Competency 7A – Capstone Project – Professor Eno

Professor Eno | Computer Information Systems

Objectives

- Students need to demonstrate their deep understanding of LAN/WAN protocols and devices to construct functioning complex networks
- Students will use the ISO OSI Reference Model to complete this capstone and to help them troubleshoot network issues
- Students will use Cisco IOS commands to configure, troubleshoot and verify proper network connectivity
- Configure and connect personal computers, laptops and mobile devices with switches and routers
- Configure a wireless network with laptops and mobile devices
- Configure multiple VLANs
- Configure hostnames, ports and secure all intermediate devices
- Switches will be configured with SVI and be able to be managed remotely
- Connect multiple LAN segments using either static routes or dynamic routes
- Use proper transmission mediums for wired (copper and fiber) and wireless devices (air)
- Configure the layer 2 WAN protocol Frame-relay
- Design an IPv4 network and subnetworks (using FLSM and VLSM)
- Develop and deploy DNS , DHCP and Web servers
- Configure and implement Access Point
- Configure email server and email clients
- Configure IP phones using Voice over Internet Protocol (VoIP)
- FTP Server (on VLAN 70)

LAN	Network ID	Direct Connect	Administrative Cost	VLAN
WAN	Host ID	Static Route	Autonomous Network	SVI
OSI Model	Broadcast Address	Dynamic Route	NAT	DTP
TCP/IP Model	IOS Modes	Vector-Distance	Outbound Interface	VTP
IPv4	IOS Commands	Link-State	Default Route	RIPv2
Classful	MOTD	Telco (copper, glass, & air)	Default Gateway	OSPF
Classless	Routers	Route Summation	Route of last resort	Gateway Address
CIDR	Switches	FLSM	Frame Relay / DLCI	Mobile Devices
Netmask	ISR's	VLSM	Ping	SSH
Subnet	PC / Laptop	Supernetting	Tracert	HTTP
Custom Subnet Mask	Metric	Personal Computers	Nslookup	DHCP
Bit Borrowing	Hop	Laptops	Netstat	DNS

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Create a complex fully hierarchical and functional network topology as illustrated in ***Figure 1*** in Cisco PacketTracer. Design an IP scheme and configure all the devices. On all devices, the console (and user exec) password needs to be "***cisco***" and the "enable" password is "***class***". Configure the hostnames as shown on Figure ***1*** (and on the spreadsheet). Students must configure all devices via console connection using IOS commands. Label your project exactly as in ***Figure 1*** and add route tables, IP ranges, netmasks and/or CIDR notions where applicable. All end devices and intermediary devices are pingable except switches.

Directions:

- Routers are connected via serial connections: ***1 pts***
- Switches are connected to the routers via GigE: ***3 pts***
- Laptops are connected to the routers via GigE and/or via console: ***2 pts***
- PC are connected to switches via FastEthernet: ***1 pts***
- Switches will be configured via VLAN 99 after console and vty are securely configured: ***2 pts***
- *Proper Labeling throughout PacketTracer (*upload to Google Classroom*): ***8 pts***
- Properly configured VLANs (*SVI and default gateway*): ***5 pts***
- Properly configured Routes (*static and/or dynamic*): ***5 pts***
- Properly configured Inter-VLAN Routing (router-on-a-stick): ***5 pts***
- Properly configured DHCP on a router over VLANs: ***8 pts***
- Properly configured HTTP Servers (srv3 MSG="Welcome to Enology Incorporated", srv5 MSG="Welcome to South Campus") ***5 pts***
- Properly configure DNS Server (srv3 "www.enology.com", srv5 "www.eno.com") - *dns-server ip*: ***3 pts***
- Properly configure Web Servers: ***3 pts***
- Properly configure Access Point (SSID **ENO** and WPA2-PSK PSK Passphrase **michaeleno**): ***1 pts***
- Properly configure Email Server ((eno.com), user accounts: Mike, Sara, Kyle and Sky with default password: 123): ***3 pts***
    - Properly configure email client on PC15 (Mike), PC 16 (Sara), PC17 (Kyle) and PC18 (Sky) and SSID (ENO): ***3 pts***
- Properly configure VoIP (router 2811 (subnet GW Addr.)): ***5 pts***
- Properly configured Wi-Fi (LAN/WAN): ***5 pts***
- SSID: **Enology**, (WPA2 Personal) Passphrase **michaeleno**, and password **Eno123!** (WAN (Internet) IP/LAN IP Addresses)
- All devices are pingable from any device except switches (ISR wireless devices can ping out, but cannot be pinged): ***5 pts***
- Correct cable must be applied throughout (serial, copper straight-through and crossover and fiber (1FE FX)): ***5 pts***
- *Accurate completed legible routing table (*turn-in spreadsheet*): ***5 pts***
- *Accurate completed VLSM chart (*turn-in chart*): ***4 pts***
- Use FLSM on South campus. Grow north campus network by 100% (FLSM): ***2 pts***
- Configure switches and routers via COM1: ***1 pts***

***Complete and turn in four items** (Google Classroom)**:** PacketTracer, spreadsheet, essential questions (Google Doc) and VLSM chart

Competency 7A Equipment List

Routers
- 6 1941 or 4321 router
- 1 2811 router (CME)

Wireless
- 1 AP-PT wireless router
- 1 WRT300N

Switches
- 5 2960 switch
- 1 PT-Empty (for fiber)

Servers
- 3 DHCP servers
- 2 Email servers

End Devices
- 18 PC
- 9 Wired Laptop
- 5 Wireless Laptops
- 3 VoIP Phone
- 1 Smartphone

Cables
- 2 Fiber cables cables
- 9 Copper cross-over cables
- 32 Copper straight-through cables
- 7 Serial DTE cables
- 10 Console cables

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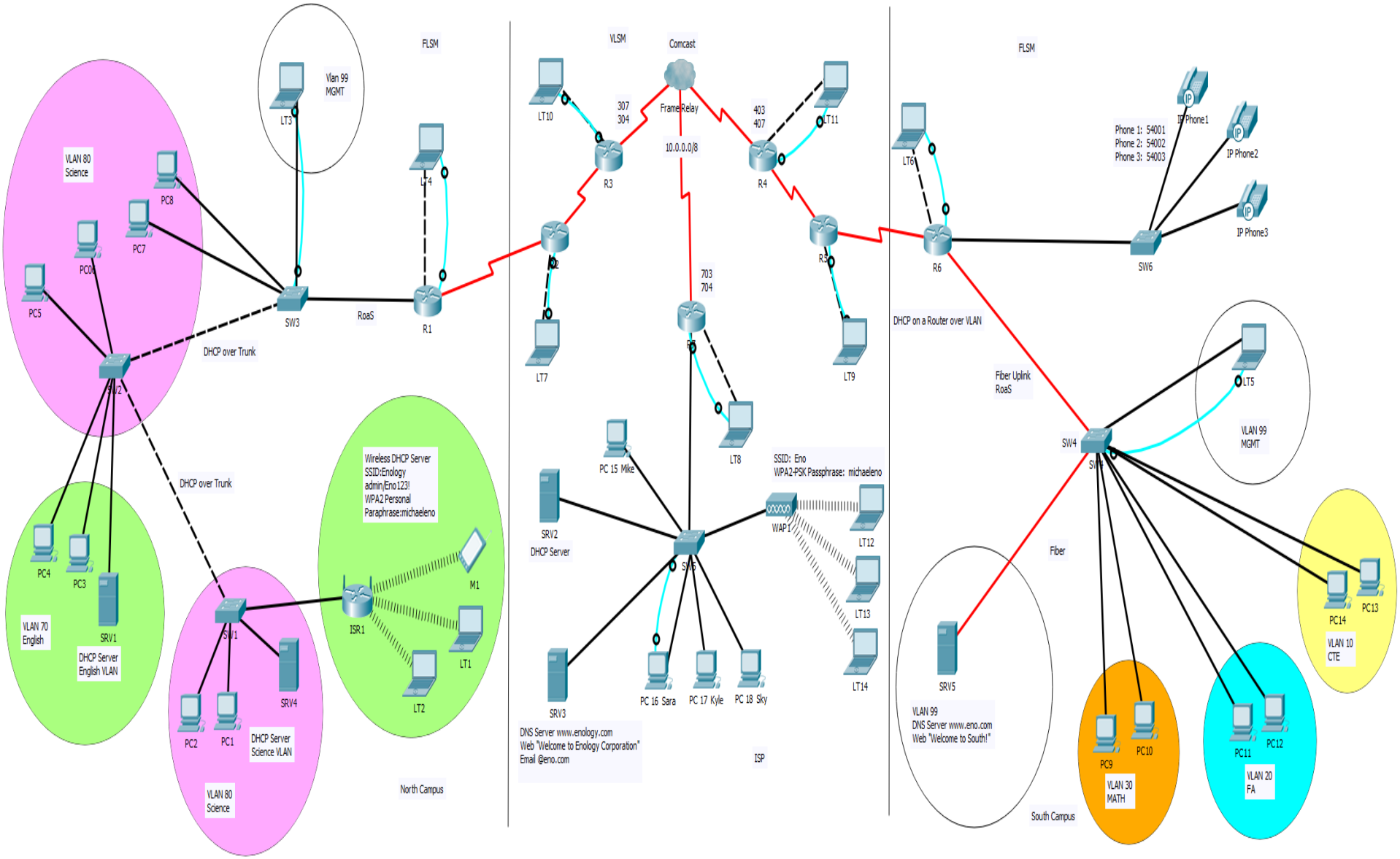

Figure 1