Lab Course: Networking Lab

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Course Description

This course offers a series of hands-on laboratory exercises for students to learn basic concepts in networking and Internet services. Students can practice their implementation, problem-solving, and debugging skills in a setting very close to the real-world environment.

Learning Outcomes

1. Let students have hand-on experience on
    - managing routers and switches
    - setting up basic Internet services (DNS, MAIL, WWW, PROXY, FIREWALL)
    - network monitoring such as traffic measurement (e.g. MRTG via SNMP), packet analysis (e.g. NTOP, ETHEREAL, TCPDUMP, SNORT)
2. Let students have some idea of how an enterprise network is set up, operated, and managed

Story Line

Let the adventure begin ...

In 20XX Fall, you are hired to be the technology officers to set up a branch office network for a nationwide enterprise within 12 weeks. The Chief Technology Officer (CTO, in this lab, he is your tutor) in the enterprise headquarter will only give you some general guidelines to set up this network since he is too busy to give you detail steps. As you are the only technical staff in this branch office, you need to figure out the detail implementation procedures by yourselves from manuals and on-line documents. If you encounter any problem, you can post your question to the eLearning discussion forum for discussion. You

need to report your progress to the enterprise headquarter in each week. In some cases, you may need to explain or justify why you need to take such approach or step to achieve your missions.

Background Information

Students are divided into four enterprises and each enterprise has four branch offices. They will learn how to cooperate with other staff in different branch offices to accomplish their missions by effective communication and documentations.

Course Outlines

Mission 1: Know your lab equipment

- Familiarize with your branch office working environment.
- Inspect all your hardware equipment.
- Set all your hosts, router and switch hostname and password.

Mission 2: Network equipment initial setup

- Set up the router to connect to your network upstream ISP and test the connection.
- Configure all your host network interfaces.
- Configure your switch to link up your hosts.

Mission 3: Setup your branch office firewall and Internet services

- Set your router and firewall to restrict the traffic to your network (e.g. restrict the access to your colleagues from other branch offices).
- Set up your branch office DNS server and Mail servers so that headquarter and other branch offices can send you e-mails.

Mission 4: Setup your DMZ and HTTPS webserver

- Set up your web server in DMZ to for public access.
- Apply for a PKI certificate from headquarter so as to support secure communication on your web server and e-mail communication among other branch offices.
- Set up the firewall to restrict access to your internal private network.

Mission 5: Setup internal DNS and proxy server of private network

- Start building up your internal private network (e.g. internal DNS).
- Open accounts for your staff in your branch office.
- Set up a proxy server and mail gateway in DMZ, so that your hosts in the internal network can access the Internet and send e-mails to outsiders.

Mission 6: Setup network monitoring server for your branch office network

- Set up a network monitoring station in your internal private network.
- Set up the radius authentication server for the router and switch.
- Set up the SNMP/MRTG/NTOP/NETFLOW monitoring of your router and switch.
- Set up a web reverse proxy in DMZ or NAT in your router/firewall so that headquarter can access your network monitoring station web page.

Mission 7: Network Security

- vulnerability scanner
  - ❖ Set up a vulnerability scanner and conduct a security vulnerability test to your network and other branch office networks in your enterprise. You may conduct penetration test as well.
- IDS/IPS
  - ❖ Set up an Intrusion Detection System (IDS) or Intrusion Prevention System for your network.
- Risk Assessment
  - ❖ Identify the thread of your branch office and propose its migration plan.