



CS4514 B06

HELP Session 3 Wireless LAN Measurements

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Outline

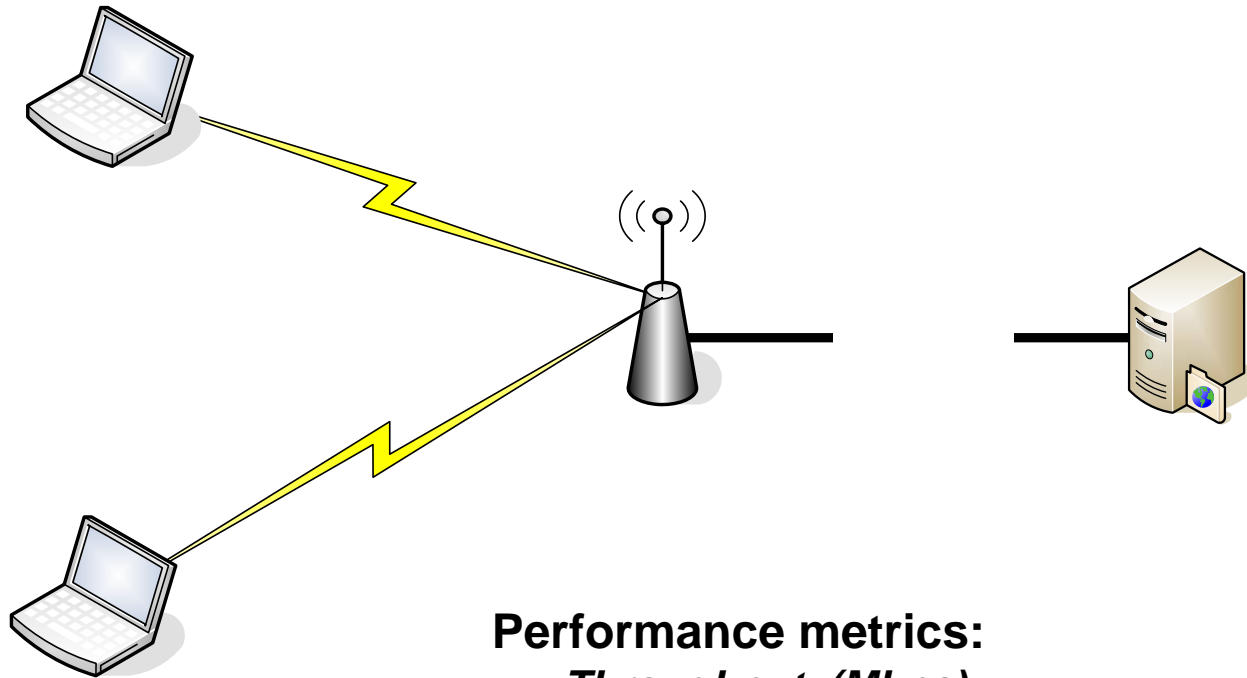
- Project 3 Overview
- Tools
- Reading



CS4514 Project 3

- **Hands on performance study on IEEE 802.11 wireless networks**
- **Design experiments for performance study**
- **Understand the performance metrics**
- **Understand the factors that impact the network performance**
- **Process and analyze the performance data**

Wireless Testbed



Performance metrics:

- *Throughput (Mbps)*
- *Round trip time (RTT, in ms)*
- *Packet loss rate (%)*
- *Received Signal Strength Indicator (RSSI)*
- *Wireless Link capacity (Mbps)*



Measurement Tasks

1. **TCP Throughput to the good client.**
2. **TCP Throughput to the bad client.**
3. **Concurrent TCP Throughput to both the good and bad client.**
 - Decide Files size to be used in experiments
4. **UDP Throughput for 1-3**
 - Decide The length of UDP traffic (mgen) session
 - Decide Maximum UDP sending rate
5. **Concurrent TCP and UDP Throughput**
 - TCP to good client and a UDP to the bad client
6. **5 Extra Credit points:**
Concurrent TCP and UDP Throughput
 - TCP to bad client and a UDP to the good client



Report Deliverables

(see the details in the handout)

- Experiments design and completion
- Graphs of your performance results
- Analysis of the experimental results.
- Indicate **individual** student involvement and responsibilities for this assignment.
- Approximately 10 pages long.



Outline

- **Project 3 Overview**
- **Tools**
- **Reading**



Tools

1. **wget** is a standard tool for transferring files
 - Generate TCP traffic
2. **mgen** is a tool that generates UDP traffic
 - Generate UDP traffic
 - <http://pf.itd.nrl.navy.mil/mgem/>
3. **WRAPI+** is an extension to the open-source WRAPI tool
 - see <http://perform.wpi.edu/tools/>
 - WRAPI+ provide received signal strength (RSSI)
4. **ping** is a standard tool to measure
 - RTT
 - Packet lost rates
5. **typeperf** is the command-line version of **Performance Monitor** of Windows XP to collect performance information
 - Throughput
 - Current wireless link capacity

wget

- **Command**
 - “wget.exe -o wget.dat
http://fossil.wpi.edu/cs4514/filesize-
XXM.dat”
- **Supports ftp/http protocols**
- **“-o” option to save log file**
- **Find the proper size to download**
 - E.g. 60 to 120 seconds

mgen

- **Command:**
 - **On Windows XP clients (good/bad)**
 - “mgen.exe output NUL port 5000”
 - **On Linux server (fossil)**
 - “ssh fossil.wpi.edu mgen input config_file_name txlog log /dev/null”
- **Find the proper length of the flow**
 - **E.g. 60 to 120 seconds**
- **Configuration files:**
 - Examples on fossil:/home/public/cs4514
 - Copy to your home directory and modify them
 - udp-load-good.mgn/udp-load-bad.mgn
 - Be careful with the IP address of good/bad
 - Use “ipconfig” on windows XP clients to find ip address



wrapi+

- **Command:**
 - “wrapi.bat log_prefix”
 - “killwrapi.bat”
 - **Before start wrapi.bat**
 - "net stop WZCSVC"
 - **After stop wrapi.bat**
 - "net start WZCSVC"
- **Log files:**
 - **Log_prefix_en.dat:** information about the wireless network.
 - **Log_prefix_log.dat:** time, RSSI etc.



typeperf

- **Command:**
 - "typeperf.exe -cf C:\bin\wlan.cfg -si 1 -f CSV -y -o typeperf.csv"
- **Configuration file:** C:\bin\wlan.cfg
- **Log file:**
 - typeperf.csv
 - Throughput (column 5)
 - Wireless capacity (column 4)
 - Others (CPU usage, memory usage, etc.)
 - Time format
 - Convert to relative time start from 0



ping

- **Command:**
 - “ping -n 100 fossil.wpi.edu”
- **Option “-n”**
 - Number of total ping packet
 - One packet every second
 - Total time should be similar to your TCP/UDP sessions
- **Report RTTs and loss rates**

.bat file

- **Put all tools in one bat file:**
 - ping -n 50 fossil > ping-before-test.dat
 - net stop WZCSVC
 - start wrapi.bat wrapi.log
 - start typeperf.exe -cf C:\bin\wlan.cfg -si 1 -f CSV -y -o typeperf.csv
 - start cmd /K "ping -n 50 fossil > ping-during-test.dat"
 - wget.exe -o wget.dat http://fossil.wpi.edu/filesize-XXM.dat
 - del filesize-XXM.dat
 - start killwrapi
 - taskkill /F /IM typeperf.exe
- **“start xxx” will start a new cmd window to execute the tool**
- **“taskkill” kill tasks**
- **Examples (starttcp.bat/startudp.bat) in c:\bin**



Other Tips

1. Copy the “starttcp.bat” and “startudp.bat” to your working directory and make changes as your need.
2. Be careful with the configuration files that may be different for good/bad clients, such as the IP addresses. In cmd windows, you can get the IP address by using “ipconfig”.
3. Use a bat file can be helpful to sync the time stamps for different tools. In addition, be aware that the time stamps given by different tool are different. You need to convert them and sync them when draw the figures.
4. Chose the log name carefully so that you will not forget which test generates the logs. Copy log after each run, so that it won't be overwritten by mistakes.
5. Even though you can copy the logs by using “scp”, the better way may be using an USB drive. Because the network is slow for the bad condition client.
6. Prepare before you entering the Lab, because the time for each group is limited.
7. Read through cookbook before you start anything!!



Reading

- **Cookbook!**
 - Attached at the end of handout
 - Detailed explanation and example for all tools
 - External links for tools
- **Measurement Research Papers**
 - Example figures/data analysis
 - Writing report for performance study
 - Papers on class webpage:
 - *"Characterization of 802.11 Wireless Networks in the Home"*
 - *"Performance Analysis of the Intertwined Effects between Network Layers for 802.11g Transmissions"*



Questions? and Help session for Matlab