**Aim:** Comparative study and analysis of routing protocols using XGraph / GNUplot.

**Theory:**

**XGraph**

The xgraph program draws a graph on an X display given data read from either data files or from standard input if no files are specified. It can display up to 64 independent data sets using different colors and/or line styles for each set. It annotates the graph with a title, axis labels, grid lines or tick marks, grid labels, and a legend. There are options to control the appearance of most components of the graph.

A data set consists of an ordered list of points of the form “directive X Y”. For directive “draw”, a line will be drawn between the previous point and the current point. Specifying a “move” directive tells xgraph not to draw a line between the points. “draw” is the default directive. The name of a data set can be specified by enclosing the name in double quotes.

The interface used to specify the size and location of this window depends on the window manager currently in use. Once the window has been opened, all of the data sets will be displayed graphically with a legend in the upper right corner of the screen.

Xgraph also presents three control buttons in the upper left corner of each window: Hardcopy, Close and about xgraph accepts a large number of options most of which can be specified either on the command line, in the user’s .Xdefaults or .Xresources file, or in the data files themselves.

The xgraph can be installed to your linux by using the below code on the terminal window;

In Ubuntu 10.10 you can now install ns,nam and xgraph by just a single command in the Terminal:

$ sudo apt-get install ns2 nam xgraph

You will be prompted for the user password. Enter it and watch Ubuntu 10.10 do the things for You!

**Gnu PLOT**

**1. INSTALLING AND STARTING GNUPLOT**

Gnuplot is a free, command-driven, interactive, function and data plotting program. Pre-compiled executeables and source code for Gnuplot 4.2.4 may be downloaded for OS X, Windows, OS2, DOS, and Linux. The enhancements provided by version 4.2 are described here.  
On Windows, unzip gp424win32.zip into an appropriate directory, (e.g. C:\My Programs\Gnuplot, C:\Gnuplot, C:\Apps\gnuplot, etc.). Make a link from ...\gnuplot\bin\wgnuplot.exe to your desktop or some other convenient location.  
On Unix, Linux and OS X systems start Gnuplot by simply opening a terminal and typing:

gnuplot

**2. FUNCTIONS**

In general, any mathematical expression accepted by C, FORTRAN, Pascal, or BASIC may be plotted. The precedence of operators is determined by the specifications of the C programming language.  
The supported functions include:

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Function Returns

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abs(x) absolute value of x, |x|

acos(x) arc-cosine of x

asin(x) arc-sine of x

atan(x) arc-tangent of x

cos(x) cosine of x, x is in radians.

cosh(x) hyperbolic cosine of x, x is in radians

erf(x) error function of x

exp(x) exponential function of x, base e

inverf(x) inverse error function of x

invnorm(x) inverse normal distribution of x

log(x) log of x, base e

log10(x) log of x, base 10

norm(x) normal Gaussian distribution function

rand(x) pseudo-random number generator

sgn(x) 1 if x > 0, -1 if x < 0, 0 if x=0

sin(x) sine of x, x is in radians

sinh(x) hyperbolic sine of x, x is in radians

sqrt(x) the square root of x

tan(x) tangent of x, x is in radians

tanh(x) hyperbolic tangent of x, x is in radians

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Bessel, gamma, ibeta, igamma, and lgamma functions are also

supported. Many functions can take complex arguments.

Binary and unary operators are also supported.

The supported operators in Gnuplot are the same as the corresponding operators in the C programming language, except that most operators accept integer, real, and complex arguments. The \*\* operator (exponentiation) is supported as in FORTRAN. Parentheses may be used to change the order of evaluation. The variable names x, y, and z are used as the default independent variables.

**Approach:**

For any two routing protocols plot performance using GNUplot or Xgrapgh from trace file of NS2

**USING GNU PLOT WITH NS 2**

Use gnuplot to visualize the trace file. For this example,   
I use the trace file which is generated from this **code.**   
The first step is using awk to get throughput of cbr and tcp packets from node 2 to node 3. For example script is *myflowcalcall.awk.*

**Run at the terminal :**

$ awk -f myflowcalcall.awk -v graphgran=0 -v fidfrom=2 -v fidto=3 -v fid=1 -v flowtype=”tcp” -v outdata\_file=”nothing” out\_example4.tr > thr1  
  
  
$ awk -f myflowcalcall.awk -v graphgran=0 -v fidfrom=2 -v fidto=3 -v fid=2 -v flowtype=”cbr” -v outdata\_file=”nothing” out\_example4.tr > thr2

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| **Conclusion:** |

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| **Post lab:**   1. Compare between different types of routing protocols. |

Signature of Faculty