

Campus Network Security High Level Overview

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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

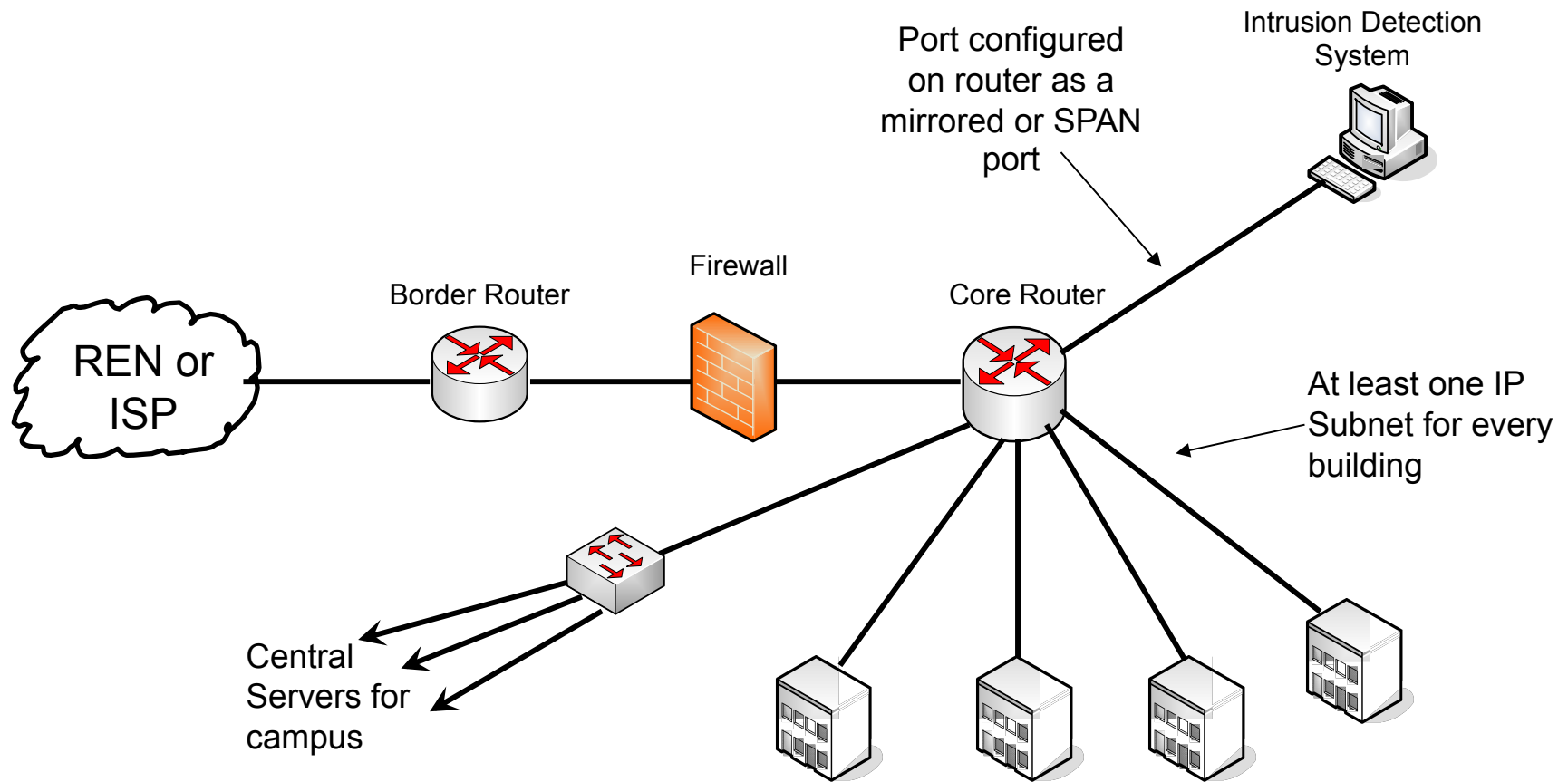


Design with Security in Mind

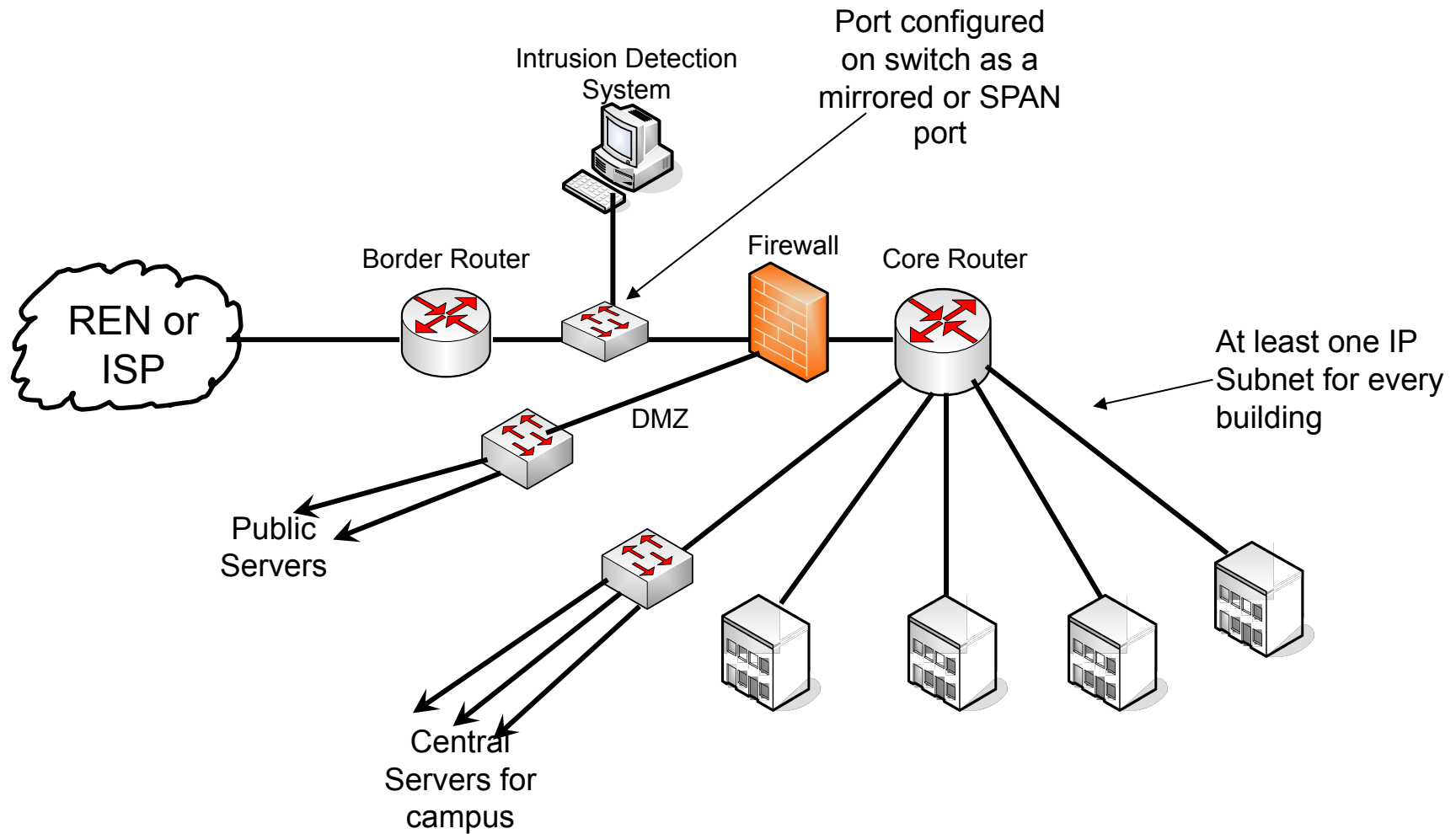
- Segmentation and IP addressing schemes
 - Follow campus network best practices
 - Route in the core
 - One IP Subnet per building
 - Put campus-level servers on IP subnet that is separate from users
- Where to put firewalls and IDSs
 - Firewalls protect critical assets
 - IDS needs to see as much traffic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



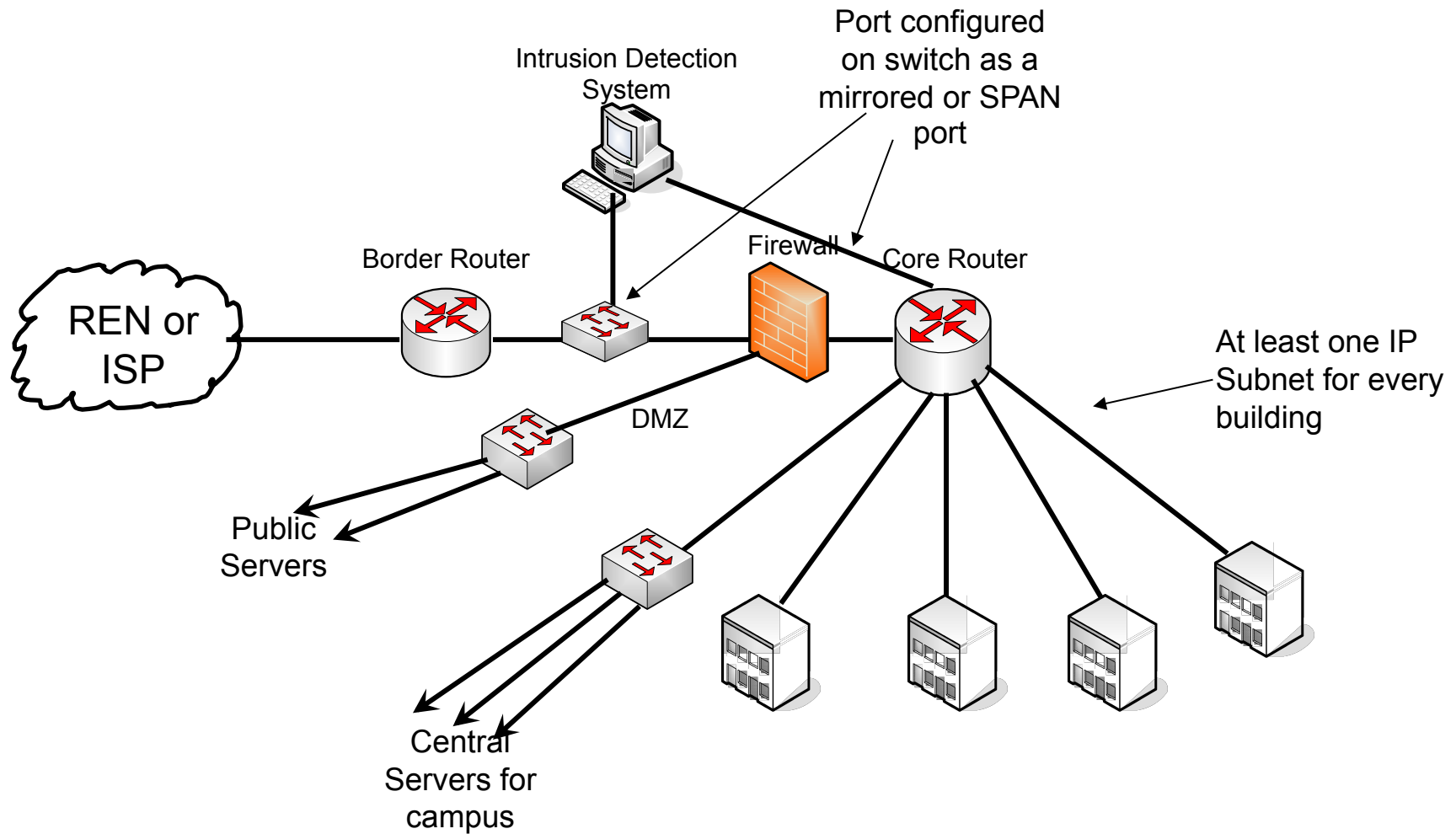
Typical Design



Another Typical Design



Another Typical Design



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



Key Network Management Tools

- Are some devices not responding or responding poorly, possibly because of a DOS attack or breakin?
 - Nagios
 - Smokeping
- Are you seeing unusual levels of traffic?
 - Cacti



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 (and use ssh, scp)
 - 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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