The Chinese University of Hong Kong
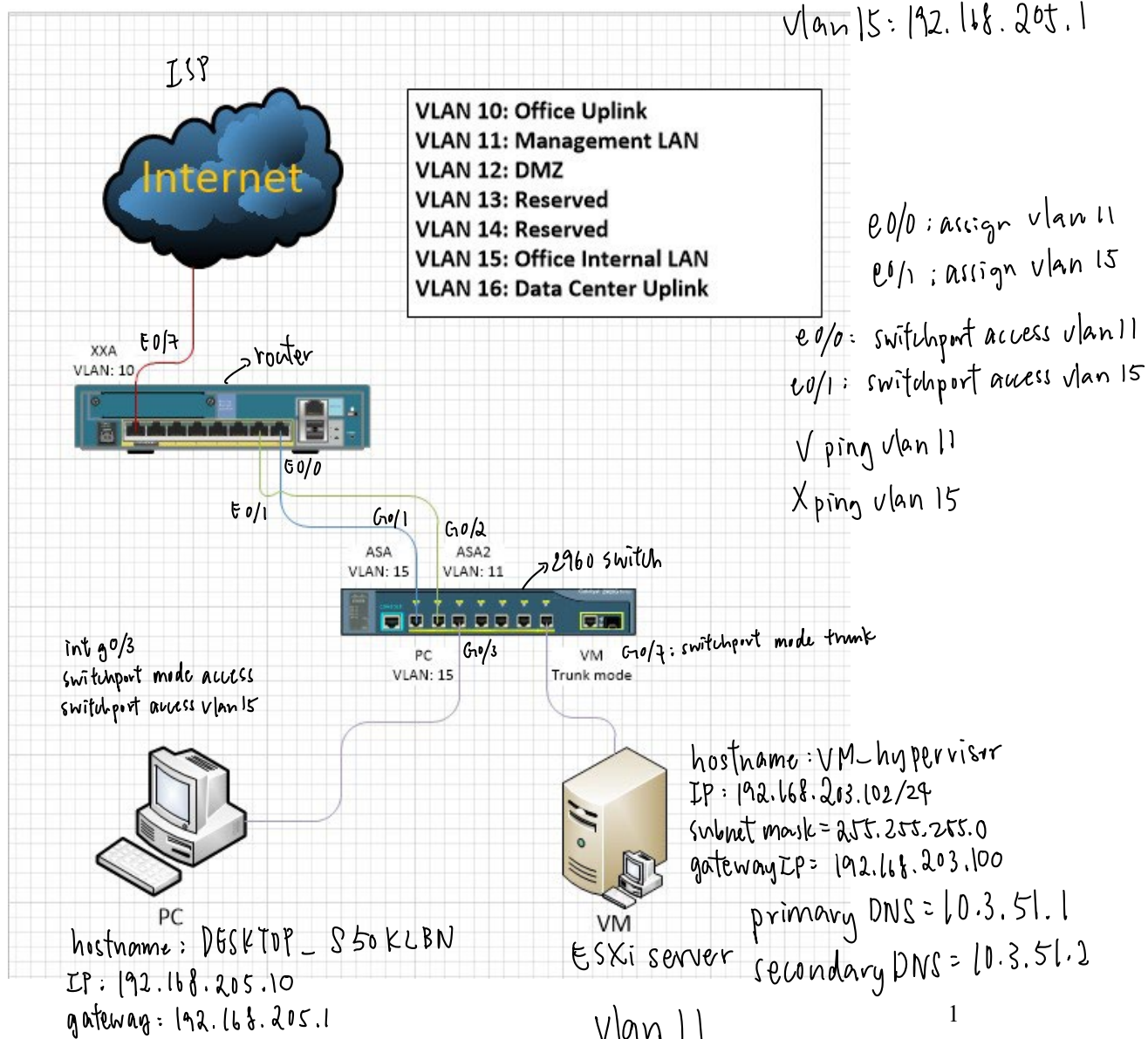**Department of Information Engineering**

IERG 4841 Networking Laboratory II
Advance computer network design and setup
(Student Manual)

Lab 1: Connecting your devices

In the first lab, you need to configure the Cisco 2960 switch and the ASA 5505 security appliance according to the network diagram and vlan chart below. In addition, please configure the ASA 5505 as a DHCP Server & NAT machine, such that all internal clients can get the IP automatically and connect to the Internet via the 5505.

Network Diagram

vlan 10: 10.2.46.101
vlan 11: 192.168.203.100
vlan 15: 192.168.205.1

VLAN 10: Office Uplink
VLAN 11: Management LAN
VLAN 12: DMZ
VLAN 13: Reserved
VLAN 14: Reserved
VLAN 15: Office Internal LAN
VLAN 16: Data Center Uplink

e0/0: assign vlan 11
e0/1: assign vlan 15

e0/0: switchport access vlan 11
e0/1: switchport access vlan 15

✓ ping vlan 11
✗ ping vlan 15

ISP

XXA — E0/7 — VLAN: 10 — *router*

G0/0

E0/1 — G0/1 — G0/2

ASA VLAN: 15 — ASA2 VLAN: 11 — *2960 switch*

int g0/3
switchport mode access
switchport access vlan 15

PC VLAN: 15 — G0/3

VM Trunk mode — G0/7: *switchport mode trunk*

hostname: VM-hypervisor
IP: 192.168.203.102/24
subnet mask = 255.255.255.0
gateway IP = 192.168.203.100
primary DNS = 10.3.51.1
secondary DNS = 10.3.51.2

PC
hostname: DESKTOP_S50KLBN
IP: 192.168.205.10
gateway: 192.168.205.1

VM
ESXi server
vlan 11

- IP address assignment
  - ➢ Please read carefully the appendix A, some IP address already reserved for infrastructure. You should avoid using those IP address when assigning the IP address to your VMs/network devices.
  - ➢ For the internal network (vlan15), please choose one from:
    192.168.204.0/24 – 192.168.209.0/24
- Managing the VM server
  - ➢ Access the main console of your ESXi hypervisor. *Fn + scroll lock*
  - ➢ Enter the configuration page by pressing [F2] key.
    Username: root
    Password: AsD24!!0 *4$i^5#2d*
  - ➢ Configure your ESXi hypervisor management network.
    - ✧ Assign vlan ID to your management interface. It should be the same as Management LAN one.
    - ✧ Assign IP address / subnet mask / gateway IP / hostname…...
    - ✧ IP address: 192.168.203.102/24
    - ✧ Please change the default password.
- Access Network device console *Connect to COM3*
  - ➢ The switch & ASA's console port have been connected to the DB-9 selector. Select target device at DB-9 selector and run "putty" or "hyper terminal".

putty

box

hser
g1ab12#$

serial port → Xgateway
↓
SW/RT/ASA/AP

References

- Cisco ASA5505 basic configuration guide
  (*https://www.routerfreak.com/basic-configuration-tutorial-cisco-asa-5505-firewall/*)
- Running DHCP server at ASA appliance.
  (*http://ciscorouterswitch.over-blog.com/article-how-to-configure-dhcp-on-a-cisco-asa-5505-96115958.html*)
- The VMware document
  (https://docs.vmware.com/en/VMware-vSphere/index.html)

No → customise settings → ✓ yes default settings

Router : ① port IP
② vlan
③ gateway → default gateway
gateway → ESXi network
④ DHCP → internal
→ external

Appendix A

Information for Group 1:

IP address assigned to Main Office: 10.2.46.101/24 vlan 10

IP address for ISP's router (Main Office): 10.2.46.254   ASA IP

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp01.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp01.nlab2.ine.cuhk.edu.hk (10.3.51.1)

                                ns2. gp01.nlab2.ine.cuhk.edu.hk (10.3.51.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.51.0/24

Default route for Data Center's devices: 10.3.51.254

IP address reserved by Data Center's operator: 10.3.51.251 – 10.3.51.254

Information for Group 2:

IP address assigned to Main Office: 10.2.46.102/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp02.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp02.nlab2.ine.cuhk.edu.hk (10.3.52.1)

                                ns2. gp02.nlab2.ine.cuhk.edu.hk (10.3.52.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.52.0/24

Default route for Data Center's devices: 10.3.52.254

IP address reserved by Data Center's operator: 10.3.52.251 – 10.3.52.254

Information for Group 3:

IP address assigned to Main Office: 10.2.46.103/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp03.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp03.nlab2.ine.cuhk.edu.hk (10.3.53.1)

                                ns2. gp03.nlab2.ine.cuhk.edu.hk (10.3.53.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.53.0/24

Default route for Data Center's devices: 10.3.53.254

IP address reserved by Data Center's operator: 10.3.53.251 – 10.3.53.254

Information for Group 4:

IP address assigned to Main Office: 10.2.46.104/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp04.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp04.nlab2.ine.cuhk.edu.hk (10.3.54.1)

                                    ns2. gp04.nlab2.ine.cuhk.edu.hk (10.3.54.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.54.0/24

Default route for Data Center's devices: 10.3.54.254

IP address reserved by Data Center's operator: 10.3.54.251 – 10.3.54.254

Information for Group 5:

IP address assigned to Main Office: 10.2.46.105/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp05.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp05.nlab2.ine.cuhk.edu.hk (10.3.55.1)

                                      ns2. gp05.nlab2.ine.cuhk.edu.hk (10.3.55.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.55.0/24

Default route for Data Center's devices: 10.3.55.254

IP address reserved by Data Center's operator: 10.3.55.251 – 10.3.51.254

Information for Group 6:

IP address assigned to Main Office: 10.2.46.106/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp06.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp06.nlab2.ine.cuhk.edu.hk (10.3.56.1)

                                      ns2. gp06.nlab2.ine.cuhk.edu.hk (10.3.56.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.56.0/24

Default route for Data Center's devices: 10.3.56.254

IP address reserved by Data Center's operator: 10.3.56.251 – 10.3.56.254

Information for Group 7:

IP address assigned to Main Office: 10.2.46.107/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp07.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp07.nlab2.ine.cuhk.edu.hk (10.3.57.1)

                                    ns2. gp07.nlab2.ine.cuhk.edu.hk (10.3.57.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.57.0/24

Default route for Data Center's devices: 10.3.57.254

IP address reserved by Data Center's operator: 10.3.57.251 – 10.3.57.254

Information for Group 8:

IP address assigned to Main Office: 10.2.46.108/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp08.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp08.nlab2.ine.cuhk.edu.hk (10.3.58.1)

                                      ns2. gp08.nlab2.ine.cuhk.edu.hk (10.3.58.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.58.0/24

Default route for Data Center's devices: 10.3.58.254

IP address reserved by Data Center's operator: 10.3.58.251 – 10.3.58.254

Information for Group 9:

IP address assigned to Main Office: 10.2.46.109/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp09.nlab2.ine.cuhk.edu.hk

    Name servers for your domain: ns1. gp09.nlab2.ine.cuhk.edu.hk (10.3.59.1)

                                      ns2. gp09.nlab2.ine.cuhk.edu.hk (10.3.59.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.59.0/24

Default route for Data Center's devices: 10.3.59.254

IP address reserved by Data Center's operator: 10.3.59.251 – 10.3.59.254

Information for Group 10:

IP address assigned to Main Office: 10.2.46.110/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp10.nlab2.ine.cuhk.edu.hk

  Name servers for your domain: ns1. gp10.nlab2.ine.cuhk.edu.hk (10.3.60.1)

              ns2. gp10.nlab2.ine.cuhk.edu.hk (10.3.60.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.60.0/24

Default route for Data Center's devices: 10.3.60.254

IP address reserved by Data Center's operator: 10.3.60.251 – 10.3.60.254

Information for Group 11:

IP address assigned to Main Office: 10.2.46.111/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp11.nlab2.ine.cuhk.edu.hk

  Name servers for your domain: ns1. gp11.nlab2.ine.cuhk.edu.hk (10.3.61.1)

              ns2. gp11.nlab2.ine.cuhk.edu.hk (10.3.61.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.61.0/24

Default route for Data Center's devices: 10.3.61.254

IP address reserved by Data Center's operator: 10.3.61.251 – 10.3.61.254

Information for Group 12:

IP address assigned to Main Office: 10.2.46.112/24

IP address for ISP's router (Main Office): 10.2.46.254

IP address for the ESXi server located at main office: 192.168.203.102/24

Domain name managed by your group: gp12.nlab2.ine.cuhk.edu.hk

  Name servers for your domain: ns1. gp12.nlab2.ine.cuhk.edu.hk (10.3.62.1)

              ns2. gp12.nlab2.ine.cuhk.edu.hk (10.3.62.2)

IP address for the ESXi server located at Data Center: 192.168.203.101/24

IP address range assigned to the Data Center's devices: 10.3.62.0/24

Default route for Data Center's devices: 10.3.62.254

IP address reserved by Data Center's operator: 10.3.62.251 – 10.3.62.254

Appendix B

IPv6 address assignment for:

Group 1: 2405:3000:3:F602::/63

  DC router: FE80::7:B4FF:FE00:0B00

  Group 1 router: FD96:730D:4F8D:1001::21

Group 2: 2405:3000:3:F604::/63

  DC router: FE80::7:B4FF:FE00:0C00

  Group 2 router: FD96:730D:4F8D:1002::21

Group 3: 2405:3000:3:F606::/63

  DC router: FE80::7:B4FF:FE00:0D00

  Group 3 router: FD96:730D:4F8D:1003::21

Group 4: 2405:3000:3:F608::/63

  DC router: FE80::7:B4FF:FE00:0E00

  Group 4 router: FD96:730D:4F8D:1004::21

Group 5: 2405:3000:3:F60A::/63

  DC router: FE80::7:B4FF:FE00:0F00

  Group 5 router: FD96:730D:4F8D:1005::21

Group 6: 2405:3000:3:F60C::/63

  DC router: FE80::7:B4FF:FE00:1000

  Group 6 router: FD96:730D:4F8D:1006::21

Group 7: 2405:3000:3:F60E::/63

  DC router: FE80::7:B4FF:FE00:1100

  Group 7 router: FD96:730D:4F8D:1007::21

Group 8: 2405:3000:3:F610::/63

  DC router: FE80::7:B4FF:FE00:1200

  Group 8 router: FD96:730D:4F8D:1008::21

Group 9: 2405:3000:3:F612::/63

  DC router: FE80::7:B4FF:FE00:1300

  Group 9 router: FD96:730D:4F8D:1009::21

Group 10: 2405:3000:3:F614::/63

  DC router: FE80::7:B4FF:FE00:1400

  Group 10 router: FD96:730D:4F8D:100A::21

Group 11: 2405:3000:3:F616::/63

  DC router: FE80::7:B4FF:FE00:1500

  Group 11 router: FD96:730D:4F8D:100B::21

Group 12: 2405:3000:3:F618::/63

  DC router: FE80::7:B4FF:FE00:1600

  Group 12 router: FD96:730D:4F8D:100C::21

Appendix C: Setup and Connect to VPN Service

- If you are using IE Computing lab's PC, the VPN connection already setup for you.
    - For Windows 7/10 user, left click the network icon at notification area and select nlab vpn >> connect.
- If you are outside IE network, please follow the procedure below to create the VPN connection:
    - The setup procedures of the IPSEC VPN is similar to the [CUHK VPN server] (http://www.cuhk.edu.hk/itsc/network/vpn/vpn.html), except:
        - Replace the hostname to vpn.ine.cuhk.edu.hk
        - Do not select unencrypted password (PAP) at encryption protocol.
        - Use your Windows Login-name with realm and password for authentication (ie. IEPCLAN\Username)
        - The Max connection time is 4 hours