IP HELPER-ADDRES on each sub-interface that requires an IP address to be assigned by the DHCP server.

IP helper-address acts like a DHCP relay agent you configure on a RRAS.

AR2811(config)#int f0/.10

AR2811(config-if)#ip helper-address 10.100.0.1

After you have configured each sub-interface with the IP helper-address command, EXCLUDING vlan2, verify connectivity by pinging all the PC’s from the DHCP server.

Step7: Securing the network using access-list

In this step we are going to deny access to vlan20 from being able to access vlan 50

AR2811(config)#access-list 20 deny 10.100.0.64 0.0.0.31

AR2811(config)#access-list 20 permit any

AR2811(config)# int f0/0.50

AR2811(config-subif)#ip access-group 20 out

Step8: Configure the rest of AR2811 & NAT2811

AR2811(config)#int f0/1

AR2811(config-if)#ip address 10.100.0.193 255.255.255.252

AR2811(config-if)#no shut

AR2811(config-if)#exit

AR2811(config)#router rip

AR2811(config-router)#version 2

AR2811(config-router)#network 10.0.0.0

AR2811(config-router)#no auto-summary

NAT2811(config)#int f0/0

NAT2811(config-if)#ip address 10.100.0.194 255.255.255.252

NAT2811(config-if)#no shut

NAT2811(config-if)#int f0/1

NAT2811(config-if)#ip address 71.25.83.70 255.255.255.248

NAT2811(config-if)#no shut

NAT2811 (config)#router rip

NAT2811 (config-router)#version 2

NAT2811 (config-router)#network 71.0.0.0

NAT2811(config-router)#network 10.0.0.0

NAT2811 (config-router)#no auto-summary

Step9: Configuring Dynamic NAT

NAT2811(config)#int f0/0

NAT2811(config-if)#ip nat inside

NAT2811(config-if)#int f0/1

NAT2811(config-if)#ip nat outside

NAT2811(config-if)#exit

NAT2811(config)#ip nat pool udemy 71.25.83.65 71.25.83.65 netmask 255.255.255.248

NAT2811(config)#access-list 99 permit 10.100.0.0 0.0.0.255

NAT2811(config)#iip nat inside source list 99 pool udemy overload

Once you have configured NAT ping from any PC to the external web server, then on the NAT2811 router type the following command to verify that translation is actually happening.

NAT2811#sh ip nat translation

Step11: Verify Connectivity across your entire network by pinging and using Web Browser of each PC and typing [www.udemy.com](http://www.udemy.com) in the address bar.

Step12: Backup the configurations on the routers

The final step is to back up the startup-config to the TFTP server from both routers.

NAT2811#copy start tftp

Address or name of remote host []? 10.100.0.2

Destination filename [Router-confg]? NAT2811

AR2811#copy start tftp

Address or name of remote host []? 10.100.0.2

Destination filename [AR2811-confg]?

Go to the TFTP server Click on the CONFIG tab then click on the TFTP button and look for your

File name.

**DONE!!!**