

Network Simulator 2 (NS2)

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OUTLINE

- Introduction of NS2
- Installation of NS2
- NS2 basic programming
- Visual Sensor Network
- Implementation of VSN in NS2
- Introduce new TCP flavor In WSN
- Implementation of TCP through NS2



Network Simulator2 (NS2)



- NS (version 2) is an object-oriented, discrete event driven network simulator developed at UC Berkely written in C++ and OTcl (Tcl script language with Object-oriented extensions).
- Ns2 is a widely used simulation tool to simulate the topologies, behaviors and protocols for wired and wireless network.



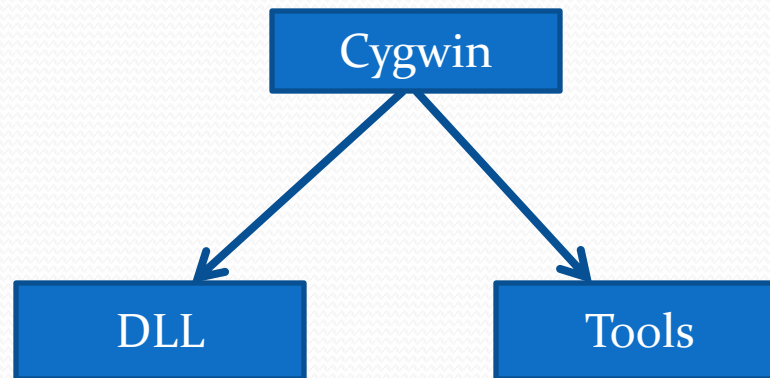
Installation of NS2

- NS2 is an open-source simulation tool that runs on Linux.
- You can also run this simulation tool on windows using [cygwin](#).



Cygwin

- Cygwin is a Linux like environment for Windows.

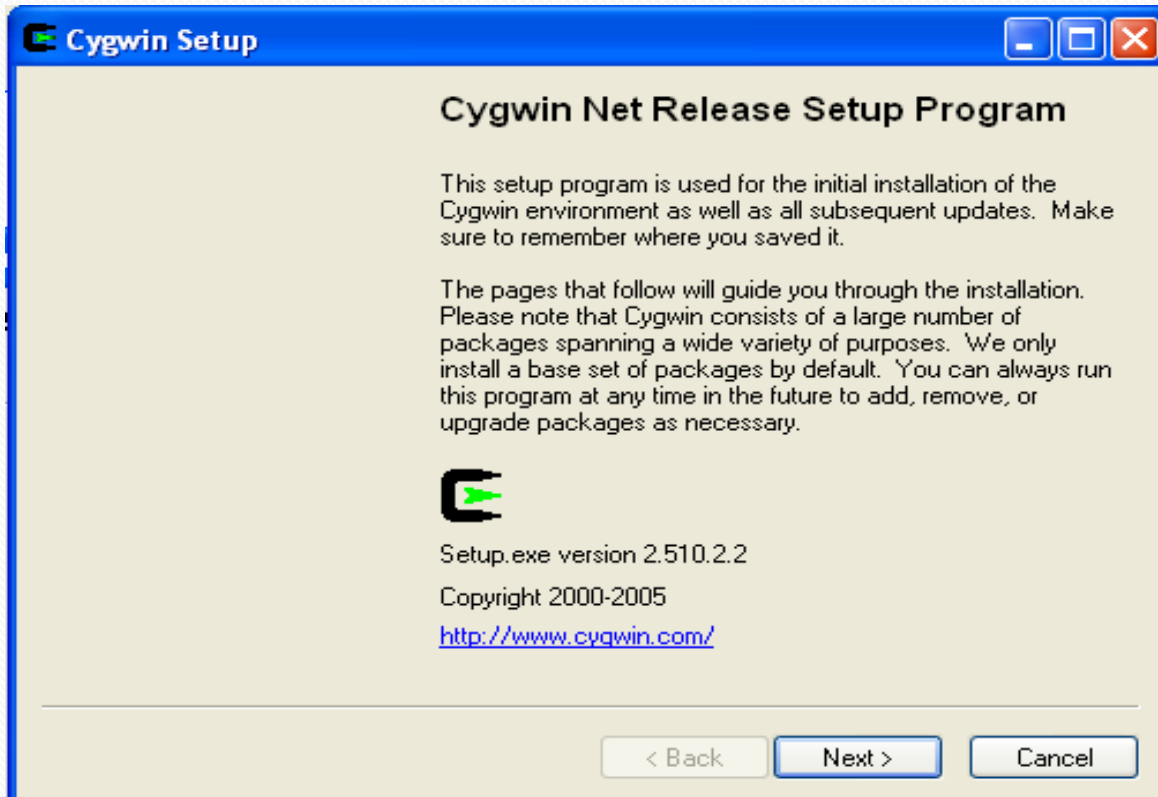


- `cygwin1.dll` : acts as a Linux API emulation layer providing the Linux API functionality.
- Collection of tools which provide Linux look and feel.



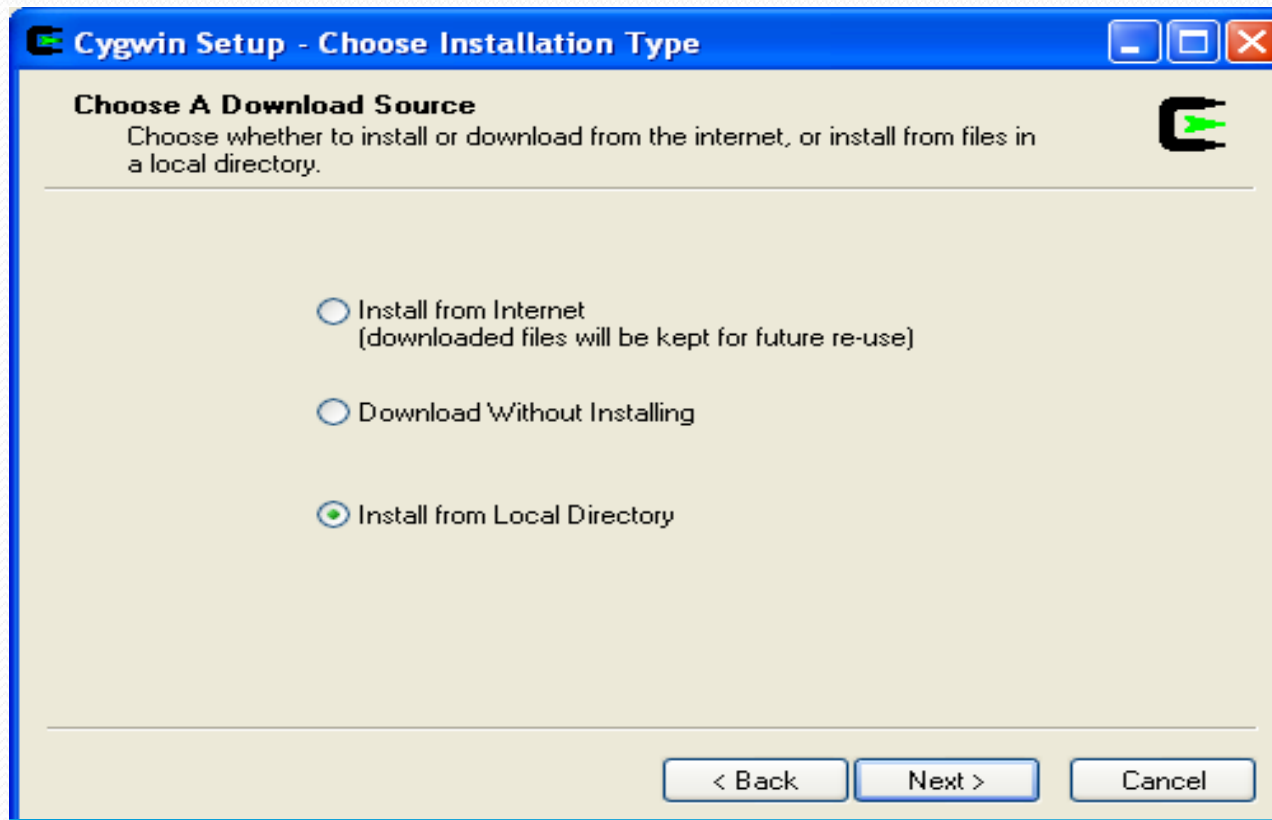
Cygwin Installation Steps

- Download cygwin setup from www.cygwin.com





Cygwin Installation(Cont..)





Cygwin Installation(Cont..)

Cygwin Setup - Choose Installation Directory

Select Root Install Directory
Select the directory where you want to install Cygwin. Also choose a few installation parameters.

Root Directory

Install For

- All Users (RECOMMENDED)
Cygwin will be available to all users of the system. NOTE: This is required if you wish to run services like sshd, etc.
- Just Me
Cygwin will only be available to the current user. Only select this if you lack Admin. privileges or you have specific needs.

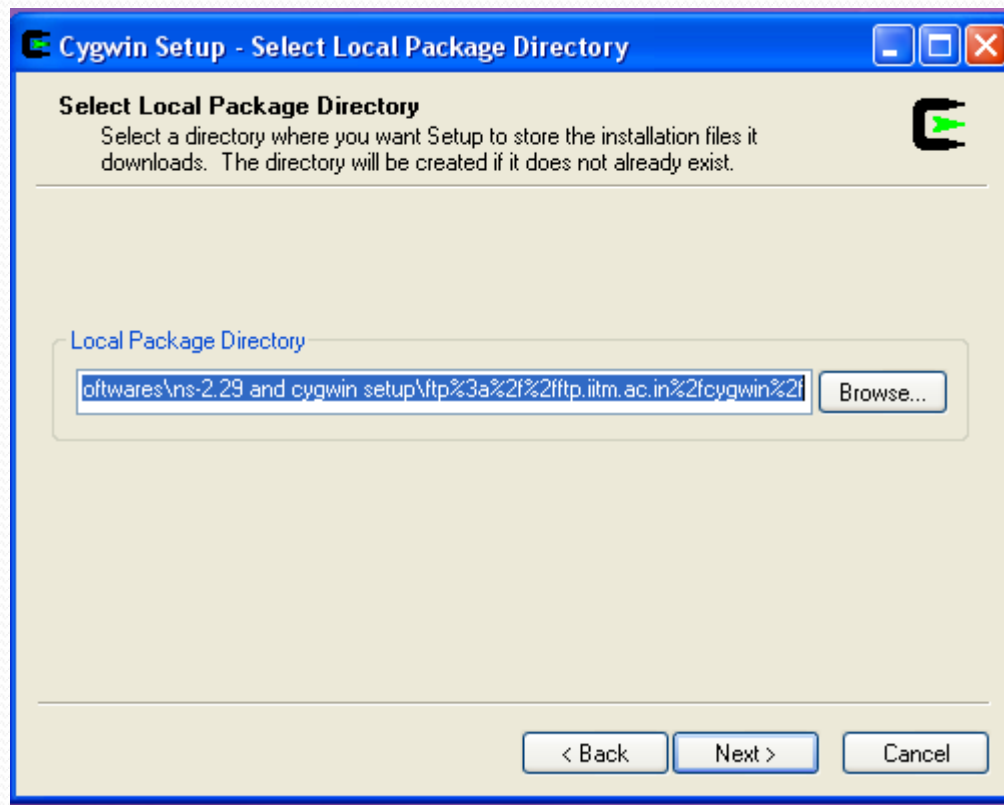
Default Text File Type

- Unix / binary (RECOMMENDED)
No line translation done; all files opened in binary mode. Files on disk will have LF line endings.
- DOS / text
Line endings will be translated from unix (LF) to DOS (CR-LF) on write and vice versa on read.
[Read more about file modes...](#)

< Back Next > Cancel

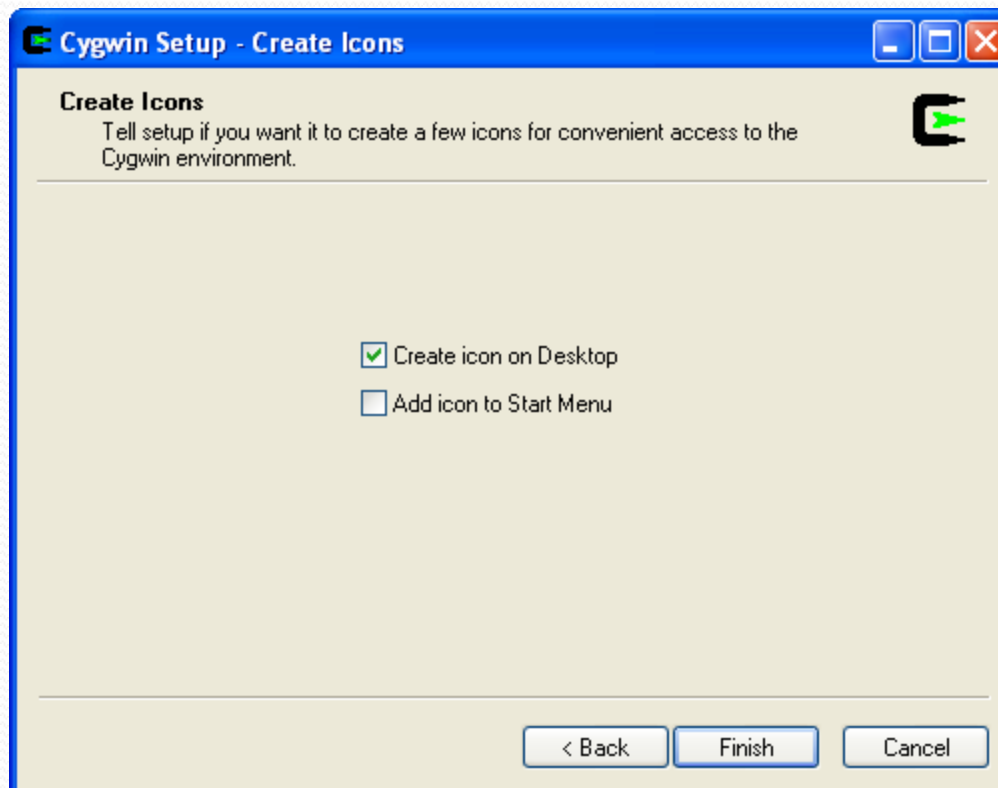


Cygwin Installation(Cont..)





Cygwin Installation(Cont..)





NS2 Installation

- Download zip file of ns2.29 (allinone) from:
<http://www.isi.edu/nsnam/dist/ns-allinone-2.29.2.tar.gz>
- Copy ns-allinone-2.29.2.tar to directory
c:/cygwin/usr/local.
- Click on the cygwin icon and then go to the folder
local .
- Run the command “./install” for installation of Ns2.
- After the installation there are some messages to set
the environment variables and library paths.



Setting of Environment Variable

- `/usr/local/ns-allinone-2.29.2/ns-allinone-2.29/bin,`
- `/usr/local/ns-allinone-2.29.2/ns-allinone-2.29/tcl8.4.11/unix,`
- `/usr/local/ns-allinone-2.29.2/ns-allinone-2.29/tk8.4.11/unix.`
- From this setting you will be able to run Xgraph.
- Similarly it gives some messages to set your library paths ,set those path using the cygwin command prompt.



Library Path Setting

```
dali@wei /usr/local/ns-allinone-2.29.2/ns-allinone-2.29
$ LD_LIBRARY_PATH=/usr/local/ns-allinone-2.29.2/ns-allinone-2.29/
otcl-1.11

dali@wei /usr/local/ns-allinone-2.29.2/ns-allinone-2.29
$ LD_LIBRARY_PATH=/usr/local/ns-allinone-2.29.2/ns-allinone-2.29/
lib

dali@wei /usr/local/ns-allinone-2.29.2/ns-allinone-2.29
$
```

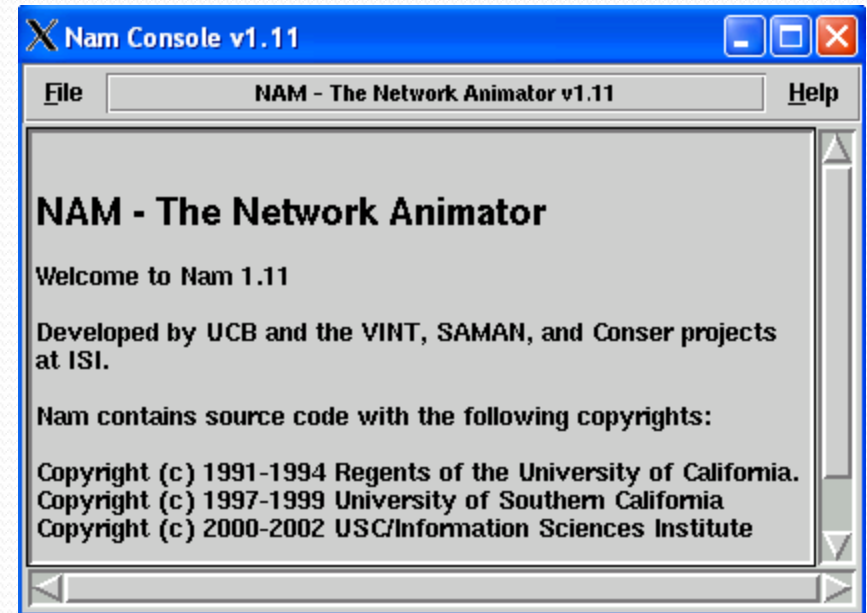
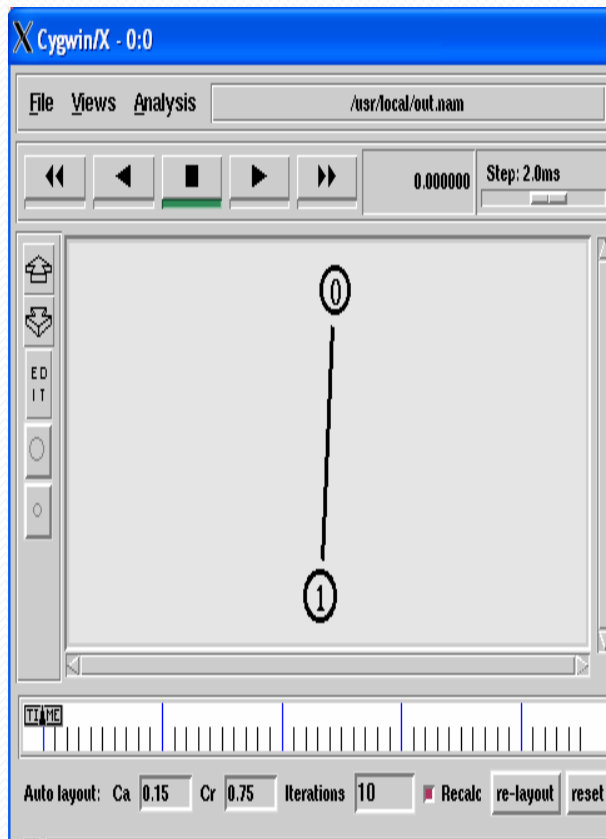


Run the first Example

- Go to the ns -tutorials folder and copy the examples .
- Paste them into any folder from where you want to run that.
- Run “example1b.tcl” by giving the command “ns example1b.tcl”.
- if it gives you the display and NAM (network animator) runs then ns2 installation successfully completed.

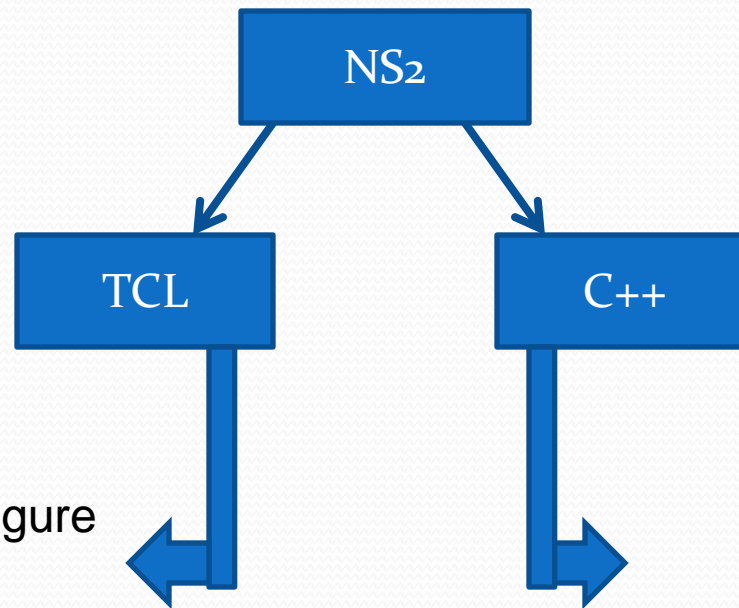


Run the first Example





NS2 Basics



Create and configure
the network

Slow to run but fast
to change

quickly exploring a
number of scenarios

Algorithm running

Packet processing

Byte manipulation

Fast to run slow to
change



Tcl Script

- Firstly create a new simulator object
set ns [new Simulator]
- Now open a file for writing for the nam trace data
set nf [open out.nam w]
\$ns namtrace-all \$nf
- Add a 'finish' procedure that closes the trace file and starts nam
proc finish {}
{ global ns
nf \$ns flush-trace
close \$nf exec nam out.nam &
exit 0
}



Tcl Script (Cont ...)

- Now tell the simulator object to execute the 'finish' procedure after 5.0 seconds of simulation time.

“\$ns at 5.0 "finish”

- This command finally starts the simulation.

“\$ns run”



Topology Creation in NS2

Create Nodes:

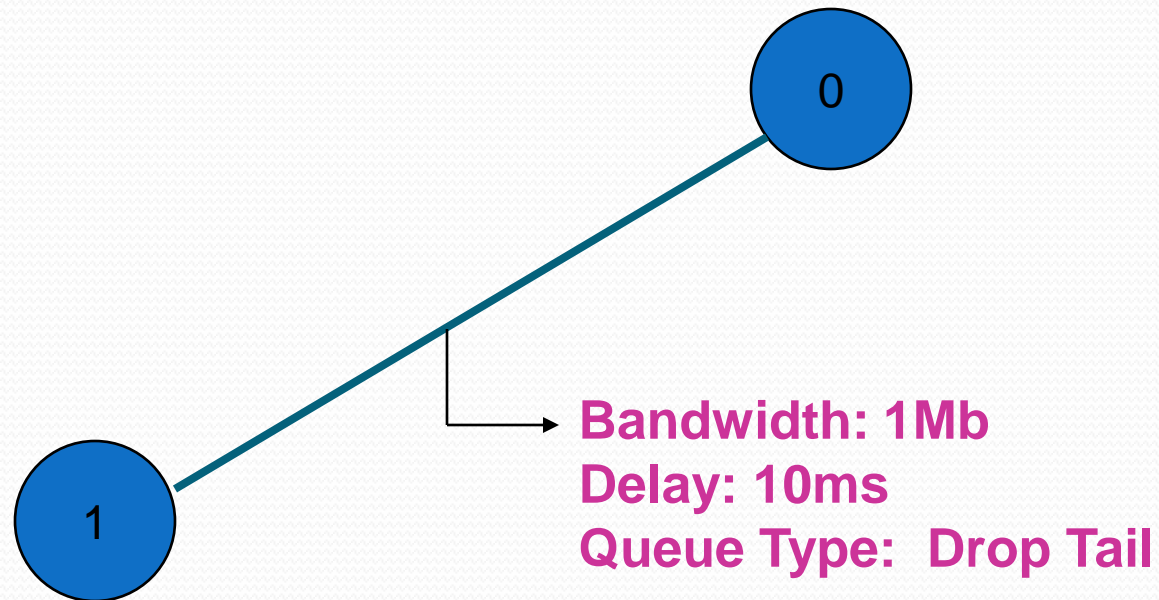
- Create the first node: set no [\$ns node]
- Create the second node: set n1 [\$ns node]
- Here [\$ns node] used to create nodes.

Create Link:

- \$ns duplex-link \$no \$n1 1Mb 10ms DropTail



Topology Creation in NS2





Sending Data

- In ns, data is always being sent from one 'agent' to another .
- To create a UDP agent and attach it to node to send data from nodeo

- **Create the Agent:**

```
set udpo [new Agent/UDP]
```

- **Attach the Agent:**

```
$ns attach-agent $no $udpo
```



Sending Data

- **Create Traffic Agent:**

```
set cbro [new Application/Traffic/CBR]
```

- **Packet Size:**

```
$cbro set packetSize_ 500
```

- **Sending Interval:**

```
$cbro set interval_ 0.005
```

- **Attach a CBR traffic generator to the UDP agent:**

```
$cbro attach-agent $udpo
```



Receiving Data

- Now create a Null agent which acts as traffic sink and attach it to node n1.

```
set nullo [new Agent/Null]
$ns attach-agent $n1 $nullo
```

- Now Attach two agents to each other to allow communication

```
$ns connect $udpo $nullo
```

- Now tell the CBR agent when to send data and when to stop sending

```
$ns at 0.5 "$cbro start"
$ns at 4.5 "$cbro stop"
```



Simulation Display

