Campus Network Design Workshop

Campus Network Security: High Level Overview

UNIVERSITY OF OREGON

NSRC
Network Startup Resource Center

Campus Networks and Security

- Goal: Prepare for problems you will have
  - You will have compromises and hackers
  - You will have viruses
- You get a call from your ISP saying that they have a report that one of your hosts is participating in a Denial of Service (DoS) attack
  - What do you do?
  - How do you find the host (very hard if NAT)?

Security is a Process

- You can never achieve security – it is a process that you have to continually work on
  - Assessment – what is at risk
  - Protection – efforts to mitigate risk
  - Detection – detect intrusions or problem
  - Response – respond to intrusion or problem
  - Do it all over again

Security Policy Framework

- Why is policy important?
  - How do your users know what is permissible?
  - How do you know what you can do?
    - Can you disconnect users from the network?
    - Can you eavesdrop on network traffic?
- What do you include?
  - Typical policy framework for a University is an "Acceptable Use Policy" or AUP
    - Google "University Acceptable Use Policy"

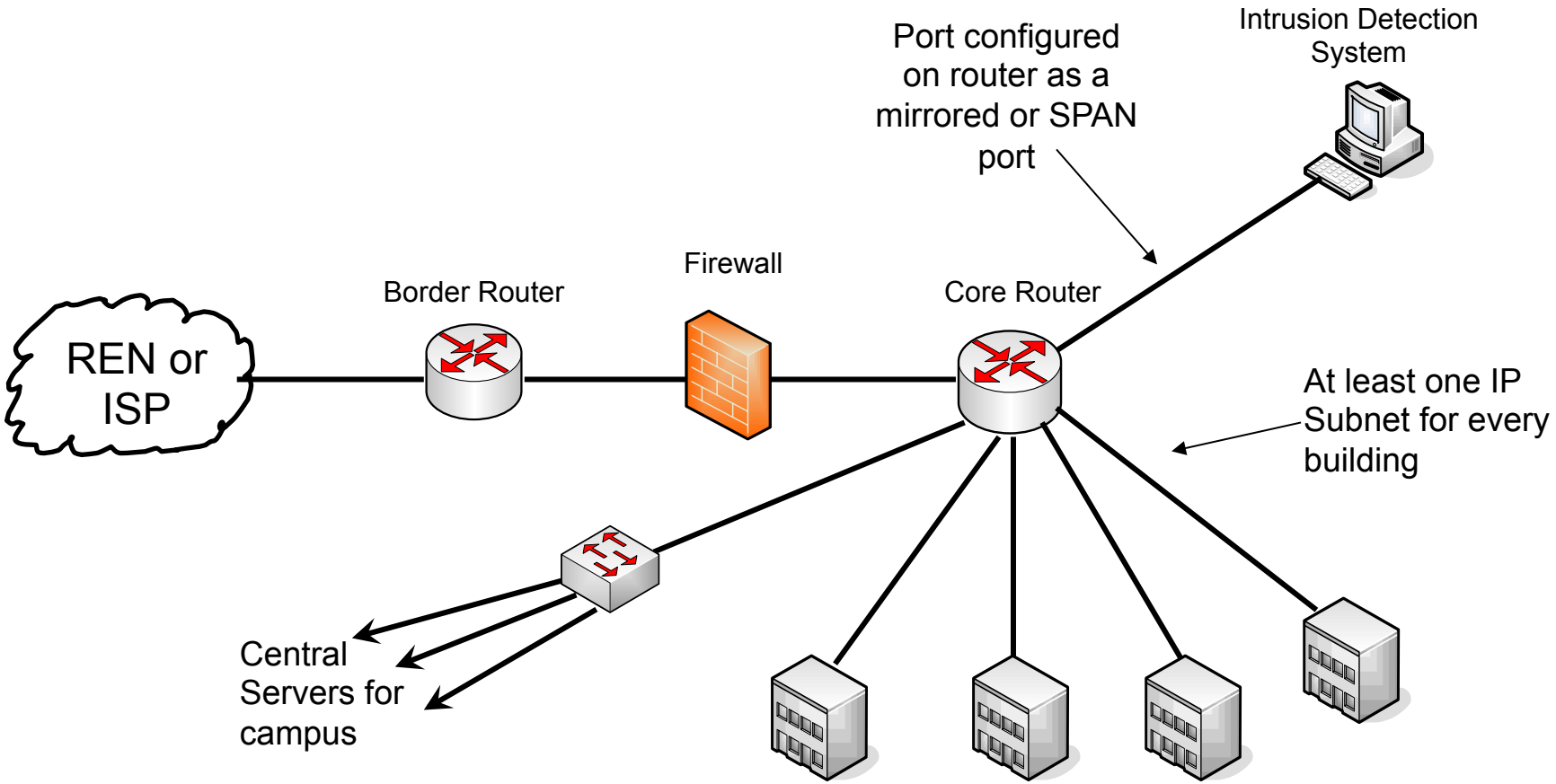
Typical Acceptable Use Policy

- Use of University computing and network for University-related use only (prohibits commercial use)
- Shall not interfere with use of computing or network of others (prohibits hogging of resources)
- Copyright must be respected
- Violators can be denied access
- Use of computing and network is not private and can be monitored by IT Staff
- And more. Use Google and find examples
- Make this an official University Policy so that violations of AUP will be treated as violations of University policy

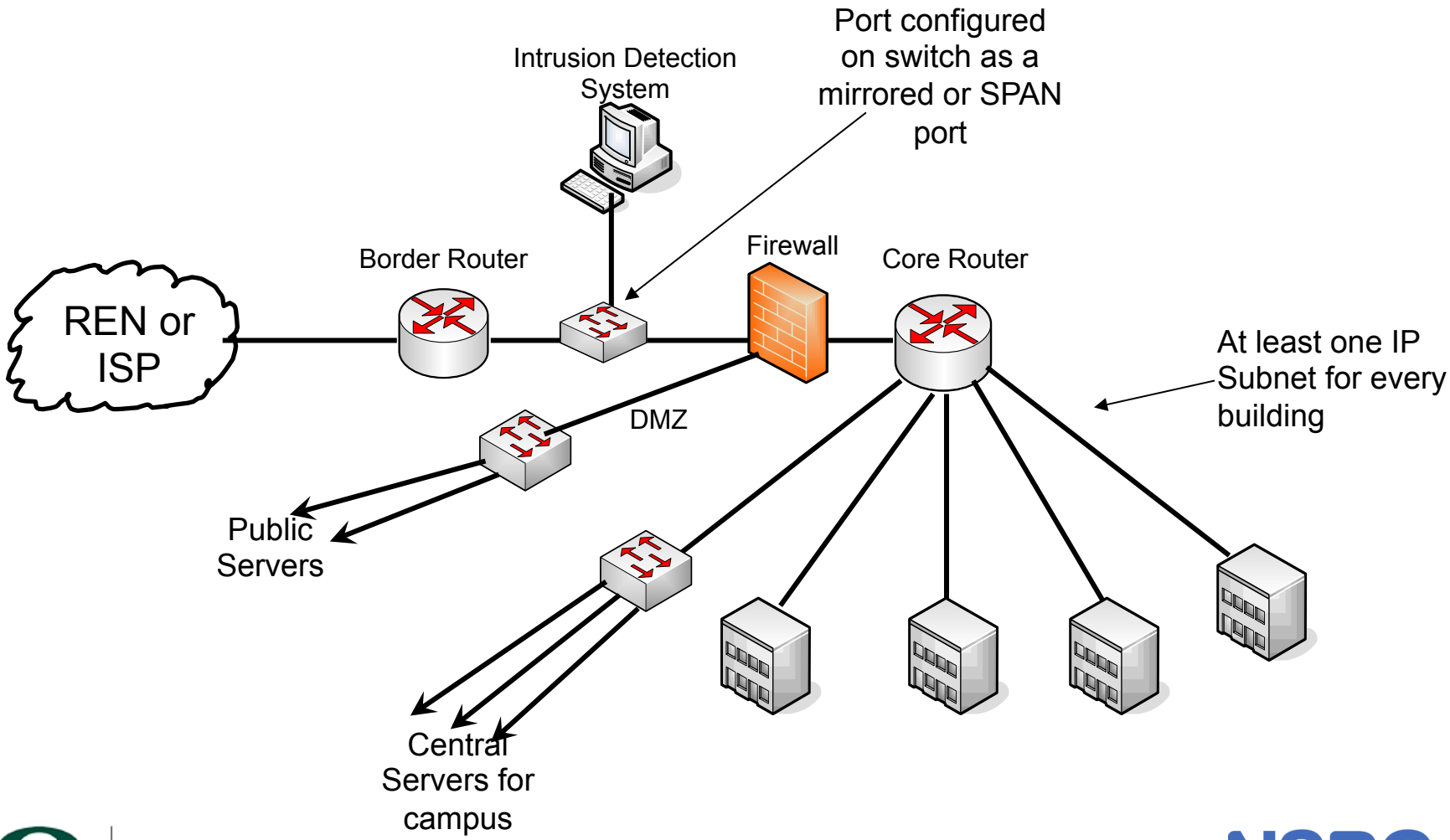
Design with Security in Mind

- Segmentation and IP addressing schemes
  - Follow campus network best practices
  - Route in the core
  - One IP Subnet per building
  - Put campus-level servers on IP subnet that is separate from users
- Where to put firewalls and IDSs
  - Firewalls protect critical assets
  - IDS needs to see as much traffic as possible

Typical Design



Another Typical Design



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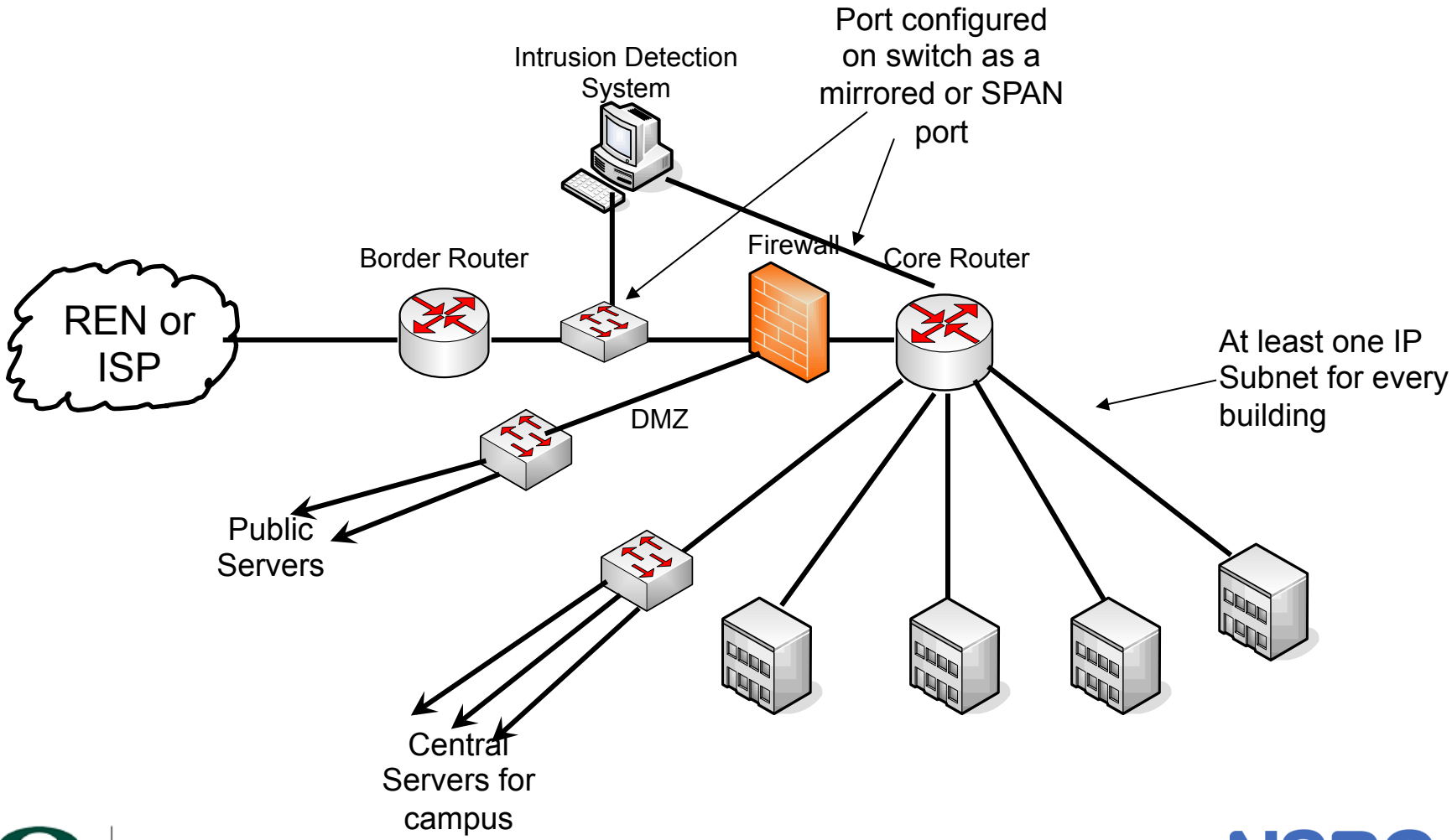

Security Foundation

- You must have managed equipment in your network
- You must have some basic network management running
- Network Management is the foundation that much of the security framework operates on

Network Traffic Analysis

- It is important to know what traverses your network
  - You learn about a new virus and find out that all infected machines connect to 128.223.60.21
  - What machines have connected?
- What tools are available?
  - netflow: you will learn about this
  - Snort: open source intrusion detection system that is very useful to find viruses

Log Analysis

- Can be just as important as traffic analysis
- Central syslog server and gather logs from:
  - DHCP server, DNS servers, Mail servers, switches, routers, etc.
  - Now, you have data to look at
  - Given an IP, you can probably find user
- Lots of tools to correlate logs and alarm on critical events

Centralized Authentication

- AAA: Authorization, Authentication, and Accounting
- Central database of users
  - Can be a single system that everyone has a login (or password file entry)
  - LDAP or Microsoft Active Directory
- Systems and Devices use database
  - Protocols: Radius, LDAP, Kerberos, LDAP, and Active Directory

Encryption

- Encryption is important
  - Protect sensitive data
  - Protect passwords
- Disable clear-text password protocols
  - Disable telnet, ftp
  - Only allow TLS based POP and IMAP
  - Move all web traffic to HTTPS that involves passwords or sensitive data

SSL Certificates

- Don’t use self-signed for public services
  - They teach users bad habits
- Get certificates from well known certificate authorities (CA)
- Larger campus may want to provide certificate service

Wireless

- Best practice is to authenticate users
  - This allows you to know who your users are
  - Requires central AAA database
  - Log the access to your central syslog server
- How to do this
  - Captive Portal
  - 802.1x WPA2 Enterprise
- Who can install access points (AUP)?

Virus Protection

- Most viruses are spread through the action of users
  - Clicking “OK” or “Install” when they shouldn’t
  - Firewalls generally won’t help
  - Windows needs virus protection software (is MS Security Essentials enough?)
- Server-based viruses or intrusions are typically caused from external attacks
  - Firewalls might help

Responding to Incidents

- This is not an “if”, but “when”. You will have incidents.
- Need to establish policy & procedures
- This is different from an AUP – it is an internal operating policy
  - Who do you notify?
  - Can you disconnect a system from the network?

High Level Wrapup

- Security is hard – you are never done
  - You are always in the Assessment, Prevention, Detection, Response cycle
- Many security tools and practices builds upon your network management framework
  - Build your network management framework first and get started on all of this
- Acceptable Use Policy a high priority

Resources

- Lots of resources on the Internet
  - www.sans.org – subscribe to the SANS newsletter
  - www.cert.org – a good resource for lists of vulnerabilities
  - www.wikipedia.org – good source of information for lots of topics
  - www.google.com – having a problem? Seeing an error message? Google it.

Questions/Discussion?

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