North Western University

Sessional Final Report

Course Code: CSE-3304

Title: Introduction to computer network using NS2 based on the domain as www.Instagram.com

Course Code: **CSE-3304**

Course Title: **Computer network sessional**

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Overview of the Project

1. Introduction to Zenmap

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5. Introduction to NS2

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7. Output topology of NS2

8. Summarization of the designed network

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10. References

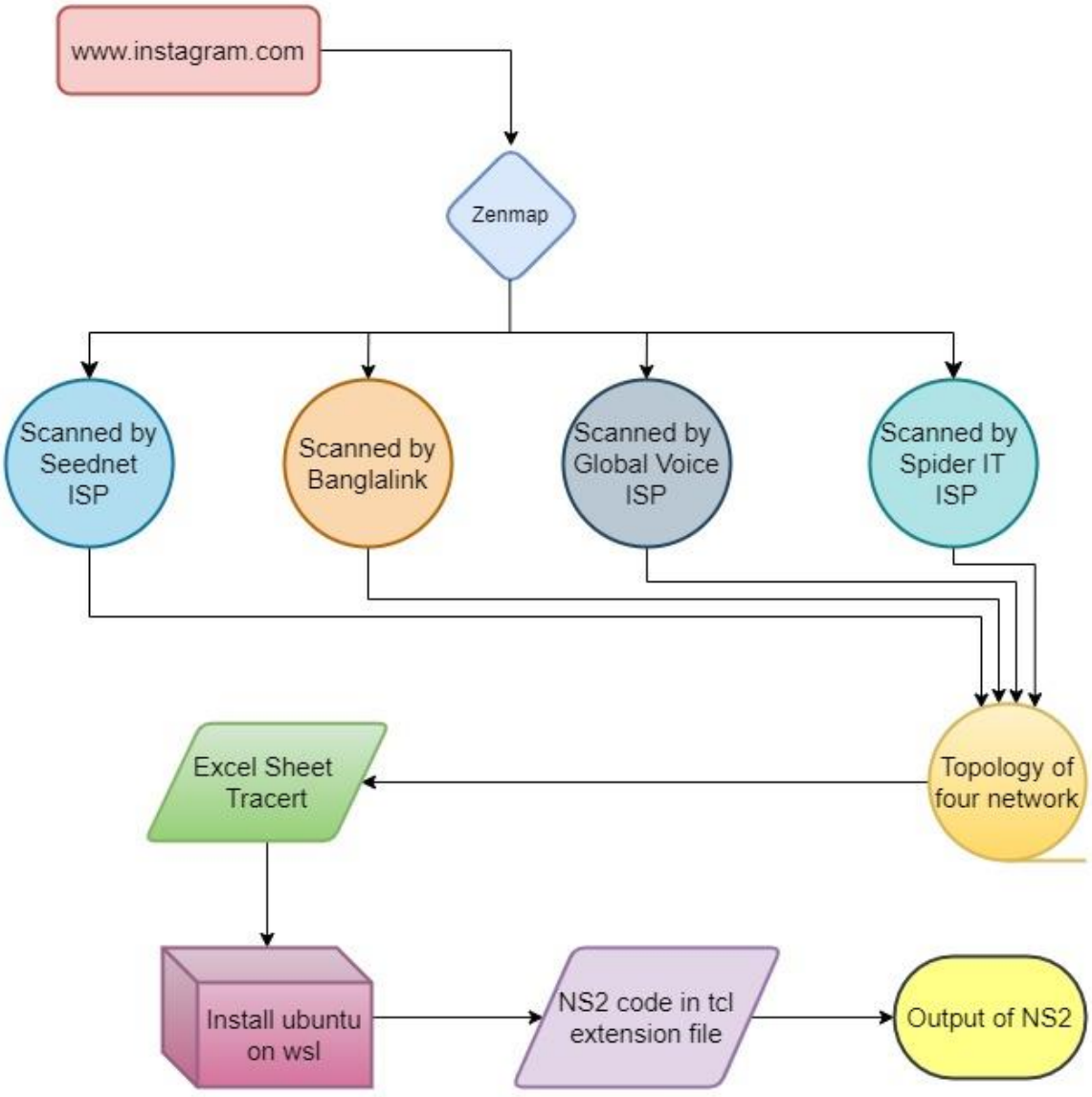

Fig 1: Birds Eye View of the project

1. Introduction to Zenmap

Zenmap is a graphical user interface for Nmap. 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. 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. Results of multiple scans can be combined together for review and it has the ability to show the difference between two scans and identify what has changed from previous scan to now on hosts and help to easily track new hosts or services appearing on networks and disappearing services.

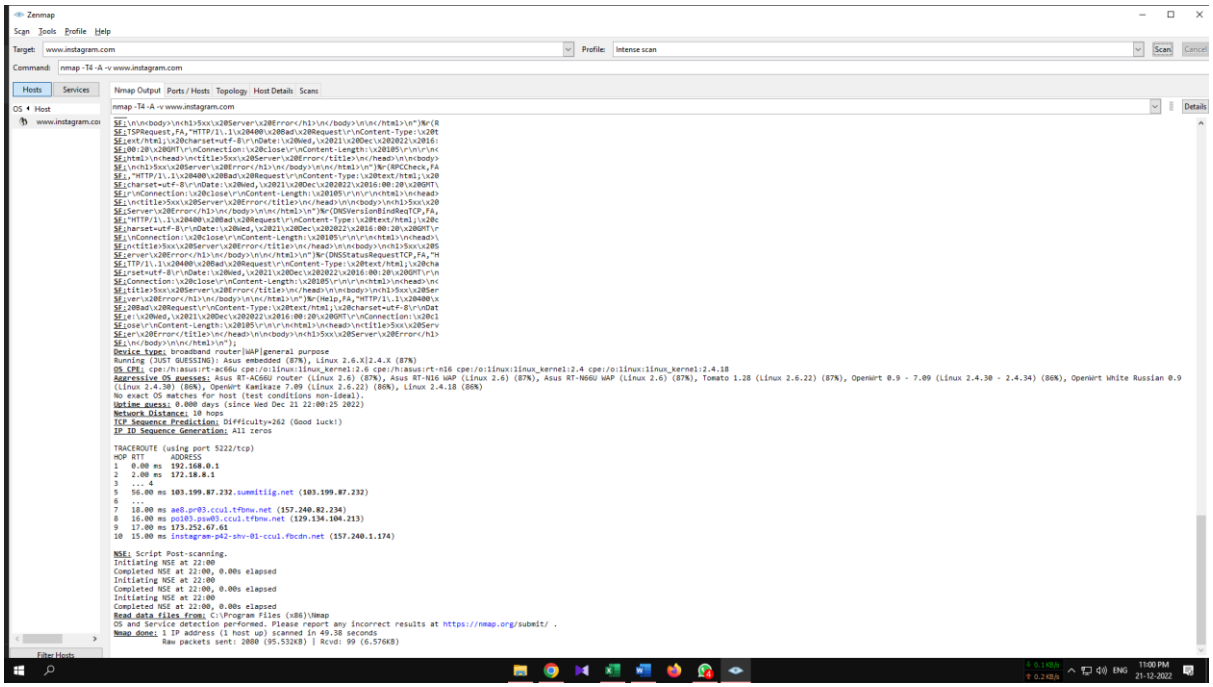

Fig 2: Introduction to Zenmap

2.*Different Host to Domain*

In this Project we scanned the website www.instagram.com with four different network to find the routing. We scanned the website with three WIFI network and one cellular network. The scan results of the four network is given below.

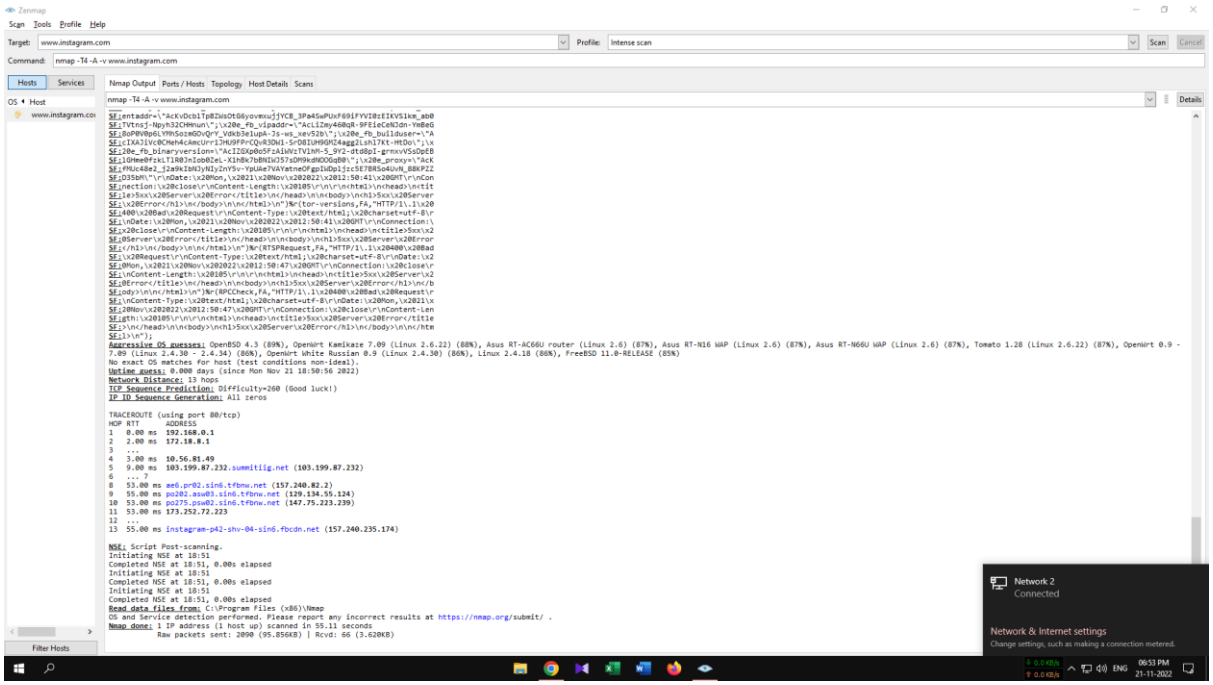

Fig 3: Speednet ISP network Zenmap scan result

Here in fig 3 is shown the scan result of Speednet WIFI network. In this scan result we can see that there are 9 different IP addresses from source to domain.

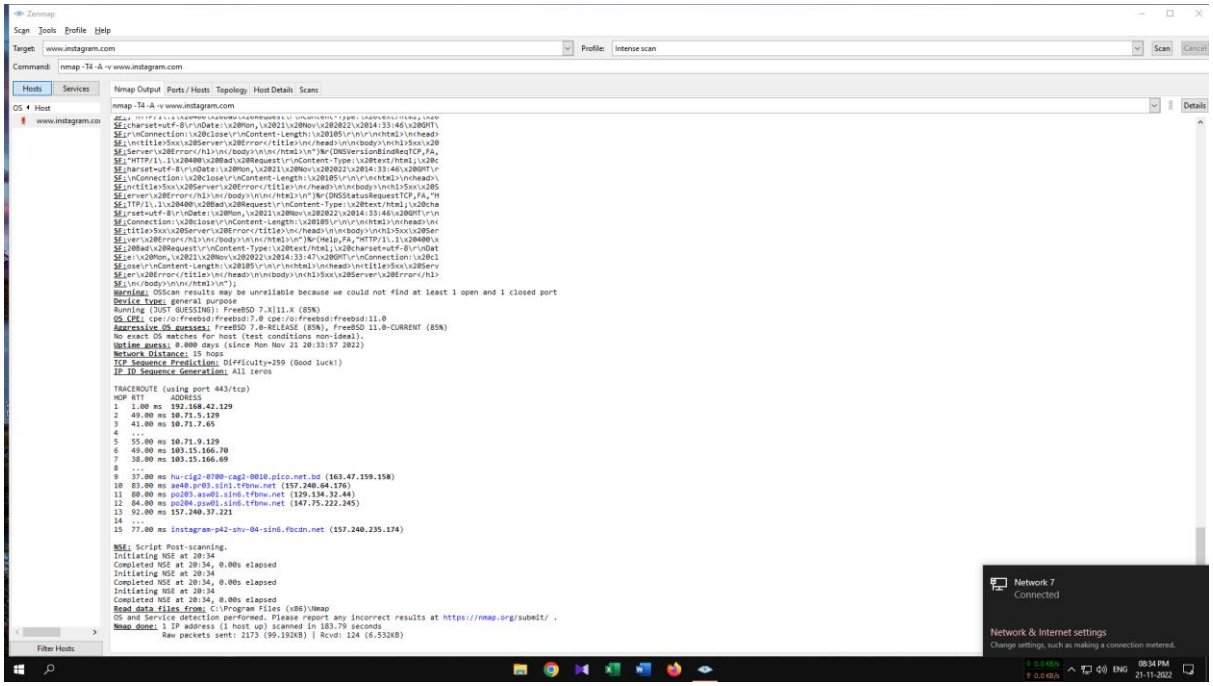

Fig 4: Banglalink cellular Network Zenmap result

Here in fig 4 is shown the scan result of Banglalink cellular network. In this scan result we can see that there are 12 different IP addresses from source to domain.

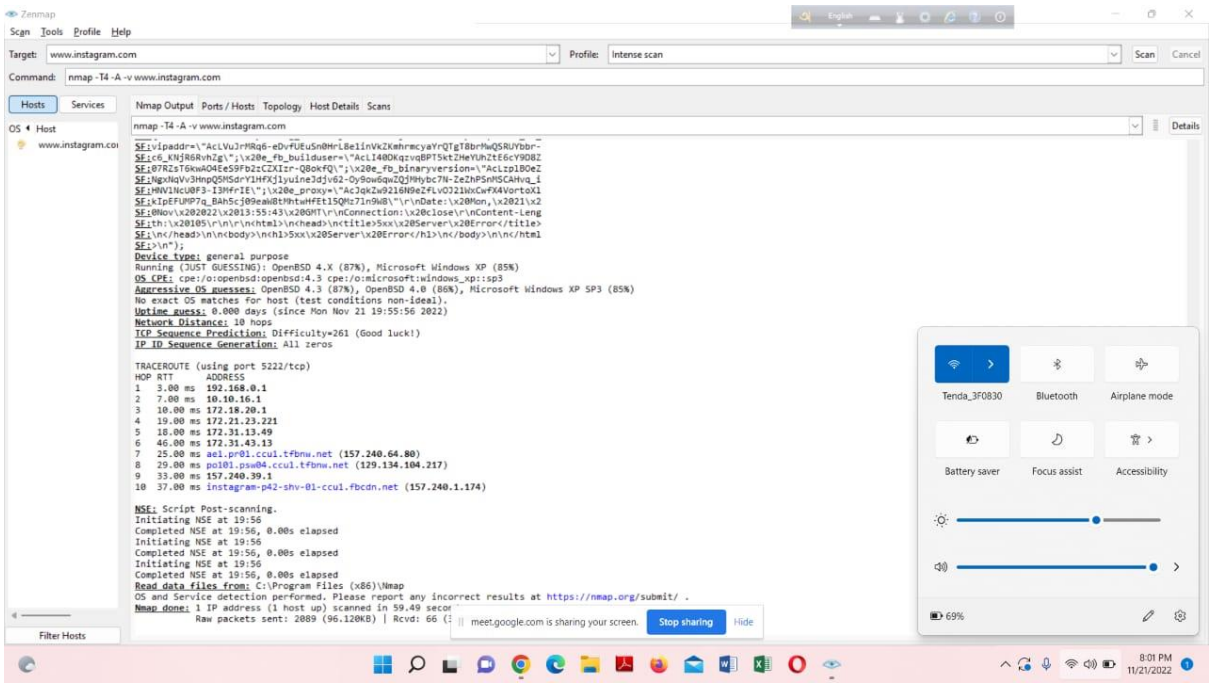

Fig 5: Global Voice ISP Zenmap scan result

Here in fig 5 is shown the scan result of Global Voice ISP network. In this scan result. In this scan result we can see that there are 10 different IP addresses from source to domain.

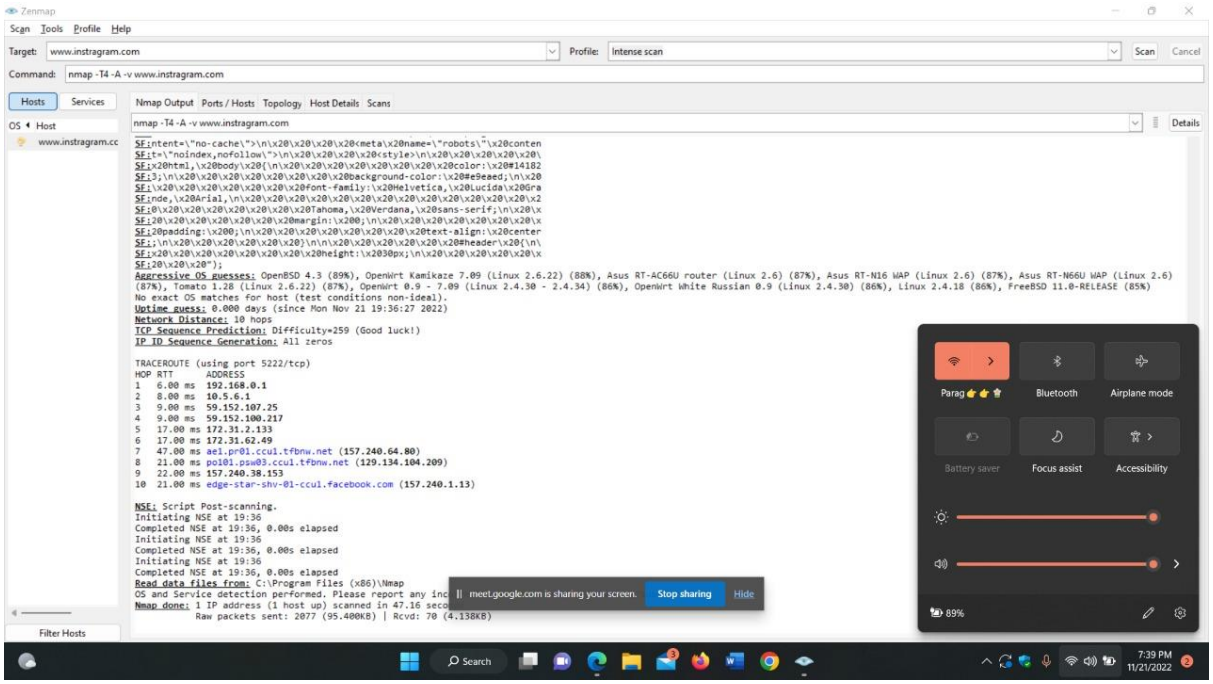

Fig 6: Spider IT ISP Zenmap scan result

Here in fig 6 is shown the scan result of Spider IT WIFI network. In this scan result. In this scan result we can see that there are 12 different IP addresses from source to domain.

3.Design Network Topology

Network topology is the arrangement of computers, network devices and other components of a network. It describes how various devices in a network are connected to one another and how they communicate. Network topology can be either physical or logical. Physical topology describes the physical layout of a network and the location of the various devices, while logical topology describes how data is transferred between the different nodes

In this project our target IP is same but hosts IP is different. After scanning four network with Zenmap we find this network topology.

Fig 7: Network topology of Instagram.

Fig 7 is the network topology of Instagram website. Here we can see that our host IP addresses are different but the target IP addresses are same.

4.Prepared Excel Sheet for Network Diagram

After getting network topology from Zenmap, we have to create a excel sheet for network simulation. At first we need to prepare different sheets for each network we used in Zenmap. Then we need to put the IP addresses we found from Zenmap in the final sheet for the tracert of the IP addresses from localhost to target Ip.

	Website: www.instagram.com	
	Network : SpeedNet	
SL No	IP Address	Services
1	192.168.0.1	domain,http
2	172.18.8.1	
3	10.56.81.49	
4	103.199.87.232	
5	157.240.82.2	
6	129.134.55.124	
7	147.75.223.239	
8	173.252.72.223	
9	157.240.235.174	http

Fig 8: Service table of Speednet

	Website: www.instagram.com	
	Network: Banglalink	
SL No	IP Address	Services
1	192.168.42.129	domain,http
2	10.71.5.129	
3	10.71.7.65	
4	10.71.9.129	
5	103.15.166.70	
6	103.15.166.69	
7	163.47.159.158	
8	157.240.64.176	
9	129.134.32.44	
10	147.75.222.245	
11	157.240.37.221	
12	157.240.235.174	http,https

Fig 9: Service table of Banglalink

	Website:www.instagram.com	
	Network : Global Voice	
SL No	IP Address	Services
1	192.168.0.1	domain,http
2	10.10.16.1	
3	172.18.20.1	
4	172.21.23.221	
5	172.31.13.49	
6	172.31.43.13	
7	157.240.64.80	
8	129.134.104.217	
9	157.240.39.1	
10	157.240.1.174	http,https

Fig 10: Service table of Global Voice

	Website: www.instagram.com	
	Network: Spider IT	
SL No	IP Address	Services
1	192.168.0.1	domain,http
2	10.5.6.1	
3	59.152.107.25	
4	59.152.100.217	
5	172.31.2.133	
6	172.31.62.49	
7	157.240.64.80	
8	129.134.104.209	
9	157.240.38.153	
10	157.240.1.13	http,https

Fig 11: Service table of Spider IT

Fig 8-11 represents the four table containing IP addresses of four different network that we found from Zenmap after scanning our targeted website. Different network goes through different Ip addresses for reaching their targeted Ip address. Next we will create a tracert for the simulation process.

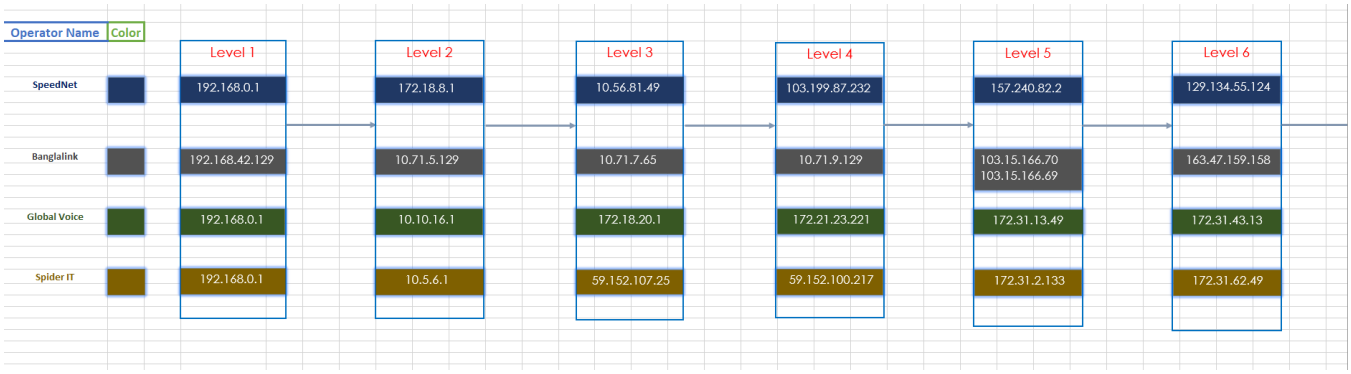

Fig 12: First half of the excel sheet tracert

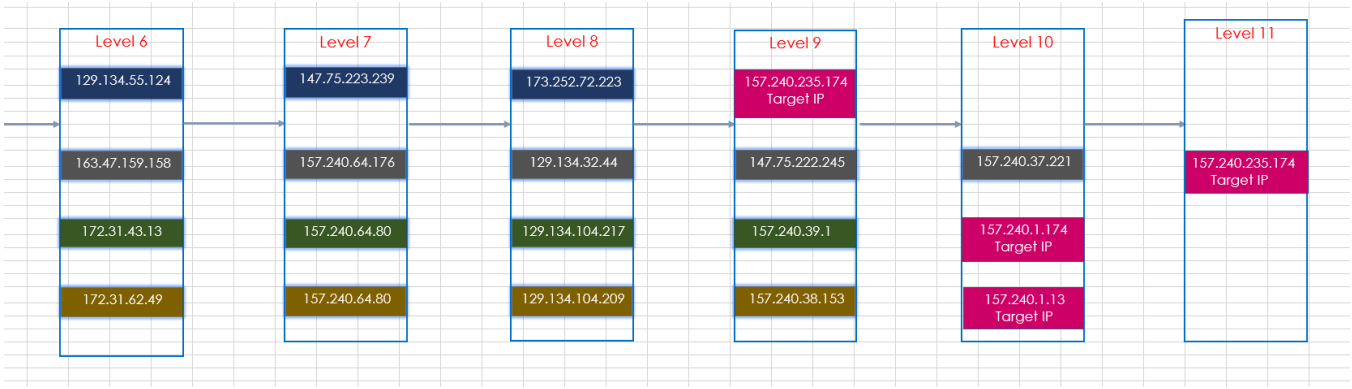

Fig 13: Last half of the excel sheet tracert

Fig 12 and 13 are the visual representation of the IP addresses that is shown in excel file.

5.Introduction to NS2

Network Simulator (NS) is simply a discrete event-driven network simulation tool for studying the dynamic nature of communication networks. Network Simulator 2 (NS2) provides substantial support for simulation of different protocols over wired and wireless networks. It provides a highly modular platform for wired and wireless simulations supporting different network elements, protocols, traffic, and routing types.

NS2 is a simulation package that supports several network protocols including TCP, UDP, HTTP, and DHCP and these can be modeled using this package. In addition, several kinds of network traffic types such as constant bit rate (CBR), available bit rate (ABR), and variable bit rate (VBR) can be generated easily using this package. It is a very popular simulation package in academic environments [1].

6. Source Code of NS2 Based on Network Diagram

Source code:

network.tcl

```
#-----------------------------------------
# This ns script has been created by the nam
# If you edit it manually, the nam editor mig
# 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/p/network.nam w]
$ns namtrace-all $namfile

# Create wired nodes.
set node(42) [$ns node]
## node(42) at 517.135681,572.071472
$node(42) set X_ 517.135681
$node(42) set Y_ 572.071472
$node(42) set Z_ 0.0
$node(42) color "grey"

set node(41) [$ns node]
## node(41) at 706.020081,467.778839
$node(41) set X_ 706.020081
$node(41) set Y_ 467.778839
$node(41) set Z_ 0.0
$node(41) color "yellow"

set node(40) [$ns node]
## node(40) at 678.018677,454.111603
$node(40) set X_ 678.018677
$node(40) set Y_ 454.111603
$node(40) set Z_ 0.0
$node(40) color "yellow"

set node(39) [$ns node]
## node(39) at 631.349426,455.778381
$node(39) set X_ 631.349426
$node(39) set Y_ 455.778381
$node(39) set Z_ 0.0
$node(39) color "yellow"

set node(38) [$ns node]
## node(38) at 586.680603,462.445343
$node(38) set X_ 586.680603
$node(38) set Y_ 462.445343
$node(38) set Z_ 0.0
$node(38) color "yellow"

set node(37) [$ns node]
## node(37) at 527.343994,466.778961
$node(37) set X_ 527.343994
$node(37) set Y_ 466.778961
```

network.tcl

```
$node(37) set Z_ 0.0
$node(37) color "yellow"

set node(36) [$ns node]
## node(36) at 494.342316,472.112427
$node(36) set X_ 494.342316
$node(36) set Y_ 472.112427
$node(36) set Z_ 0.0
$node(36) color "yellow"

set node(35) [$ns node]
## node(35) at 458.007111,478.779419
$node(35) set X_ 458.007111
$node(35) set Y_ 478.779419
$node(35) set Z_ 0.0
$node(35) color "yellow"

set node(34) [$ns node]
## node(34) at 417.004944,488.446747
$node(34) set X_ 417.004944
$node(34) set Y_ 488.446747
$node(34) set Z_ 0.0
$node(34) color "yellow"

set node(33) [$ns node]
## node(33) at 363.668823,494.447021
$node(33) set X_ 363.668823
$node(33) set Y_ 494.447021
$node(33) set Z_ 0.0
$node(33) color "yellow"

set node(32) [$ns node]
## node(32) at 674.685242,496.780518
$node(32) set X_ 674.685242
$node(32) set Y_ 496.780518
$node(32) set Z_ 0.0
$node(32) color "green"

set node(1) [$ns node]
## node(1) at 379.460419,620.208191
$node(1) set X_ 379.460419
$node(1) set Y_ 620.208191
$node(1) set Z_ 0.0
$node(1) color "blue"

set node(2) [$ns node]
## node(2) at 422.982605,612.010498
$node(2) set X_ 422.982605
$node(2) set Y_ 612.010498
$node(2) set Z_ 0.0
$node(2) color "blue"

set node(3) [$ns node]
```

```
106 set node(3) [$ns node]
107 ## node(3) at 472.609344,600.312500
108 $node(3) set X_ 472.609344
109 $node(3) set Y_ 600.312500
110 $node(3) set Z_ 0.0
111 $node(3) color "blue"
112
113 set node(4) [$ns node]
114 ## node(4) at 519.359375,593.437500
115 $node(4) set X_ 519.359375
116 $node(4) set Y_ 593.437500
117 $node(4) set Z_ 0.0
118 $node(4) color "blue"
119
120 set node(5) [$ns node]
121 ## node(5) at 563.359375,587.937500
122 $node(5) set X_ 563.359375
123 $node(5) set Y_ 587.937500
124 $node(5) set Z_ 0.0
125 $node(5) color "blue"
126
127 set node(6) [$ns node]
128 ## node(6) at 592.578125,581.406250
129 $node(6) set X_ 592.578125
130 $node(6) set Y_ 581.406250
131 $node(6) set Z_ 0.0
132 $node(6) color "blue"
133
134 set node(7) [$ns node]
135 ## node(7) at 623.515625,572.812500
136 $node(7) set X_ 623.515625
137 $node(7) set Y_ 572.812500
138 $node(7) set Z_ 0.0
139 $node(7) color "blue"
140
141 set node(8) [$ns node]
142 ## node(8) at 651.703125,565.937500
143 $node(8) set X_ 651.703125
144 $node(8) set Y_ 565.937500
145 $node(8) set Z_ 0.0
146 $node(8) color "blue"
147
148 set node(9) [$ns node]
149 ## node(9) at 681.609375,558.031250
150 $node(9) set X_ 681.609375
151 $node(9) set Y_ 558.031250
152 $node(9) set Z_ 0.0
153 $node(9) color "red"
154
155 set node(10) [$ns node]
156 ## node(10) at 369.475372,587.194580
157 $node(10) set X_ 369.475372
158 $node(10) set Y_ 587.194580
```

```
155 set node(10) [$ns node]
156 ## node(10) at 369.475372,587.194580
157 $node(10) set X_ 369.475372
158 $node(10) set Y_ 587.194580
159 $node(10) set Z_ 0.0
160 $node(10) color "grey"
161
162 set node(11) [$ns node]
163 ## node(11) at 410.050629,582.465515
164 $node(11) set X_ 410.050629
165 $node(11) set Y_ 582.465515
166 $node(11) set Z_ 0.0
167 $node(11) color "grey"
168
169 set node(12) [$ns node]
170 ## node(12) at 447.449463,573.749878
171 $node(12) set X_ 447.449463
172 $node(12) set Y_ 573.749878
173 $node(12) set Z_ 0.0
174 $node(12) color "grey"
175
176 set node(13) [$ns node]
177 ## node(13) at 486.030334,563.310486
178 $node(13) set X_ 486.030334
179 $node(13) set Y_ 563.310486
180 $node(13) set Z_ 0.0
181 $node(13) color "grey"
182
183 set node(14) [$ns node]
184 ## node(14) at 532.414551,551.553772
185 $node(14) set X_ 532.414551
186 $node(14) set Y_ 551.553772
187 $node(14) set Z_ 0.0
188 $node(14) color "grey"
189
190 set node(15) [$ns node]
191 ## node(15) at 571.773376,541.688782
192 $node(15) set X_ 571.773376
193 $node(15) set Y_ 541.688782
194 $node(15) set Z_ 0.0
195 $node(15) color "grey"
196
197 set node(16) [$ns node]
198 ## node(16) at 607.516357,532.465942
199 $node(16) set X_ 607.516357
200 $node(16) set Y_ 532.465942
201 $node(16) set Z_ 0.0
202 $node(16) color "grey"
203
204 set node(17) [$ns node]
205 ## node(17) at 646.637634,525.472107
206 $node(17) set X_ 646.637634
```

```
207 $node(17) set Y_ 525.472107
208 $node(17) set Z_ 0.0
209 $node(17) color "grey"
210
211 set node(18) [$ns node]
212 ## node(18) at 680.757568,525.337280
213 $node(18) set X_ 680.757568
214 $node(18) set Y_ 525.337280
215 $node(18) set Z_ 0.0
216 $node(18) color "grey"
217
218 set node(19) [$ns node]
219 ## node(19) at 760.758240,501.801636
220 $node(19) set X_ 760.758240
221 $node(19) set Y_ 501.801636
222 $node(19) set Z_ 0.0
223 $node(19) color "grey"
224
225 set node(20) [$ns node]
226 ## node(20) at 818.046143,500.028961
227 $node(20) set X_ 818.046143
228 $node(20) set Y_ 500.028961
229 $node(20) set Z_ 0.0
230 $node(20) color "red"
231
232 set node(21) [$ns node]
233 ## node(21) at 367.839722,539.796021
234 $node(21) set X_ 367.839722
235 $node(21) set Y_ 539.796021
236 $node(21) set Z_ 0.0
237 $node(21) color "green"
238
239 set node(22) [$ns node]
240 ## node(22) at 401.083618,528.445984
241 $node(22) set X_ 401.083618
242 $node(22) set Y_ 528.445984
243 $node(22) set Z_ 0.0
244 $node(22) color "green"
245
246 set node(23) [$ns node]
247 ## node(23) at 436.489014,522.500000
248 $node(23) set X_ 436.489014
249 $node(23) set Y_ 522.500000
250 $node(23) set Z_ 0.0
251 $node(23) color "green"
252
253 set node(24) [$ns node]
254 ## node(24) at 481.083588,511.689209
255 $node(24) set X_ 481.083588
256 $node(24) set Y_ 511.689209
257 $node(24) set Z_ 0.0
258 $node(24) color "green"
259
```

```
259
260 set node(25) [$ns node]
261 ## node(25) at 511.894440,506.013550
262 $node(25) set X_ 511.894440
263 $node(25) set Y_ 506.013550
264 $node(25) set Z_ 0.0
265 $node(25) color "green"
266
267 set node(26) [$ns node]
268 ## node(26) at 551.624146,498.986511
269 $node(26) set X_ 551.624146
270 $node(26) set Y_ 498.986511
271 $node(26) set Z_ 0.0
272 $node(26) color "green"
273
274 set node(27) [$ns node]
275 ## node(27) at 592.164673,494.662201
276 $node(27) set X_ 592.164673
277 $node(27) set Y_ 494.662201
278 $node(27) set Z_ 0.0
279 $node(27) color "green"
280
281 set node(28) [$ns node]
282 ## node(28) at 630.542786,492.770233
283 $node(28) set X_ 630.542786
284 $node(28) set Y_ 492.770233
285 $node(28) set Z_ 0.0
286 $node(28) color "green"
287
288
289 # ----- Setup wireless environment. ----
290 set wireless_tracefile [open /home/p/network.trace w]
291 set topography [new Topography]
292 $ns trace-all $wireless_tracefile
293 $ns namtrace-all-wireless $namfile 838.046143 640.208191
294 $topography load_flatgrid 838.046143 640.208191
295 #
296 # Create God
297 #
298 set god_ [create-god 3]
299 #global node setting
300 $ns node-config -adhocRouting DSR \
301                 -llType LL \
302                 -macType Mac/802_11 \
303                 -ifqType Queue/DropTail/PriQueue \
304                 -ifqLen 50 \
305                 -antType Antenna/OmniAntenna \
306                 -propType Propagation/TwoRayGround \
307                 -phyType Phy/WirelessPhy \
308                 -channel [new Channel/WirelessChannel] \
309                 -topoInstance $topography \
310                 -agentTrace ON \
311                 -routerTrace OFF \
```

network.tcl × Untitled Document

```
311                 -routerTrace OFF \
312                 -macTrace ON
313
314 # Create wireless nodes.
315 set node(29) [$ns node]
316 ## node(29) at 678.921448,0.000000
317 $node(29) set X_ 678.921448
318 $node(29) set Y_ 0.000000
319 $node(29) set Z_ 0.0
320 $node(29) color "black"
321 $ns initial_node_pos $node(29) 10.000000
322 set node(30) [$ns node]
323 ## node(30) at 715.948486,0.000000
324 $node(30) set X_ 715.948486
325 $node(30) set Y_ 0.000000
326 $node(30) set Z_ 0.0
327 $node(30) color "black"
328 $ns initial_node_pos $node(30) 10.000000
329 set node(31) [$ns node]
330 ## node(31) at 758.110596,0.000000
331 $node(31) set X_ 758.110596
332 $node(31) set Y_ 0.000000
333 $node(31) set Z_ 0.0
334 $node(31) color "black"
335 $ns initial_node_pos $node(31) 10.000000
336
337 # Create links between nodes.
338 $ns simplex-link $node(42) $node(14) 1.000000Mb 20.000000ms DropTail
339 $ns simplex-link-op $node(42) $node(14) queuePos 0.5
340 $ns simplex-link-op $node(42) $node(14) color black
341 $ns simplex-link-op $node(42) $node(14) orient 306.7deg
342 # Set Queue Properties for link 42->14
343 [[$ns link $node(42) $node(14)] queue] set limit_ 20
344
345 $ns simplex-link $node(42) $node(13) 1.000000Mb 20.000000ms DropTail
346 $ns simplex-link-op $node(42) $node(13) queuePos 0.5
347 $ns simplex-link-op $node(42) $node(13) color black
348 $ns simplex-link-op $node(42) $node(13) orient 195.7deg
349 # Set Queue Properties for link 42->13
350 [[$ns link $node(42) $node(13)] queue] set limit_ 20
351
352 $ns simplex-link $node(41) $node(19) 1.000000Mb 20.000000ms DropTail
353 $ns simplex-link-op $node(41) $node(19) queuePos 0.5
354 $ns simplex-link-op $node(41) $node(19) color black
355 $ns simplex-link-op $node(41) $node(19) orient 31.9deg
356 # Set Queue Properties for link 41->19
357 [[$ns link $node(41) $node(19)] queue] set limit_ 20
358
359 $ns simplex-link $node(41) $node(40) 1.000000Mb 20.000000ms DropTail
360 $ns simplex-link-op $node(41) $node(40) queuePos 0.5
361 $ns simplex-link-op $node(41) $node(40) color black
362 $ns simplex-link-op $node(41) $node(40) orient 206.0deg
363 # Set Queue Properties for link 41->40
```

network.tcl × Untitled Document

```
363 # Set Queue Properties for link 41->40
364 [[$ns link $node(41) $node(40)] queue] set limit_ 20
365
366 $ns simplex-link $node(40) $node(41) 1.000000Mb 20.000000ms DropTail
367 $ns simplex-link-op $node(40) $node(41) queuePos 0.5
368 $ns simplex-link-op $node(40) $node(41) color black
369 $ns simplex-link-op $node(40) $node(41) orient 26.0deg
370 # Set Queue Properties for link 40->41
371 [[$ns link $node(40) $node(41)] queue] set limit_ 20
372
373 $ns simplex-link $node(40) $node(39) 1.000000Mb 20.000000ms DropTail
374 $ns simplex-link-op $node(40) $node(39) queuePos 0.5
375 $ns simplex-link-op $node(40) $node(39) color black
376 $ns simplex-link-op $node(40) $node(39) orient 178.0deg
377 # Set Queue Properties for link 40->39
378 [[$ns link $node(40) $node(39)] queue] set limit_ 20
379
380 $ns simplex-link $node(39) $node(40) 1.000000Mb 20.000000ms DropTail
381 $ns simplex-link-op $node(39) $node(40) queuePos 0.5
382 $ns simplex-link-op $node(39) $node(40) color black
383 $ns simplex-link-op $node(39) $node(40) orient 358.0deg
384 # Set Queue Properties for link 39->40
385 [[$ns link $node(39) $node(40)] queue] set limit_ 20
386
387 $ns simplex-link $node(39) $node(38) 1.000000Mb 20.000000ms DropTail
388 $ns simplex-link-op $node(39) $node(38) queuePos 0.5
389 $ns simplex-link-op $node(39) $node(38) color black
390 $ns simplex-link-op $node(39) $node(38) orient 171.5deg
391 # Set Queue Properties for link 39->38
392 [[$ns link $node(39) $node(38)] queue] set limit_ 20
393
394 $ns simplex-link $node(38) $node(39) 1.000000Mb 20.000000ms DropTail
395 $ns simplex-link-op $node(38) $node(39) queuePos 0.5
396 $ns simplex-link-op $node(38) $node(39) color black
397 $ns simplex-link-op $node(38) $node(39) orient 351.5deg
398 # Set Queue Properties for link 38->39
399 [[$ns link $node(38) $node(39)] queue] set limit_ 20
400
401 $ns simplex-link $node(38) $node(37) 1.000000Mb 20.000000ms DropTail
402 $ns simplex-link-op $node(38) $node(37) queuePos 0.5
403 $ns simplex-link-op $node(38) $node(37) color black
404 $ns simplex-link-op $node(38) $node(37) orient 175.8deg
405 # Set Queue Properties for link 38->37
406 [[$ns link $node(38) $node(37)] queue] set limit_ 20
407
408 $ns simplex-link $node(37) $node(38) 1.000000Mb 20.000000ms DropTail
409 $ns simplex-link-op $node(37) $node(38) queuePos 0.5
410 $ns simplex-link-op $node(37) $node(38) color black
411 $ns simplex-link-op $node(37) $node(38) orient 355.8deg
412 # Set Queue Properties for link 37->38
413 [[$ns link $node(37) $node(38)] queue] set limit_ 20
414
415 $ns simplex-link $node(37) $node(36) 1.000000Mb 20.000000ms DropTail
```

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415 $ns simplex-link $node(37) $node(36) 1.000000Mb 20.000000ms DropTail
416 $ns simplex-link-op $node(37) $node(36) queuePos 0.5
417 $ns simplex-link-op $node(37) $node(36) color black
418 $ns simplex-link-op $node(37) $node(36) orient 170.8deg
419 # Set Queue Properties for link 37->36
420 [[$ns link $node(37) $node(36)] queue] set limit_ 20
421
422 $ns simplex-link $node(36) $node(37) 1.000000Mb 20.000000ms DropTail
423 $ns simplex-link-op $node(36) $node(37) queuePos 0.5
424 $ns simplex-link-op $node(36) $node(37) color black
425 $ns simplex-link-op $node(36) $node(37) orient 350.8deg
426 # Set Queue Properties for link 36->37
427 [[$ns link $node(36) $node(37)] queue] set limit_ 20
428
429 $ns simplex-link $node(36) $node(35) 1.000000Mb 20.000000ms DropTail
430 $ns simplex-link-op $node(36) $node(35) queuePos 0.5
431 $ns simplex-link-op $node(36) $node(35) color black
432 $ns simplex-link-op $node(36) $node(35) orient 169.6deg
433 # Set Queue Properties for link 36->35
434 [[$ns link $node(36) $node(35)] queue] set limit_ 20
435
436 $ns simplex-link $node(35) $node(36) 1.000000Mb 20.000000ms DropTail
437 $ns simplex-link-op $node(35) $node(36) queuePos 0.5
438 $ns simplex-link-op $node(35) $node(36) color black
439 $ns simplex-link-op $node(35) $node(36) orient 349.6deg
440 # Set Queue Properties for link 35->36
441 [[$ns link $node(35) $node(36)] queue] set limit_ 20
442
443 $ns simplex-link $node(35) $node(34) 1.000000Mb 20.000000ms DropTail
444 $ns simplex-link-op $node(35) $node(34) queuePos 0.5
445 $ns simplex-link-op $node(35) $node(34) color black
446 $ns simplex-link-op $node(35) $node(34) orient 166.7deg
447 # Set Queue Properties for link 35->34
448 [[$ns link $node(35) $node(34)] queue] set limit_ 20
449
450 $ns simplex-link $node(34) $node(35) 1.000000Mb 20.000000ms DropTail
451 $ns simplex-link-op $node(34) $node(35) queuePos 0.5
452 $ns simplex-link-op $node(34) $node(35) color black
453 $ns simplex-link-op $node(34) $node(35) orient 346.7deg
454 # Set Queue Properties for link 34->35
455 [[$ns link $node(34) $node(35)] queue] set limit_ 20
456
457 $ns simplex-link $node(34) $node(33) 1.000000Mb 20.000000ms DropTail
458 $ns simplex-link-op $node(34) $node(33) queuePos 0.5
459 $ns simplex-link-op $node(34) $node(33) color black
460 $ns simplex-link-op $node(34) $node(33) orient 173.6deg
461 # Set Queue Properties for link 34->33
462 [[$ns link $node(34) $node(33)] queue] set limit_ 20
463
464 $ns simplex-link $node(33) $node(34) 1.000000Mb 20.000000ms DropTail
465 $ns simplex-link-op $node(33) $node(34) queuePos 0.5
466 $ns simplex-link-op $node(33) $node(34) color black
467 $ns simplex-link-op $node(33) $node(34) orient 353.6deg
```

```
468 # Set Queue Properties for link 33->34
469 [[$ns link $node(33) $node(34)] queue] set limit_ 20
470
471 $ns simplex-link $node(32) $node(19) 1.000000Mb 20.000000ms DropTail
472 $ns simplex-link-op $node(32) $node(19) queuePos 0.5
473 $ns simplex-link-op $node(32) $node(19) color black
474 $ns simplex-link-op $node(32) $node(19) orient 3.3deg
475 # Set Queue Properties for link 32->19
476 [[$ns link $node(32) $node(19)] queue] set limit_ 20
477
478 $ns simplex-link $node(32) $node(28) 1.000000Mb 20.000000ms DropTail
479 $ns simplex-link-op $node(32) $node(28) queuePos 0.5
480 $ns simplex-link-op $node(32) $node(28) color black
481 $ns simplex-link-op $node(32) $node(28) orient 185.2deg
482 # Set Queue Properties for link 32->28
483 [[$ns link $node(32) $node(28)] queue] set limit_ 20
484
485 $ns simplex-link $node(1) $node(2) 1.000000Mb 20.000000ms DropTail
486 $ns simplex-link-op $node(1) $node(2) queuePos 0.5
487 $ns simplex-link-op $node(1) $node(2) color black
488 $ns simplex-link-op $node(1) $node(2) orient 349.3deg
489 # Set Queue Properties for link 1->2
490 [[$ns link $node(1) $node(2)] queue] set limit_ 20
491
492 $ns simplex-link $node(2) $node(1) 1.000000Mb 20.000000ms DropTail
493 $ns simplex-link-op $node(2) $node(1) queuePos 0.5
494 $ns simplex-link-op $node(2) $node(1) color black
495 $ns simplex-link-op $node(2) $node(1) orient 169.3deg
496 # Set Queue Properties for link 2->1
497 [[$ns link $node(2) $node(1)] queue] set limit_ 20
498
499 $ns simplex-link $node(2) $node(3) 1.000000Mb 20.000000ms DropTail
500 $ns simplex-link-op $node(2) $node(3) queuePos 0.5
501 $ns simplex-link-op $node(2) $node(3) color black
502 $ns simplex-link-op $node(2) $node(3) orient 346.7deg
503 # Set Queue Properties for link 2->3
504 [[$ns link $node(2) $node(3)] queue] set limit_ 20
505
506 $ns simplex-link $node(3) $node(2) 1.000000Mb 20.000000ms DropTail
507 $ns simplex-link-op $node(3) $node(2) queuePos 0.5
508 $ns simplex-link-op $node(3) $node(2) color black
509 $ns simplex-link-op $node(3) $node(2) orient 166.7deg
510 # Set Queue Properties for link 3->2
511 [[$ns link $node(3) $node(2)] queue] set limit_ 20
512
513 $ns simplex-link $node(3) $node(4) 1.000000Mb 20.000000ms DropTail
514 $ns simplex-link-op $node(3) $node(4) queuePos 0.5
515 $ns simplex-link-op $node(3) $node(4) color black
516 $ns simplex-link-op $node(3) $node(4) orient 351.6deg
517 # Set Queue Properties for link 3->4
518 [[$ns link $node(3) $node(4)] queue] set limit_ 20
519
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519
520 $ns simplex-link $node(4) $node(3) 1.000000Mb 20.000000ms DropTail
521 $ns simplex-link-op $node(4) $node(3) queuePos 0.5
522 $ns simplex-link-op $node(4) $node(3) color black
523 $ns simplex-link-op $node(4) $node(3) orient 171.6deg
524 # Set Queue Properties for link 4->3
525 [[$ns link $node(4) $node(3)] queue] set limit_ 20
526
527 $ns simplex-link $node(4) $node(5) 1.000000Mb 20.000000ms DropTail
528 $ns simplex-link-op $node(4) $node(5) queuePos 0.5
529 $ns simplex-link-op $node(4) $node(5) color black
530 $ns simplex-link-op $node(4) $node(5) orient 352.9deg
531 # Set Queue Properties for link 4->5
532 [[$ns link $node(4) $node(5)] queue] set limit_ 20
533
534 $ns simplex-link $node(5) $node(4) 1.000000Mb 20.000000ms DropTail
535 $ns simplex-link-op $node(5) $node(4) queuePos 0.5
536 $ns simplex-link-op $node(5) $node(4) color black
537 $ns simplex-link-op $node(5) $node(4) orient 172.9deg
538 # Set Queue Properties for link 5->4
539 [[$ns link $node(5) $node(4)] queue] set limit_ 20
540
541 $ns simplex-link $node(5) $node(6) 1.000000Mb 20.000000ms DropTail
542 $ns simplex-link-op $node(5) $node(6) queuePos 0.5
543 $ns simplex-link-op $node(5) $node(6) color black
544 $ns simplex-link-op $node(5) $node(6) orient 347.4deg
545 # Set Queue Properties for link 5->6
546 [[$ns link $node(5) $node(6)] queue] set limit_ 20
547
548 $ns simplex-link $node(6) $node(5) 1.000000Mb 20.000000ms DropTail
549 $ns simplex-link-op $node(6) $node(5) queuePos 0.5
550 $ns simplex-link-op $node(6) $node(5) color black
551 $ns simplex-link-op $node(6) $node(5) orient 167.4deg
552 # Set Queue Properties for link 6->5
553 [[$ns link $node(6) $node(5)] queue] set limit_ 20
554
555 $ns simplex-link $node(6) $node(7) 1.000000Mb 20.000000ms DropTail
556 $ns simplex-link-op $node(6) $node(7) queuePos 0.5
557 $ns simplex-link-op $node(6) $node(7) color black
558 $ns simplex-link-op $node(6) $node(7) orient 344.5deg
559 # Set Queue Properties for link 6->7
560 [[$ns link $node(6) $node(7)] queue] set limit_ 20
561
562 $ns simplex-link $node(7) $node(6) 1.000000Mb 20.000000ms DropTail
563 $ns simplex-link-op $node(7) $node(6) queuePos 0.5
564 $ns simplex-link-op $node(7) $node(6) color black
565 $ns simplex-link-op $node(7) $node(6) orient 164.5deg
566 # Set Queue Properties for link 7->6
567 [[$ns link $node(7) $node(6)] queue] set limit_ 20
568
569 $ns simplex-link $node(7) $node(8) 1.000000Mb 20.000000ms DropTail
570 $ns simplex-link-op $node(7) $node(8) queuePos 0.5
571 $ns simplex-link-op $node(7) $node(8) color black
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571 $ns simplex-link-op $node(7) $node(8) color black
572 $ns simplex-link-op $node(7) $node(8) orient 346.3deg
573 # Set Queue Properties for link 7->8
574 [[$ns link $node(7) $node(8)] queue] set limit_ 20
575
576 $ns simplex-link $node(8) $node(7) 1.000000Mb 20.000000ms DropTail
577 $ns simplex-link-op $node(8) $node(7) queuePos 0.5
578 $ns simplex-link-op $node(8) $node(7) color black
579 $ns simplex-link-op $node(8) $node(7) orient 166.3deg
580 # Set Queue Properties for link 8->7
581 [[$ns link $node(8) $node(7)] queue] set limit_ 20
582
583 $ns simplex-link $node(8) $node(9) 1.000000Mb 20.000000ms DropTail
584 $ns simplex-link-op $node(8) $node(9) queuePos 0.5
585 $ns simplex-link-op $node(8) $node(9) color black
586 $ns simplex-link-op $node(8) $node(9) orient 345.2deg
587 # Set Queue Properties for link 8->9
588 [[$ns link $node(8) $node(9)] queue] set limit_ 20
589
590 $ns simplex-link $node(9) $node(8) 1.000000Mb 20.000000ms DropTail
591 $ns simplex-link-op $node(9) $node(8) queuePos 0.5
592 $ns simplex-link-op $node(9) $node(8) color black
593 $ns simplex-link-op $node(9) $node(8) orient 165.2deg
594 # Set Queue Properties for link 9->8
595 [[$ns link $node(9) $node(8)] queue] set limit_ 20
596
597 $ns simplex-link $node(9) $node(19) 1.000000Mb 20.000000ms DropTail
598 $ns simplex-link-op $node(9) $node(19) queuePos 0.5
599 $ns simplex-link-op $node(9) $node(19) color black
600 $ns simplex-link-op $node(9) $node(19) orient 324.6deg
601 # Set Queue Properties for link 9->19
602 [[$ns link $node(9) $node(19)] queue] set limit_ 20
603
604 $ns simplex-link $node(10) $node(11) 1.000000Mb 20.000000ms DropTail
605 $ns simplex-link-op $node(10) $node(11) queuePos 0.5
606 $ns simplex-link-op $node(10) $node(11) color black
607 $ns simplex-link-op $node(10) $node(11) orient 353.4deg
608 # Set Queue Properties for link 10->11
609 [[$ns link $node(10) $node(11)] queue] set limit_ 20
610
611 $ns simplex-link $node(11) $node(10) 1.000000Mb 20.000000ms DropTail
612 $ns simplex-link-op $node(11) $node(10) queuePos 0.5
613 $ns simplex-link-op $node(11) $node(10) color black
614 $ns simplex-link-op $node(11) $node(10) orient 173.4deg
615 # Set Queue Properties for link 11->10
616 [[$ns link $node(11) $node(10)] queue] set limit_ 20
617
618 $ns simplex-link $node(11) $node(12) 1.000000Mb 20.000000ms DropTail
619 $ns simplex-link-op $node(11) $node(12) queuePos 0.5
620 $ns simplex-link-op $node(11) $node(12) color black
621 $ns simplex-link-op $node(11) $node(12) orient 346.9deg
622 # Set Queue Properties for link 11->12
623 [[$ns link $node(11) $node(12)] queue] set limit_ 20
```

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624
625 $ns simplex-link $node(12) $node(11) 1.000000Mb 20.000000ms DropTail
626 $ns simplex-link-op $node(12) $node(11) queuePos 0.5
627 $ns simplex-link-op $node(12) $node(11) color black
628 $ns simplex-link-op $node(12) $node(11) orient 166.9deg
629 # Set Queue Properties for link 12->11
630 [[$ns link $node(12) $node(11)] queue] set limit_ 20
631
632 $ns simplex-link $node(12) $node(13) 1.000000Mb 20.000000ms DropTail
633 $ns simplex-link-op $node(12) $node(13) queuePos 0.5
634 $ns simplex-link-op $node(12) $node(13) color black
635 $ns simplex-link-op $node(12) $node(13) orient 344.9deg
636 # Set Queue Properties for link 12->13
637 [[$ns link $node(12) $node(13)] queue] set limit_ 20
638
639 $ns simplex-link $node(13) $node(42) 1.000000Mb 20.000000ms DropTail
640 $ns simplex-link-op $node(13) $node(42) queuePos 0.5
641 $ns simplex-link-op $node(13) $node(42) color black
642 $ns simplex-link-op $node(13) $node(42) orient 15.7deg
643 # Set Queue Properties for link 13->42
644 [[$ns link $node(13) $node(42)] queue] set limit_ 20
645
646 $ns simplex-link $node(13) $node(12) 1.000000Mb 20.000000ms DropTail
647 $ns simplex-link-op $node(13) $node(12) queuePos 0.5
648 $ns simplex-link-op $node(13) $node(12) color black
649 $ns simplex-link-op $node(13) $node(12) orient 164.9deg
650 # Set Queue Properties for link 13->12
651 [[$ns link $node(13) $node(12)] queue] set limit_ 20
652
653 $ns simplex-link $node(13) $node(14) 1.000000Mb 20.000000ms DropTail
654 $ns simplex-link-op $node(13) $node(14) queuePos 0.5
655 $ns simplex-link-op $node(13) $node(14) color black
656 $ns simplex-link-op $node(13) $node(14) orient 345.8deg
657 # Set Queue Properties for link 13->14
658 [[$ns link $node(13) $node(14)] queue] set limit_ 20
659
660 $ns simplex-link $node(14) $node(42) 1.000000Mb 20.000000ms DropTail
661 $ns simplex-link-op $node(14) $node(42) queuePos 0.5
662 $ns simplex-link-op $node(14) $node(42) color black
663 $ns simplex-link-op $node(14) $node(42) orient 126.7deg
664 # Set Queue Properties for link 14->42
665 [[$ns link $node(14) $node(42)] queue] set limit_ 20
666
667 $ns simplex-link $node(14) $node(13) 1.000000Mb 20.000000ms DropTail
668 $ns simplex-link-op $node(14) $node(13) queuePos 0.5
669 $ns simplex-link-op $node(14) $node(13) color black
670 $ns simplex-link-op $node(14) $node(13) orient 165.8deg
671 # Set Queue Properties for link 14->13
672 [[$ns link $node(14) $node(13)] queue] set limit_ 20
673
674 $ns simplex-link $node(14) $node(15) 1.000000Mb 20.000000ms DropTail
675 $ns simplex-link-op $node(14) $node(15) queuePos 0.5
```

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676 $ns simplex-link-op $node(14) $node(15) color black
677 $ns simplex-link-op $node(14) $node(15) orient 345.9deg
678 # Set Queue Properties for link 14->15
679 [[$ns link $node(14) $node(15)] queue] set limit_ 20
680
681 $ns simplex-link $node(15) $node(14) 1.000000Mb 20.000000ms DropTail
682 $ns simplex-link-op $node(15) $node(14) queuePos 0.5
683 $ns simplex-link-op $node(15) $node(14) color black
684 $ns simplex-link-op $node(15) $node(14) orient 165.9deg
685 # Set Queue Properties for link 15->14
686 [[$ns link $node(15) $node(14)] queue] set limit_ 20
687
688 $ns simplex-link $node(15) $node(16) 1.000000Mb 20.000000ms DropTail
689 $ns simplex-link-op $node(15) $node(16) queuePos 0.5
690 $ns simplex-link-op $node(15) $node(16) color black
691 $ns simplex-link-op $node(15) $node(16) orient 345.5deg
692 # Set Queue Properties for link 15->16
693 [[$ns link $node(15) $node(16)] queue] set limit_ 20
694
695 $ns simplex-link $node(16) $node(15) 1.000000Mb 20.000000ms DropTail
696 $ns simplex-link-op $node(16) $node(15) queuePos 0.5
697 $ns simplex-link-op $node(16) $node(15) color black
698 $ns simplex-link-op $node(16) $node(15) orient 165.5deg
699 # Set Queue Properties for link 16->15
700 [[$ns link $node(16) $node(15)] queue] set limit_ 20
701
702 $ns simplex-link $node(16) $node(17) 1.000000Mb 20.000000ms DropTail
703 $ns simplex-link-op $node(16) $node(17) queuePos 0.5
704 $ns simplex-link-op $node(16) $node(17) color black
705 $ns simplex-link-op $node(16) $node(17) orient 349.9deg
706 # Set Queue Properties for link 16->17
707 [[$ns link $node(16) $node(17)] queue] set limit_ 20
708
709 $ns simplex-link $node(17) $node(16) 1.000000Mb 20.000000ms DropTail
710 $ns simplex-link-op $node(17) $node(16) queuePos 0.5
711 $ns simplex-link-op $node(17) $node(16) color black
712 $ns simplex-link-op $node(17) $node(16) orient 169.9deg
713 # Set Queue Properties for link 17->16
714 [[$ns link $node(17) $node(16)] queue] set limit_ 20
715
716 $ns simplex-link $node(17) $node(18) 1.000000Mb 20.000000ms DropTail
717 $ns simplex-link-op $node(17) $node(18) queuePos 0.5
718 $ns simplex-link-op $node(17) $node(18) color black
719 $ns simplex-link-op $node(17) $node(18) orient 359.8deg
720 # Set Queue Properties for link 17->18
721 [[$ns link $node(17) $node(18)] queue] set limit_ 20
722
723 $ns simplex-link $node(18) $node(17) 1.000000Mb 20.000000ms DropTail
724 $ns simplex-link-op $node(18) $node(17) queuePos 0.5
725 $ns simplex-link-op $node(18) $node(17) color black
726 $ns simplex-link-op $node(18) $node(17) orient 179.8deg
727 # Set Queue Properties for link 18->17
```

```
$ns simplex-link $node(18) $node(19) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(18) $node(19) queuePos 0.5
$ns simplex-link-op $node(18) $node(19) color black
$ns simplex-link-op $node(18) $node(19) orient 343.6deg
# Set Queue Properties for link 18->19
[[$ns link $node(18) $node(19)] queue] set limit_ 20

$ns simplex-link $node(19) $node(41) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(19) $node(41) queuePos 0.5
$ns simplex-link-op $node(19) $node(41) color black
$ns simplex-link-op $node(19) $node(41) orient 211.9deg
# Set Queue Properties for link 19->41
[[$ns link $node(19) $node(41)] queue] set limit_ 20

$ns simplex-link $node(19) $node(32) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(19) $node(32) queuePos 0.5
$ns simplex-link-op $node(19) $node(32) color black
$ns simplex-link-op $node(19) $node(32) orient 183.3deg
# Set Queue Properties for link 19->32
[[$ns link $node(19) $node(32)] queue] set limit_ 20

$ns simplex-link $node(19) $node(18) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(19) $node(18) queuePos 0.5
$ns simplex-link-op $node(19) $node(18) color black
$ns simplex-link-op $node(19) $node(18) orient 163.6deg
# Set Queue Properties for link 19->18
[[$ns link $node(19) $node(18)] queue] set limit_ 20

$ns simplex-link $node(19) $node(20) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(19) $node(20) queuePos 0.5
$ns simplex-link-op $node(19) $node(20) color black
$ns simplex-link-op $node(19) $node(20) orient 358.2deg
# Set Queue Properties for link 19->20
[[$ns link $node(19) $node(20)] queue] set limit_ 20

$ns simplex-link $node(19) $node(9) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(19) $node(9) queuePos 0.5
$ns simplex-link-op $node(19) $node(9) color black
$ns simplex-link-op $node(19) $node(9) orient 144.6deg
# Set Queue Properties for link 19->9
[[$ns link $node(19) $node(9)] queue] set limit_ 20

$ns simplex-link $node(20) $node(19) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(20) $node(19) queuePos 0.5
$ns simplex-link-op $node(20) $node(19) color black
$ns simplex-link-op $node(20) $node(19) orient 178.2deg
# Set Queue Properties for link 20->19
[[$ns link $node(20) $node(19)] queue] set limit_ 20

$ns simplex-link $node(21) $node(22) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(21) $node(22) queuePos 0.5
$ns simplex-link-op $node(21) $node(22) color black
```

```
$ns simplex-link-op $node(22) $node(21) orient 161.1deg
# Set Queue Properties for link 22->21
[[$ns link $node(22) $node(21)] queue] set limit_ 20

$ns simplex-link $node(22) $node(23) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(22) $node(23) queuePos 0.5
$ns simplex-link-op $node(22) $node(23) color black
$ns simplex-link-op $node(22) $node(23) orient 350.5deg
# Set Queue Properties for link 22->23
[[$ns link $node(22) $node(23)] queue] set limit_ 20

$ns simplex-link $node(23) $node(22) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(23) $node(22) queuePos 0.5
$ns simplex-link-op $node(23) $node(22) color black
$ns simplex-link-op $node(23) $node(22) orient 170.5deg
# Set Queue Properties for link 23->22
[[$ns link $node(23) $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) $node(24) orient 346.4deg
# Set Queue Properties for link 23->24
[[$ns link $node(23) $node(24)] 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) $node(23) orient 166.4deg
# Set Queue Properties for link 24->23
[[$ns link $node(24) $node(23)] 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) $node(25) orient 349.6deg
# Set Queue Properties for link 24->25
[[$ns link $node(24) $node(25)] 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) $node(24) orient 169.6deg
# Set Queue Properties for link 25->24
[[$ns link $node(25) $node(24)] 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) $node(26) orient 350.0deg
# Set Queue Properties for link 25->26
[[$ns link $node(25) $node(26)] queue] set limit_ 20

```

```
# Set Queue Properties for link 26->27
[[$ns link $node(26) $node(27)] queue] set limit_ 20

$ns simplex-link $node(27) $node(26) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(27) $node(26) queuePos 0.5
$ns simplex-link-op $node(27) $node(26) color black
$ns simplex-link-op $node(27) $node(26) orient 173.9deg
# Set Queue Properties for link 27->26
[[$ns link $node(27) $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) $node(28) orient 357.2deg
# Set Queue Properties for link 27->28
[[$ns link $node(27) $node(28)] queue] set limit_ 20

$ns simplex-link $node(28) $node(32) 1.000000Mb 20.000000ms DropTail
$ns simplex-link-op $node(28) $node(32) queuePos 0.5
$ns simplex-link-op $node(28) $node(32) color black
$ns simplex-link-op $node(28) $node(32) orient 5.2deg
# Set Queue Properties for link 28->32
[[$ns link $node(28) $node(32)] 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) $node(27) orient 177.2deg
# Set Queue Properties for link 28->27
[[$ns link $node(28) $node(27)] queue] set limit_ 20

# Add Link Loss Models

# Create agents.
set agent(6) [new Agent/TCP]
$ns attach-agent $node(33) $agent(6)

# Create traffic sources and add them to the agent.
set traffic_source(5) [new Application/FTP]
$traffic_source(5) attach-agent $agent(6)
$traffic_source(5) set maxpkts_ 256
set traffic_source(34) [new Application/FTP]
$traffic_source(34) attach-agent $agent(6)
$traffic_source(34) set maxpkts_ 256
set agent(1) [new Agent/TCP]
$ns attach-agent $node(1) $agent(1)

$ns color 1 "black"
$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
```

```
$ns attach-agent $node(10) $agent(3)

$ns color 3 "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(2) [new Application/FTP]
$traffic_source(2) attach-agent $agent(3)
$traffic_source(2) set maxpkts_ 256
set agent(10) [new Agent/TCPSink]
$ns attach-agent $node(19) $agent(10)
set agent(9) [new Agent/TCPSink]
$ns attach-agent $node(19) $agent(9)
set agent(8) [new Agent/TCPSink]
$ns attach-agent $node(19) $agent(8)
set agent(21) [new Agent/TCPSink]
$ns attach-agent $node(20) $agent(21)
set agent(2) [new Agent/TCPSink]
$ns attach-agent $node(20) $agent(2)
$agent(2) set packetSize_ 210
set agent(4) [new Agent/TCPSink]
$ns attach-agent $node(20) $agent(4)
$agent(4) set packetSize_ 210
set agent(11) [new Agent/TCPSink]
$ns attach-agent $node(20) $agent(11)
set agent(7) [new Agent/TCP]
$ns attach-agent $node(21) $agent(7)
set agent(5) [new Agent/TCP]
$ns attach-agent $node(21) $agent(5)

# Create traffic sources and add them to the agent.
set traffic_source(4) [new Application/FTP]
$traffic_source(4) attach-agent $agent(5)
$traffic_source(4) set maxpkts_ 256
set traffic_source(17) [new Application/FTP]
$traffic_source(17) attach-agent $agent(5)
$traffic_source(17) set maxpkts_ 256
set traffic_source(18) [new Application/FTP]
$traffic_source(18) attach-agent $agent(5)
$traffic_source(18) set maxpkts_ 256
set traffic_source(19) [new Application/FTP]
$traffic_source(19) attach-agent $agent(5)
$traffic_source(19) set maxpkts_ 256

# Connect agents.
$ns connect $agent(1) $agent(2)


# Traffic Source actions.
```

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

$ns connect $agent(3) $agent(4)


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

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

7.Output Topology of NS2:

By using the executed command to go the simulation window and to get the simulation results successfully.

Here ,4 different types of IP-address are used to making this network simulator.

Bellow this figure, this is the starting point of network simulator.

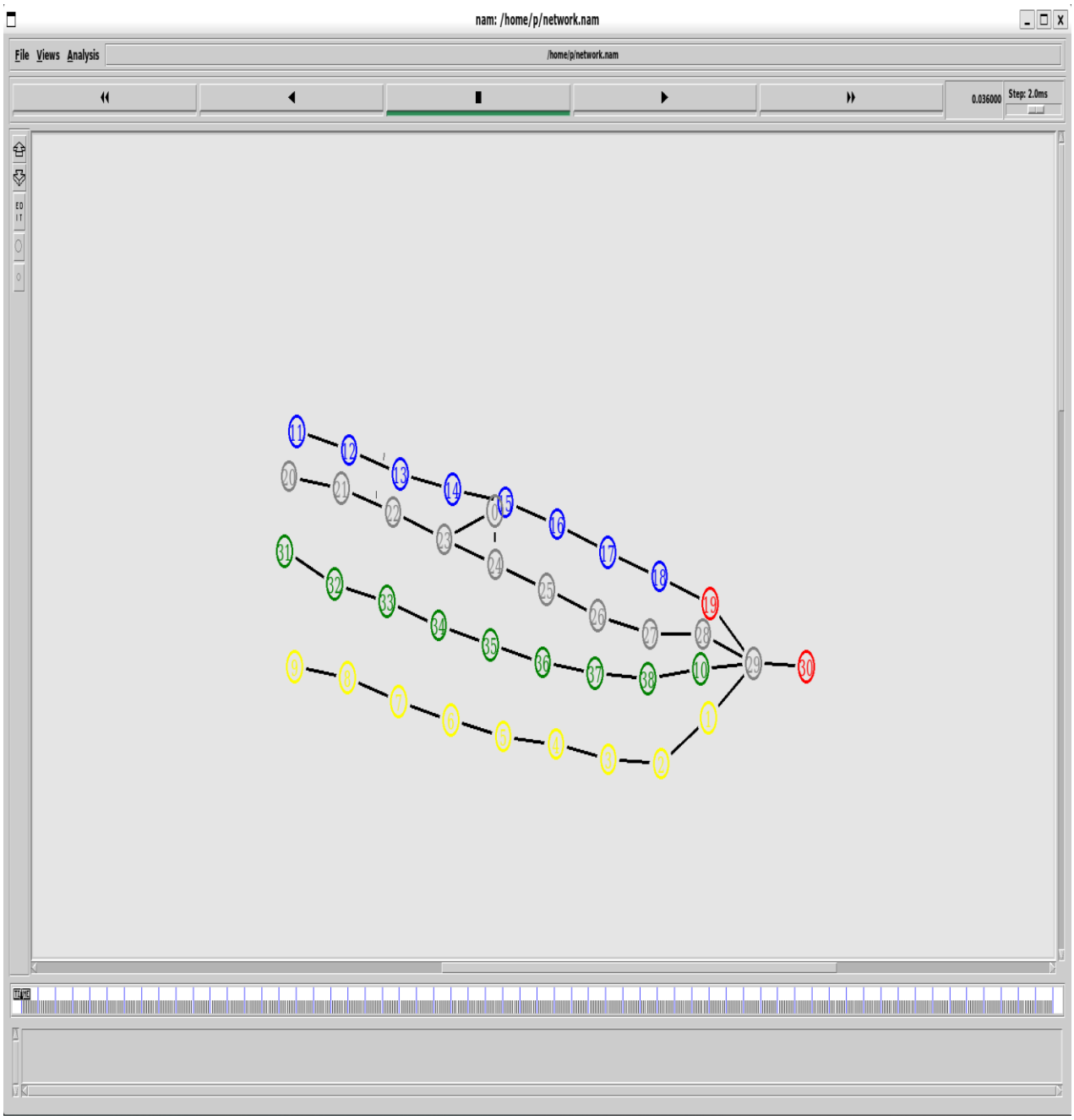

Fig 16: First Output of NS2

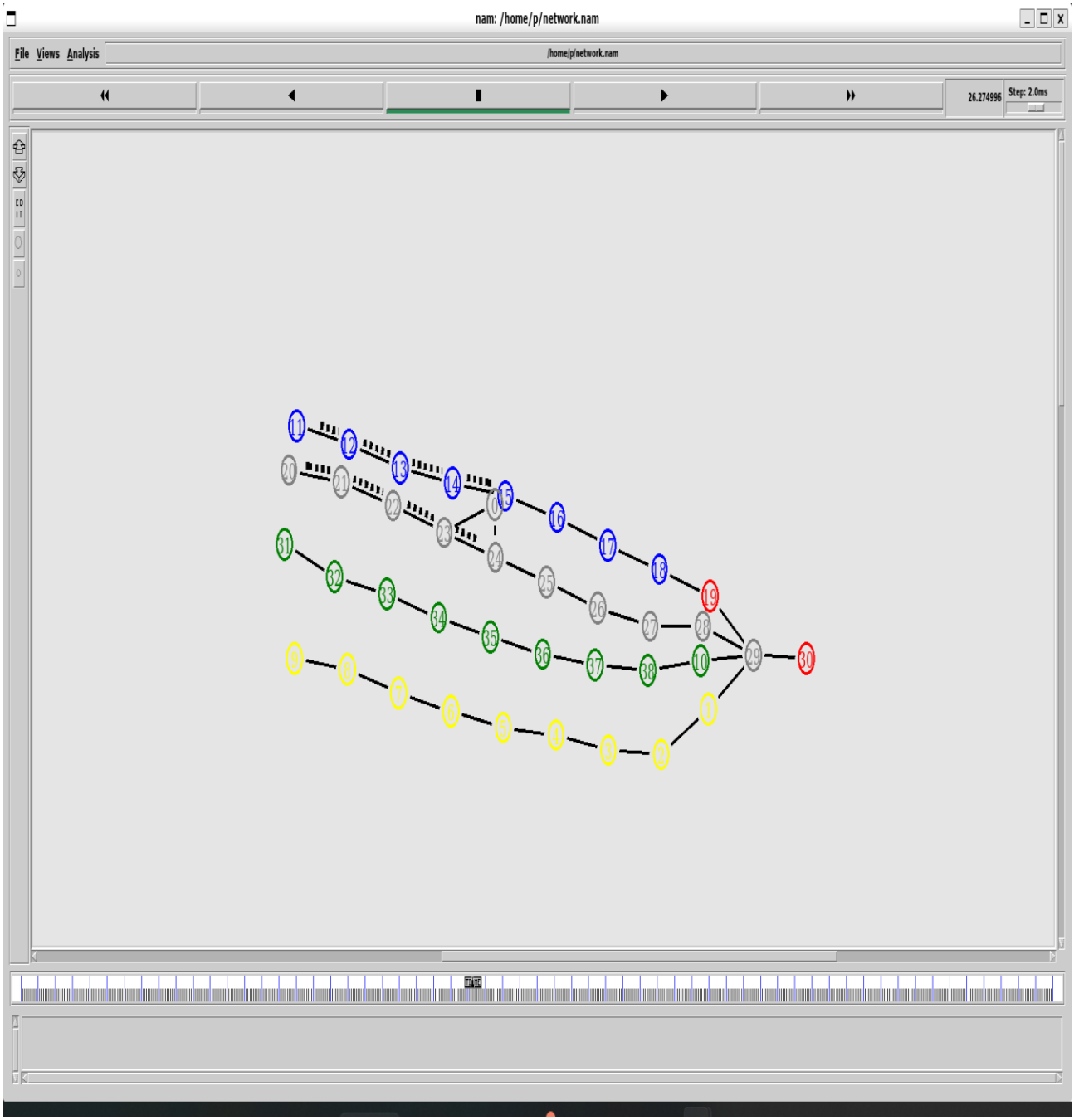

Fig 17: Second output of NS2

In this figure, it is shown the middle position of this network simulation.The simulations were going to the target IP-address by these nodes.

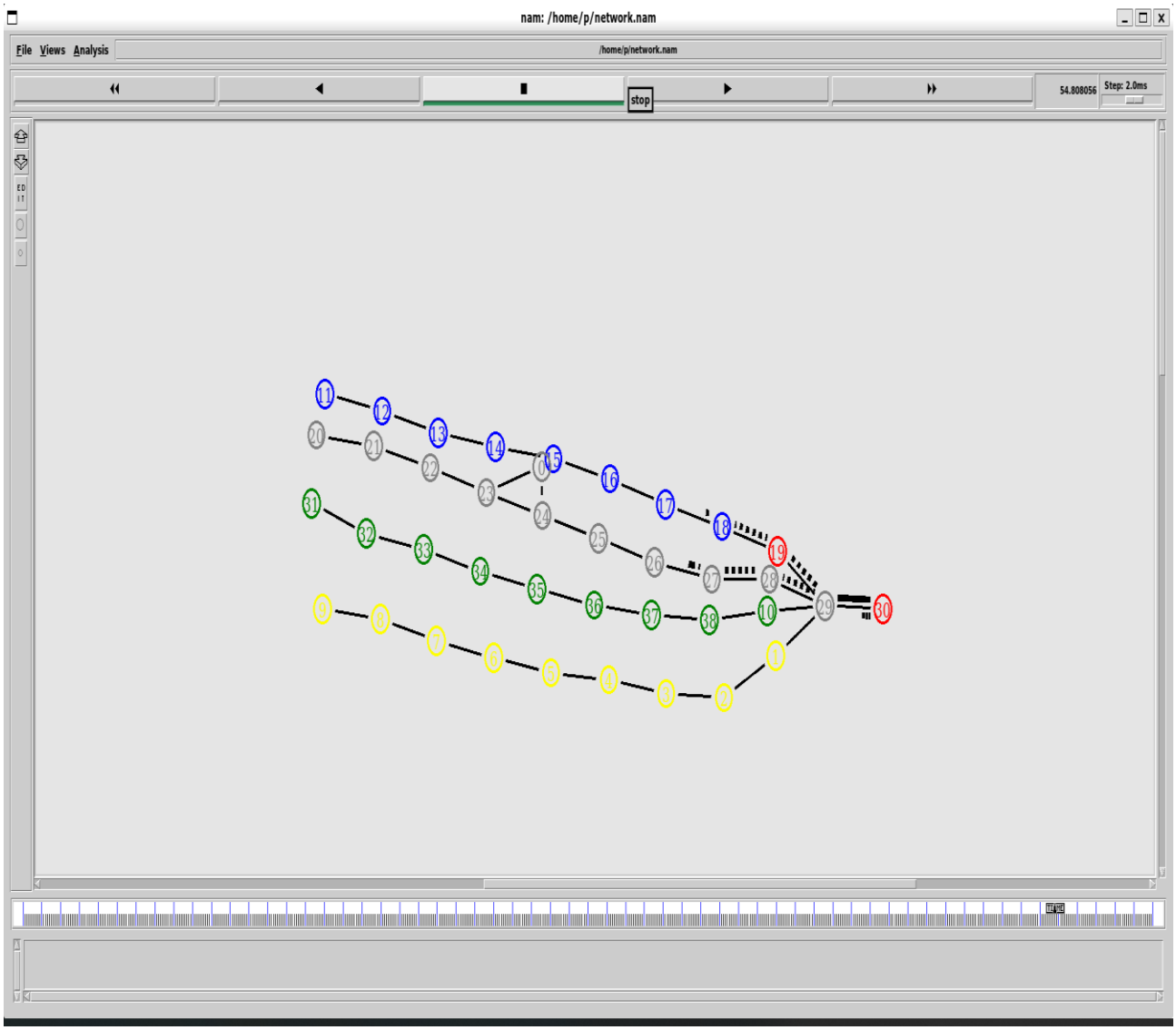

Fig 18: Third output of NS2

This is the last position of network simulations. The simulations were going to the target IP-address and want go back to the previous IP-address after reached the target IP-address/nodes.

The last nodes 29 or 30 is the receiver nodes/target nodes in this figure.

8.Summarization of the Designed network

Zenmap lets us 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 we scanned www.instagram.com using all 4 different networks we found our desired topology design.

After completing the scan and collecting all the IP addresses from the 4 different networks we stored them in a excel sheet named final excel sheet. Then we organized them into a excel tracert.

Then we used the source code and the IP addresses in NS2 softwere to and got the output.

9.Conclusion:

We first of all learnt a lot about NS2 and wireless scenarios in NS2 and it is also a good experience to work on ubuntu. The main learning of our projects the practical understanding of Networking Simulator.

The goal of NS2 is to support networking research and education. It is suitable for designing new protocols, comparing different protocols and traffic evaluations. NS2 is developed as a collaborative environment.

10.Reference

[1] https://www.sciencedirect.com/topics/computer-science/network-simulator

[2] https://storage.googleapis.com/plos-corpus-prod/10.1371/journal.pone.0138932/1/pone.0138932.s001.pdf?X-Goog-Algorithm=GOOG4-RSA-SHA256&X-Goog-Credential=wombat-sa%40plos-prod.iam.gserviceaccount.com%2F20221221%2Fauto%2Fstorage%2Fgoog4_request&X-Goog-Date=20221221T165853Z&X-Goog-Expires=86400&X-Goog-SignedHeaders=host&X-Goog-Signature=5395a24c8a8b960924a017fc0fd0cf193bd665bdf456be02d2b685d8d08e3fd48f9fa6660526579eb3d67aaa912f34fd32eef459ff45042275beb861def934fab04eca30df5372d2288cc4d7206f59702619b810e78fc6e7daf8d693587bfb7fa3c12eb70af816504dcd3e5ad74c247df581dff36a856c65b360638cb183662fd11beb20ca91c2b0e04b340275e7324699ac6eb058e92eea89525baeed45dbed90ba7e078006a279921f1c76694d04749202731b2b0ee205b1403ac28941362f41430cab734ac213e8b51260d089ae5caa35fea8fffabe3400cf512024948814d0be02e522b71701033a6e94f10bcd3c23b5923590250d2ac52fce4796478c87