

Lab2: Introduction to Wireless Network Experiments

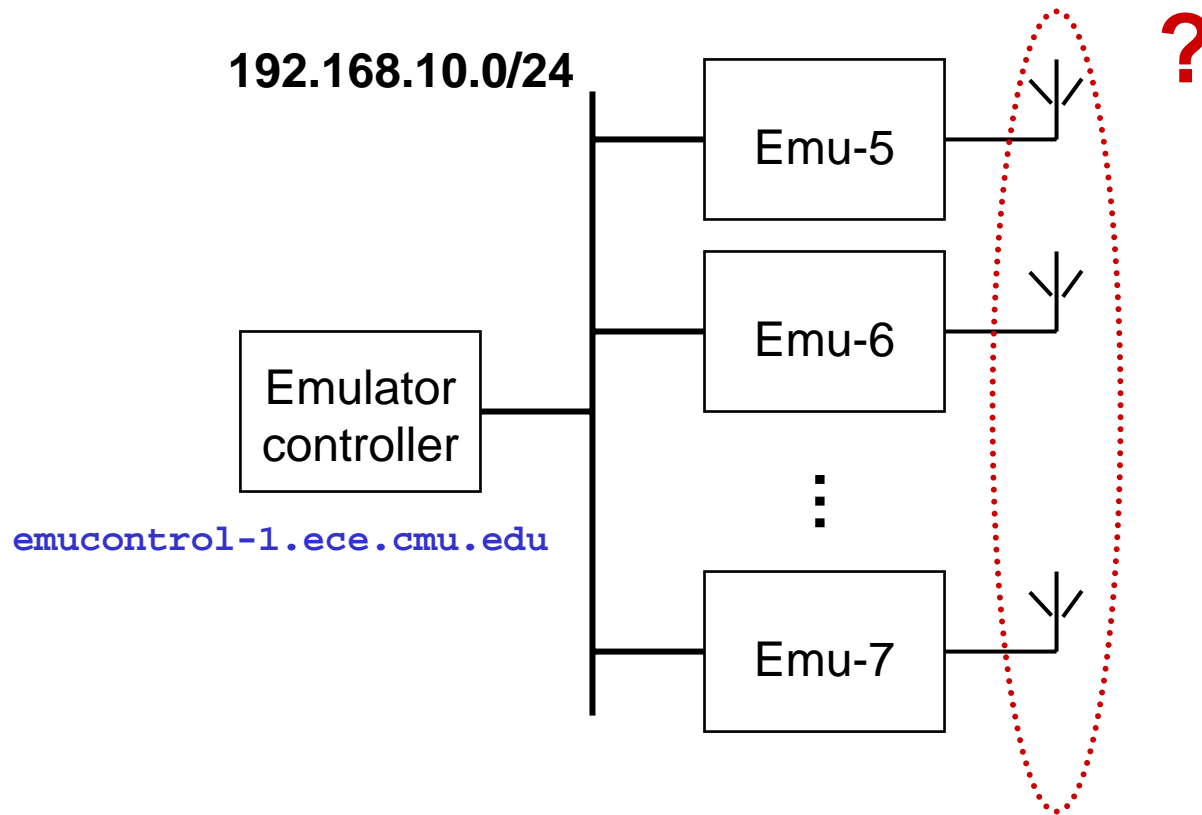
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Outline

- **Wireless network setup basis**
- Assignment 1


Wireless emulator



Wireless network setup: driver

- MadWifi: linux kernel device driver for wireless LAN chipsets from Atheros
 - More information www.madwifi.org
- Implemented as linux kernel module
- Use `modprobe` to load/unload the driver module
 - Load the driver module
`modprobe ath_pci`
 - Unload the driver module
`modprobe -r ath_pci`

Wireless network setup: layer 2

- With 802.11 a/b/g standards, wireless cards can operate in different mode
 - Infrastructure mode vs. Ad Hoc mode
- Infrastructure mode
 - One master (access point), multiple slaves (wireless devices)
 - Wireless devices cannot communicate with each other directly, but only via the access point
 - Application: wireless LAN
- Ad Hoc mode 
 - All the wireless nodes are equal
 - Every node can communicate directly with every other node in range
 - Application: personal area network, mobile ad-hoc network, wireless mesh network

Assignment 1 only makes use of ad hoc mode

Wireless network setup: layer 2

- Set the wireless card in ad hoc mode
 - Create an interface (ath0) in ad hoc mode
`wlanconfig ath0 create wlandev wifi0 wlanmode ahdemo`
 - You can also remove the created interface
`wlanconfig ath0 destroy`
 - Set the card operate in 802.11b
`iwpriv ath0 mode 2`

Wireless network setup: layer 2

- Configure the wireless card by the linux wireless configuration tool `iwconfig`
 - Set essid
`iwconfig ath0 essid my-adhoc-net`
 - Operate in channel 6
`iwconfig ath0 channel 6`
 - Set transmission power
`iwconfig ath0 txpower 19`
 - Set bit-rate
`iwconfig ath0 bitrate 11M`

Wireless network setup: layer 3

- Assigning an IP address to the card is the same for wireless/wired card by the linux network configuration tool `ifconfig`
- Wired Ethernet interface uses the private subnet: `192.168.10.0/24` pre-configured by admin
- You can pick up another subnet from those allowed for private use:
 - <http://www.faqs.org/rfcs/rfc1918.html>
- As an example, we use `192.168.0.0/24` for wireless card
 - `ifconfig ath0 192.168.0.5`

iwsetup.sh

- Help you to initialize the wireless interface on the wireless nodes
- No need to run it multiple times for one wireless node
- Use `iwconfig` and `ifconfig` (instead of `iwsetup.sh`) to change the configuration of wireless interface

Outline

- Wireless network setup basis
- **Assignment 1**

Path loss model

- LogDistance model

$$PL(dB) = PL(d_0) + 10n \log\left(\frac{d}{d_0}\right)$$

d_0 : reference distance (1m)

d : transmitter - receiver separation distance

n : path loss exponent (2.8)

$PL(d_0)$: path loss at the reference distance (40 dB)

Execute program w/ script

- In experiment script, `wiredNicIpAddress` for the wireless nodes, on which you will execute program, must be specified
- `rmiregistry` and `nodeDaemon` must be started on the wireless nodes, before you start your experiment script
 - On wireless node:
`rmiregistry&`
`nodeDaemon&`

Example

- Measure RSSI vs. distance (20m, 60m, 140m)

Office hours

- **Thu. 10.00 - 11.30**
- **Fri. 13.30 - 15.00**