Building a Network and Security Lab in an Educational Environment

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NCUIRE

Introduction

The network and security lab gives students an opportunity to explore and develop solutions to network and security problems that enterprise-level networks face in today's complex technical environments. Specifically, the lab aims to equip ACO Cybersecurity students with an in-depth understanding of security threats and breaches, defense mechanisms, risk analysis, and data forensics in order to secure the network/system/application and protect data. The learning of students is enhanced with enterprise-grade networking equipment, various operating systems including Kali Linux, and fun projects that are developed by undergraduate students and integrated into the curriculum. This lab is isolated from ASU for security reasons.

Lab Description

The network and security lab at West campus consists of three routers and over twenty computers. Two Cisco 1941 series routers are used to build two networks, an ACO network and a LAB network, which consists of both wired and wireless networks, while one Cisco 2911 series router is used to simulate the internet. In addition, we implement both WPA protected networks and unprotected wireless guest networks. The LAB network hosts subset of servers consisting of file/streaming servers, email/DNS servers, and web servers, while the ACO network implements a RADIUS server and a firewall. The twenty computers are used to simulate servers and clients on various operating systems.

Projects

✔ Securing Enterprise Wireless LANs with RADIUS Authentication
✔ Building a Scalable Enterprise Network Environment for Education
✔ Wi-Fi Troubleshooting Android App Development
✔ Replicating Evil Twin Attacks on an Enterprise Network
✔ Locating a Malicious Wireless Device
✔ Launching Packet Injecting Attack with Scapy
✔ Hacking into WPA2 Protected Wireless Networks
✔ Wireless DNS Injection
✔ …..

Career Opportunities

❑ Network/system/application security engineer
❑ Security/Risk/Threat Analysis
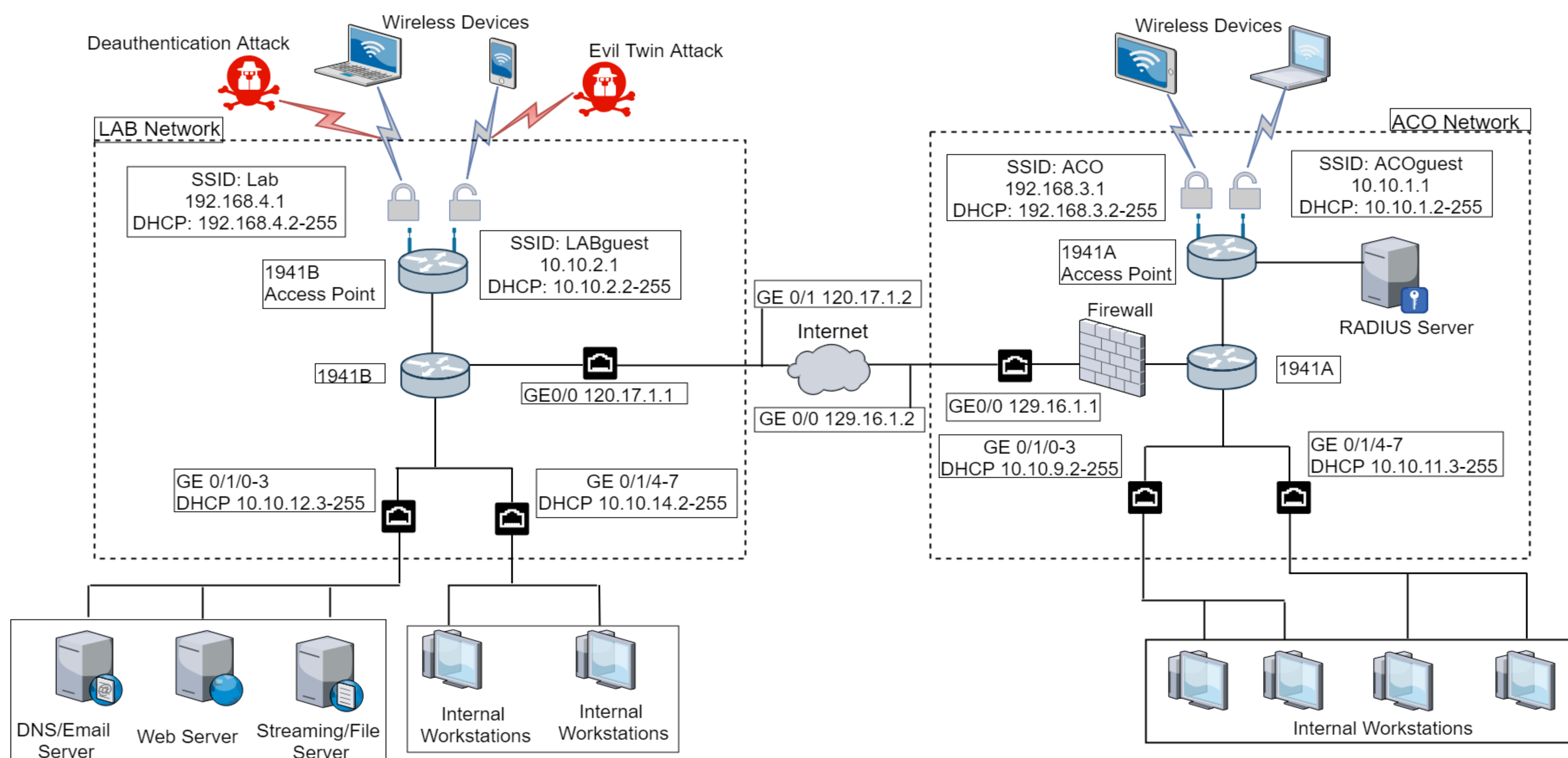❑ Network/System engineer
❑ Software engineer

Figure 1. Lab Topology

Figure 2. Cisco Routers


```
ip dhcp pool ccp-pool
 import all
 network 10.10.10.0 255.255.255.128
 default-router 10.10.10.1
 lease 0 2
!
ip dhcp pool vlan 5
 network 10.10.12.0 255.255.255.0
 default-router 10.10.12.1
!
ip dhcp pool vlan 6
 network 10.10.14.0 255.255.255.0
 default-router 10.10.14.1
!
ip domain name ACOlab.com
```

Figure 3. Configuration capture