Ch. 2 - Cisco

Sem 2

* Ways to get to CLI
- AUX, console, telnet
* Purpose of IOS
- routing & switching
- reliable & secure
- scaliable
* CLI
- console, AUX, telnet
- initial config through console
- structure is hierarchial
- for security, it separates EXEC from user mode
- user doesn't allow config, but only to monitor, can't change
- privilages -
* Privileges
- global → show, erase
- interface → serial, local
- router → RIP, EIGRP
- line → AUX, console
* Interface
- serial, local (ethernet)
* Serial
- rule interfaces
* User EXEC
- basic, view only
* Going Back
- (ctrl - Z, disable, end

* IOS software
- show version - config register
- user mode - (Name)>
- > - monitor mode
- (Name) boot - boot mode
* Sequence
- flash, TFTP, ROM for mini-IOS (IOS)
- NVRAM, TFTP, console (config)
* Boot System Command
- changes order of boot
- none store in flash or NVRAM
* LEDS
- last most important
- front is important
- 2102 is default setting
- 210F - default
- 2100 - monitor
- 2101 - mini-IOS
- 2142 - ROM mode for password recovery
*
- Ctrl-Z - goes directly to USER mode
* Editing
- terminal - default
- Ctrl-B - back one letter
- Ctrl-A - beginning of line
- Ctrl-E - end of line
- Ctrl-P - previous

* history
- go into global - term history size #
- default is
* show version
- detail!
- IOS version
- boot thru
- config register
- location
- system image
*

* WANs
- geographically separated areas
- RBOC - regional bell operating company
- all WAN are serial
* WAN devices
- routers
- switches - frame relay, PPP
- modems
- communication servers
* Routers in a WAN
- CPU, RAM, interfaces, bus
- IOS - internetworking operating system
* RAM
- temp storage
- goes away when shutoff
- holds running config
- ARP caches, fast switching caches
- packet buffering
* NVRAM & Flash
- non volatile
- copies running config into NVRAM
- flash - erasable programmable memory
- IOS is run in flash
* ROM & Interfaces
- read only - permanent
- contains stripped version of IOS and boot monitor

* Bus
- transfer info
* Segment
- routers segment networks & broadcast domains
- routers controls traffic
* Routers role in a WAN
- if in same LAN, just switches
- makes path selection on layer 3, just forward on layer 2
* WAN layer 1 + 2 Protocols
- physical - EIA/TIA-232 - serial
- EIA/TIA 449
- V.35 + V.25
- X.21
- E3
- OC12
* Connecting WAN interfaces
- leased line - T1, T3, OC2
- circuit - switching - dialup
- packet-switching - buying bandwidth, sharing, packet

Ch. 3 - Cisco

Sem 2

* CLI modes
  - global - controller, interface, router, line
  - line - access to router
  - router - path selection
  - interface - E/Serial
  - mapping - class & list
  - controller - slot of chip
* Password
  - global, secret and each line (highest)
* show command
  - interfaces
  - controller
  - clock
  - host
  - flash
  - version
  - arp
  - history
* Serial interface
  - interface - physical line - data link
  - ifpc - physical line - protocol
  - default is always shutdown
  - ip addr (IP) (subnet)
  - must be in interface-config mode
  - don't set clock if DTE is connected
  - set on DCE for clock

* add, modify, delete
  - erase start = write erase
  - changes are effective immediately
* Importance of config standards
  - host table does mapping of hosts & IPs
* Configure interface
  - description commands

Chapter 4

- frequency / time domain analysis
- frequency - how many cycles per second
- ∿ - analog - AC - positive & negative
- ⊓⊓ - digital (varying DC) - doesn't go negative
- noise changes signal
- NEXT - near end X-talk - one set of wires to another
- FEXT - far end -
- PSNEXT - power sum "
- thermal noise - fast differences
- analog bandwidth - range of frequencies
- PSNEXT - problem when multiple pairs are used
- wire map - layout of wires
- reversed pair - 1-2, 2-1 not 1-1, 2-2
- split pair - 1-4, 2-2, 3-3, random
- transposed -
- Cat 6 -
- Pin 1 - transmit +
  2 - T -
  3 - R +
  4 - R -

$$\begin{array}{r} {}^{1}9.8 \\ \times\ 2 \\ \hline 19.6 \end{array} \qquad \begin{array}{r} {}^{2}9.8 \\ \times\ 3 \\ \hline 29.4 \end{array}$$

$$\begin{array}{r} {}^{1\,2}29.4 \\ +\ 19.6 \\ \hline 9.8 \\ \hline 59.8\ m \end{array}$$

* Wireless
- needs transmitter & receiver
- converts to EM waves
- no wires
- security issues
- specialized NIC
* Wireless Tech
- IR + RF
- line of sight
* Bridges
- layer 2 device
- filters traffic based on MAC
- keeps local traffic local instead of sending it out
- runs software, makes decision based on software filter/flood
* Switches
- filter/port
- makes decisions in hardware
- alot of ports
- increases bandwidth
- segmentation - bridges
- micro-segmentation - switches
* Role of a switch
- decision based on MAC
- has high speed
- better performance without rewiring
-

* NIC
- layer 2, but deals with layer 1
- has MAC
* Peer to Peer Network
- data is everywhere
- easy to install
- 10 or less computers or collision increase
* Client / Server Network
- info is on one central server
* WAN talking
- ISDN, DSL, PPP,
- connecting over long distances
* WAN speeds
- ISDN - 2 64Kbps channels
- PPP - 2400 bps - 1.544 Mbps
- slower than LANs
*
- DTE - usually a router
* Clocking issues
- CSU/DSU can be DCE
- DCE hooks up to service provider - changes responsibility to ISP
- CSU/DSU usually does signal clocking
* ISDN
- ISDN BRI S/T or BRI U
- U is the normal
- BRI - smallest rate for ISDN

* Setting up Console Port
- AUX is same as console except it can be hooked to modem
* DTE / DCE
- DTE - Data termination equipment
- DCE - Data communication equipment
- DTE - end of user's device on the WAN link
- DCE - end of WAN's side of communication
- DCE - responsible for clocking
* Routers & Serial connections
- CSU/DSU - signal clocking
- the router is usually a DTE, but can be DCE
- "port type slot # / port #"
- serial 1/0 - serial is used, slot is 1, and port 0 is referenced
* Console Ports
- usual setting - 9600 bps, 8 data bits, no parity, 1 stop bit, no flow control
- uses rollover cable
- DB-9 (com port) to RJ-45
* P2P networks
- computers act as equal partners
- each computer can take on role of server or client
- each users controls resources & security on comp
- easy to install & operate
- difficult to maintain with more users
* Server / Client
- clients get files from servers
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Ch. 4 Review

Sem 2

- CDP connects layer 1 & 3
- runs at layer 2
- display - show cdp neighbors
- CDP uses TTLV, transmit type length values
- cdp run - global
- cdp enable - on interface
- no cdp run
- telnet
- telnet verifies all layers
- 0-4 on VTY
- hostname table on DNS
- ping - end-to-end
- default timeout - 10 mins
- exit
- telnet connections - 16
- show sessions - telnet connections
- kickout - Ctl - Shift - 6 - then x
- echo - ICMP
- traceroute - ICMP
- show ip route - routing table

Ch. 4 - Cisco 2

* CDP
- layer 2 operation
- runs on any layer 1 or 3
- only works on Cisco products
- CDPv2 is version 2 on
- type of device
- what interface connected on
- model #
- uses SNAP - subnetwork access protocol
- starts up automatically
- CDP sends advertisements every 60 seconds
* show cdp neighbors
- device ID
- local interface
- holdtime
- capability
- platform
- port ID
- VTP Management
- native VLAN
- full/half duplex (CDPv2 only)
* CDP on
- cdp run
- cdp run & enable - runs on all interfaces, enable just for one interface
- show cdp

* Remote Devices
- find concurrent sessions
- telnet hostname
- hostname
- connect hostname
* Telnet
- telnet from users
- exit or logout
- logs out after 10 mins
- Ctrl - Shift - 6 - x - suspending a session
- disconnect
- resume [ID]
- find IDs in show sessions
- show users
* Ping & Traceroute
-

Chapter 5 - Sec 2

Cisco

- IOS - platform, special capabilities, version
- 2102 - looks in NVRAM for boot system commands
- if boot sys tftp 192.168.0.1 & tftp server doesn't work goes to ROM
- e ; erase flash
- read errors: flash is corrupted

* Boot up
- POST
- boot strap
- IOS
- config - file
- almost not changable - 2142 bypasses startup

* Config
- NVRAM
- TFTP
- console (setup mode)

* IOS boot
- flash
- tftp
- ROM

* Config register
- boot field - lower 4 bits
- 2-F - NVRAM
- 1 - boot first file in flash
- 0 - ROM mon
- 2142 - bypasses startup

* IOS doesn't boot
- flash corruption
- hardware failure
- look for boot sys commands in NVRAM
- looks in config register
* IOS naming
- platform
- special capabilities (features) (m is memory, z is zipped)
- version
* Moving config via TFTP
- copy from to
* HT
- no shutdown is always missing
*

Ch. 6 - Cisco

Sem 2 Review

- enable rip sends out updates
- 3 - static, dynamic, local
- static vs. dynamic
- convergence
- link state vs. distance vector
- AS - 16 bits - consistent view of network from outside
- routing processes
- ip route (network) (subnet) (host)
- network command
- do network [IP of network] to send updates
- delay, load, bandwith, reliability, cost for link state
- exterior & border -
- exterior - between AS
- EIGRP is hybrid
-

Ch. 7 - Cisco Sec 2

* Updates
- preset time & changes
* Routing Loops
- split horizon - doesn't receive info about sent same info
- holddown timers - won't accept unless has a better metric
- poison reverse - sends out 16 hops on RIP
- count to infinity happens only to distance vector
* Holddown
- only updates if a better metric during time
* RIP
- 15 hops, 30 seconds, admin distance - 120
* RIP commands
- router rip
- version 1 or 2
- version 2 - classless
- show ip route
* ip classless
- allows routing of networks or something
* Troubleshooting RIP updates
- alot of commands
* Passive
- receive updates, but will not send
- good for a border
* Admin distance
- the lowest number is the most reliable protocol
- RIP, EIGRP, IGRP, OSPF, static

* RIP & static admin distance
- set static to 121
* IGRP
- uses 4 metrics
- needs network command
- needs an AS number
* Timers
- holdtime is usually 3x the update time
- flush is 9x update
* Migrating RIP to IGRP
- hop count is the same
-