

19 Network Simulator NS-2

19.1 Aim

Install network simulator NS-2 in any of the Linux operating system and simulate wired and wireless scenarios.

19.2 Theory

NS2 is an open-source network simulating software released as a revision of NS1 between 1997 and 2000. Network Simulators are tools used to simulate a network and identify the performance of the network.

19.2.1 Installation

- Download all in package for ns2 from below link
<https://sourceforge.net/projects/nsnam/files/latest/download>
- All the files will be extracted into a folder called "ns-allinone-2.35".
- NS2 requires a few packages to be pre installed. It also requires the GCC version 4.3 to work correctly
- Building dependencies
sudo apt-get install build-essential autoconf automake libxmu-dev
One of the dependencies mentioned is the compiler GCC-4.3, which is no longer available, and thus we have to install GCC-4.4 version. The version 4.4 is the oldest we can get. To do that, use the following command:
sudo apt-get install gcc-4.4
- **Installation**
sudo su cd /ns-allinone-2.35/./install
- **Setting Environment Path**
The final step is to tell the system, where the files for ns2 are installed or present. To do that, we have to set the environment path using the ".bashrc" file. In that file, we need to add a few lines at the bottom. The things to be added are given below. But for the path indicated below, many of those lines have "/home/rohit/ns-allinone-2.35/..." , but that is where I have my extracted folder. Make sure you replace them with your path. For example, if you have installed it in a folder "/home/abc", then replace "/home/rohit/ns-allinone-2.35/otcl-1.14" with "/home/abc/ns-allinone-2.35/otcl-1.14"
- **Running NS2**
Once the system has restarted, open a terminal and start ns2 by using the command: ns

19.3 Program

19.3.1 Wired Transmission Program

```
set ns [new Simulator]

$ns color 1 Blue
$ns color 2 Red

set nf [open out.nam w]
$ns namtrace-all $nf

proc finish {} {
    global ns nf
    $ns flush-trace

    close $nf

    exec nam out.nam &
    exit 0
}

set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]

$ns duplex-link $n0 $n2 2Mb 10ms DropTail
$ns duplex-link $n1 $n2 2Mb 10ms DropTail
$ns duplex-link $n2 $n3 1.7Mb 20ms DropTail

$ns queue-limit $n2 $n3 10

$ns duplex-link-op $n0 $n2 orient right-down
$ns duplex-link-op $n1 $n2 orient right-up
$ns duplex-link-op $n2 $n3 orient right

$ns duplex-link-op $n2 $n3 queuePos 0.5
```

```
set tcp [new Agent/TCP]
$tcp set class_ 2
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n3 $sink
$ns connect $tcp $sink
$tcp set fid_ 1
```

```
set ftp [new Application/FTP]
$ftp attach-agent $tcp
$ftp set type_ FTP
```

```
set udp [new Agent/UDP]
$ns attach-agent $n1 $udp
set null [new Agent/Null]
$ns attach-agent $n3 $null
$ns connect $udp $null
$udp set fid_ 2
```

```
set cbr [new Application/Traffic/CBR]
$cbr attach-agent $udp
$cbr set type_ CBR
$cbr set packet_size_ 1000
$cbr set rate_ 1mb
$cbr set random_ false
```

```
$ns at 0.1 "$cbr_start"
$ns at 1.0 "$ftp_start"
$ns at 4.0 "$ftp_stop"
$ns at 4.5 "$cbr_stop"
```

```
$ns at 4.5 "$ns_detach-agent_$n0_$tcp_;_$ns_detach-agent_$n3_$sink"
```

```
$ns at 5.0 "finish"
```

```
puts "CBR_packet_size_=[ $cbr_set_packet_size_]"
puts "CBR_interval_=[ $cbr_set_interval_]"
```

```
$ns run
```

19.3.2 Wireless Transmission Program

```
set val(chan)           Channel/WirelessChannel
set val(prop)           Propagation/TwoRayGround
set val(netif)          Phy/WirelessPhy
set val(mac)            Mac/802_11
set val(ifq)            Queue/DropTail/PriQueue
set val(ll)            LL
set val(ant)            Antenna/OmniAntenna
set val(ifqlen)         50
set val(nn)             6
set val(rp)            AODV
set val(x) 500    ;/# in metres
set val(y) 500    ;/# in metres

set ns [new Simulator]

set tracefile [open wireless.tr w]
$ns trace-all $tracefile

set namfile [open wireless.nam w]
$ns namtrace-all-wireless $namfile $val(x) $val(y)

set topo [new Topography]
$topo load_flatgrid $val(x) $val(y)

create-god $val(nn)

set channel1 [new $val(chan)]
set channel2 [new $val(chan)]
set channel3 [new $val(chan)]

$ns node-config -adhocRouting $val(rp) \
    -llType $val(ll) \
    -macType $val(mac) \
```

```

-ifqType $val(ifq) \
-ifqLen $val(ifqlen) \
-antType $val(ant) \
-propType $val(prop) \
-phyType $val(netif) \
-topoInstance $topo \
-agentTrace ON \
-macTrace ON \
-routerTrace ON \
-movementTrace ON \
-channel $channel1

```

```

set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]
set n5 [$ns node]

```

```

$n0 random-motion 0
$n1 random-motion 0
$n2 random-motion 0
$n3 random-motion 0
$n4 random-motion 0
$n5 random-motion 0

```

```

$ns initial_node_pos $n0 20
$ns initial_node_pos $n1 20
$ns initial_node_pos $n2 20
$ns initial_node_pos $n3 20
$ns initial_node_pos $n4 20
$ns initial_node_pos $n5 50

```

```

$n0 set X_ 10.0
$n0 set Y_ 20.0
$n0 set Z_ 0.0

```

```

$n1 set X_ 210.0
$n1 set Y_ 230.0
$n1 set Z_ 0.0

```

```

$n2 set X_ 100.0
$n2 set Y_ 200.0
$n2 set Z_ 0.0

```

```

$ns3 set X_ 150.0
$ns3 set Y_ 330.0
$ns3 set Z_ 0.0

$ns4 set X_ 430.0
$ns4 set Y_ 320.0
$ns4 set Z_ 0.0

$ns5 set X_ 270.0
$ns5 set Y_ 120.0
$ns5 set Z_ 0.0

$ns at 1.0 "$ns0_setdest_490.0_340.0_35.0"
$ns at 1.0 "$ns1_setdest_490.0_340.0_5.0"
$ns at 1.0 "$ns2_setdest_330.0_100.0_10.0"
$ns at 1.0 "$ns3_setdest_300.0_100.0_8.0"
$ns at 1.0 "$ns4_setdest_300.0_130.0_5.0"
$ns at 1.0 "$ns5_setdest_190.0_440.0_15.0"

$ns at 20.0 "$ns5_setdest_100.0_200.0_30.0"

set tcp [new Agent/TCP]
set sink [new Agent/TCPSink]
$ns attach-agent $n0 $tcp
$ns attach-agent $n5 $sink
$ns connect $tcp $sink
set ftp [new Application/FTP]
$ftp attach-agent $tcp
$ns at 1.0 "$ftp_start"

set udp [new Agent/UDP]
set null [new Agent/Null]
$ns attach-agent $n2 $udp
$ns attach-agent $n3 $null
$ns connect $udp $null
set cbr [new Application/Traffic/CBR]
$cbr attach-agent $udp
$ns at 1.0 "$cbr_start"

$ns at 30.0 "finish"

proc finish {} {
    global ns tracefile namfile
    $ns flush-trace
    close $tracefile

```

```

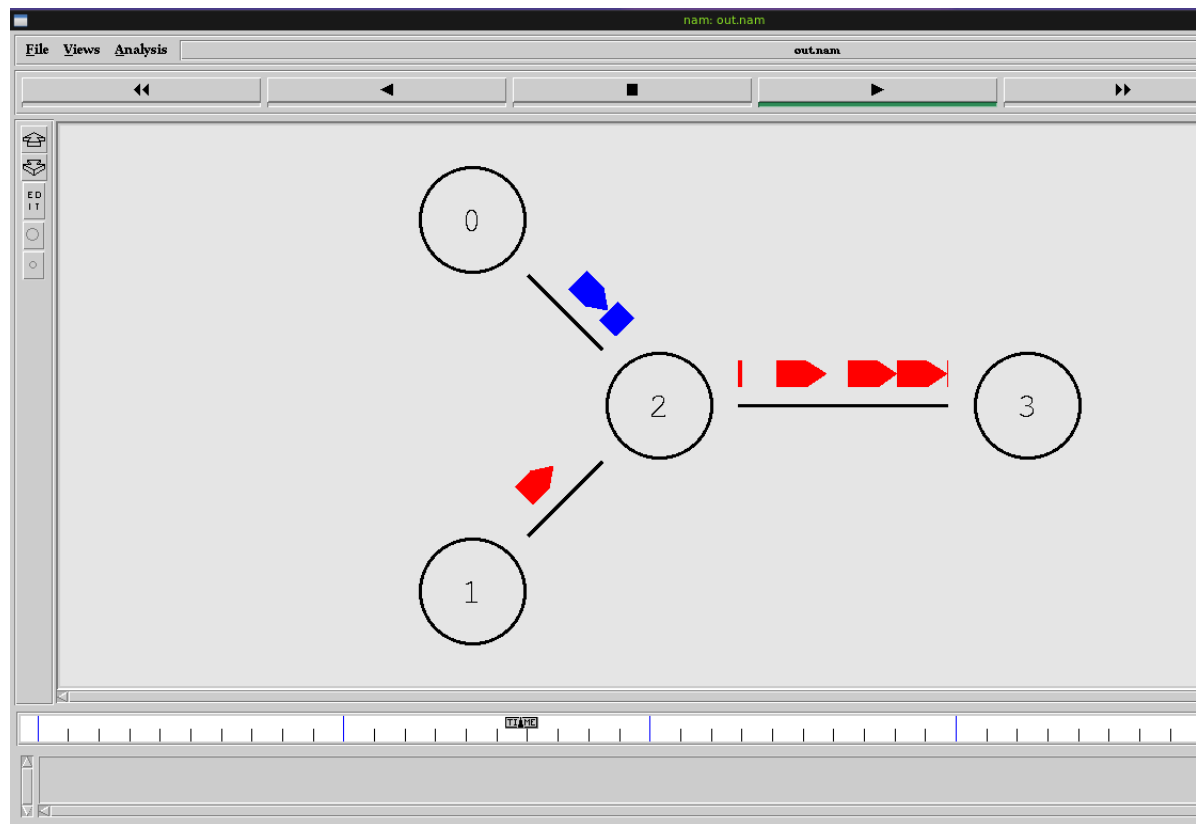
close $namfile
exec nam wireless.nam
exit 0
}

puts "Starting Simulation"
$ns run

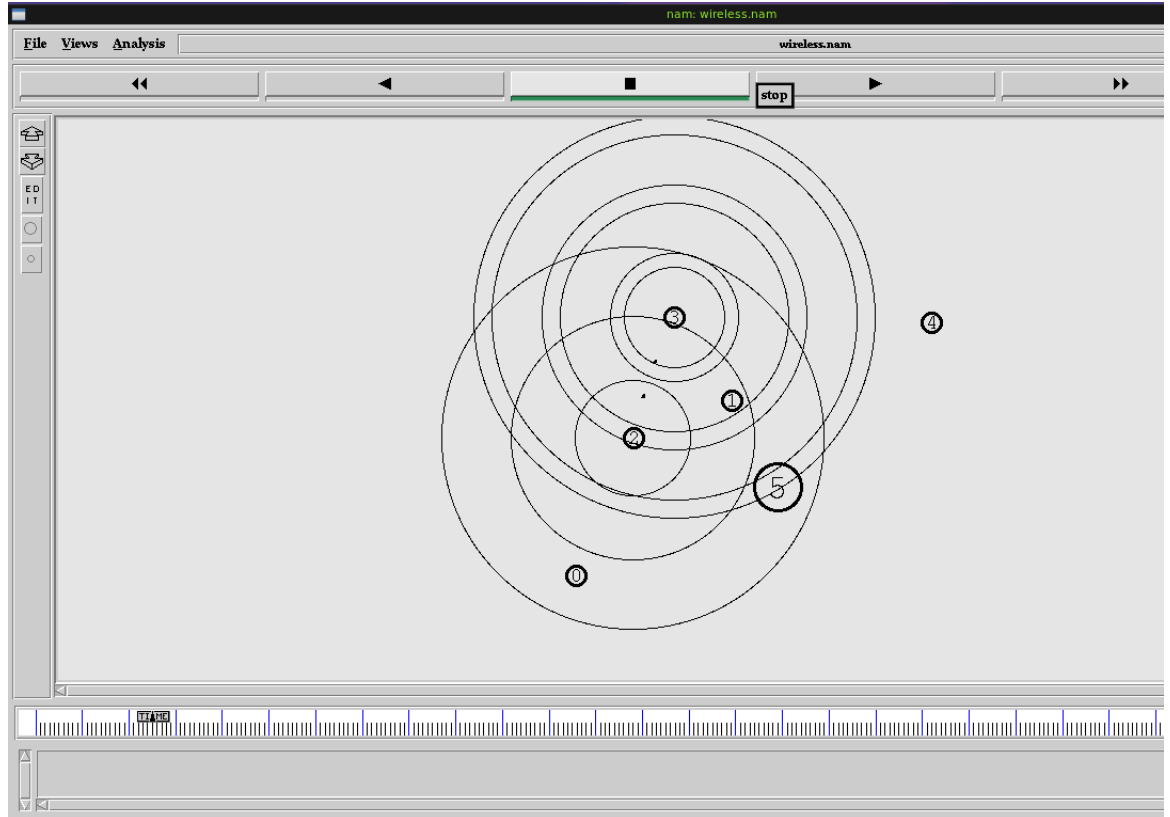
```

19.4 Output

19.4.1 Wired Transmission Output



19.4.2 Wireless Transmission Output



19.5 Result

The simulation for wired and wireless communication was run using ns version 2.35 on arch linux kernel version 4.20.6 and the above output was obtained.