North Western University, Khulna

Introduction to Computer Network Using NS2 Based on the Domain: Youtube

Submitted to,

Md. Shymon Islam

Lecturer

Department of CSE

North Western University

Submitted by,

Anisha Akter

ID: 20201119010

Raihanul Islam Apu

ID: 20201133010

Md. Shahed Afridi

ID: 20201134010

Department of CSE

3rd year 3rd semester

North Western University

Course Title: Computer Networks Sessional

Course Code: CSE-3304

Submission Date: 22/12/2022

Overview of the Project

1. Introduction to Zenmap

Zenmap lets you create a topology map of discovered networks. It arranges its display to show all ports on a host or all hosts running a specific service.

2. Four Different Host to Domain: Youtube

In this project we used 4 different host to reached www.youtube.com website. Every host generates different IP addresses.

3. Design Network Topology

After scan 4 different host to the domain youtube.com we find 4 different topology design. The "Topology" tab is an interactive view of the connections between hosts in a network. Hosts are arranged in concentric rings. Each ring represents an additional network hop from the center node.

4. Prepare Excel Sheet for Network Diagram

After completed all 4 scan in Zenmap collect all IP addresses of the 4 different network and store in a excel sheet and prepare a final sheet of all 4 networks organized level by level.

5. Introduction to Network Simulator 2

Network Simulator (Version 2), widely known as NS2, is simply an event-driven simulation tool that has proved useful in studying the dynamic nature of communication networks.

6. Source Code of NS2 Based on Network Diagram

The source code is used in NS2 for show the network flow.

7. Output Topology of Network Simulator 2

After successfully code on network simulator 2 and execute the NS2 show the network flow 4 host to 4 different destinations.

8. Summarization of the Design Network

The network flow is direction to the source to the destination and different network flow is different to other networks.

9. Conclusion

This project is based on the Zenmap, Excel sheet and Network Simulator 2 and finally show the network flow of the different networks.

10. References

For complete this project we collect many information from different websites. So the websites information given here.

Bird's Eye View of the Project

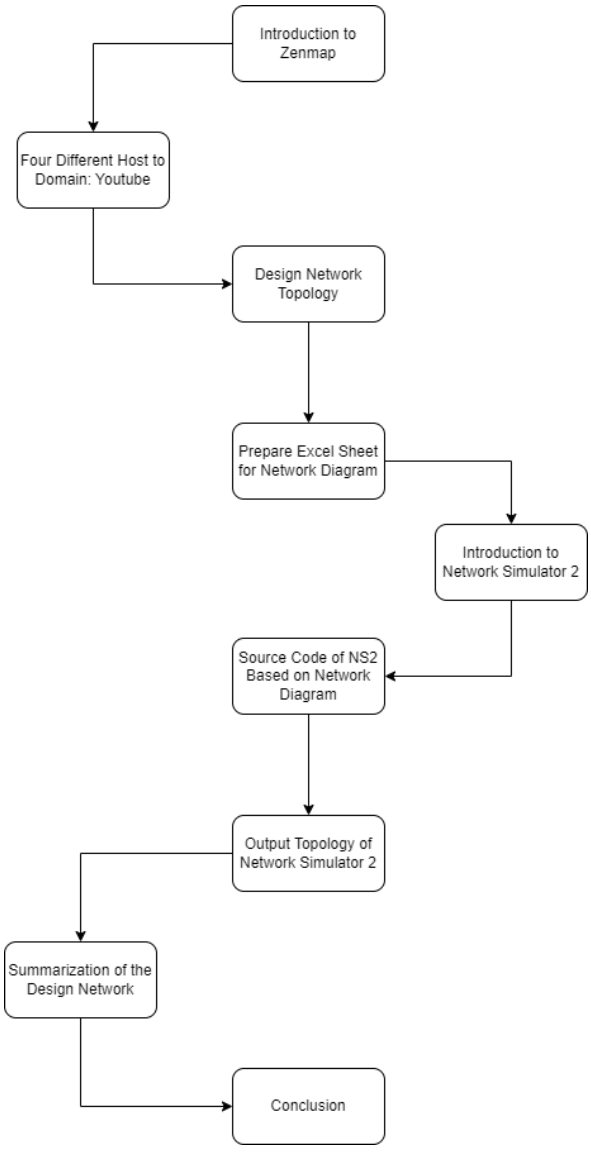

Figure: All processes of this project

Introduction to Zenmap

➢ Zenmap

Network monitoring is a crucial service to prevent any unauthorized intrusions. Scanning of network issues will make us well informed of potential network attacks and help us to prepare mitigation plans to avoid them. Simple and easy interface which is GUI based help novice users to a better and quick understanding of options are more popular with people as they are cognitively easy to use. Command line interfaces force users to memorize and recall commands to do anything. GUI interfaces are used by most commercially available applications and made them more user friendly.

Zenmap is an official Nmap Security scanner GUI (graphical user interface). It is a multi-platform, free and open source application which gives users a friendly interface. It has advanced features for experienced users. It has a command creator which lets interactive creation of Nmap command lines. Results of scans can be saved to review later and can be compared with one another (results of scans are stored in a database). It is a cross platform application available for Linux, Windows, and OS X.

➢ Features of 'Zenmap'

- Zenmap keeps track of scans until deleted
- Zenmap command profiles make it easy to run same scan more than once
- No need for a shell script to do common scan

➢ Advantages of Zenmap

- Open source
- Lightweight and easy to set up
- Fast and flexible
- Allows to scan individual IP address , IP address ranges, and full subnets

➢ Disadvantages of Zenmap

- No option to change font style of output
- Sometimes scanning takes more time than usual
- Sometimes it does not identify operating system accurately
- Bit of learning curve to go from novice to power user

Four Different Host to Domain: Youtube

- The scan result in zenmap of Daulatput Online ISP

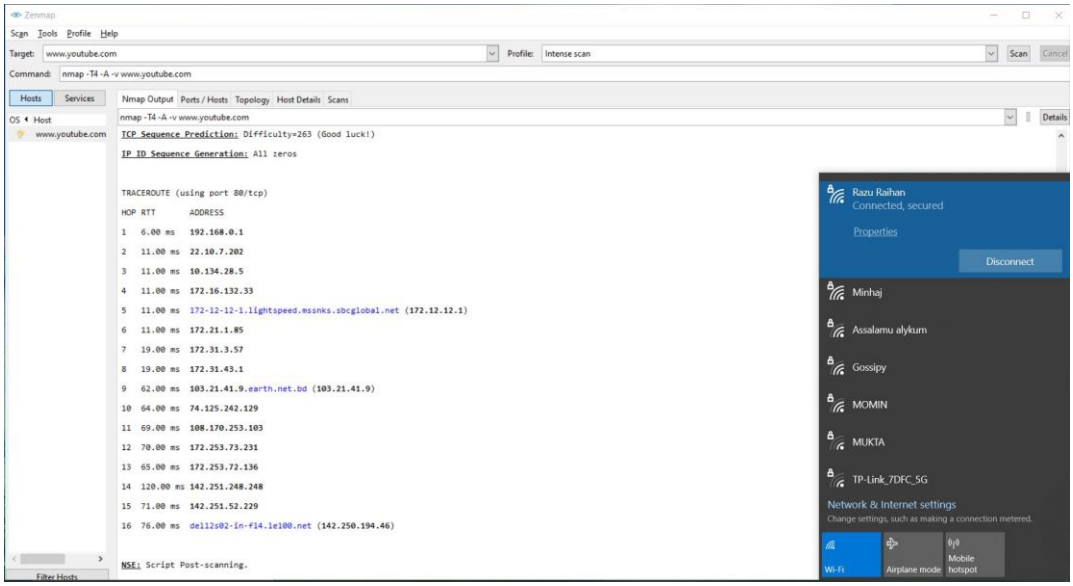

Figure: Daulatput Online ISP

- The scan result in zenmap of ISN Khulna ISP

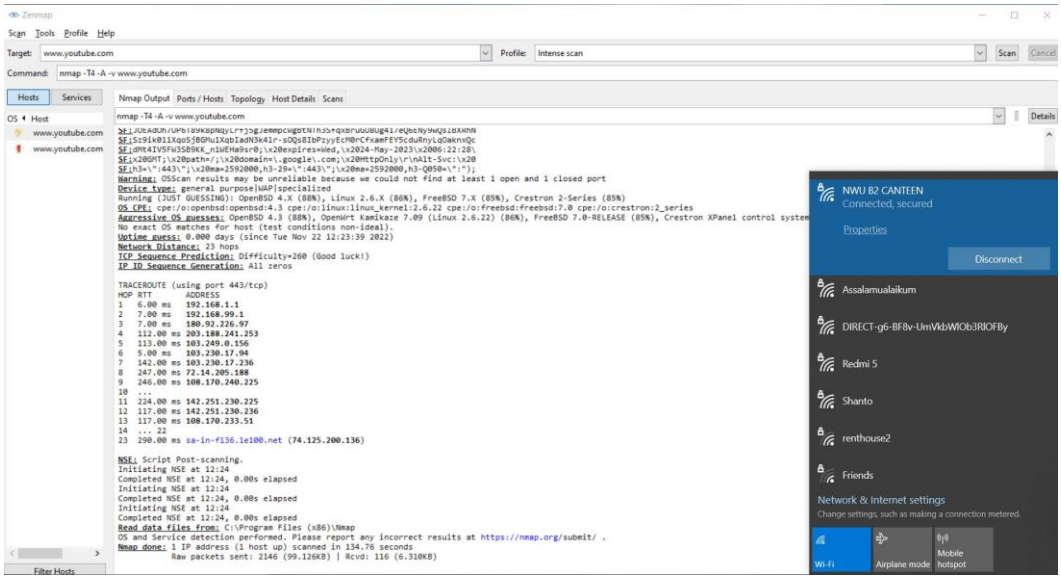

Figure: ISN Khulna ISP

- The scan result in zenmap of Banglalink ISP

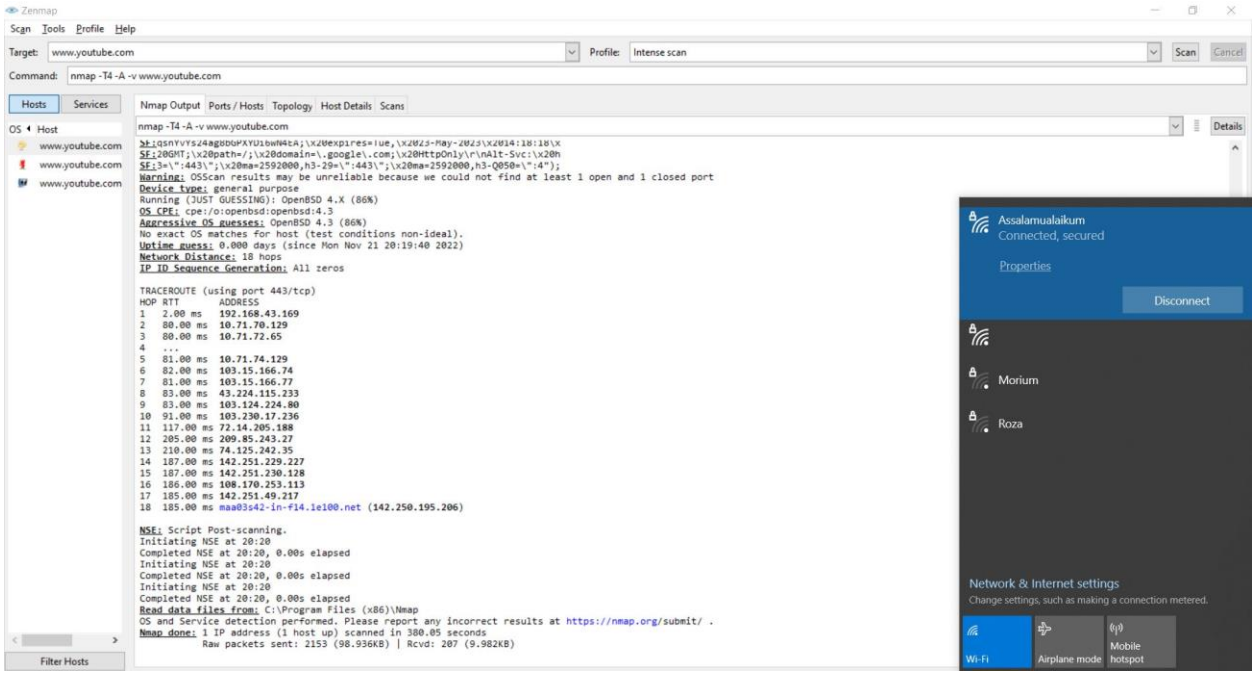

Figure: Banglalink ISP

- The scan result in zenmap of Teletalk ISP

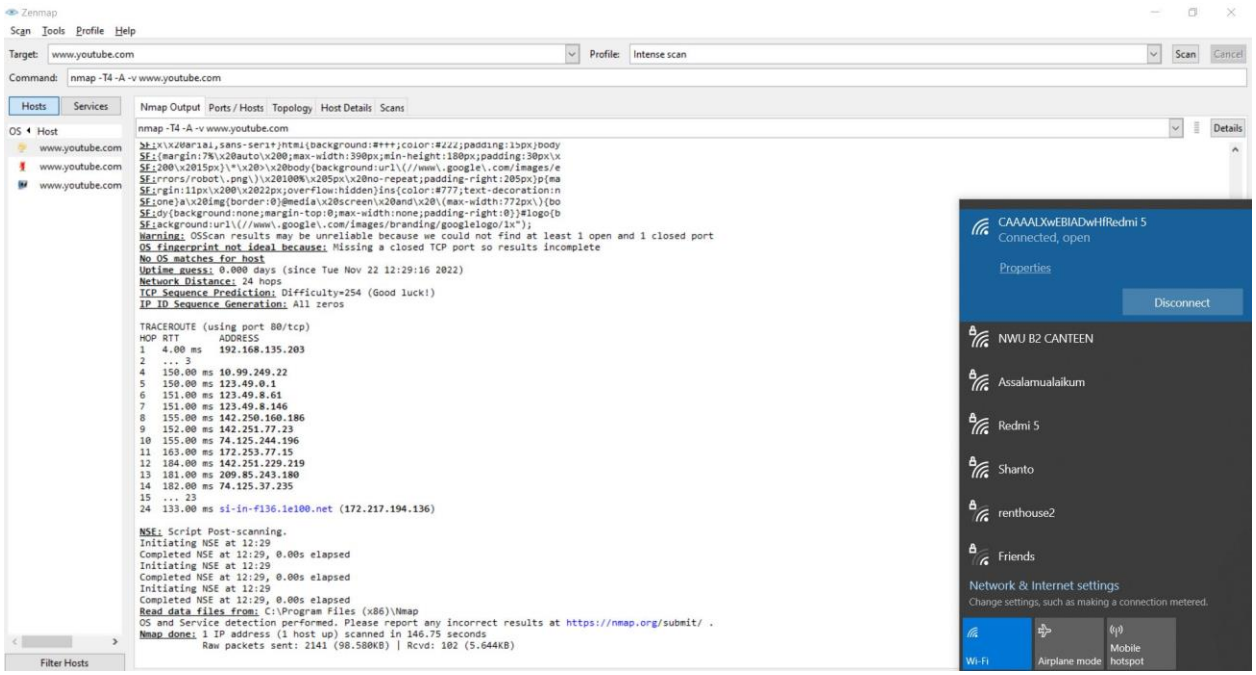

Figure: Teletalk ISP

Design Network Topology

To design Network Topology we have used 4 different networks scan in zenmap to the domain www.youtube.com and find the Network Topology down below-

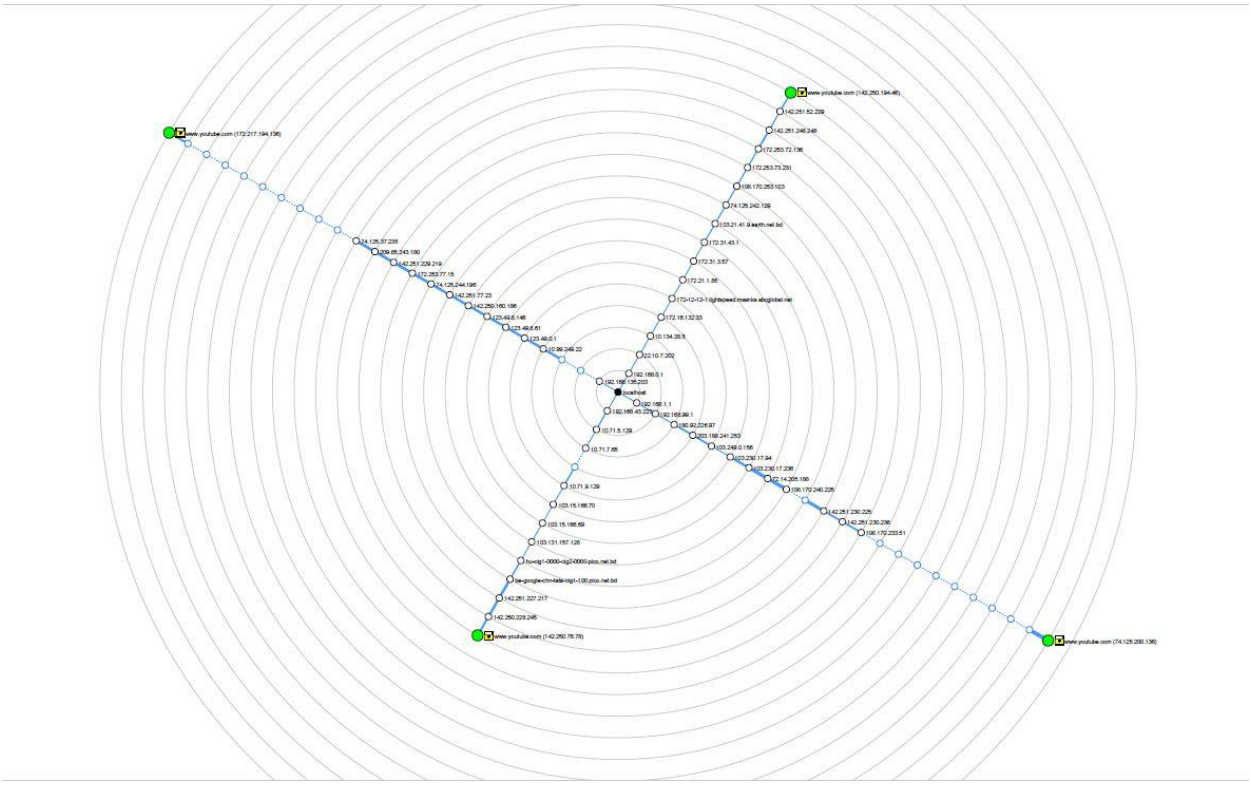

Figure: Network Topology.

Prepare Excel Sheet for Network Diagram

To prepare the excel sheet we collect the 4 different networks's IP addresses from the zenmap and put in the excel sheet organized level by level and store all the IP addresses and services of 4 different networks from the zenmap.

The 4 different ISP name is

1. Daulatpur Online
2. ISN Khulna
3. Banglalink
4. Teletalk

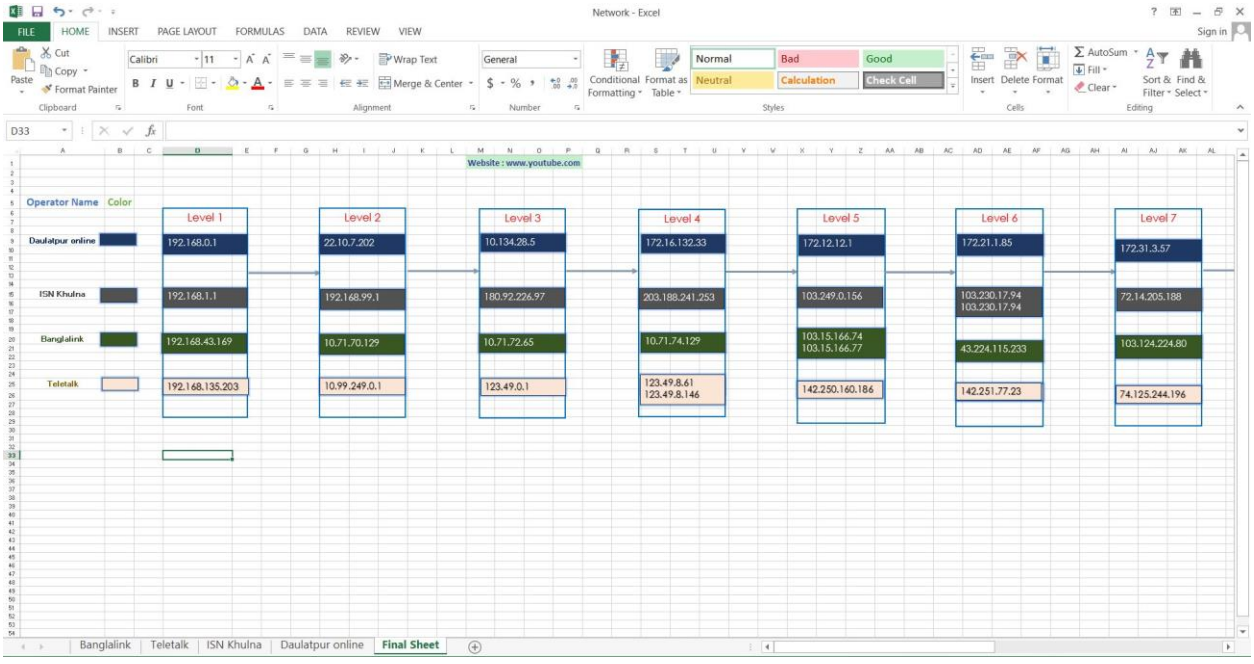

Figure: Excel Sheet of the Project

Introduction to Network Simulator 2

Network Simulator (Version 2), widely known as NS2, is simply an event-driven simulation tool that has proved useful in studying the dynamic nature of communication networks. Simulation of wired as well as wireless network functions and protocols (e.g., routing algorithms, TCP, UDP) can be done using NS2. In general, NS2 provides users with a way of specifying such network protocols and simulating their corresponding behaviors. Due to its flexibility and modular nature, NS2 has gained constant popularity in the networking research community since its birth in 1989. Ever since, several revolutions and revisions have marked the growing maturity of the tool, thanks to substantial contributions from the players in the field.

Among these are the University of California and Cornell University who developed the REAL network simulator, 1 the foundation on which NS is invented. Since 1995 the Defense Advanced Research Projects Agency (DARPA) supported the development of NS through the Virtual InterNetwork Testbed (VINT) project. 2 Currently the National Science Foundation (NSF) has joined the ride in development. Last but not the least, the group of researchers and developers in the community are constantly working to keep NS2 strong and versatile. Again, the main objective of this book is to provide the readers with insights into the NS2 architecture. This chapter gives a brief introduction to NS2. NS2 Beginners are recommended to go thorough the detailed introductory online resources. For example, NS2 official website provides NS2 source code as well as detailed installation instruction. The web pages in and are among highly recommended ones which provide tutorial and examples for setting up basic

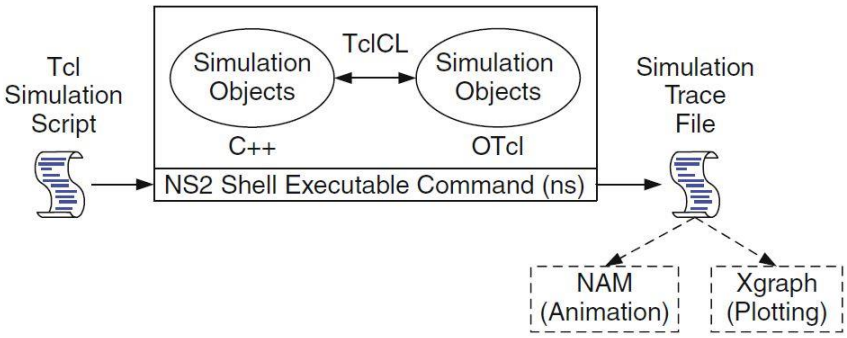

Figure: Basic architecture of NS.

Source Code of NS2 Based on Network Diagram

The source code of NS2

```
#---------------------------------------------------
# This ns script has been created by the nam editor.
# If you edit it manually, the nam editor might not
# be able to open it properly in the future.
#
# EDITING BY HAND IS AT YOUR OWN RISK!
#---------------------------------------------------
# Create a new simulator object.
set ns [new Simulator]
# Create a nam trace datafile.
set namfile [open /home/raihan/f.nam w]
$ns namtrace-all $namfile

# Create wired nodes.
set node(57) [$ns node]
## node(57) at 615.814087,507.105896
$node(57) set X_ 615.814087
$node(57) set Y_ 507.105896
$node(57) set Z_ 0.0
$node(57) color "green"

set node(56) [$ns node]
## node(56) at 598.517212,507.762726
$node(56) set X_ 598.517212
$node(56) set Y_ 507.762726
$node(56) set Z_ 0.0
$node(56) color "black"

set node(55) [$ns node]
## node(55) at 583.628662,506.667969
$node(55) set X_ 583.628662
$node(55) set Y_ 506.667969
$node(55) set Z_ 0.0
$node(55) color "black"

set node(54) [$ns node]
## node(54) at 569.177917,506.449036
$node(54) set X_ 569.177917
$node(54) set Y_ 506.449036
$node(54) set Z_ 0.0
$node(54) color "black"

set node(53) [$ns node]
## node(53) at 553.194641,505.573242
$node(53) set X_ 553.194641
$node(53) set Y_ 505.573242
$node(53) set Z_ 0.0
$node(53) color "black"

set node(52) [$ns node]
## node(52) at 533.489258,506.011139
$node(52) set X_ 533.489258
$node(52) set Y_ 506.011139
$node(52) set Z_ 0.0
$node(52) color "black"

set node(51) [$ns node]
## node(51) at 515.316467,506.449036
$node(51) set X_ 515.316467
$node(51) set Y_ 506.449036
$node(51) set Z_ 0.0
$node(51) color "black"

set node(50) [$ns node]
## node(50) at 493.202606,507.105896
$node(50) set X_ 493.202606
$node(50) set Y_ 507.105896
$node(50) set Z_ 0.0
$node(50) color "black"

set node(49) [$ns node]
## node(49) at 473.278259,497.253174
$node(49) set X_ 473.278259
$node(49) set Y_ 497.253174
$node(49) set Z_ 0.0
$node(49) color "black"

set node(48) [$ns node]
## node(48) at 473.497192,514.550110
$node(48) set X_ 473.497192
$node(48) set Y_ 514.550110
$node(48) set Z_ 0.0
$node(48) color "black"

set node(47) [$ns node]
## node(47) at 452.478088,506.449036
$node(47) set X_ 452.478088
$node(47) set Y_ 506.449036
$node(47) set Z_ 0.0
$node(47) color "black"

set node(46) [$ns node]
## node(46) at 429.269470,506.667969
$node(46) set X_ 429.269470
$node(46) set Y_ 506.667969
$node(46) set Z_ 0.0
$node(46) color "black"

set node(45) [$ns node]
## node(45) at 409.345123,506.230072
$node(45) set X_ 409.345123
$node(45) set Y_ 506.230072
$node(45) set Z_ 0.0
$node(45) color "orange"

set node(44) [$ns node]
## node(44) at 699.890503,540.167175
$node(44) set X_ 699.890503
$node(44) set Y_ 540.167175
$node(44) set Z_ 0.0
$node(44) color "green"

set node(43) [$ns node]
## node(43) at 678.871399,538.853516
$node(43) set X_ 678.871399
$node(43) set Y_ 538.853516
$node(43) set Z_ 0.0
$node(43) color "black"

set node(42) [$ns node]
## node(42) at 663.763916,538.196655
$node(42) set X_ 663.763916
$node(42) set Y_ 538.196655
$node(42) set Z_ 0.0
$node(42) color "black"

set node(41) [$ns node]
## node(41) at 646.466858,537.101868
$node(41) set X_ 646.466858
$node(41) set Y_ 537.101868
$node(41) set Z_ 0.0
$node(41) color "black"
```

```
set node(40) [$ns node]
## node(40) at 628.075256,537.539795
$node(40) set X_ 628.075256
$node(40) set Y_ 537.539795
$node(40) set Z_ 0.0
$node(40) color "black"

set node(39) [$ns node]
## node(39) at 612.092041,537.539795
$node(39) set X_ 612.092041
$node(39) set Y_ 537.539795
$node(39) set Z_ 0.0
$node(39) color "black"

set node(38) [$ns node]
## node(38) at 597.203369,536.445068
$node(38) set X_ 597.203369
$node(38) set Y_ 536.445068
$node(38) set Z_ 0.0
$node(38) color "black"

set node(37) [$ns node]
## node(37) at 576.403259,535.131348
$node(37) set X_ 576.403259
$node(37) set Y_ 535.131348
$node(37) set Z_ 0.0
$node(37) color "black"

set node(36) [$ns node]
## node(36) at 556.041016,534.036621
$node(36) set X_ 556.041016
$node(36) set Y_ 534.036621
$node(36) set Z_ 0.0
$node(36) color "black"

set node(35) [$ns node]
## node(35) at 528.453430,534.474487
$node(35) set X_ 528.453430
$node(35) set Y_ 534.474487
$node(35) set Z_ 0.0
$node(35) color "black"

set node(34) [$ns node]
## node(34) at 503.274261,524.402832
$node(34) set X_ 503.274261
$node(34) set Y_ 524.402832
$node(34) set Z_ 0.0
$node(34) color "black"

set node(33) [$ns node]
## node(33) at 503.931061,543.670349
$node(33) set X_ 503.931061
$node(33) set Y_ 543.670349
$node(33) set Z_ 0.0
$node(33) color "black"

set node(32) [$ns node]
## node(32) at 480.065674,534.036621
$node(32) set X_ 480.065674
$node(32) set Y_ 534.036621
$node(32) set Z_ 0.0
$node(32) color "black"

set node(31) [$ns node]
## node(31) at 460.141296,533.160828
$node(31) set X_ 460.141296
$node(31) set Y_ 533.160828
$node(31) set Z_ 0.0
$node(31) color "black"

set node(30) [$ns node]
## node(30) at 435.181122,534.474487
$node(30) set X_ 435.181122
$node(30) set Y_ 534.474487
$node(30) set Z_ 0.0
$node(30) color "black"

set node(29) [$ns node]
## node(29) at 413.286224,534.255554
$node(29) set X_ 413.286224
$node(29) set Y_ 534.255554
$node(29) set Z_ 0.0
$node(29) color "orange"

set node(28) [$ns node]
## node(28) at 576.622192,568.849487
$node(28) set X_ 576.622192
$node(28) set Y_ 568.849487
$node(28) set Z_ 0.0
$node(28) color "green"

set node(27) [$ns node]
## node(27) at 557.354675,554.836731
$node(27) set X_ 557.354675
$node(27) set Y_ 554.836731
$node(27) set Z_ 0.0
$node(27) color "black"

set node(26) [$ns node]
## node(26) at 555.165161,585.708679
$node(26) set X_ 555.165161
$node(26) set Y_ 585.708679
$node(26) set Z_ 0.0
$node(26) color "black"

set node(25) [$ns node]
## node(25) at 535.459778,570.163208
$node(25) set X_ 535.459778
$node(25) set Y_ 570.163208
$node(25) set Z_ 0.0
$node(25) color "black"

set node(24) [$ns node]
## node(24) at 521.447021,570.601135
$node(24) set X_ 521.447021
$node(24) set Y_ 570.601135
$node(24) set Z_ 0.0
$node(24) color "black"

set node(23) [$ns node]
## node(23) at 500.208984,559.434692
$node(23) set X_ 500.208984
$node(23) set Y_ 559.434692
$node(23) set Z_ 0.0
$node(23) color "black"

set node(22) [$ns node]
## node(22) at 501.084778,581.329590
$node(22) set X_ 501.084778
$node(22) set Y_ 581.329590
$node(22) set Z_ 0.0
```

```
$node(22) color "black"

set node(21) [$ns node]
## node(21) at 483.787811,571.257935
$node(21) set X_ 483.787811
$node(21) set Y_ 571.257935
$node(21) set Z_ 0.0
$node(21) color "black"

set node(20) [$ns node]
## node(20) at 469.993958,570.601135
$node(20) set X_ 469.993958
$node(20) set Y_ 570.601135
$node(20) set Z_ 0.0
$node(20) color "black"

set node(19) [$ns node]
## node(19) at 454.667572,572.352722
$node(19) set X_ 454.667572
$node(19) set Y_ 572.352722
$node(19) set Z_ 0.0
$node(19) color "black"

set node(18) [$ns node]
## node(18) at 429.707397,572.571655
$node(18) set X_ 429.707397
$node(18) set Y_ 572.571655
$node(18) set Z_ 0.0
$node(18) color "black"

set node(17) [$ns node]
## node(17) at 409.345123,571.257935
$node(17) set X_ 409.345123
$node(17) set Y_ 571.257935
$node(17) set Z_ 0.0
$node(17) color "orange"

set node(16) [$ns node]
## node(16) at 672.740784,609.136169
$node(16) set X_ 672.740784
$node(16) set Y_ 609.136169
$node(16) set Z_ 0.0
$node(16) color "green"

set node(15) [$ns node]
## node(15) at 648.656433,608.917175
$node(15) set X_ 648.656433
$node(15) set Y_ 608.917175
$node(15) set Z_ 0.0
$node(15) color "black"

set node(14) [$ns node]
## node(14) at 618.441467,610.230774
$node(14) set X_ 618.441467
$node(14) set Y_ 610.230774
$node(14) set Z_ 0.0
$node(14) color "black"

set node(13) [$ns node]
## node(13) at 591.291748,597.531860
$node(13) set X_ 591.291748
$node(13) set Y_ 597.531860
$node(13) set Z_ 0.0
$node(13) color "black"

set node(12) [$ns node]
## node(12) at 591.510742,620.959534
$node(12) set X_ 591.510742
$node(12) set Y_ 620.959534
$node(12) set Z_ 0.0
$node(12) color "black"

set node(11) [$ns node]
## node(11) at 570.491638,611.763428
$node(11) set X_ 570.491638
$node(11) set Y_ 611.763428
$node(11) set Z_ 0.0
$node(11) color "black"

set node(10) [$ns node]
## node(10) at 554.727295,610.668823
$node(10) set X_ 554.727295
$node(10) set Y_ 610.668823
$node(10) set Z_ 0.0
$node(10) color "black"

set node(9) [$ns node]
## node(9) at 543.341980,610.668823
$node(9) set X_ 543.341980
$node(9) set Y_ 610.668823
$node(9) set Z_ 0.0
$node(9) color "black"

set node(8) [$ns node]
## node(8) at 525.607056,611.982483
$node(8) set X_ 525.607056
$node(8) set Y_ 611.982483
$node(8) set Z_ 0.0
$node(8) color "black"

set node(7) [$ns node]
## node(7) at 507.434296,613.734070
$node(7) set X_ 507.434296
$node(7) set Y_ 613.734070
$node(7) set Z_ 0.0
$node(7) color "black"

set node(6) [$ns node]
## node(6) at 491.888916,613.953003
$node(6) set X_ 491.888916
$node(6) set Y_ 613.953003
$node(6) set Z_ 0.0
$node(6) color "black"

set node(5) [$ns node]
## node(5) at 475.029846,615.485657
$node(5) set X_ 475.029846
$node(5) set Y_ 615.485657
$node(5) set Z_ 0.0
$node(5) color "black"

set node(4) [$ns node]
## node(4) at 461.673950,615.485657
$node(4) set X_ 461.673950
$node(4) set Y_ 615.485657
$node(4) set Z_ 0.0
$node(4) color "black"

set node(3) [$ns node]
## node(3) at 446.566437,615.266724
$node(3) set X_ 446.566437
$node(3) set Y_ 615.266724
```

```
$node(3) set Z_ 0.0
$node(3) color "black"

set node(2) [$ns node]
## node(2) at 429.707397,615.266724
$node(2) set X_ 429.707397
$node(2) set Y_ 615.266724
$node(2) set Z_ 0.0
$node(2) color "black"

set node(1) [$ns node]
## node(1) at 412.629333,616.580505
$node(1) set X_ 412.629333
$node(1) set Y_ 616.580505
$node(1) set Z_ 0.0
$node(1) color "orange"


# Create links between nodes.
$ns simplex-link $node(57) $node(56) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(57) $node(56) queuePos 0.5
$ns simplex-link-op $node(57) $node(56) color black
$ns simplex-link-op $node(57) $node(56) orient 177.8deg
# Set Queue Properties for link 57->56
[[$ns link $node(57) $node(56)] queue] set limit_ 20

$ns simplex-link $node(56) $node(57) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(56) $node(57) queuePos 0.5
$ns simplex-link-op $node(56) $node(57) color black
$ns simplex-link-op $node(56) $node(57) orient 357.8deg
# Set Queue Properties for link 56->57
[[$ns link $node(56) $node(57)] queue] set limit_ 20

$ns simplex-link $node(56) $node(55) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(56) $node(55) queuePos 0.5
$ns simplex-link-op $node(56) $node(55) color black
$ns simplex-link-op $node(56) $node(55) orient 184.2deg
# Set Queue Properties for link 56->55
[[$ns link $node(56) $node(55)] queue] set limit_ 20

$ns simplex-link $node(55) $node(56) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(55) $node(56) queuePos 0.5
$ns simplex-link-op $node(55) $node(56) color black
$ns simplex-link-op $node(55) $node(56) orient 4.2deg
# Set Queue Properties for link 55->56
[[$ns link $node(55) $node(56)] queue] set limit_ 20

$ns simplex-link $node(55) $node(54) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(55) $node(54) queuePos 0.5
$ns simplex-link-op $node(55) $node(54) color black
$ns simplex-link-op $node(55) $node(54) orient 180.9deg
# Set Queue Properties for link 55->54
[[$ns link $node(55) $node(54)] queue] set limit_ 20

$ns simplex-link $node(54) $node(55) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(54) $node(55) queuePos 0.5
$ns simplex-link-op $node(54) $node(55) color black
$ns simplex-link-op $node(54) $node(55) orient 0.9deg
# Set Queue Properties for link 54->55
[[$ns link $node(54) $node(55)] queue] set limit_ 20

$ns simplex-link $node(54) $node(53) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(54) $node(53) queuePos 0.5
$ns simplex-link-op $node(54) $node(53) color black
$ns simplex-link-op $node(54) $node(53) orient 183.1deg
# Set Queue Properties for link 54->53

$ns simplex-link-op $node(49) $node(50) queuePos 0.5
$ns simplex-link-op $node(49) $node(50) color black
$ns simplex-link-op $node(49) $node(50) orient 26.3deg
# Set Queue Properties for link 49->50
[[$ns link $node(49) $node(50)] queue] set limit_ 20

$ns simplex-link $node(49) $node(47) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(49) $node(47) queuePos 0.5
$ns simplex-link-op $node(49) $node(47) color black
$ns simplex-link-op $node(49) $node(47) orient 156.1deg
# Set Queue Properties for link 49->47
[[$ns link $node(49) $node(47)] queue] set limit_ 20

$ns simplex-link $node(48) $node(50) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(48) $node(50) queuePos 0.5
$ns simplex-link-op $node(48) $node(50) color black
$ns simplex-link-op $node(48) $node(50) orient 339.3deg
# Set Queue Properties for link 48->50
[[$ns link $node(48) $node(50)] queue] set limit_ 20

$ns simplex-link $node(48) $node(47) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(48) $node(47) queuePos 0.5
$ns simplex-link-op $node(48) $node(47) color black
$ns simplex-link-op $node(48) $node(47) orient 201.1deg
# Set Queue Properties for link 48->47
[[$ns link $node(48) $node(47)] queue] set limit_ 20

$ns simplex-link $node(47) $node(49) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(47) $node(49) queuePos 0.5
$ns simplex-link-op $node(47) $node(49) color black
$ns simplex-link-op $node(47) $node(49) orient 336.1deg
# Set Queue Properties for link 47->49
[[$ns link $node(47) $node(49)] queue] set limit_ 20

$ns simplex-link $node(47) $node(48) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(47) $node(48) queuePos 0.5
$ns simplex-link-op $node(47) $node(48) color black
$ns simplex-link-op $node(47) $node(48) orient 21.1deg
# Set Queue Properties for link 47->48
[[$ns link $node(47) $node(48)] queue] set limit_ 20

$ns simplex-link $node(47) $node(46) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(47) $node(46) queuePos 0.5
$ns simplex-link-op $node(47) $node(46) color black
$ns simplex-link-op $node(47) $node(46) orient 179.5deg
# Set Queue Properties for link 47->46
[[$ns link $node(47) $node(46)] queue] set limit_ 20

$ns simplex-link $node(46) $node(47) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(46) $node(47) queuePos 0.5
$ns simplex-link-op $node(46) $node(47) color black
$ns simplex-link-op $node(46) $node(47) orient 359.5deg
# Set Queue Properties for link 46->47
[[$ns link $node(46) $node(47)] queue] set limit_ 20

$ns simplex-link $node(46) $node(45) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(46) $node(45) queuePos 0.5
$ns simplex-link-op $node(46) $node(45) color black
$ns simplex-link-op $node(46) $node(45) orient 181.3deg
# Set Queue Properties for link 46->45
[[$ns link $node(46) $node(45)] queue] set limit_ 20

$ns simplex-link $node(45) $node(46) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(45) $node(46) queuePos 0.5
$ns simplex-link-op $node(45) $node(46) color black
$ns simplex-link-op $node(45) $node(46) orient 1.3deg
```

```
[[$ns link $node(54) $node(53)] queue] set limit_ 20

$ns simplex-link $node(53) $node(54) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(53) $node(54) queuePos 0.5
$ns simplex-link-op $node(53) $node(54) color black
$ns simplex-link-op $node(53) $node(54) orient 3.1deg
# Set Queue Properties for link 53->54
[[$ns link $node(53) $node(54)] queue] set limit_ 20

$ns simplex-link $node(53) $node(52) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(53) $node(52) queuePos 0.5
$ns simplex-link-op $node(53) $node(52) color black
$ns simplex-link-op $node(53) $node(52) orient 178.7deg
# Set Queue Properties for link 53->52
[[$ns link $node(53) $node(52)] queue] set limit_ 20

$ns simplex-link $node(52) $node(53) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(52) $node(53) queuePos 0.5
$ns simplex-link-op $node(52) $node(53) color black
$ns simplex-link-op $node(52) $node(53) orient 358.7deg
# Set Queue Properties for link 52->53
[[$ns link $node(52) $node(53)] queue] set limit_ 20

$ns simplex-link $node(52) $node(51) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(52) $node(51) queuePos 0.5
$ns simplex-link-op $node(52) $node(51) color black
$ns simplex-link-op $node(52) $node(51) orient 178.6deg
# Set Queue Properties for link 52->51
[[$ns link $node(52) $node(51)] queue] set limit_ 20

$ns simplex-link $node(51) $node(52) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(51) $node(52) queuePos 0.5
$ns simplex-link-op $node(51) $node(52) color black
$ns simplex-link-op $node(51) $node(52) orient 358.6deg
# Set Queue Properties for link 51->52
[[$ns link $node(51) $node(52)] queue] set limit_ 20

$ns simplex-link $node(51) $node(50) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(51) $node(50) queuePos 0.5
$ns simplex-link-op $node(51) $node(50) color black
$ns simplex-link-op $node(51) $node(50) orient 178.3deg
# Set Queue Properties for link 51->50
[[$ns link $node(51) $node(50)] queue] set limit_ 20

$ns simplex-link $node(50) $node(51) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(50) $node(51) queuePos 0.5
$ns simplex-link-op $node(50) $node(51) color black
$ns simplex-link-op $node(50) $node(51) orient 358.3deg
# Set Queue Properties for link 50->51
[[$ns link $node(50) $node(51)] queue] set limit_ 20

$ns simplex-link $node(50) $node(49) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(50) $node(49) queuePos 0.5
$ns simplex-link-op $node(50) $node(49) color black
$ns simplex-link-op $node(50) $node(49) orient 206.3deg
# Set Queue Properties for link 50->49
[[$ns link $node(50) $node(49)] queue] set limit_ 20

$ns simplex-link $node(50) $node(48) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(50) $node(48) queuePos 0.5
$ns simplex-link-op $node(50) $node(48) color black
$ns simplex-link-op $node(50) $node(48) orient 159.3deg
# Set Queue Properties for link 50->48
[[$ns link $node(50) $node(48)] queue] set limit_ 20

$ns simplex-link $node(49) $node(50) 1.000000Mb 20.000000ms DropTail
```

```
# Set Queue Properties for link 45->46
[[$ns link $node(45) $node(46)] queue] set limit_ 20

$ns simplex-link $node(44) $node(43) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(44) $node(43) queuePos 0.5
$ns simplex-link-op $node(44) $node(43) color black
$ns simplex-link-op $node(44) $node(43) orient 183.6deg
# Set Queue Properties for link 44->43
[[$ns link $node(44) $node(43)] queue] set limit_ 20

$ns simplex-link $node(43) $node(44) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(43) $node(44) queuePos 0.5
$ns simplex-link-op $node(43) $node(44) color black
$ns simplex-link-op $node(43) $node(44) orient 3.6deg
# Set Queue Properties for link 43->44
[[$ns link $node(43) $node(44)] queue] set limit_ 20

$ns simplex-link $node(43) $node(42) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(43) $node(42) queuePos 0.5
$ns simplex-link-op $node(43) $node(42) color black
$ns simplex-link-op $node(43) $node(42) orient 182.5deg
# Set Queue Properties for link 43->42
[[$ns link $node(43) $node(42)] queue] set limit_ 20

$ns simplex-link $node(42) $node(43) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(42) $node(43) queuePos 0.5
$ns simplex-link-op $node(42) $node(43) color black
$ns simplex-link-op $node(42) $node(43) orient 2.5deg
# Set Queue Properties for link 42->43
[[$ns link $node(42) $node(43)] queue] set limit_ 20

$ns simplex-link $node(42) $node(41) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(42) $node(41) queuePos 0.5
$ns simplex-link-op $node(42) $node(41) color black
$ns simplex-link-op $node(42) $node(41) orient 183.6deg
# Set Queue Properties for link 42->41
[[$ns link $node(42) $node(41)] queue] set limit_ 20

$ns simplex-link $node(41) $node(42) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(41) $node(42) queuePos 0.5
$ns simplex-link-op $node(41) $node(42) color black
$ns simplex-link-op $node(41) $node(42) orient 3.6deg
# Set Queue Properties for link 41->42
[[$ns link $node(41) $node(42)] queue] set limit_ 20

$ns simplex-link $node(41) $node(40) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(41) $node(40) queuePos 0.5
$ns simplex-link-op $node(41) $node(40) color black
$ns simplex-link-op $node(41) $node(40) orient 178.6deg
# Set Queue Properties for link 41->40
[[$ns link $node(41) $node(40)] queue] set limit_ 20

$ns simplex-link $node(40) $node(41) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(40) $node(41) queuePos 0.5
$ns simplex-link-op $node(40) $node(41) color black
$ns simplex-link-op $node(40) $node(41) orient 358.6deg
# Set Queue Properties for link 40->41
[[$ns link $node(40) $node(41)] queue] set limit_ 20

$ns simplex-link $node(40) $node(39) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(40) $node(39) queuePos 0.5
$ns simplex-link-op $node(40) $node(39) color black
$ns simplex-link-op $node(40) $node(39) orient 180.0deg
# Set Queue Properties for link 40->39
[[$ns link $node(40) $node(39)] queue] set limit_ 20
```

```
$ns simplex-link $node(39) $node(40) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(39) $node(40) queuePos 0.5
$ns simplex-link-op $node(39) $node(40) color black
$ns simplex-link-op $node(39) $node(40) orient 0.0deg
# Set Queue Properties for link 39->40
[[$ns link $node(39) $node(40)] queue] set limit_ 20

$ns simplex-link $node(39) $node(38) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(39) $node(38) queuePos 0.5
$ns simplex-link-op $node(39) $node(38) color black
$ns simplex-link-op $node(39) $node(38) orient 184.2deg
# Set Queue Properties for link 39->38
[[$ns link $node(39) $node(38)] queue] set limit_ 20

$ns simplex-link $node(38) $node(39) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(38) $node(39) queuePos 0.5
$ns simplex-link-op $node(38) $node(39) color black
$ns simplex-link-op $node(38) $node(39) orient 4.2deg
# Set Queue Properties for link 38->39
[[$ns link $node(38) $node(39)] queue] set limit_ 20

$ns simplex-link $node(38) $node(37) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(38) $node(37) queuePos 0.5
$ns simplex-link-op $node(38) $node(37) color black
$ns simplex-link-op $node(38) $node(37) orient 183.6deg
# Set Queue Properties for link 38->37
[[$ns link $node(38) $node(37)] queue] set limit_ 20

$ns simplex-link $node(37) $node(38) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(37) $node(38) queuePos 0.5
$ns simplex-link-op $node(37) $node(38) color black
$ns simplex-link-op $node(37) $node(38) orient 3.6deg
# Set Queue Properties for link 37->38
[[$ns link $node(37) $node(38)] queue] set limit_ 20

$ns simplex-link $node(37) $node(36) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(37) $node(36) queuePos 0.5
$ns simplex-link-op $node(37) $node(36) color black
$ns simplex-link-op $node(37) $node(36) orient 183.1deg
# Set Queue Properties for link 37->36
[[$ns link $node(37) $node(36)] queue] set limit_ 20

$ns simplex-link $node(36) $node(37) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(36) $node(37) queuePos 0.5
$ns simplex-link-op $node(36) $node(37) color black
$ns simplex-link-op $node(36) $node(37) orient 3.1deg
# Set Queue Properties for link 36->37
[[$ns link $node(36) $node(37)] queue] set limit_ 20

$ns simplex-link $node(36) $node(35) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(36) $node(35) queuePos 0.5
$ns simplex-link-op $node(36) $node(35) color black
$ns simplex-link-op $node(36) $node(35) orient 179.1deg
# Set Queue Properties for link 36->35
[[$ns link $node(36) $node(35)] queue] set limit_ 20

$ns simplex-link $node(35) $node(36) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(35) $node(36) queuePos 0.5
$ns simplex-link-op $node(35) $node(36) color black
$ns simplex-link-op $node(35) $node(36) orient 359.1deg
# Set Queue Properties for link 35->36
[[$ns link $node(35) $node(36)] queue] set limit_ 20

$ns simplex-link $node(35) $node(34) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(35) $node(34) queuePos 0.5
$ns simplex-link-op $node(35) $node(34) color black
$ns simplex-link-op $node(35) $node(34) orient 201.8deg
# Set Queue Properties for link 35->34
[[$ns link $node(35) $node(34)] queue] set limit_ 20

$ns simplex-link $node(35) $node(33) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(35) $node(33) queuePos 0.5
$ns simplex-link-op $node(35) $node(33) color black
$ns simplex-link-op $node(35) $node(33) orient 159.4deg
# Set Queue Properties for link 35->33
[[$ns link $node(35) $node(33)] queue] set limit_ 20

$ns simplex-link $node(34) $node(35) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(34) $node(35) queuePos 0.5
$ns simplex-link-op $node(34) $node(35) color black
$ns simplex-link-op $node(34) $node(35) orient 21.8deg
# Set Queue Properties for link 34->35
[[$ns link $node(34) $node(35)] queue] set limit_ 20

$ns simplex-link $node(34) $node(32) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(34) $node(32) queuePos 0.5
$ns simplex-link-op $node(34) $node(32) color black
$ns simplex-link-op $node(34) $node(32) orient 157.5deg
# Set Queue Properties for link 34->32
[[$ns link $node(34) $node(32)] queue] set limit_ 20

$ns simplex-link $node(33) $node(35) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(33) $node(35) queuePos 0.5
$ns simplex-link-op $node(33) $node(35) color black
$ns simplex-link-op $node(33) $node(35) orient 339.4deg
# Set Queue Properties for link 33->35
[[$ns link $node(33) $node(35)] queue] set limit_ 20

$ns simplex-link $node(33) $node(32) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(33) $node(32) queuePos 0.5
$ns simplex-link-op $node(33) $node(32) color black
$ns simplex-link-op $node(33) $node(32) orient 202.0deg
# Set Queue Properties for link 33->32
[[$ns link $node(33) $node(32)] queue] set limit_ 20

$ns simplex-link $node(32) $node(34) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(32) $node(34) queuePos 0.5
$ns simplex-link-op $node(32) $node(34) color black
$ns simplex-link-op $node(32) $node(34) orient 337.5deg
# Set Queue Properties for link 32->34
[[$ns link $node(32) $node(34)] queue] set limit_ 20

$ns simplex-link $node(32) $node(33) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(32) $node(33) queuePos 0.5
$ns simplex-link-op $node(32) $node(33) color black
$ns simplex-link-op $node(32) $node(33) orient 22.0deg
# Set Queue Properties for link 32->33
[[$ns link $node(32) $node(33)] queue] set limit_ 20

$ns simplex-link $node(32) $node(31) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(32) $node(31) queuePos 0.5
$ns simplex-link-op $node(32) $node(31) color black
$ns simplex-link-op $node(32) $node(31) orient 182.5deg
# Set Queue Properties for link 32->31
[[$ns link $node(32) $node(31)] queue] set limit_ 20

$ns simplex-link $node(31) $node(32) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(31) $node(32) queuePos 0.5
$ns simplex-link-op $node(31) $node(32) color black
$ns simplex-link-op $node(31) $node(32) orient 2.5deg
# Set Queue Properties for link 31->32
[[$ns link $node(31) $node(32)] queue] set limit_ 20
```

```
$ns simplex-link $node(31) $node(30) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(31) $node(30) queuePos 0.5
$ns simplex-link-op $node(31) $node(30) color black
$ns simplex-link-op $node(31) $node(30) orient 177.0deg
# Set Queue Properties for link 31->30
[[$ns link $node(31) $node(30)] queue] set limit_ 20

$ns simplex-link $node(30) $node(31) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(30) $node(31) queuePos 0.5
$ns simplex-link-op $node(30) $node(31) color black
$ns simplex-link-op $node(30) $node(31) orient 357.0deg
# Set Queue Properties for link 30->31
[[$ns link $node(30) $node(31)] queue] set limit_ 20

$ns simplex-link $node(30) $node(29) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(30) $node(29) queuePos 0.5
$ns simplex-link-op $node(30) $node(29) color black
$ns simplex-link-op $node(30) $node(29) orient 180.6deg
# Set Queue Properties for link 30->29
[[$ns link $node(30) $node(29)] queue] set limit_ 20

$ns simplex-link $node(29) $node(30) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(29) $node(30) queuePos 0.5
$ns simplex-link-op $node(29) $node(30) color black
$ns simplex-link-op $node(29) $node(30) orient 0.6deg
# Set Queue Properties for link 29->30
[[$ns link $node(29) $node(30)] queue] set limit_ 20

$ns simplex-link $node(28) $node(27) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(28) $node(27) queuePos 0.5
$ns simplex-link-op $node(28) $node(27) color black
$ns simplex-link-op $node(28) $node(27) orient 216.0deg
# Set Queue Properties for link 28->27
[[$ns link $node(28) $node(27)] queue] set limit_ 20

$ns simplex-link $node(28) $node(26) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(28) $node(26) queuePos 0.5
$ns simplex-link-op $node(28) $node(26) color black
$ns simplex-link-op $node(28) $node(26) orient 141.8deg
# Set Queue Properties for link 28->26
[[$ns link $node(28) $node(26)] queue] set limit_ 20

$ns simplex-link $node(27) $node(28) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(27) $node(28) queuePos 0.5
$ns simplex-link-op $node(27) $node(28) color black
$ns simplex-link-op $node(27) $node(28) orient 36.0deg
# Set Queue Properties for link 27->28
[[$ns link $node(27) $node(28)] queue] set limit_ 20

$ns simplex-link $node(27) $node(25) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(27) $node(25) queuePos 0.5
$ns simplex-link-op $node(27) $node(25) color black
$ns simplex-link-op $node(27) $node(25) orient 145.0deg
# Set Queue Properties for link 27->25
[[$ns link $node(27) $node(25)] queue] set limit_ 20

$ns simplex-link $node(26) $node(28) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(26) $node(28) queuePos 0.5
$ns simplex-link-op $node(26) $node(28) color black
$ns simplex-link-op $node(26) $node(28) orient 321.8deg
# Set Queue Properties for link 26->28
[[$ns link $node(26) $node(28)] queue] set limit_ 20

$ns simplex-link $node(26) $node(25) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(26) $node(25) queuePos 0.5
$ns simplex-link-op $node(26) $node(25) color black
$ns simplex-link-op $node(26) $node(25) orient 218.3deg
# Set Queue Properties for link 26->25
[[$ns link $node(26) $node(25)] queue] set limit_ 20

$ns simplex-link $node(25) $node(27) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(25) $node(27) queuePos 0.5
$ns simplex-link-op $node(25) $node(27) color black
$ns simplex-link-op $node(25) $node(27) orient 325.0deg
# Set Queue Properties for link 25->27
[[$ns link $node(25) $node(27)] queue] set limit_ 20

$ns simplex-link $node(25) $node(26) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(25) $node(26) queuePos 0.5
$ns simplex-link-op $node(25) $node(26) color black
$ns simplex-link-op $node(25) $node(26) orient 38.3deg
# Set Queue Properties for link 25->26
[[$ns link $node(25) $node(26)] queue] set limit_ 20

$ns simplex-link $node(25) $node(24) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(25) $node(24) queuePos 0.5
$ns simplex-link-op $node(25) $node(24) color black
$ns simplex-link-op $node(25) $node(24) orient 178.2deg
# Set Queue Properties for link 25->24
[[$ns link $node(25) $node(24)] queue] set limit_ 20

$ns simplex-link $node(24) $node(25) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(24) $node(25) queuePos 0.5
$ns simplex-link-op $node(24) $node(25) color black
$ns simplex-link-op $node(24) $node(25) orient 358.2deg
# Set Queue Properties for link 24->25
[[$ns link $node(24) $node(25)] queue] set limit_ 20

$ns simplex-link $node(24) $node(23) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(24) $node(23) queuePos 0.5
$ns simplex-link-op $node(24) $node(23) color black
$ns simplex-link-op $node(24) $node(23) orient 207.7deg
# Set Queue Properties for link 24->23
[[$ns link $node(24) $node(23)] queue] set limit_ 20

$ns simplex-link $node(24) $node(22) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(24) $node(22) queuePos 0.5
$ns simplex-link-op $node(24) $node(22) color black
$ns simplex-link-op $node(24) $node(22) orient 152.2deg
# Set Queue Properties for link 24->22
[[$ns link $node(24) $node(22)] queue] set limit_ 20

$ns simplex-link $node(23) $node(24) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(23) $node(24) queuePos 0.5
$ns simplex-link-op $node(23) $node(24) color black
$ns simplex-link-op $node(23) $node(24) orient 27.7deg
# Set Queue Properties for link 23->24
[[$ns link $node(23) $node(24)] queue] set limit_ 20

$ns simplex-link $node(23) $node(21) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(23) $node(21) queuePos 0.5
$ns simplex-link-op $node(23) $node(21) color black
$ns simplex-link-op $node(23) $node(21) orient 144.2deg
# Set Queue Properties for link 23->21
[[$ns link $node(23) $node(21)] queue] set limit_ 20

$ns simplex-link $node(22) $node(24) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(22) $node(24) queuePos 0.5
$ns simplex-link-op $node(22) $node(24) color black
$ns simplex-link-op $node(22) $node(24) orient 332.2deg
# Set Queue Properties for link 22->24
```

```
$ns simplex-link-op $node(18) $node(17) queuePos 0.5
$ns simplex-link-op $node(18) $node(17) color black
$ns simplex-link-op $node(18) $node(17) orient 183.7deg
# Set Queue Properties for link 18->17
[[$ns link $node(18) $node(17)] queue] set limit_ 20

$ns simplex-link $node(17) $node(18) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(17) $node(18) queuePos 0.5
$ns simplex-link-op $node(17) $node(18) color black
$ns simplex-link-op $node(17) $node(18) orient 3.7deg
# Set Queue Properties for link 17->18
[[$ns link $node(17) $node(18)] queue] set limit_ 20

$ns simplex-link $node(16) $node(15) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(16) $node(15) queuePos 0.5
$ns simplex-link-op $node(16) $node(15) color black
$ns simplex-link-op $node(16) $node(15) orient 180.5deg
# Set Queue Properties for link 16->15
[[$ns link $node(16) $node(15)] queue] set limit_ 20

$ns simplex-link $node(15) $node(16) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(15) $node(16) queuePos 0.5
$ns simplex-link-op $node(15) $node(16) color black
$ns simplex-link-op $node(15) $node(16) orient 0.5deg
# Set Queue Properties for link 15->16
[[$ns link $node(15) $node(16)] queue] set limit_ 20

$ns simplex-link $node(15) $node(14) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(15) $node(14) queuePos 0.5
$ns simplex-link-op $node(15) $node(14) color black
$ns simplex-link-op $node(15) $node(14) orient 177.5deg
# Set Queue Properties for link 15->14
[[$ns link $node(15) $node(14)] queue] set limit_ 20

$ns simplex-link $node(14) $node(15) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(14) $node(15) queuePos 0.5
$ns simplex-link-op $node(14) $node(15) color black
$ns simplex-link-op $node(14) $node(15) orient 357.5deg
# Set Queue Properties for link 14->15
[[$ns link $node(14) $node(15)] queue] set limit_ 20

$ns simplex-link $node(14) $node(13) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(14) $node(13) queuePos 0.5
$ns simplex-link-op $node(14) $node(13) color black
$ns simplex-link-op $node(14) $node(13) orient 205.1deg
# Set Queue Properties for link 14->13
[[$ns link $node(14) $node(13)] queue] set limit_ 20

$ns simplex-link $node(14) $node(12) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(14) $node(12) queuePos 0.5
$ns simplex-link-op $node(14) $node(12) color black
$ns simplex-link-op $node(14) $node(12) orient 158.3deg
# Set Queue Properties for link 14->12
[[$ns link $node(14) $node(12)] queue] set limit_ 20

$ns simplex-link $node(13) $node(14) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(13) $node(14) queuePos 0.5
$ns simplex-link-op $node(13) $node(14) color black
$ns simplex-link-op $node(13) $node(14) orient 25.1deg
# Set Queue Properties for link 13->14
[[$ns link $node(13) $node(14)] queue] set limit_ 20

$ns simplex-link $node(13) $node(11) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(13) $node(11) queuePos 0.5
$ns simplex-link-op $node(13) $node(11) color black
$ns simplex-link-op $node(13) $node(11) orient 145.6deg
# Set Queue Properties for link 13->11
[[$ns link $node(13) $node(11)] queue] set limit_ 20

$ns simplex-link $node(12) $node(14) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(12) $node(14) queuePos 0.5
$ns simplex-link-op $node(12) $node(14) color black
$ns simplex-link-op $node(12) $node(14) orient 338.3deg
# Set Queue Properties for link 12->14
[[$ns link $node(12) $node(14)] queue] set limit_ 20

$ns simplex-link $node(12) $node(11) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(12) $node(11) queuePos 0.5
$ns simplex-link-op $node(12) $node(11) color black
$ns simplex-link-op $node(12) $node(11) orient 203.6deg
# Set Queue Properties for link 12->11
[[$ns link $node(12) $node(11)] queue] set limit_ 20

$ns simplex-link $node(11) $node(13) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(11) $node(13) queuePos 0.5
$ns simplex-link-op $node(11) $node(13) color black
$ns simplex-link-op $node(11) $node(13) orient 325.6deg
# Set Queue Properties for link 11->13
[[$ns link $node(11) $node(13)] queue] set limit_ 20

$ns simplex-link $node(11) $node(12) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(11) $node(12) queuePos 0.5
$ns simplex-link-op $node(11) $node(12) color black
$ns simplex-link-op $node(11) $node(12) orient 23.6deg
# Set Queue Properties for link 11->12
[[$ns link $node(11) $node(12)] queue] set limit_ 20

$ns simplex-link $node(11) $node(10) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(11) $node(10) queuePos 0.5
$ns simplex-link-op $node(11) $node(10) color black
$ns simplex-link-op $node(11) $node(10) orient 184.0deg
# Set Queue Properties for link 11->10
[[$ns link $node(11) $node(10)] queue] set limit_ 20

$ns simplex-link $node(10) $node(11) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(10) $node(11) queuePos 0.5
$ns simplex-link-op $node(10) $node(11) color black
$ns simplex-link-op $node(10) $node(11) orient 4.0deg
# Set Queue Properties for link 10->11
[[$ns link $node(10) $node(11)] queue] set limit_ 20

$ns simplex-link $node(10) $node(9) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(10) $node(9) queuePos 0.5
$ns simplex-link-op $node(10) $node(9) color black
$ns simplex-link-op $node(10) $node(9) orient 180.0deg
# Set Queue Properties for link 10->9
[[$ns link $node(10) $node(9)] queue] set limit_ 20

$ns simplex-link $node(9) $node(8) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(9) $node(8) queuePos 0.5
$ns simplex-link-op $node(9) $node(8) color black
$ns simplex-link-op $node(9) $node(8) orient 175.8deg
# Set Queue Properties for link 9->8
[[$ns link $node(9) $node(8)] queue] set limit_ 20

$ns simplex-link $node(9) $node(10) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(9) $node(10) queuePos 0.5
$ns simplex-link-op $node(9) $node(10) color black
$ns simplex-link-op $node(9) $node(10) orient 0.0deg
# Set Queue Properties for link 9->10
[[$ns link $node(9) $node(10)] queue] set limit_ 20
```

```
$ns simplex-link-op $node(4) $node(3) orient 180.8deg
# Set Queue Properties for link 4->3
[[$ns link $node(4) $node(3)] queue] set limit_ 20

$ns simplex-link $node(3) $node(4) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(3) $node(4) queuePos 0.5
$ns simplex-link-op $node(3) $node(4) color black
$ns simplex-link-op $node(3) $node(4) orient 0.8deg
# Set Queue Properties for link 3->4
[[$ns link $node(3) $node(4)] queue] set limit_ 20

$ns simplex-link $node(3) $node(2) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(3) $node(2) queuePos 0.5
$ns simplex-link-op $node(3) $node(2) color black
$ns simplex-link-op $node(3) $node(2) orient 180.0deg
# Set Queue Properties for link 3->2
[[$ns link $node(3) $node(2)] queue] set limit_ 20

$ns simplex-link $node(2) $node(3) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(2) $node(3) queuePos 0.5
$ns simplex-link-op $node(2) $node(3) color black
$ns simplex-link-op $node(2) $node(3) orient 0.0deg
# Set Queue Properties for link 2->3
[[$ns link $node(2) $node(3)] queue] set limit_ 20

$ns simplex-link $node(2) $node(1) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(2) $node(1) queuePos 0.5
$ns simplex-link-op $node(2) $node(1) color black
$ns simplex-link-op $node(2) $node(1) orient 175.6deg
# Set Queue Properties for link 2->1
[[$ns link $node(2) $node(1)] queue] set limit_ 20

$ns simplex-link $node(1) $node(2) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(1) $node(2) queuePos 0.5
$ns simplex-link-op $node(1) $node(2) color black
$ns simplex-link-op $node(1) $node(2) orient 355.6deg
# Set Queue Properties for link 1->2
[[$ns link $node(1) $node(2)] queue] set limit_ 20

# Add Link Loss Models

# Create agents.
set agent(8) [new Agent/TCPSink]
$ns attach-agent $node(57) $agent(8)
$agent(8) set packetSize_ 210
set agent(4) [new Agent/TCP]
$ns attach-agent $node(45) $agent(4)

$ns color 4 "purple"
$agent(4) set fid_ 4
$agent(4) set packetSize_ 210
$agent(4) set window_ 20
$agent(4) set windowInit_ 1
$agent(4) set maxcwnd_ 0

# Create traffic sources and add them to the agent.
set traffic_source(4) [new Application/FTP]
$traffic_source(4) attach-agent $agent(4)
$traffic_source(4) set maxpkts_ 256
set agent(7) [new Agent/TCPSink]
$ns attach-agent $node(44) $agent(7)
$agent(7) set packetSize_ 210
set agent(3) [new Agent/TCP]
$ns attach-agent $node(29) $agent(3)

$ns color 3 "green"
```

```
$ns simplex-link $node(8) $node(9) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(8) $node(9) queuePos 0.5
$ns simplex-link-op $node(8) $node(9) color black
$ns simplex-link-op $node(8) $node(9) orient 355.8deg
# Set Queue Properties for link 8->9
[[$ns link $node(8) $node(9)] queue] set limit_ 20

$ns simplex-link $node(8) $node(7) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(8) $node(7) queuePos 0.5
$ns simplex-link-op $node(8) $node(7) color black
$ns simplex-link-op $node(8) $node(7) orient 174.5deg
# Set Queue Properties for link 8->7
[[$ns link $node(8) $node(7)] queue] set limit_ 20

$ns simplex-link $node(7) $node(8) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(7) $node(8) queuePos 0.5
$ns simplex-link-op $node(7) $node(8) color black
$ns simplex-link-op $node(7) $node(8) orient 354.5deg
# Set Queue Properties for link 7->8
[[$ns link $node(7) $node(8)] queue] set limit_ 20

$ns simplex-link $node(7) $node(6) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(7) $node(6) queuePos 0.5
$ns simplex-link-op $node(7) $node(6) color black
$ns simplex-link-op $node(7) $node(6) orient 179.2deg
# Set Queue Properties for link 7->6
[[$ns link $node(7) $node(6)] queue] set limit_ 20

$ns simplex-link $node(6) $node(7) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(6) $node(7) queuePos 0.5
$ns simplex-link-op $node(6) $node(7) color black
$ns simplex-link-op $node(6) $node(7) orient 359.2deg
# Set Queue Properties for link 6->7
[[$ns link $node(6) $node(7)] queue] set limit_ 20

$ns simplex-link $node(6) $node(5) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(6) $node(5) queuePos 0.5
$ns simplex-link-op $node(6) $node(5) color black
$ns simplex-link-op $node(6) $node(5) orient 174.8deg
# Set Queue Properties for link 6->5
[[$ns link $node(6) $node(5)] queue] set limit_ 20

$ns simplex-link $node(5) $node(6) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(5) $node(6) queuePos 0.5
$ns simplex-link-op $node(5) $node(6) color black
$ns simplex-link-op $node(5) $node(6) orient 354.8deg
# Set Queue Properties for link 5->6
[[$ns link $node(5) $node(6)] queue] set limit_ 20

$ns simplex-link $node(5) $node(4) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(5) $node(4) queuePos 0.5
$ns simplex-link-op $node(5) $node(4) color black
$ns simplex-link-op $node(5) $node(4) orient 180.0deg
# Set Queue Properties for link 5->4
[[$ns link $node(5) $node(4)] queue] set limit_ 20

$ns simplex-link $node(4) $node(5) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(4) $node(5) queuePos 0.5
$ns simplex-link-op $node(4) $node(5) color black
$ns simplex-link-op $node(4) $node(5) orient 0.0deg
# Set Queue Properties for link 4->5
[[$ns link $node(4) $node(5)] queue] set limit_ 20

$ns simplex-link $node(4) $node(3) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(4) $node(3) queuePos 0.5
$ns simplex-link-op $node(4) $node(3) color black
```

```
$agent(3) set fid_ 3
$agent(3) set packetSize_ 210
$agent(3) set window_ 20
$agent(3) set windowInit_ 1
$agent(3) set maxcwnd_ 0

# Create traffic sources and add them to the agent.
set traffic_source(3) [new Application/FTP]
$traffic_source(3) attach-agent $agent(3)
$traffic_source(3) set maxpkts_ 256
set agent(6) [new Agent/TCPSink]
$ns attach-agent $node(28) $agent(6)
$agent(6) set packetSize_ 210
set agent(2) [new Agent/TCP]
$ns attach-agent $node(17) $agent(2)

$ns color 2 "blue"
$agent(2) set fid_ 2
$agent(2) set packetSize_ 210
$agent(2) set window_ 20
$agent(2) set windowInit_ 1
$agent(2) set maxcwnd_ 0

# Create traffic sources and add them to the agent.
set traffic_source(2) [new Application/FTP]
$traffic_source(2) attach-agent $agent(2)
$traffic_source(2) set maxpkts_ 256
set agent(5) [new Agent/TCPSink]
$ns attach-agent $node(16) $agent(5)
$agent(5) set packetSize_ 210
set agent(1) [new Agent/TCP]
$ns attach-agent $node(1) $agent(1)

$ns color 1 "red"
$agent(1) set fid_ 1
$agent(1) set packetSize_ 210
$agent(1) set window_ 20
$agent(1) set windowInit_ 1
$agent(1) set maxcwnd_ 0

# Create traffic sources and add them to the agent.
set traffic_source(1) [new Application/FTP]
$traffic_source(1) attach-agent $agent(1)
$traffic_source(1) set maxpkts_ 256

# Connect agents.
$ns connect $agent(4) $agent(8)


# Traffic Source actions.
$ns at 0.000000 "$traffic_source(4) start"
$ns at 60.000000 "$traffic_source(4) stop"

$ns connect $agent(3) $agent(7)


# Traffic Source actions.
$ns at 0.000000 "$traffic_source(3) start"
$ns at 60.000000 "$traffic_source(3) stop"

$ns connect $agent(2) $agent(6)


# Traffic Source actions.
$ns at 0.000000 "$traffic_source(2) start"
$ns at 60.000000 "$traffic_source(2) stop"

$ns connect $agent(1) $agent(5)


# Traffic Source actions.
$ns at 0.000000 "$traffic_source(1) start"
$ns at 60.000000 "$traffic_source(1) stop"

# Run the simulation
proc finish {} {
        global ns namfile
        $ns flush-trace
        close $namfile
        exec nam -r 2000.000000us /home/raihan/f.nam &
        exit 0
        }
$ns at 60.000000 "finish"
$ns run
```

Output Topology of Network Simulator 2

The output topology of the NS2

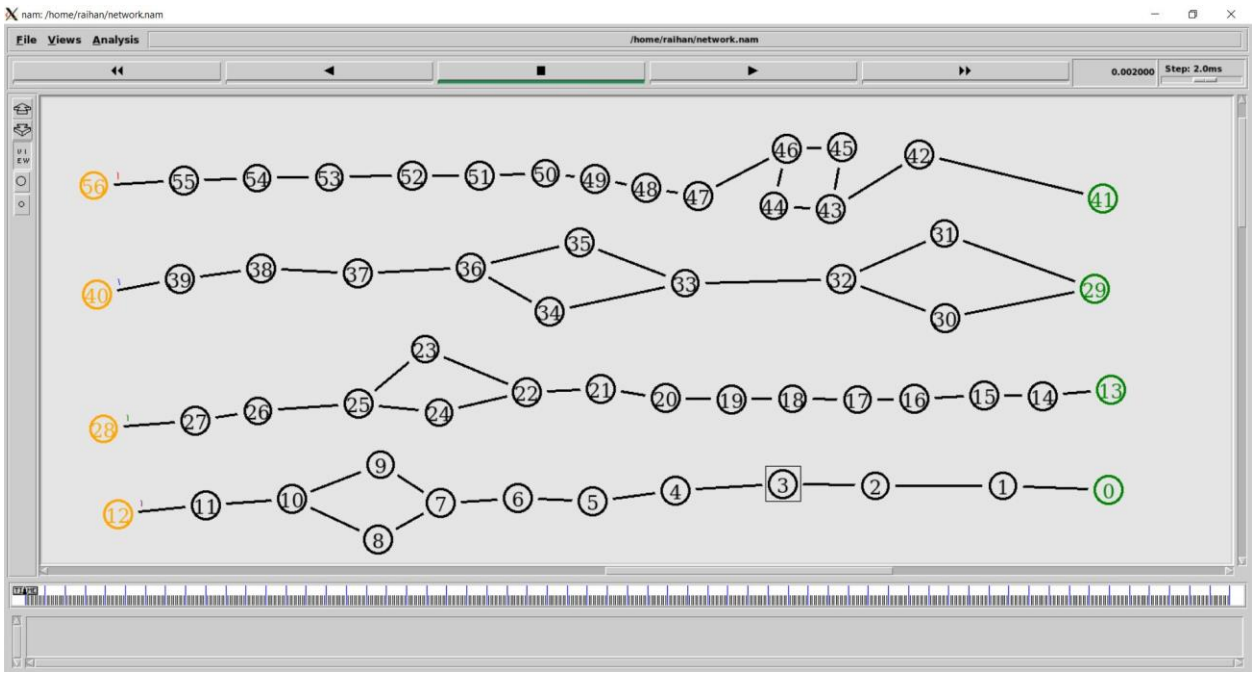

Figure: Beginning time output of the NS2

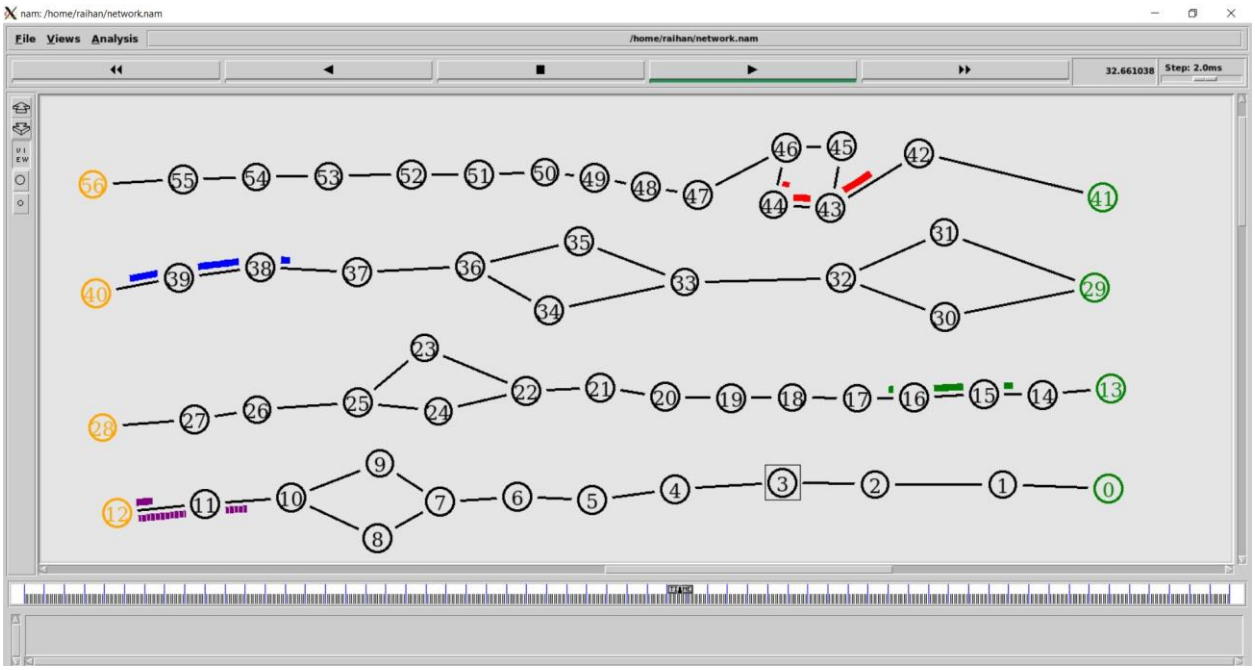

Figure: Middle time output of NS2

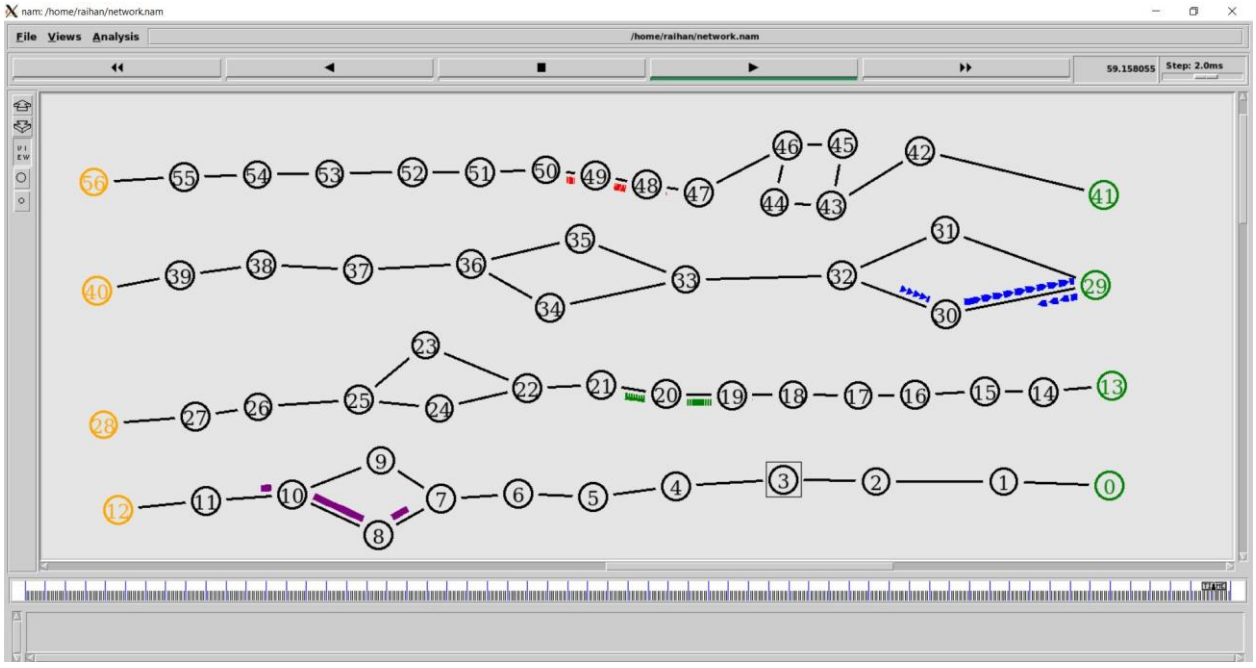

Figure: End time output of NS2

Summarization of the Design Network

- Zenmap lets you create a topology map of discovered networks. It arranges its display to show all ports on a host or all hosts running a specific service.

- After scan 4 different host to the domain youtube.com we find 4 different topology design.

- After completed all 4 scan in Zenmap collect all IP addresses of the 4 different network and store in a excel sheet and prepare a final sheet of all 4 networks organized level by level.

- Network Simulator (Version 2), widely known as NS2, is simply an event-driven simulation tool that has proved useful in studying the dynamic nature of communication networks.

- The source code is used in NS2 for show the network flow.After successfully code on network simulator 2 and execute the NS2 show the network flow 4 host to 4 different destinations.

Conclusion

There is some limitations also. No option to change font style of output. Sometimes scanning takes more time than usual. Sometimes it does not identify operating system accurately. Bit of learning curve to go from novice to power user.

Hope that in future upgrade NS and fixed the issues.

References

[1] https://ipwithease.com/introduction-to-zenmap-nmap network-mapper/

[2] https://link.springer.com/chapter/10.1007/978-1-4614 1406-3_2

[3] https://nmap.org/book/zenmap-results.html