

# COMP1047 – Computer Networks – Lab 4

## Lab 4: Analyzing Wireless Networks

The objective of this practical lab activity is to become familiar with the analysis of the performance of a network system via simulations. In this Lab, in the first quarter you will continue the previous work and analyze the results obtained by simulations. Later on, you need to run the wireless topologies and obtain the trace files. After getting the trace files you need to analyse the trace files using AWK scripts.

You will be provided with the following files

- [ns-simple-trace.tcl](#), [wireless.tcl](#), and [performance.tcl](#) the details of TCL files are [here](#)
- In this lab, you need to generate the wireless trace and analyze it. You need to write AWK and Shell script for trace analysis.

Here is an example of wireless trace generated from the above wireless.tcl file.

```
1 M 0.0 nn 4 x 670 y 670 rp AODV
2 M 0.0 sc ./scen-3-test cp ./cbr-3-test seed 0.0
3 M 0.0 prop Propagation/TwoRayGround ant Antenna/OmniAntenna
4 M 33.00000 0 (83.36, 239.44, 0.00), (89.66, 283.49), 19.15
5 M 50.00000 2 (591.26, 199.37, 0.00), (369.46, 170.52), 3.37
6 M 51.00000 1 (257.05, 345.36, 0.00), (221.83, 80.86), 14.91
7 s 127.936679222 _0 AGT --- 0 cbr 512 [0 0 0 0] ----- [0:0 2:0 32 0] [0] 0 3
8 r 127.936679222 _0 RTR --- 0 cbr 512 [0 0 0 0] ----- [0:0 2:0 32 0] [0] 0 3
9 s 127.936679222 _0 RTR --- 0 AODV 48 [0 0 0 0] ----- [0:255 -1:255 30 0] [0x2 1 1 [2 0] [0 4]] (REQUEST)
10 s 127.937314222 _0 MAC --- 0 AODV 106 [0 ffffffff 0 800] ----- [0:255 -1:255 30 0] [0x2 1 1 [2 0] [0 4]] (REQUEST)
11 r 127.938163028 _1 MAC --- 0 AODV 48 [0 ffffffff 0 800] ----- [0:255 -1:255 30 0] [0x2 1 1 [2 0] [0 4]] (REQUEST)
12 r 127.938188028 _1 RTR --- 0 AODV 48 [0 ffffffff 0 800] ----- [0:255 -1:255 30 0] [0x2 1 1 [2 0] [0 4]] (REQUEST)
13 s 127.942599762 _1 RTR --- 0 AODV 48 [0 ffffffff 0 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
14 s 127.942674762 _1 MAC --- 0 AODV 106 [0 ffffffff 1 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
15 r 127.943523338 _2 MAC --- 0 AODV 48 [0 ffffffff 1 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
16 r 127.943523549 _3 MAC --- 0 AODV 48 [0 ffffffff 1 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
17 r 127.943523568 _0 MAC --- 0 AODV 48 [0 ffffffff 1 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
18 r 127.943548338 _2 RTR --- 0 AODV 48 [0 ffffffff 1 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
19 s 127.943548338 _2 RTR --- 0 AODV 44 [0 0 0 0] ----- [2:255 0:255 30 1] [0x4 1 [2 4] 10.000000] (REPLY)
20 r 127.943548549 _3 RTR --- 0 AODV 48 [0 ffffffff 1 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
21 r 127.943548568 _0 RTR --- 0 AODV 48 [0 ffffffff 1 800] ----- [1:255 -1:255 29 0] [0x2 2 1 [2 0] [0 4]] (REQUEST)
22 s 127.943843338 _2 MAC --- 0 ARP 86 [0 ffffffff 2 806] ----- [REQUEST 2/2 0/1]
23 r 127.944531913 _1 MAC --- 0 ARP 28 [0 ffffffff 2 806] ----- [REQUEST 2/2 0/1]
24 s 127.944846913 _1 MAC --- 0 RTS 44 [52e 2 1 0]
25 r 127.945199489 _2 MAC --- 0 RTS 44 [52e 2 1 0]
26 s 127.945209489 _2 MAC --- 0 CTS 38 [3f4 1 0 0]
27 r 127.945514065 _1 MAC --- 0 CTS 38 [3f4 1 0 0]
28 s 127.945524065 _1 MAC --- 0 ARP 86 [13a 2 1 806] ----- [REPLY 1/1 2/2]
29 r 127.946212641 _2 MAC --- 0 ARP 28 [13a 2 1 806] ----- [REPLY 1/1 2/2]
30 s 127.946222641 _2 MAC --- 0 ACK 38 [0 1 0 0]
31 r 127.946527217 _1 MAC --- 0 ACK 38 [0 1 0 0]
32 s 127.946676641 _2 MAC --- 0 RTS 44 [5ae 1 2 0]
33 r 127.947029217 _1 MAC --- 0 RTS 44 [5ae 1 2 0]
34 s 127.947039217 _1 MAC --- 0 CTS 38 [474 2 0 0]
35 r 127.947343792 _2 MAC --- 0 CTS 38 [474 2 0 0]
36 s 127.947353792 _2 MAC --- 0 AODV 102 [13a 1 2 800] ----- [2:255 0:255 30 1] [0x4 1 [2 4] 10.000000] (REPLY)
37 r 127.948170368 _1 MAC --- 0 AODV 44 [13a 1 2 800] ----- [2:255 0:255 30 1] [0x4 1 [2 4] 10.000000] (REPLY)
38 s 127.948180368 _1 MAC --- 0 ACK 38 [0 2 0 0]
39 r 127.948195368 _1 RTR --- 0 AODV 44 [13a 1 2 800] ----- [2:255 0:255 30 1] [0x4 1 [2 4] 10.000000] (REPLY)
40 f 127.948195368 _1 RTR --- 0 AODV 44 [13a 1 2 800] ----- [2:255 0:255 29 0] [0x4 2 [2 4] 10.000000] (REPLY)
41 r 127.948484944 _2 MAC --- 0 ACK 38 [0 2 0 0]
```

You need to generate the new trace file format shown below and its explanation is available [here](#). You only need to use the command

#new tracef file

\$ns\_ use-newtrace

```
wireless3.tcl x  scen-670x670-50-600-20-1 x  wired-cum-wireless-sim.tcl x  wired-cum-wireless-sim.tcl x  performance.tcl x  *trace2.tr x
1 s -t 0.003025172 -Hs 0 -Hd -1 -Ni 0 -Nx 5.00 -Ny 5.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md 0 -Ms 0 -Mt 0 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
2 s -t 0.003360172 -Hs 0 -Hd -1 -Ni 0 -Nx 5.00 -Ny 5.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 90 -If 0 -Ii 0 -Iv 32
3 r -t 0.004080322 -Hs 2 -Hd -1 -Ni 2 -Nx 005.00 -Ny 0050.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
4 r -t 0.004080489 -Hs 4 -Hd -1 -Ni 4 -Nx 005.00 -Ny 100.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
5 r -t 0.004080655 -Hs 6 -Hd -1 -Ni 6 -Nx 005.00 -Ny 150.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
6 r -t 0.004080822 -Hs 1 -Hd -1 -Ni 1 -Nx 200.00 -Ny 005.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
7 r -t 0.004080939 -Hs 3 -Hd -1 -Ni 3 -Nx 200.00 -Ny 050.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
8 r -t 0.004080995 -Hs 5 -Hd -1 -Ni 5 -Nx 200.00 -Ny 100.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
9 r -t 0.004080982 -Hs 7 -Hd -1 -Ni 7 -Nx 200.00 -Ny 150.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
10 r -t 0.004105322 -Hs 2 -Hd -1 -Ni 2 -Nx 005.00 -Ny 050.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
11 r -t 0.004105489 -Hs 4 -Hd -1 -Ni 4 -Nx 005.00 -Ny 100.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
12 r -t 0.004105655 -Hs 6 -Hd -1 -Ni 6 -Nx 005.00 -Ny 150.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
13 r -t 0.004105822 -Hs 1 -Hd -1 -Ni 1 -Nx 200.00 -Ny 005.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
14 r -t 0.004105839 -Hs 3 -Hd -1 -Ni 3 -Nx 200.00 -Ny 050.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
15 r -t 0.004105895 -Hs 5 -Hd -1 -Ni 5 -Nx 200.00 -Ny 100.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
16 r -t 0.004105982 -Hs 7 -Hd -1 -Ni 7 -Nx 200.00 -Ny 150.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32
17 s -t 0.030050775 -Hs 2 -Hd -1 -Ni 2 -Nx 005.00 -Ny 050.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma 0 -Md 0 -Ms 0 -Mt 0 -Is 2.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 1 -Iv 32
18 s -t 0.030285775 -Hs 2 -Hd -1 -Ni 2 -Nx 005.00 -Ny 050.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 2 -Mt 800 -Is 2.255 -Id -1.255 -It message -Il 90 -If 0 -Ii 1 -Iv 32
19 r -t 0.031005925 -Hs 0 -Hd -1 -Ni 0 -Nx 005.00 -Ny 005.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 2 -Mt 800 -Is 2.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 1 -Iv 32
20 r -t 0.031005942 -Hs 4 -Hd -1 -Ni 4 -Nx 005.00 -Ny 100.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 2 -Mt 800 -Is 2.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 1 -Iv 32
21 r -t 0.031006109 -Hs 6 -Hd -1 -Ni 6 -Nx 005.00 -Ny 150.00 -Nz 0.00 -Ne -1.000000 -Nl MAC -Nw --- -Ma 0 -Md ffffffff -Ms 2 -Mt 800 -Is 2.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 1 -Iv 32
```

s -t 0.003025172 -Hs 0 -Hd -1 -Ni 0 -Nx 005.00 -Ny 005.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -  
Ma 0 -Md 0 -Ms 0 -Mt 0 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32

r -t 0.004105322 -Hs 2 -Hd -1 -Ni 2 -Nx 005.00 -Ny 050.00 -Nz 0.00 -Ne -1.000000 -Nl RTR -Nw --- -Ma  
0 -Md ffffffff -Ms 0 -Mt 800 -Is 0.255 -Id -1.255 -It message -Il 32 -If 0 -Ii 0 -Iv 32