

SEM: A Simulation Execution Manager for ns-3

Setup!

This lesson requires some setup. We will download a new copy of ns-3, and use that one for the rest of this lab.

Open up a terminal!

```
cd
git clone --recursive https://github.com/DvdMgr/sem-lab
cd sem-lab
ls -l
```

What is in this folder?

This is what you should see in the sem-lab folder

`ns-3` Our new ns-3 installation folder

`params` Ignore this for now!

`Slides` Folder containing this lesson's slides

`wifi-plot.m` Octave script to plot the results of our simulations

`wifi-sem.cc` The ns-3 simulation script we will run

Let's compile ns-3

```
cd ns-3
```

```
./waf configure build
```

Summary of what `wifi-sem.cc` does

- ▶ Creates a WiFi network
- ▶ Provides a set of command line arguments we can use
 - ▶ Distance from AP
 - ▶ Number of devices
 - ▶ MCS
 - ▶ Using Request To Send (RTS)
 - ▶ Using Short Guard Interval (SGI)
 - ▶ Randomness of channel
- ▶ Prints the throughput of the network

Playing around with the wifi-sem script

Try some arguments!

```
./waf --run "wifi-sem --useRts=False"
```

```
./waf --run "wifi-sem --useRts=True"
```

```
./waf --run "wifi-sem --mcs=3 --RngRun=1"
```

```
./waf --run "wifi-sem --mcs=3 --RngRun=2"
```

What is SEM?

With `./waf --run script` you will only run a single simulation. SEM allows you to:

- ▶ Run multiple simulations in parallel
- ▶ Export results to various formats (folders, MATLAB)
- ▶ Perform both simulations and analysis from the same Python script

Running the program with SEM

Try it! *Make sure to be in the sem-lab folder for this.*

```
cd ..  
sem run --help  
sem run
```

Viewing results

```
sem view --help  
sem view
```


Simulating multiple parameter combinations

```
sem run
```

Use [Value1, Value2, ...] to specify multiple values.

Exporting results

```
sem export --help  
sem export results-directory
```

Plotting after MATLAB export

```
rm -r res
```

```
sem run --parameters params
```

- ▶ distance: [1, 20, 40, 60]
- ▶ mcs: [0, 3, 6]
- ▶ nWifi: 1
- ▶ useRts: False
- ▶ useShortGuardInterval: False
- ▶ randomChannel: False

```
sem export results.mat --results-dir res
```

Exercise

Plot the throughput for increasing mcs and for every setting of SGI and RTS at a fixed distance.

- ▶ Reset your results directory

```
rm -r res
```

- ▶ Make sure you run all the simulations you need
 - ▶ What values for MCS, SGI and RTS?
- ▶ Export results
- ▶ Modify `wifiplot.m` to create the new plot

