



NATIONAL UNIVERSITY OF SCIENCES AND TECHNOLOGY

School of Electrical Engineering and Computer Sciences

COMPUTER NETWORKS (EE353)

Assignment 3

Project Scenario 4

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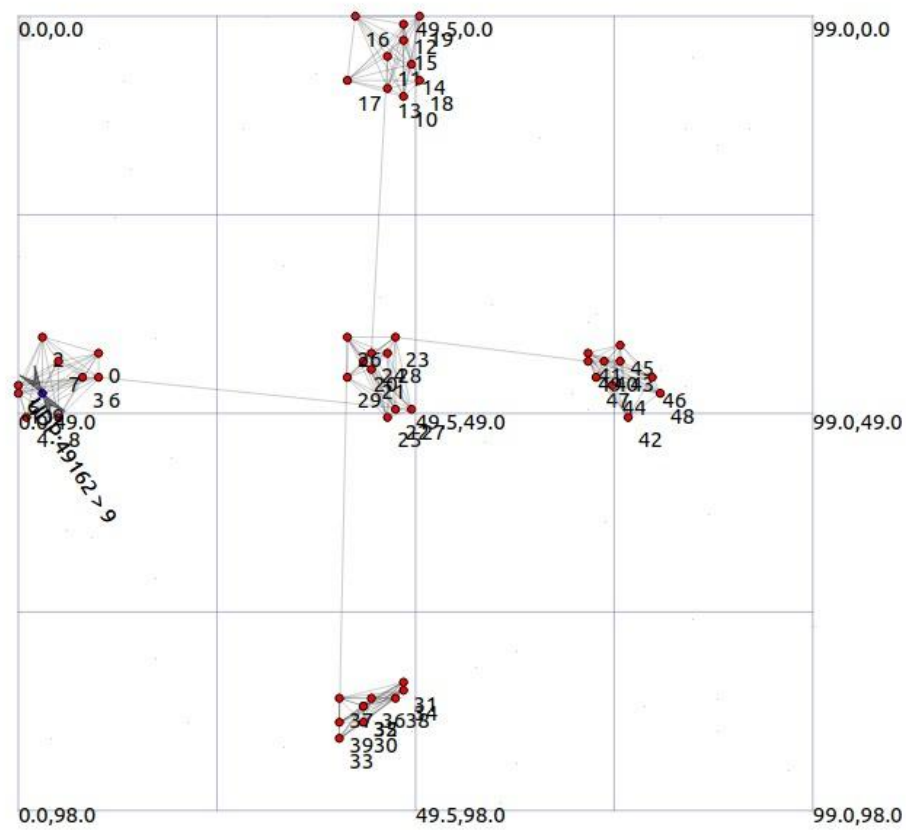
Scenario 4: Repeat scenario 2 and consider link cost as bandwidth.

Question: Considering your project scenario, find the best route only among all routes.

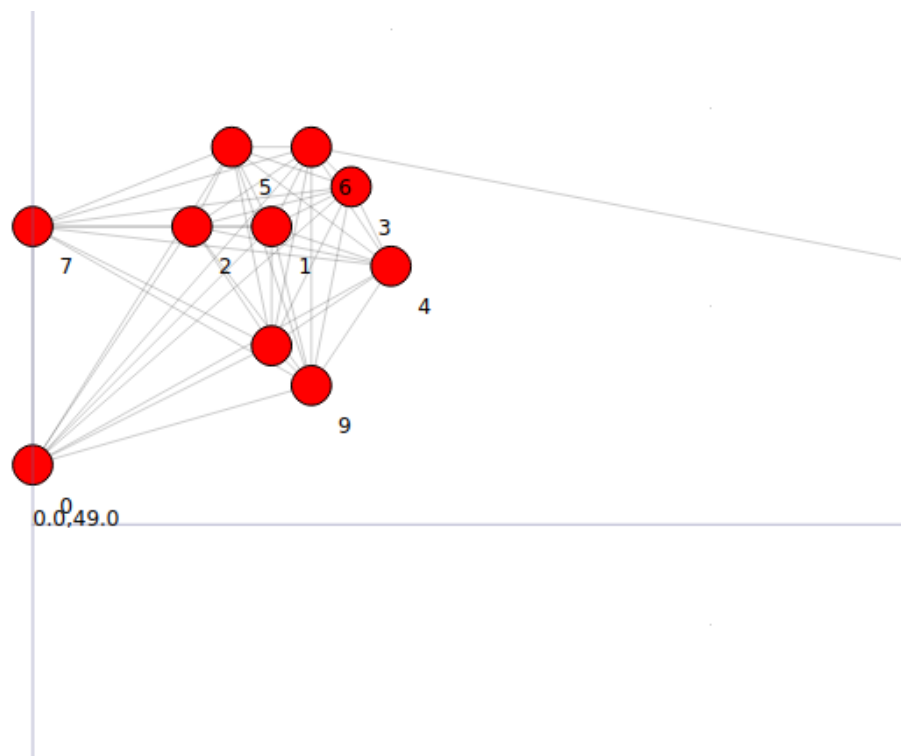
- i) Network figure: specify nodes with a clear cost (8 marks). Highlight source and destination nodes. In the case of AS, mention ASs, gateway nodes, etc. (2+2 marks) (12 marks)**

Network Topology:

In this network topology, a total of 50 nodes are organized into five autonomous systems (AS), each representing a distinct administrative domain. The AS division ranges from AS 0 to AS 4, with nodes grouped accordingly (AS 0: 0-9, AS 1: 10-19, AS 2: 20-29, AS 3: 30-39, AS 4: 40-49). Within each AS, a gateway node is established and connected to the source node (Node 0), serving as the entry point for communication within its respective AS. Nodes within an AS are interconnected through point-to-point links, forming a mesh-like structure. These links are assigned random bandwidth values between 50 and 250 Mbps. To optimize communication within each AS, Dijkstra's algorithm is employed for routing, calculating the shortest paths. The overall optimal path from the source node (Node 0) to the destination node (Node 47) is determined by combining the optimal paths within each AS. The NetAnim module visualizes this complex network topology, aiding in a clearer understanding of the AS divisions and interconnections.



AS1 (Nodes 0-9):



Gateway Node: Node 6

Links within the AS based on bandwidth:

Assigning Links for Node 0:

- Link between nodes 0 and 6 configured with bandwidth: 126.732 Mbps
- Link between nodes 0 and 1 configured with bandwidth: 193.453 Mbps
- Link between nodes 0 and 2 configured with bandwidth: 114.132 Mbps
- Link between nodes 0 and 3 configured with bandwidth: 219.369 Mbps
- Link between nodes 0 and 4 configured with bandwidth: 141.815 Mbps
- Link between nodes 0 and 5 configured with bandwidth: 159.862 Mbps
- Link between nodes 0 and 6 configured with bandwidth: 136.592 Mbps
- Link between nodes 0 and 7 configured with bandwidth: 203.532 Mbps
- Link between nodes 0 and 8 configured with bandwidth: 198.997 Mbps
- Link between nodes 0 and 9 configured with bandwidth: 149.783 Mbps

Assigning Links for Node 1:

- Link between nodes 1 and 6 configured with bandwidth: 112.64 Mbps
- Link between nodes 1 and 0 configured with bandwidth: 223.181 Mbps
- Link between nodes 1 and 2 configured with bandwidth: 174.457 Mbps
- Link between nodes 1 and 3 configured with bandwidth: 97.3176 Mbps
- Link between nodes 1 and 4 configured with bandwidth: 100.802 Mbps
- Link between nodes 1 and 5 configured with bandwidth: 63.1862 Mbps
- Link between nodes 1 and 6 configured with bandwidth: 185.093 Mbps
- Link between nodes 1 and 7 configured with bandwidth: 104.027 Mbps
- Link between nodes 1 and 8 configured with bandwidth: 168.31 Mbps
- Link between nodes 1 and 9 configured with bandwidth: 202.865 Mbps

Assigning Links for Node 2:

- Link between nodes 2 and 6 configured with bandwidth: 73.4407 Mbps
- Link between nodes 2 and 0 configured with bandwidth: 153.716 Mbps
- Link between nodes 2 and 1 configured with bandwidth: 139.876 Mbps
- Link between nodes 2 and 3 configured with bandwidth: 230.892 Mbps
- Link between nodes 2 and 4 configured with bandwidth: 198.688 Mbps
- Link between nodes 2 and 5 configured with bandwidth: 177.394 Mbps
- Link between nodes 2 and 6 configured with bandwidth: 96.4119 Mbps
- Link between nodes 2 and 7 configured with bandwidth: 76.8636 Mbps
- Link between nodes 2 and 8 configured with bandwidth: 82.4372 Mbps
- Link between nodes 2 and 9 configured with bandwidth: 82.5543 Mbps

Assigning Links for Node 3:

- Link between nodes 3 and 6 configured with bandwidth: 80.9098 Mbps
- Link between nodes 3 and 0 configured with bandwidth: 80.2449 Mbps
- Link between nodes 3 and 1 configured with bandwidth: 50.3351 Mbps
- Link between nodes 3 and 2 configured with bandwidth: 178.038 Mbps
- Link between nodes 3 and 4 configured with bandwidth: 219.835 Mbps
- Link between nodes 3 and 5 configured with bandwidth: 161.914 Mbps
- Link between nodes 3 and 6 configured with bandwidth: 199.333 Mbps
- Link between nodes 3 and 7 configured with bandwidth: 219.203 Mbps
- Link between nodes 3 and 8 configured with bandwidth: 58.4708 Mbps
- Link between nodes 3 and 9 configured with bandwidth: 134.292 Mbps

Assigning Links for Node 4:

- Link between nodes 4 and 6 configured with bandwidth: 87.0067 Mbps
- Link between nodes 4 and 0 configured with bandwidth: 202.703 Mbps
- Link between nodes 4 and 1 configured with bandwidth: 221.738 Mbps
- Link between nodes 4 and 2 configured with bandwidth: 166.87 Mbps
- Link between nodes 4 and 3 configured with bandwidth: 139.808 Mbps
- Link between nodes 4 and 5 configured with bandwidth: 142.768 Mbps
- Link between nodes 4 and 6 configured with bandwidth: 142.835 Mbps
- Link between nodes 4 and 7 configured with bandwidth: 115.858 Mbps
- Link between nodes 4 and 8 configured with bandwidth: 63.1228 Mbps
- Link between nodes 4 and 9 configured with bandwidth: 139.801 Mbps

Assigning Links for Node 5

- Link between nodes 5 and 6 configured with bandwidth: 200.166 Mbps
- Link between nodes 5 and 0 configured with bandwidth: 55.6165 Mbps
- Link between nodes 5 and 1 configured with bandwidth: 61.1512 Mbps
- Link between nodes 5 and 2 configured with bandwidth: 123.239 Mbps
- Link between nodes 5 and 3 configured with bandwidth: 245.271 Mbps
- Link between nodes 5 and 4 configured with bandwidth: 121.884 Mbps
- Link between nodes 5 and 6 configured with bandwidth: 216.822 Mbps
- Link between nodes 5 and 7 configured with bandwidth: 105.639 Mbps
- Link between nodes 5 and 8 configured with bandwidth: 92.267 Mbps
- Link between nodes 5 and 9 configured with bandwidth: 116.798 Mbps

Assigning Links for Node 6:

- Link between nodes 6 and 6 configured with bandwidth: 119.005 Mbps
- Link between nodes 6 and 0 configured with bandwidth: 165.216 Mbps
- Link between nodes 6 and 1 configured with bandwidth: 161.079 Mbps
- Link between nodes 6 and 2 configured with bandwidth: 193.42 Mbps
- Link between nodes 6 and 3 configured with bandwidth: 167.62 Mbps

- Link between nodes 6 and 4 configured with bandwidth: 117.09 Mbps
- Link between nodes 6 and 5 configured with bandwidth: 68.6485 Mbps
- Link between nodes 6 and 7 configured with bandwidth: 212.776 Mbps
- Link between nodes 6 and 8 configured with bandwidth: 84.4875 Mbps
- Link between nodes 6 and 9 configured with bandwidth: 71.8218 Mbps

Assigning Links for Node 7:

- Link between nodes 7 and 6 configured with bandwidth: 192.896 Mbps
- Link between nodes 7 and 0 configured with bandwidth: 178.721 Mbps
- Link between nodes 7 and 1 configured with bandwidth: 205.725 Mbps
- Link between nodes 7 and 2 configured with bandwidth: 152.869 Mbps
- Link between nodes 7 and 3 configured with bandwidth: 148.376 Mbps
- Link between nodes 7 and 4 configured with bandwidth: 232.53 Mbps
- Link between nodes 7 and 5 configured with bandwidth: 244.662 Mbps
- Link between nodes 7 and 6 configured with bandwidth: 197.84 Mbps
- Link between nodes 7 and 8 configured with bandwidth: 242.387 Mbps
- Link between nodes 7 and 9 configured with bandwidth: 216.938 Mbps

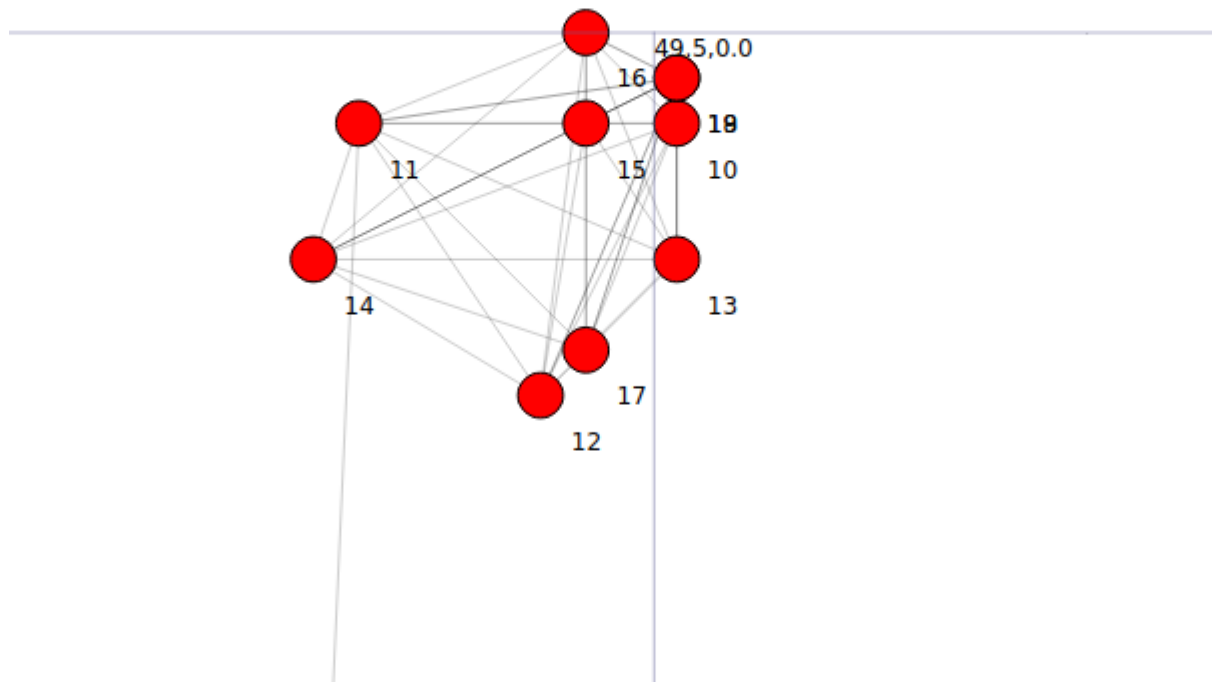
Assigning Links for Node 8:

- Link between nodes 8 and 6 configured with bandwidth: 118.587 Mbps
- Link between nodes 8 and 0 configured with bandwidth: 89.1051 Mbps
- Link between nodes 8 and 1 configured with bandwidth: 51.7739 Mbps
- Link between nodes 8 and 2 configured with bandwidth: 216.019 Mbps
- Link between nodes 8 and 3 configured with bandwidth: 243.65 Mbps
- Link between nodes 8 and 4 configured with bandwidth: 199.594 Mbps
- Link between nodes 8 and 5 configured with bandwidth: 119.324 Mbps
- Link between nodes 8 and 6 configured with bandwidth: 143.165 Mbps
- Link between nodes 8 and 7 configured with bandwidth: 204.309 Mbps
- Link between nodes 8 and 9 configured with bandwidth: 51.1488 Mbps

Assigning Links for Node 9:

- Link between nodes 9 and 6 configured with bandwidth: 79.1467 Mbps
- Link between nodes 9 and 0 configured with bandwidth: 228.097 Mbps
- Link between nodes 9 and 1 configured with bandwidth: 160.872 Mbps
- Link between nodes 9 and 2 configured with bandwidth: 191.694 Mbps
- Link between nodes 9 and 3 configured with bandwidth: 163.052 Mbps
- Link between nodes 9 and 4 configured with bandwidth: 131.729 Mbps
- Link between nodes 9 and 5 configured with bandwidth: 124.727 Mbps
- Link between nodes 9 and 6 configured with bandwidth: 134.466 Mbps
- Link between nodes 9 and 7 configured with bandwidth: 205.696 Mbps
- Link between nodes 9 and 8 configured with bandwidth: 132.716 Mbps

AS2 (Nodes 10-19):



Gateway Node: Node 11

Links within the AS based on bandwidth:

Assigning links for Node 10:

- Link between nodes 10 and 11 configured with bandwidth: 206.595 Mbps
- Link between nodes 10 and 12 configured with bandwidth: 74.2061 Mbps
- Link between nodes 10 and 13 configured with bandwidth: 93.6957 Mbps
- Link between nodes 10 and 14 configured with bandwidth: 64.6193 Mbps
- Link between nodes 10 and 15 configured with bandwidth: 188.213 Mbps
- Link between nodes 10 and 16 configured with bandwidth: 61.2315 Mbps
- Link between nodes 10 and 17 configured with bandwidth: 79.0872 Mbps
- Link between nodes 10 and 18 configured with bandwidth: 95.2206 Mbps
- Link between nodes 10 and 19 configured with bandwidth: 144.204 Mbps
- Link between nodes 10 and 19 configured with bandwidth: 222.27 Mbps

Assigning links for Node 11:

- Link between nodes 11 and 11 configured with bandwidth: 203.69 Mbps
- Link between nodes 11 and 10 configured with bandwidth: 108.197 Mbps
- Link between nodes 11 and 12 configured with bandwidth: 145.589 Mbps
- Link between nodes 11 and 13 configured with bandwidth: 159.843 Mbps
- Link between nodes 11 and 14 configured with bandwidth: 115.4 Mbps
- Link between nodes 11 and 15 configured with bandwidth: 145.509 Mbps
- Link between nodes 11 and 16 configured with bandwidth: 241.912 Mbps
- Link between nodes 11 and 17 configured with bandwidth: 78.6488 Mbps
- Link between nodes 11 and 18 configured with bandwidth: 81.7796 Mbps
- Link between nodes 11 and 19 configured with bandwidth: 60.9325 Mbps

Assigning links for Node 12:

- Link between nodes 12 and 11 configured with bandwidth: 194.54 Mbps
- Link between nodes 12 and 10 configured with bandwidth: 118.064 Mbps
- Link between nodes 12 and 11 configured with bandwidth: 234.885 Mbps
- Link between nodes 12 and 13 configured with bandwidth: 120.744 Mbps
- Link between nodes 12 and 14 configured with bandwidth: 222.672 Mbps
- Link between nodes 12 and 15 configured with bandwidth: 170.845 Mbps
- Link between nodes 12 and 16 configured with bandwidth: 221.221 Mbps
- Link between nodes 12 and 17 configured with bandwidth: 140.515 Mbps
- Link between nodes 12 and 18 configured with bandwidth: 114.645 Mbps
- Link between nodes 12 and 19 configured with bandwidth: 203.333 Mbps

Assigning links for Node 13:

- Link between nodes 13 and 11 configured with bandwidth: 208.001 Mbps
- Link between nodes 13 and 10 configured with bandwidth: 71.463 Mbps
- Link between nodes 13 and 11 configured with bandwidth: 79.2906 Mbps
- Link between nodes 13 and 12 configured with bandwidth: 225.316 Mbps
- Link between nodes 13 and 14 configured with bandwidth: 247.386 Mbps
- Link between nodes 13 and 15 configured with bandwidth: 58.6969 Mbps
- Link between nodes 13 and 16 configured with bandwidth: 244.045 Mbps
- Link between nodes 13 and 17 configured with bandwidth: 60.0678 Mbps
- Link between nodes 13 and 18 configured with bandwidth: 218.841 Mbps
- Link between nodes 13 and 19 configured with bandwidth: 99.3066 Mbps

Assigning links for Node 14:

- Link between nodes 14 and 11 configured with bandwidth: 76.2116 Mbps
- Link between nodes 14 and 10 configured with bandwidth: 101.577 Mbps
- Link between nodes 14 and 11 configured with bandwidth: 150.368 Mbps
- Link between nodes 14 and 12 configured with bandwidth: 166.987 Mbps
- Link between nodes 14 and 13 configured with bandwidth: 175.088 Mbps

- Link between nodes 14 and 15 configured with bandwidth: 223.39 Mbps
- Link between nodes 14 and 16 configured with bandwidth: 86.1347 Mbps
- Link between nodes 14 and 17 configured with bandwidth: 73.3477 Mbps
- Link between nodes 14 and 18 configured with bandwidth: 135.385 Mbps
- Link between nodes 14 and 19 configured with bandwidth: 190.969 Mbps

Assigning links for Node 15:

- Link between nodes 15 and 11 configured with bandwidth: 178.967 Mbps
- Link between nodes 15 and 10 configured with bandwidth: 93.5107 Mbps
- Link between nodes 15 and 11 configured with bandwidth: 236.27 Mbps
- Link between nodes 15 and 12 configured with bandwidth: 112.778 Mbps
- Link between nodes 15 and 13 configured with bandwidth: 145.594 Mbps
- Link between nodes 15 and 14 configured with bandwidth: 141.531 Mbps
- Link between nodes 15 and 16 configured with bandwidth: 148.38 Mbps
- Link between nodes 15 and 17 configured with bandwidth: 88.3438 Mbps
- Link between nodes 15 and 18 configured with bandwidth: 128.936 Mbps
- Link between nodes 15 and 19 configured with bandwidth: 121.406 Mbps

Assigning links for Node 16:

- Link between nodes 16 and 11 configured with bandwidth: 168.517 Mbps
- Link between nodes 16 and 10 configured with bandwidth: 214.316 Mbps
- Link between nodes 16 and 11 configured with bandwidth: 193.839 Mbps
- Link between nodes 16 and 12 configured with bandwidth: 70.1898 Mbps
- Link between nodes 16 and 13 configured with bandwidth: 84.7794 Mbps
- Link between nodes 16 and 14 configured with bandwidth: 150.439 Mbps
- Link between nodes 16 and 15 configured with bandwidth: 134.909 Mbps
- Link between nodes 16 and 17 configured with bandwidth: 123.158 Mbps
- Link between nodes 16 and 18 configured with bandwidth: 87.535 Mbps
- Link between nodes 16 and 19 configured with bandwidth: 236.425 Mbps

Assigning links for Node 17:

- Link between nodes 17 and 11 configured with bandwidth: 164.253 Mbps
- Link between nodes 17 and 10 configured with bandwidth: 123.003 Mbps
- Link between nodes 17 and 11 configured with bandwidth: 243.414 Mbps
- Link between nodes 17 and 12 configured with bandwidth: 161.02 Mbps
- Link between nodes 17 and 13 configured with bandwidth: 225.723 Mbps
- Link between nodes 17 and 14 configured with bandwidth: 53.0141 Mbps
- Link between nodes 17 and 15 configured with bandwidth: 83.3286 Mbps
- Link between nodes 17 and 16 configured with bandwidth: 60.6031 Mbps
- Link between nodes 17 and 18 configured with bandwidth: 125.073 Mbps
- Link between nodes 17 and 19 configured with bandwidth: 122.267 Mbps

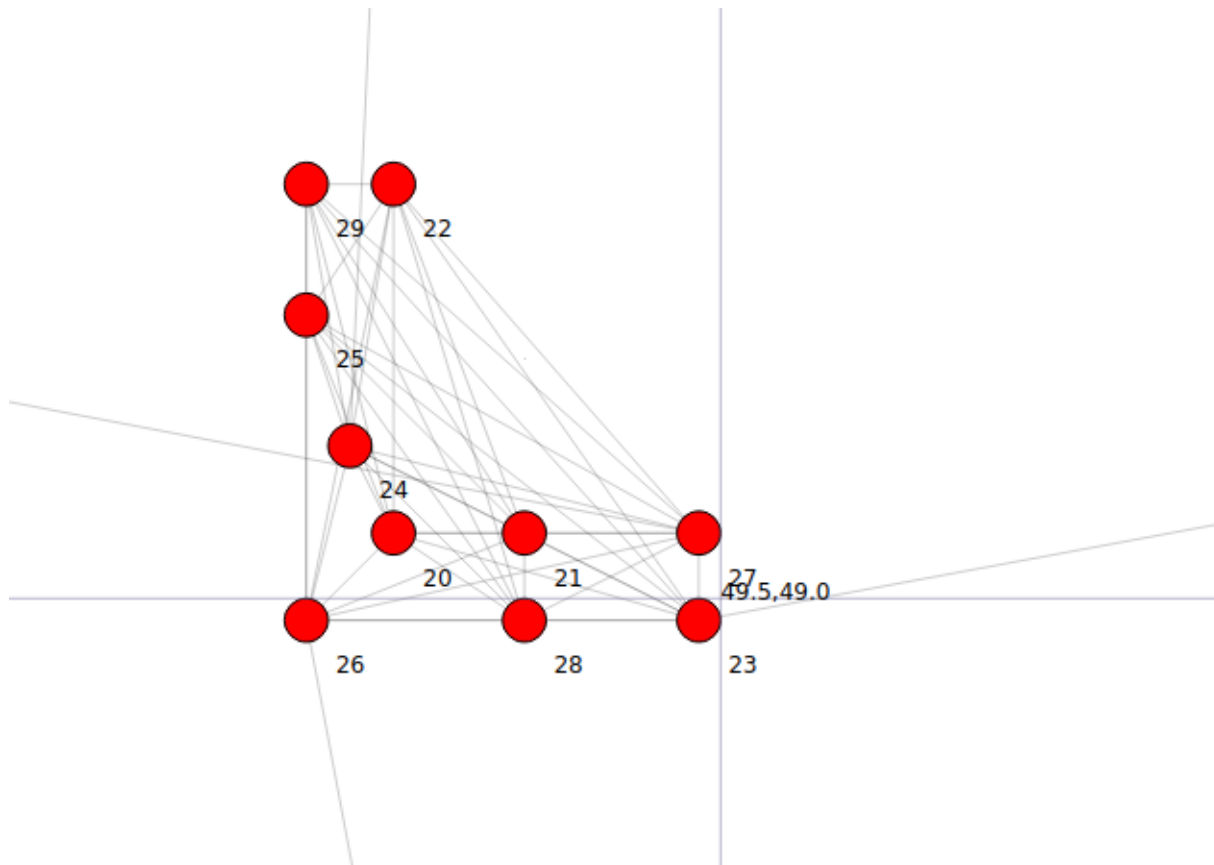
Assigning links for Node 18:

- Link between nodes 18 and 11 configured with bandwidth: 171.05 Mbps
- Link between nodes 18 and 10 configured with bandwidth: 81.7482 Mbps
- Link between nodes 18 and 11 configured with bandwidth: 205.946 Mbps
- Link between nodes 18 and 12 configured with bandwidth: 60.9942 Mbps
- Link between nodes 18 and 13 configured with bandwidth: 90.6951 Mbps
- Link between nodes 18 and 14 configured with bandwidth: 158.56 Mbps
- Link between nodes 18 and 15 configured with bandwidth: 152.813 Mbps
- Link between nodes 18 and 16 configured with bandwidth: 244.763 Mbps
- Link between nodes 18 and 17 configured with bandwidth: 235.106 Mbps
- Link between nodes 18 and 19 configured with bandwidth: 219.52 Mbps

Assigning links for Node 19:

- Link between nodes 19 and 11 configured with bandwidth: 191.681 Mbps
- Link between nodes 19 and 10 configured with bandwidth: 160.076 Mbps
- Link between nodes 19 and 11 configured with bandwidth: 121.68 Mbps
- Link between nodes 19 and 12 configured with bandwidth: 172.576 Mbps
- Link between nodes 19 and 13 configured with bandwidth: 188.731 Mbps
- Link between nodes 19 and 14 configured with bandwidth: 65.9696 Mbps
- Link between nodes 19 and 15 configured with bandwidth: 129.019 Mbps
- Link between nodes 19 and 16 configured with bandwidth: 218.601 Mbps
- Link between nodes 19 and 17 configured with bandwidth: 120.514 Mbps
- Link between nodes 19 and 18 configured with bandwidth: 57.2271 Mbp

AS3 (Nodes 20-29):



Gateway Node: Node 23

Links within the AS based on Bandwidth:

Assigning links for Node 20:

- Link between nodes 20 and 23 configured with bandwidth: 244.189 Mbps
- Link between nodes 20 and 21 configured with bandwidth: 193.82 Mbps
- Link between nodes 20 and 22 configured with bandwidth: 230.165 Mbps
- Link between nodes 20 and 23 configured with bandwidth: 137.193 Mbps
- Link between nodes 20 and 24 configured with bandwidth: 121.351 Mbps
- Link between nodes 20 and 25 configured with bandwidth: 75.7181 Mbps
- Link between nodes 20 and 26 configured with bandwidth: 190.942 Mbps
- Link between nodes 20 and 27 configured with bandwidth: 246.873 Mbps
- Link between nodes 20 and 28 configured with bandwidth: 130.639 Mbps
- Link between nodes 20 and 29 configured with bandwidth: 58.6249 Mbps

Assigning links for Node 21:

- Link between nodes 21 and 23 configured with bandwidth: 184.604 Mbps
- Link between nodes 21 and 20 configured with bandwidth: 149.34 Mbps
- Link between nodes 21 and 22 configured with bandwidth: 171.798 Mbps

- Link between nodes 21 and 23 configured with bandwidth: 117.21 Mbps
- Link between nodes 21 and 24 configured with bandwidth: 202.38 Mbps
- Link between nodes 21 and 25 configured with bandwidth: 198.194 Mbps
- Link between nodes 21 and 26 configured with bandwidth: 235.932 Mbps
- Link between nodes 21 and 27 configured with bandwidth: 85.0645 Mbps
- Link between nodes 21 and 28 configured with bandwidth: 98.2832 Mbps
- Link between nodes 21 and 29 configured with bandwidth: 52.8135 Mbps

Assigning links for Node 22:

- Link between nodes 22 and 23 configured with bandwidth: 62.6029 Mbps
- Link between nodes 22 and 20 configured with bandwidth: 88.4312 Mbps
- Link between nodes 22 and 21 configured with bandwidth: 137.237 Mbps
- Link between nodes 22 and 23 configured with bandwidth: 245.877 Mbps
- Link between nodes 22 and 24 configured with bandwidth: 237.756 Mbps
- Link between nodes 22 and 25 configured with bandwidth: 163.214 Mbps
- Link between nodes 22 and 26 configured with bandwidth: 124.361 Mbps
- Link between nodes 22 and 27 configured with bandwidth: 174.442 Mbps
- Link between nodes 22 and 28 configured with bandwidth: 209.263 Mbps
- Link between nodes 22 and 29 configured with bandwidth: 143.914 Mbps

Assigning links for Node 23:

- Link between nodes 23 and 23 configured with bandwidth: 172.56 Mbps
- Link between nodes 23 and 20 configured with bandwidth: 157.356 Mbps
- Link between nodes 23 and 21 configured with bandwidth: 51.3605 Mbps
- Link between nodes 23 and 22 configured with bandwidth: 73.0369 Mbps
- Link between nodes 23 and 24 configured with bandwidth: 163.126 Mbps
- Link between nodes 23 and 25 configured with bandwidth: 155.707 Mbps
- Link between nodes 23 and 26 configured with bandwidth: 79.8886 Mbps
- Link between nodes 23 and 27 configured with bandwidth: 193.291 Mbps
- Link between nodes 23 and 28 configured with bandwidth: 177.857 Mbps
- Link between nodes 23 and 29 configured with bandwidth: 244.037 Mbps

Assigning links for Node 24:

- Link between nodes 24 and 23 configured with bandwidth: 153.079 Mbps
- Link between nodes 24 and 20 configured with bandwidth: 166.096 Mbps
- Link between nodes 24 and 21 configured with bandwidth: 206.074 Mbps
- Link between nodes 24 and 22 configured with bandwidth: 146.687 Mbps
- Link between nodes 24 and 23 configured with bandwidth: 63.7109 Mbps
- Link between nodes 24 and 25 configured with bandwidth: 170.494 Mbps
- Link between nodes 24 and 26 configured with bandwidth: 221.093 Mbps
- Link between nodes 24 and 27 configured with bandwidth: 157.434 Mbps

- Link between nodes 24 and 28 configured with bandwidth: 134.319 Mbps
- Link between nodes 24 and 29 configured with bandwidth: 117.14 Mbps

Assigning links for Node 25:

- Link between nodes 25 and 23 configured with bandwidth: 184.174 Mbps
- Link between nodes 25 and 20 configured with bandwidth: 140.804 Mbps
- Link between nodes 25 and 21 configured with bandwidth: 246.724 Mbps
- Link between nodes 25 and 22 configured with bandwidth: 52.7486 Mbps
- Link between nodes 25 and 23 configured with bandwidth: 194.831 Mbps
- Link between nodes 25 and 24 configured with bandwidth: 195.719 Mbps
- Link between nodes 25 and 26 configured with bandwidth: 184.63 Mbps
- Link between nodes 25 and 27 configured with bandwidth: 55.2114 Mbps
- Link between nodes 25 and 28 configured with bandwidth: 183.216 Mbps
- Link between nodes 25 and 29 configured with bandwidth: 144.905 Mbps

Assigning links for Node 26:

- Link between nodes 26 and 23 configured with bandwidth: 248.305 Mbps
- Link between nodes 26 and 20 configured with bandwidth: 58.8889 Mbps
- Link between nodes 26 and 21 configured with bandwidth: 184.401 Mbps
- Link between nodes 26 and 22 configured with bandwidth: 157.104 Mbps
- Link between nodes 26 and 23 configured with bandwidth: 221.695 Mbps
- Link between nodes 26 and 24 configured with bandwidth: 191.542 Mbps
- Link between nodes 26 and 25 configured with bandwidth: 65.7052 Mbps
- Link between nodes 26 and 27 configured with bandwidth: 142.368 Mbps
- Link between nodes 26 and 28 configured with bandwidth: 74.6233 Mbps
- Link between nodes 26 and 29 configured with bandwidth: 122.014 Mbps

Assigning links for Node 27:

- Link between nodes 27 and 23 configured with bandwidth: 226.562 Mbps
- Link between nodes 27 and 20 configured with bandwidth: 231.604 Mbps
- Link between nodes 27 and 21 configured with bandwidth: 174.734 Mbps
- Link between nodes 27 and 22 configured with bandwidth: 75.361 Mbps
- Link between nodes 27 and 23 configured with bandwidth: 239.576 Mbps
- Link between nodes 27 and 24 configured with bandwidth: 165.096 Mbps
- Link between nodes 27 and 25 configured with bandwidth: 105.178 Mbps
- Link between nodes 27 and 26 configured with bandwidth: 65.1344 Mbps
- Link between nodes 27 and 28 configured with bandwidth: 219.746 Mbps
- Link between nodes 27 and 29 configured with bandwidth: 108.556 Mbps

Assigning links for Node 28:

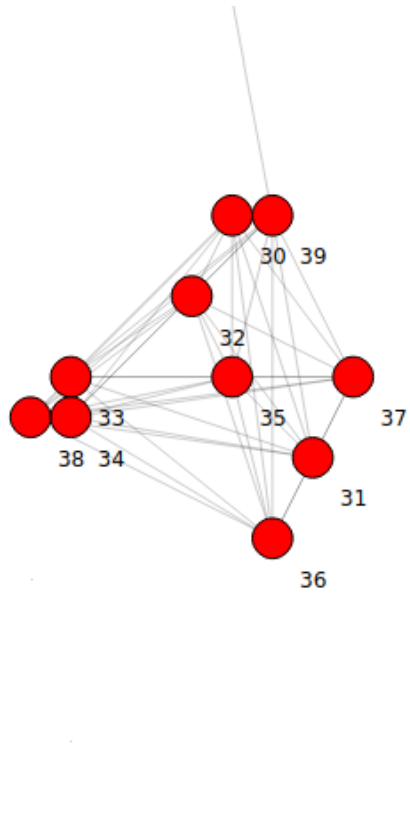
- Link between nodes 28 and 23 configured with bandwidth: 113.291 Mbps

- Link between nodes 28 and 20 configured with bandwidth: 240.706 Mbps
- Link between nodes 28 and 21 configured with bandwidth: 148.557 Mbps
- Link between nodes 28 and 22 configured with bandwidth: 160.404 Mbps
- Link between nodes 28 and 23 configured with bandwidth: 200.092 Mbps
- Link between nodes 28 and 24 configured with bandwidth: 222.891 Mbps
- Link between nodes 28 and 25 configured with bandwidth: 187.438 Mbps
- Link between nodes 28 and 26 configured with bandwidth: 124.139 Mbps
- Link between nodes 28 and 27 configured with bandwidth: 149.512 Mbps
- Link between nodes 28 and 29 configured with bandwidth: 171.875 Mbps

Assigning links for Node 29:

- Link between nodes 29 and 23 configured with bandwidth: 107.466 Mbps
- Link between nodes 29 and 20 configured with bandwidth: 203.84 Mbps
- Link between nodes 29 and 21 configured with bandwidth: 180.172 Mbps
- Link between nodes 29 and 22 configured with bandwidth: 223.847 Mbps
- Link between nodes 29 and 23 configured with bandwidth: 189.959 Mbps
- Link between nodes 29 and 24 configured with bandwidth: 133.148 Mbps
- Link between nodes 29 and 25 configured with bandwidth: 99.8508 Mbps
- Link between nodes 29 and 26 configured with bandwidth: 83.6327 Mbps
- Link between nodes 29 and 27 configured with bandwidth: 86.6421 Mbps
- Link between nodes 29 and 28 configured with bandwidth: 148.001 Mbps

AS4 (Nodes 30-39):



Gateway Node: Node 39

Links within the AS based on Bandwidth:

Assigning links for Node 30:

- Link between nodes 30 and 39 configured with bandwidth: 155.786 Mbps
- Link between nodes 30 and 31 configured with bandwidth: 142.292 Mbps
- Link between nodes 30 and 32 configured with bandwidth: 238.459 Mbps
- Link between nodes 30 and 33 configured with bandwidth: 222.518 Mbps
- Link between nodes 30 and 34 configured with bandwidth: 204.099 Mbps
- Link between nodes 30 and 35 configured with bandwidth: 119.341 Mbps
- Link between nodes 30 and 36 configured with bandwidth: 74.6714 Mbps
- Link between nodes 30 and 37 configured with bandwidth: 164.521 Mbps
- Link between nodes 30 and 38 configured with bandwidth: 118.564 Mbps
- Link between nodes 30 and 39 configured with bandwidth: 128.68 Mbps

Assigning links for Node 31:

- Link between nodes 31 and 39 configured with bandwidth: 128.511 Mbps
- Link between nodes 31 and 30 configured with bandwidth: 73.8192 Mbps
- Link between nodes 31 and 32 configured with bandwidth: 218.283 Mbps
- Link between nodes 31 and 33 configured with bandwidth: 109.072 Mbps

- Link between nodes 31 and 34 configured with bandwidth: 232.2 Mbps
- Link between nodes 31 and 35 configured with bandwidth: 203.397 Mbps
- Link between nodes 31 and 36 configured with bandwidth: 107.171 Mbps
- Link between nodes 31 and 37 configured with bandwidth: 93.5882 Mbps
- Link between nodes 31 and 38 configured with bandwidth: 138.394 Mbps
- Link between nodes 31 and 39 configured with bandwidth: 61.7586 Mbps

Assigning links for Node 32:

- Link between nodes 32 and 39 configured with bandwidth: 223.81 Mbps
- Link between nodes 32 and 30 configured with bandwidth: 70.8036 Mbps
- Link between nodes 32 and 31 configured with bandwidth: 222.12 Mbps
- Link between nodes 32 and 33 configured with bandwidth: 124.574 Mbps
- Link between nodes 32 and 34 configured with bandwidth: 167.86 Mbps
- Link between nodes 32 and 35 configured with bandwidth: 73.6229 Mbps
- Link between nodes 32 and 36 configured with bandwidth: 158.293 Mbps
- Link between nodes 32 and 37 configured with bandwidth: 219.779 Mbps
- Link between nodes 32 and 38 configured with bandwidth: 231.579 Mbps
- Link between nodes 32 and 39 configured with bandwidth: 231.991 Mbps

Assigning links for Node 33:

- Link between nodes 33 and 39 configured with bandwidth: 85.4374 Mbps
- Link between nodes 33 and 30 configured with bandwidth: 157.65 Mbps
- Link between nodes 33 and 31 configured with bandwidth: 133.723 Mbps
- Link between nodes 33 and 32 configured with bandwidth: 65.9847 Mbps
- Link between nodes 33 and 34 configured with bandwidth: 161.125 Mbps
- Link between nodes 33 and 35 configured with bandwidth: 126.03 Mbps
- Link between nodes 33 and 36 configured with bandwidth: 126.26 Mbps
- Link between nodes 33 and 37 configured with bandwidth: 214.271 Mbps
- Link between nodes 33 and 38 configured with bandwidth: 92.2425 Mbps
- Link between nodes 33 and 39 configured with bandwidth: 105.699 Mbps

Assigning links for Node 34:

- Link between nodes 34 and 39 configured with bandwidth: 99.2886 Mbps
- Link between nodes 34 and 30 configured with bandwidth: 212.545 Mbps
- Link between nodes 34 and 31 configured with bandwidth: 205.504 Mbps
- Link between nodes 34 and 32 configured with bandwidth: 99.1629 Mbps
- Link between nodes 34 and 33 configured with bandwidth: 124.639 Mbps
- Link between nodes 34 and 35 configured with bandwidth: 108.31 Mbps
- Link between nodes 34 and 36 configured with bandwidth: 173.816 Mbps
- Link between nodes 34 and 37 configured with bandwidth: 53.7198 Mbps
- Link between nodes 34 and 38 configured with bandwidth: 50.4292 Mbps

- Link between nodes 34 and 39 configured with bandwidth: 76.4188 Mbps

Assigning links for Node 35:

- Link between nodes 35 and 39 configured with bandwidth: 238.334 Mbps
- Link between nodes 35 and 30 configured with bandwidth: 229.245 Mbps
- Link between nodes 35 and 31 configured with bandwidth: 174.002 Mbps
- Link between nodes 35 and 32 configured with bandwidth: 161.557 Mbps
- Link between nodes 35 and 33 configured with bandwidth: 126.005 Mbps
- Link between nodes 35 and 34 configured with bandwidth: 122.169 Mbps
- Link between nodes 35 and 36 configured with bandwidth: 58.6232 Mbps
- Link between nodes 35 and 37 configured with bandwidth: 138.968 Mbps
- Link between nodes 35 and 38 configured with bandwidth: 146.906 Mbps
- Link between nodes 35 and 39 configured with bandwidth: 183.805 Mbps

Assigning links for Node 36:

- Link between nodes 36 and 39 configured with bandwidth: 126.215 Mbps
- Link between nodes 36 and 30 configured with bandwidth: 223.659 Mbps
- Link between nodes 36 and 31 configured with bandwidth: 58.7798 Mbps
- Link between nodes 36 and 32 configured with bandwidth: 236.217 Mbps
- Link between nodes 36 and 33 configured with bandwidth: 83.4979 Mbps
- Link between nodes 36 and 34 configured with bandwidth: 66.2886 Mbps
- Link between nodes 36 and 35 configured with bandwidth: 161.474 Mbps
- Link between nodes 36 and 37 configured with bandwidth: 55.0831 Mbps
- Link between nodes 36 and 38 configured with bandwidth: 239.865 Mbps
- Link between nodes 36 and 39 configured with bandwidth: 83.8983 Mbps

Assigning links for Node 37:

- Link between nodes 37 and 39 configured with bandwidth: 107.723 Mbps
- Link between nodes 37 and 30 configured with bandwidth: 150.996 Mbps
- Link between nodes 37 and 31 configured with bandwidth: 96.3443 Mbps
- Link between nodes 37 and 32 configured with bandwidth: 51.9268 Mbps
- Link between nodes 37 and 33 configured with bandwidth: 234.148 Mbps
- Link between nodes 37 and 34 configured with bandwidth: 221.055 Mbps
- Link between nodes 37 and 35 configured with bandwidth: 63.6847 Mbps
- Link between nodes 37 and 36 configured with bandwidth: 65.7825 Mbps
- Link between nodes 37 and 38 configured with bandwidth: 138.994 Mbps
- Link between nodes 37 and 39 configured with bandwidth: 84.4913 Mbps

Assigning links for Node 38:

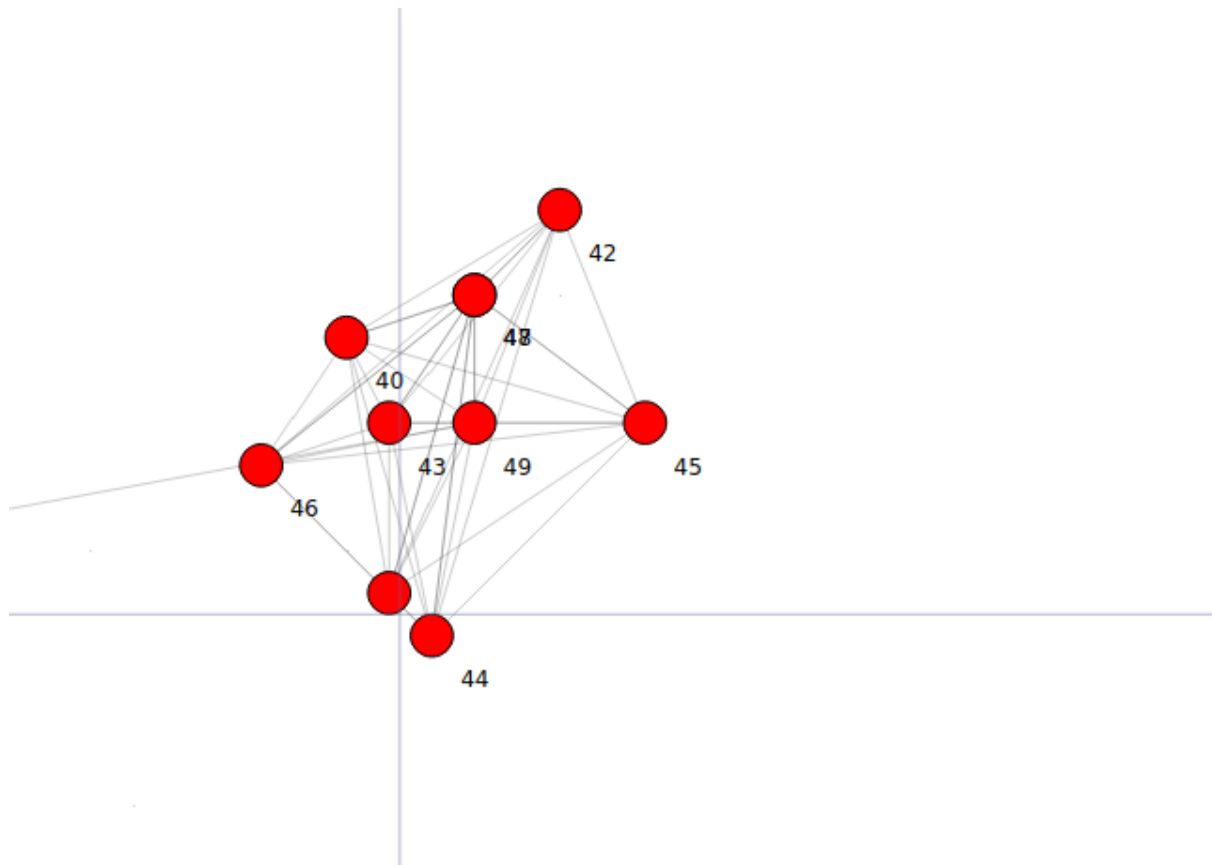
- Link between nodes 38 and 39 configured with bandwidth: 58.4548 Mbps
- Link between nodes 38 and 30 configured with bandwidth: 182.597 Mbps

- Link between nodes 38 and 31 configured with bandwidth: 155.995 Mbps
- Link between nodes 38 and 32 configured with bandwidth: 93.1629 Mbps
- Link between nodes 38 and 33 configured with bandwidth: 139.071 Mbps
- Link between nodes 38 and 34 configured with bandwidth: 179.253 Mbps
- Link between nodes 38 and 35 configured with bandwidth: 149.671 Mbps
- Link between nodes 38 and 36 configured with bandwidth: 57.356 Mbps
- Link between nodes 38 and 37 configured with bandwidth: 229.399 Mbps
- Link between nodes 38 and 39 configured with bandwidth: 85.2974 Mbps

Assigning links for Node 39:

- Link between nodes 39 and 39 configured with bandwidth: 204.435 Mbps
- Link between nodes 39 and 30 configured with bandwidth: 203.58 Mbps
- Link between nodes 39 and 31 configured with bandwidth: 83.4242 Mbps
- Link between nodes 39 and 32 configured with bandwidth: 191.974 Mbps
- Link between nodes 39 and 33 configured with bandwidth: 159.801 Mbps
- Link between nodes 39 and 34 configured with bandwidth: 216.03 Mbps
- Link between nodes 39 and 35 configured with bandwidth: 52.3593 Mbps
- Link between nodes 39 and 36 configured with bandwidth: 179.987 Mbps
- Link between nodes 39 and 37 configured with bandwidth: 176.467 Mbps
- Link between nodes 39 and 38 configured with bandwidth: 140.713 Mbps

AS5 (Nodes 40-49):



Gateway Node: Node 49

Links within the AS based on Bandwidth:

Assigning links for Node 40:

- Link between nodes 40 and 49 configured with bandwidth: 54.0225 Mbps
- Link between nodes 40 and 41 configured with bandwidth: 194.333 Mbps
- Link between nodes 40 and 42 configured with bandwidth: 207.351 Mbps
- Link between nodes 40 and 43 configured with bandwidth: 239.022 Mbps
- Link between nodes 40 and 44 configured with bandwidth: 61.5288 Mbps
- Link between nodes 40 and 45 configured with bandwidth: 165.106 Mbps
- Link between nodes 40 and 46 configured with bandwidth: 245.35 Mbps
- Link between nodes 40 and 47 configured with bandwidth: 170.493 Mbps
- Link between nodes 40 and 48 configured with bandwidth: 108.986 Mbps
- Link between nodes 40 and 49 configured with bandwidth: 54.4526 Mbps

Assigning links for Node 41:

- Link between nodes 41 and 49 configured with bandwidth: 120.971 Mbps
- Link between nodes 41 and 40 configured with bandwidth: 52.4822 Mbps
- Link between nodes 41 and 42 configured with bandwidth: 132.588 Mbps
- Link between nodes 41 and 43 configured with bandwidth: 230.079 Mbps

- Link between nodes 41 and 44 configured with bandwidth: 119.163 Mbps
- Link between nodes 41 and 45 configured with bandwidth: 75.1755 Mbps
- Link between nodes 41 and 46 configured with bandwidth: 167.447 Mbps
- Link between nodes 41 and 47 configured with bandwidth: 201.833 Mbps
- Link between nodes 41 and 48 configured with bandwidth: 94.555 Mbps
- Link between nodes 41 and 49 configured with bandwidth: 222.389 Mbps

Assigning links for Node 42:

- Link between nodes 42 and 49 configured with bandwidth: 214.313 Mbps
- Link between nodes 42 and 40 configured with bandwidth: 147.998 Mbps
- Link between nodes 42 and 41 configured with bandwidth: 188.289 Mbps
- Link between nodes 42 and 43 configured with bandwidth: 219.244 Mbps
- Link between nodes 42 and 44 configured with bandwidth: 245.08 Mbps
- Link between nodes 42 and 45 configured with bandwidth: 75.3659 Mbps
- Link between nodes 42 and 46 configured with bandwidth: 212.982 Mbps
- Link between nodes 42 and 47 configured with bandwidth: 205.204 Mbps
- Link between nodes 42 and 48 configured with bandwidth: 173.822 Mbps
- Link between nodes 42 and 49 configured with bandwidth: 221.941 Mbps

Assigning links for Node 43:

- Link between nodes 43 and 49 configured with bandwidth: 240.162 Mbps
- Link between nodes 43 and 40 configured with bandwidth: 231.998 Mbps
- Link between nodes 43 and 41 configured with bandwidth: 153.403 Mbps
- Link between nodes 43 and 42 configured with bandwidth: 96.8673 Mbps
- Link between nodes 43 and 44 configured with bandwidth: 69.6133 Mbps
- Link between nodes 43 and 45 configured with bandwidth: 209.363 Mbps
- Link between nodes 43 and 46 configured with bandwidth: 176.827 Mbps
- Link between nodes 43 and 47 configured with bandwidth: 118.081 Mbps
- Link between nodes 43 and 48 configured with bandwidth: 83.338 Mbps
- Link between nodes 43 and 49 configured with bandwidth: 192.045 Mbps

Assigning links for Node 44:

- Link between nodes 44 and 49 configured with bandwidth: 114.902 Mbps
- Link between nodes 44 and 40 configured with bandwidth: 60.2344 Mbps
- Link between nodes 44 and 41 configured with bandwidth: 78.3493 Mbps
- Link between nodes 44 and 42 configured with bandwidth: 169.425 Mbps
- Link between nodes 44 and 43 configured with bandwidth: 142.254 Mbps
- Link between nodes 44 and 45 configured with bandwidth: 216.5 Mbps
- Link between nodes 44 and 46 configured with bandwidth: 138.864 Mbps
- Link between nodes 44 and 47 configured with bandwidth: 169.087 Mbps
- Link between nodes 44 and 48 configured with bandwidth: 86.4951 Mbps

Assigning links for Node 45:

- Link between nodes 45 and 49 configured with bandwidth: 107.414 Mbps
- Link between nodes 45 and 40 configured with bandwidth: 184.394 Mbps
- Link between nodes 45 and 41 configured with bandwidth: 104.862 Mbps
- Link between nodes 45 and 42 configured with bandwidth: 186.428 Mbps
- Link between nodes 45 and 43 configured with bandwidth: 80.1583 Mbps
- Link between nodes 45 and 44 configured with bandwidth: 177.94 Mbps
- Link between nodes 45 and 46 configured with bandwidth: 173.429 Mbps
- Link between nodes 45 and 47 configured with bandwidth: 241.446 Mbps
- Link between nodes 45 and 48 configured with bandwidth: 73.4959 Mbps
- Link between nodes 45 and 49 configured with bandwidth: 52.628 Mbps

Assigning links for Node 46:

- Link between nodes 46 and 49 configured with bandwidth: 106.282 Mbps
- Link between nodes 46 and 40 configured with bandwidth: 213.581 Mbps
- Link between nodes 46 and 41 configured with bandwidth: 71.5847 Mbps
- Link between nodes 46 and 42 configured with bandwidth: 119.175 Mbps
- Link between nodes 46 and 43 configured with bandwidth: 166.808 Mbps
- Link between nodes 46 and 44 configured with bandwidth: 239.993 Mbps
- Link between nodes 46 and 45 configured with bandwidth: 109.69 Mbps
- Link between nodes 46 and 47 configured with bandwidth: 168.213 Mbps
- Link between nodes 46 and 48 configured with bandwidth: 203.828 Mbps
- Link between nodes 46 and 49 configured with bandwidth: 177.421 Mbps

Assigning links for Node 47:

- Link between nodes 47 and 49 configured with bandwidth: 157 Mbps
- Link between nodes 47 and 40 configured with bandwidth: 119.104 Mbps
- Link between nodes 47 and 41 configured with bandwidth: 198.261 Mbps
- Link between nodes 47 and 42 configured with bandwidth: 233.189 Mbps
- Link between nodes 47 and 43 configured with bandwidth: 223.611 Mbps
- Link between nodes 47 and 44 configured with bandwidth: 230.64 Mbps
- Link between nodes 47 and 45 configured with bandwidth: 58.301 Mbps
- Link between nodes 47 and 46 configured with bandwidth: 92.471 Mbps
- Link between nodes 47 and 48 configured with bandwidth: 199.765 Mbps
- Link between nodes 47 and 49 configured with bandwidth: 176.357 Mbps

Assigning links for Node 48:

- Link between nodes 48 and 49 configured with bandwidth: 119.508 Mbps
- Link between nodes 48 and 40 configured with bandwidth: 71.754 Mbps
- Link between nodes 48 and 41 configured with bandwidth: 135.863 Mbps

- Link between nodes 48 and 42 configured with bandwidth: 109.209 Mbps
- Link between nodes 48 and 43 configured with bandwidth: 216.976 Mbps
- Link between nodes 48 and 44 configured with bandwidth: 164.744 Mbps
- Link between nodes 48 and 45 configured with bandwidth: 77.3022 Mbps
- Link between nodes 48 and 46 configured with bandwidth: 82.0493 Mbps
- Link between nodes 48 and 47 configured with bandwidth: 65.4366 Mbps
- Link between nodes 48 and 49 configured with bandwidth: 202.845 Mbps

Assigning links for Node 49:

- Link between nodes 49 and 49 configured with bandwidth: 191.924 Mbps
- Link between nodes 49 and 40 configured with bandwidth: 226.856 Mbps
- Link between nodes 49 and 41 configured with bandwidth: 91.3433 Mbps
- Link between nodes 49 and 42 configured with bandwidth: 94.2566 Mbps
- Link between nodes 49 and 43 configured with bandwidth: 202.095 Mbps
- Link between nodes 49 and 44 configured with bandwidth: 210.142 Mbps
- Link between nodes 49 and 45 configured with bandwidth: 84.8268 Mbps
- Link between nodes 49 and 46 configured with bandwidth: 169.966 Mbps
- Link between nodes 49 and 47 configured with bandwidth: 78.5541 Mbps
- Link between nodes 49 and 48 configured with bandwidth: 70.3016 Mbps

Link between nodes 6 and 27 configured with bandwidth: 97.8392 Mbps
Link between nodes 11 and 24 configured with bandwidth: 162.235 Mbps
Link between nodes 23 and 49 configured with bandwidth: 232.682 Mbps
Link between nodes 26 and 39 configured with bandwidth: 161.704 Mbps
Link between nodes 0 and 6 configured with bandwidth: 126.732 Mbps
Link between nodes 0 and 1 configured with bandwidth: 193.453 Mbps
Link between nodes 0 and 2 configured with bandwidth: 114.132 Mbps
Link between nodes 0 and 3 configured with bandwidth: 219.369 Mbps
Link between nodes 0 and 4 configured with bandwidth: 141.815 Mbps
Link between nodes 0 and 5 configured with bandwidth: 159.862 Mbps
Link between nodes 0 and 6 configured with bandwidth: 136.592 Mbps
Link between nodes 0 and 7 configured with bandwidth: 203.532 Mbps
Link between nodes 0 and 8 configured with bandwidth: 198.997 Mbps
Link between nodes 0 and 9 configured with bandwidth: 149.783 Mbps
Link between nodes 1 and 6 configured with bandwidth: 112.64 Mbps
Link between nodes 1 and 0 configured with bandwidth: 223.181 Mbps
Link between nodes 1 and 2 configured with bandwidth: 174.457 Mbps
Link between nodes 1 and 3 configured with bandwidth: 97.3176 Mbps
Link between nodes 1 and 4 configured with bandwidth: 100.802 Mbps
Link between nodes 1 and 5 configured with bandwidth: 63.1862 Mbps
Link between nodes 1 and 6 configured with bandwidth: 185.093 Mbps
Link between nodes 1 and 7 configured with bandwidth: 104.027 Mbps
Link between nodes 1 and 8 configured with bandwidth: 168.31 Mbps
Link between nodes 1 and 9 configured with bandwidth: 202.865 Mbps
Link between nodes 2 and 6 configured with bandwidth: 73.4407 Mbps
Link between nodes 2 and 0 configured with bandwidth: 153.716 Mbps
Link between nodes 2 and 1 configured with bandwidth: 139.876 Mbps
Link between nodes 2 and 3 configured with bandwidth: 230.892 Mbps
Link between nodes 2 and 4 configured with bandwidth: 198.688 Mbps
Link between nodes 2 and 5 configured with bandwidth: 177.394 Mbps
Link between nodes 2 and 6 configured with bandwidth: 96.4119 Mbps
Link between nodes 2 and 7 configured with bandwidth: 76.8636 Mbps
Link between nodes 2 and 8 configured with bandwidth: 82.4372 Mbps
Link between nodes 2 and 9 configured with bandwidth: 82.5543 Mbps
Link between nodes 3 and 6 configured with bandwidth: 80.9098 Mbps
Link between nodes 3 and 0 configured with bandwidth: 80.2449 Mbps
Link between nodes 3 and 1 configured with bandwidth: 50.3351 Mbps
Link between nodes 3 and 2 configured with bandwidth: 178.038 Mbps
Link between nodes 3 and 4 configured with bandwidth: 219.835 Mbps
Link between nodes 3 and 5 configured with bandwidth: 161.914 Mbps
Link between nodes 3 and 6 configured with bandwidth: 199.333 Mbps
Link between nodes 3 and 7 configured with bandwidth: 219.203 Mbps
Link between nodes 3 and 8 configured with bandwidth: 58.4708 Mbps
Link between nodes 3 and 9 configured with bandwidth: 134.292 Mbps
Link between nodes 4 and 6 configured with bandwidth: 87.0067 Mbps
Link between nodes 4 and 0 configured with bandwidth: 222.782 Mbps

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Link between nodes 4 and 3 configured with bandwidth: 139.808 Mbps
Link between nodes 4 and 5 configured with bandwidth: 142.768 Mbps
Link between nodes 4 and 6 configured with bandwidth: 142.835 Mbps
Link between nodes 4 and 7 configured with bandwidth: 115.858 Mbps
Link between nodes 4 and 8 configured with bandwidth: 63.1228 Mbps
Link between nodes 4 and 9 configured with bandwidth: 139.801 Mbps
Link between nodes 5 and 6 configured with bandwidth: 200.166 Mbps
Link between nodes 5 and 0 configured with bandwidth: 55.6165 Mbps
Link between nodes 5 and 1 configured with bandwidth: 61.1512 Mbps
Link between nodes 5 and 2 configured with bandwidth: 123.239 Mbps
Link between nodes 5 and 3 configured with bandwidth: 245.271 Mbps
Link between nodes 5 and 4 configured with bandwidth: 121.884 Mbps
Link between nodes 5 and 6 configured with bandwidth: 216.822 Mbps
Link between nodes 5 and 7 configured with bandwidth: 105.639 Mbps
Link between nodes 5 and 8 configured with bandwidth: 92.267 Mbps
Link between nodes 5 and 9 configured with bandwidth: 116.798 Mbps
Link between nodes 6 and 6 configured with bandwidth: 119.005 Mbps
Link between nodes 6 and 0 configured with bandwidth: 165.216 Mbps
Link between nodes 6 and 1 configured with bandwidth: 161.079 Mbps
Link between nodes 6 and 2 configured with bandwidth: 193.42 Mbps
Link between nodes 6 and 3 configured with bandwidth: 167.62 Mbps
Link between nodes 6 and 4 configured with bandwidth: 117.09 Mbps
Link between nodes 6 and 5 configured with bandwidth: 68.6485 Mbps
Link between nodes 6 and 7 configured with bandwidth: 212.776 Mbps
Link between nodes 6 and 8 configured with bandwidth: 84.4875 Mbps
Link between nodes 6 and 9 configured with bandwidth: 71.8218 Mbps
Link between nodes 7 and 6 configured with bandwidth: 192.896 Mbps
Link between nodes 7 and 0 configured with bandwidth: 178.721 Mbps
Link between nodes 7 and 1 configured with bandwidth: 205.725 Mbps
Link between nodes 7 and 2 configured with bandwidth: 152.869 Mbps
Link between nodes 7 and 3 configured with bandwidth: 148.376 Mbps
Link between nodes 7 and 4 configured with bandwidth: 232.53 Mbps
Link between nodes 7 and 5 configured with bandwidth: 244.662 Mbps
Link between nodes 7 and 6 configured with bandwidth: 197.84 Mbps
Link between nodes 7 and 8 configured with bandwidth: 242.387 Mbps
Link between nodes 7 and 9 configured with bandwidth: 216.938 Mbps
Link between nodes 8 and 6 configured with bandwidth: 118.587 Mbps
Link between nodes 8 and 0 configured with bandwidth: 89.1051 Mbps
Link between nodes 8 and 1 configured with bandwidth: 51.7739 Mbps
Link between nodes 8 and 2 configured with bandwidth: 216.019 Mbps
Link between nodes 8 and 3 configured with bandwidth: 243.65 Mbps
Link between nodes 8 and 4 configured with bandwidth: 199.594 Mbps
Link between nodes 8 and 5 configured with bandwidth: 119.324 Mbps
Link between nodes 8 and 6 configured with bandwidth: 143.165 Mbps
Link between nodes 8 and 7 configured with bandwidth: 204.309 Mbps
Link between nodes 8 and 9 configured with bandwidth: 51.1488 Mbps
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Link between nodes 8 and 9 configured with bandwidth: 51.1488 Mbps
Link between nodes 9 and 6 configured with bandwidth: 79.1467 Mbps
Link between nodes 9 and 0 configured with bandwidth: 228.097 Mbps
Link between nodes 9 and 1 configured with bandwidth: 160.872 Mbps
Link between nodes 9 and 2 configured with bandwidth: 191.694 Mbps
Link between nodes 9 and 3 configured with bandwidth: 163.052 Mbps
Link between nodes 9 and 4 configured with bandwidth: 131.729 Mbps
Link between nodes 9 and 5 configured with bandwidth: 124.727 Mbps
Link between nodes 9 and 6 configured with bandwidth: 134.466 Mbps
Link between nodes 9 and 7 configured with bandwidth: 205.696 Mbps
Link between nodes 9 and 8 configured with bandwidth: 132.716 Mbps
Link between nodes 10 and 11 configured with bandwidth: 206.595 Mbps
Link between nodes 10 and 11 configured with bandwidth: 74.2061 Mbps
Link between nodes 10 and 12 configured with bandwidth: 93.6957 Mbps
Link between nodes 10 and 13 configured with bandwidth: 64.6193 Mbps
Link between nodes 10 and 14 configured with bandwidth: 188.213 Mbps
Link between nodes 10 and 15 configured with bandwidth: 61.2315 Mbps
Link between nodes 10 and 16 configured with bandwidth: 79.0872 Mbps
Link between nodes 10 and 17 configured with bandwidth: 95.2206 Mbps
Link between nodes 10 and 18 configured with bandwidth: 144.204 Mbps
Link between nodes 10 and 19 configured with bandwidth: 222.27 Mbps
Link between nodes 11 and 11 configured with bandwidth: 203.69 Mbps
Link between nodes 11 and 10 configured with bandwidth: 108.197 Mbps
Link between nodes 11 and 12 configured with bandwidth: 145.589 Mbps
Link between nodes 11 and 13 configured with bandwidth: 159.843 Mbps
Link between nodes 11 and 14 configured with bandwidth: 115.4 Mbps
Link between nodes 11 and 15 configured with bandwidth: 145.509 Mbps
Link between nodes 11 and 16 configured with bandwidth: 241.912 Mbps
Link between nodes 11 and 17 configured with bandwidth: 78.6488 Mbps
Link between nodes 11 and 18 configured with bandwidth: 81.7796 Mbps
Link between nodes 11 and 19 configured with bandwidth: 60.9325 Mbps
Link between nodes 12 and 11 configured with bandwidth: 194.54 Mbps
Link between nodes 12 and 10 configured with bandwidth: 118.064 Mbps
Link between nodes 12 and 11 configured with bandwidth: 234.885 Mbps
Link between nodes 12 and 13 configured with bandwidth: 120.744 Mbps
Link between nodes 12 and 14 configured with bandwidth: 222.672 Mbps
Link between nodes 12 and 15 configured with bandwidth: 170.845 Mbps
Link between nodes 12 and 16 configured with bandwidth: 221.221 Mbps
Link between nodes 12 and 17 configured with bandwidth: 140.515 Mbps
Link between nodes 12 and 18 configured with bandwidth: 114.645 Mbps
Link between nodes 12 and 19 configured with bandwidth: 203.333 Mbps
Link between nodes 13 and 11 configured with bandwidth: 208.001 Mbps
Link between nodes 13 and 10 configured with bandwidth: 71.463 Mbps
Link between nodes 13 and 11 configured with bandwidth: 79.2906 Mbps
Link between nodes 13 and 12 configured with bandwidth: 225.316 Mbps
Link between nodes 13 and 14 configured with bandwidth: 247.386 Mbps
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Link between nodes 13 and 14 configured with bandwidth: 247.386 Mbps
Link between nodes 13 and 15 configured with bandwidth: 58.6969 Mbps
Link between nodes 13 and 16 configured with bandwidth: 244.045 Mbps
Link between nodes 13 and 17 configured with bandwidth: 60.0678 Mbps
Link between nodes 13 and 18 configured with bandwidth: 218.841 Mbps
Link between nodes 13 and 19 configured with bandwidth: 99.3066 Mbps
Link between nodes 14 and 11 configured with bandwidth: 76.2116 Mbps
Link between nodes 14 and 10 configured with bandwidth: 101.577 Mbps
Link between nodes 14 and 11 configured with bandwidth: 150.368 Mbps
Link between nodes 14 and 12 configured with bandwidth: 166.987 Mbps
Link between nodes 14 and 13 configured with bandwidth: 175.088 Mbps
Link between nodes 14 and 15 configured with bandwidth: 223.39 Mbps
Link between nodes 14 and 16 configured with bandwidth: 86.1347 Mbps
Link between nodes 14 and 17 configured with bandwidth: 73.3477 Mbps
Link between nodes 14 and 18 configured with bandwidth: 135.385 Mbps
Link between nodes 14 and 19 configured with bandwidth: 190.969 Mbps
Link between nodes 15 and 11 configured with bandwidth: 178.967 Mbps
Link between nodes 15 and 10 configured with bandwidth: 93.5107 Mbps
Link between nodes 15 and 11 configured with bandwidth: 236.27 Mbps
Link between nodes 15 and 12 configured with bandwidth: 112.778 Mbps
Link between nodes 15 and 13 configured with bandwidth: 145.594 Mbps
Link between nodes 15 and 14 configured with bandwidth: 141.531 Mbps
Link between nodes 15 and 16 configured with bandwidth: 148.38 Mbps
Link between nodes 15 and 17 configured with bandwidth: 88.3438 Mbps
Link between nodes 15 and 18 configured with bandwidth: 128.936 Mbps
Link between nodes 15 and 19 configured with bandwidth: 121.406 Mbps
Link between nodes 16 and 11 configured with bandwidth: 168.517 Mbps
Link between nodes 16 and 10 configured with bandwidth: 214.316 Mbps
Link between nodes 16 and 11 configured with bandwidth: 193.839 Mbps
Link between nodes 16 and 12 configured with bandwidth: 70.1898 Mbps
Link between nodes 16 and 13 configured with bandwidth: 84.7794 Mbps
Link between nodes 16 and 14 configured with bandwidth: 150.439 Mbps
Link between nodes 16 and 15 configured with bandwidth: 134.909 Mbps
Link between nodes 16 and 17 configured with bandwidth: 123.158 Mbps
Link between nodes 16 and 18 configured with bandwidth: 87.535 Mbps
Link between nodes 16 and 19 configured with bandwidth: 236.425 Mbps
Link between nodes 17 and 11 configured with bandwidth: 164.253 Mbps
Link between nodes 17 and 10 configured with bandwidth: 123.003 Mbps
Link between nodes 17 and 11 configured with bandwidth: 243.414 Mbps
Link between nodes 17 and 12 configured with bandwidth: 161.02 Mbps
Link between nodes 17 and 13 configured with bandwidth: 225.723 Mbps
Link between nodes 17 and 14 configured with bandwidth: 53.0141 Mbps
Link between nodes 17 and 15 configured with bandwidth: 83.3286 Mbps
Link between nodes 17 and 16 configured with bandwidth: 60.6031 Mbps
Link between nodes 17 and 18 configured with bandwidth: 125.073 Mbps
Link between nodes 17 and 19 configured with bandwidth: 122.267 Mbps
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Link between nodes 17 and 18 configured with bandwidth: 125.073 Mbps
Link between nodes 17 and 19 configured with bandwidth: 122.267 Mbps
Link between nodes 18 and 11 configured with bandwidth: 171.05 Mbps
Link between nodes 18 and 10 configured with bandwidth: 81.7482 Mbps
Link between nodes 18 and 11 configured with bandwidth: 205.946 Mbps
Link between nodes 18 and 12 configured with bandwidth: 60.9942 Mbps
Link between nodes 18 and 13 configured with bandwidth: 90.6951 Mbps
Link between nodes 18 and 14 configured with bandwidth: 158.56 Mbps
Link between nodes 18 and 15 configured with bandwidth: 152.813 Mbps
Link between nodes 18 and 16 configured with bandwidth: 244.763 Mbps
Link between nodes 18 and 17 configured with bandwidth: 235.106 Mbps
Link between nodes 18 and 19 configured with bandwidth: 219.52 Mbps
Link between nodes 19 and 11 configured with bandwidth: 191.681 Mbps
Link between nodes 19 and 10 configured with bandwidth: 160.076 Mbps
Link between nodes 19 and 11 configured with bandwidth: 121.68 Mbps
Link between nodes 19 and 12 configured with bandwidth: 172.576 Mbps
Link between nodes 19 and 13 configured with bandwidth: 188.731 Mbps
Link between nodes 19 and 14 configured with bandwidth: 65.9696 Mbps
Link between nodes 19 and 15 configured with bandwidth: 129.019 Mbps
Link between nodes 19 and 16 configured with bandwidth: 218.601 Mbps
Link between nodes 19 and 17 configured with bandwidth: 120.514 Mbps
Link between nodes 19 and 18 configured with bandwidth: 57.2271 Mbps
Link between nodes 20 and 23 configured with bandwidth: 244.189 Mbps
Link between nodes 20 and 21 configured with bandwidth: 193.82 Mbps
Link between nodes 20 and 22 configured with bandwidth: 230.165 Mbps
Link between nodes 20 and 23 configured with bandwidth: 137.193 Mbps
Link between nodes 20 and 24 configured with bandwidth: 121.351 Mbps
Link between nodes 20 and 25 configured with bandwidth: 75.7181 Mbps
Link between nodes 20 and 26 configured with bandwidth: 190.942 Mbps
Link between nodes 20 and 27 configured with bandwidth: 246.873 Mbps
Link between nodes 20 and 28 configured with bandwidth: 130.639 Mbps
Link between nodes 20 and 29 configured with bandwidth: 58.6249 Mbps
Link between nodes 21 and 23 configured with bandwidth: 184.604 Mbps
Link between nodes 21 and 20 configured with bandwidth: 149.34 Mbps
Link between nodes 21 and 22 configured with bandwidth: 171.798 Mbps
Link between nodes 21 and 23 configured with bandwidth: 117.21 Mbps
Link between nodes 21 and 24 configured with bandwidth: 202.38 Mbps
Link between nodes 21 and 25 configured with bandwidth: 198.194 Mbps
Link between nodes 21 and 26 configured with bandwidth: 235.932 Mbps
Link between nodes 21 and 27 configured with bandwidth: 85.0645 Mbps
Link between nodes 21 and 28 configured with bandwidth: 98.2832 Mbps
Link between nodes 21 and 29 configured with bandwidth: 52.8135 Mbps
Link between nodes 22 and 23 configured with bandwidth: 62.6029 Mbps
Link between nodes 22 and 20 configured with bandwidth: 88.4312 Mbps
Link between nodes 22 and 21 configured with bandwidth: 137.237 Mbps
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Link between nodes 22 and 21 configured with bandwidth: 137.237 Mbps
Link between nodes 22 and 23 configured with bandwidth: 245.877 Mbps
Link between nodes 22 and 24 configured with bandwidth: 237.756 Mbps
Link between nodes 22 and 25 configured with bandwidth: 163.214 Mbps
Link between nodes 22 and 26 configured with bandwidth: 124.361 Mbps
Link between nodes 22 and 27 configured with bandwidth: 174.442 Mbps
Link between nodes 22 and 28 configured with bandwidth: 209.263 Mbps
Link between nodes 22 and 29 configured with bandwidth: 143.914 Mbps
Link between nodes 23 and 23 configured with bandwidth: 172.56 Mbps
Link between nodes 23 and 20 configured with bandwidth: 157.356 Mbps
Link between nodes 23 and 21 configured with bandwidth: 51.3605 Mbps
Link between nodes 23 and 22 configured with bandwidth: 73.0369 Mbps
Link between nodes 23 and 24 configured with bandwidth: 163.126 Mbps
Link between nodes 23 and 25 configured with bandwidth: 155.707 Mbps
Link between nodes 23 and 26 configured with bandwidth: 79.8886 Mbps
Link between nodes 23 and 27 configured with bandwidth: 193.291 Mbps
Link between nodes 23 and 28 configured with bandwidth: 177.857 Mbps
Link between nodes 23 and 29 configured with bandwidth: 244.037 Mbps
Link between nodes 24 and 23 configured with bandwidth: 153.079 Mbps
Link between nodes 24 and 20 configured with bandwidth: 166.096 Mbps
Link between nodes 24 and 21 configured with bandwidth: 206.074 Mbps
Link between nodes 24 and 22 configured with bandwidth: 146.687 Mbps
Link between nodes 24 and 23 configured with bandwidth: 63.7109 Mbps
Link between nodes 24 and 25 configured with bandwidth: 170.494 Mbps
Link between nodes 24 and 26 configured with bandwidth: 221.093 Mbps
Link between nodes 24 and 27 configured with bandwidth: 157.434 Mbps
Link between nodes 24 and 28 configured with bandwidth: 134.319 Mbps
Link between nodes 24 and 29 configured with bandwidth: 117.14 Mbps
Link between nodes 25 and 23 configured with bandwidth: 184.174 Mbps
Link between nodes 25 and 20 configured with bandwidth: 140.804 Mbps
Link between nodes 25 and 21 configured with bandwidth: 246.724 Mbps
Link between nodes 25 and 22 configured with bandwidth: 52.7486 Mbps
Link between nodes 25 and 23 configured with bandwidth: 194.831 Mbps
Link between nodes 25 and 24 configured with bandwidth: 195.719 Mbps
Link between nodes 25 and 26 configured with bandwidth: 184.63 Mbps
Link between nodes 25 and 27 configured with bandwidth: 55.2114 Mbps
Link between nodes 25 and 28 configured with bandwidth: 183.216 Mbps
Link between nodes 25 and 29 configured with bandwidth: 144.905 Mbps
Link between nodes 26 and 23 configured with bandwidth: 248.305 Mbps
Link between nodes 26 and 20 configured with bandwidth: 58.8889 Mbps
Link between nodes 26 and 21 configured with bandwidth: 184.401 Mbps
Link between nodes 26 and 22 configured with bandwidth: 157.104 Mbps
Link between nodes 26 and 23 configured with bandwidth: 221.695 Mbps
Link between nodes 26 and 24 configured with bandwidth: 191.542 Mbps
Link between nodes 26 and 25 configured with bandwidth: 65.7052 Mbps
Link between nodes 26 and 27 configured with bandwidth: 142.368 Mbps

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Link between nodes 26 and 25 configured with bandwidth: 65.7052 Mbps
Link between nodes 26 and 27 configured with bandwidth: 142.368 Mbps
Link between nodes 26 and 28 configured with bandwidth: 74.6233 Mbps
Link between nodes 26 and 29 configured with bandwidth: 122.014 Mbps
Link between nodes 27 and 23 configured with bandwidth: 226.562 Mbps
Link between nodes 27 and 20 configured with bandwidth: 231.604 Mbps
Link between nodes 27 and 21 configured with bandwidth: 174.734 Mbps
Link between nodes 27 and 22 configured with bandwidth: 75.361 Mbps
Link between nodes 27 and 23 configured with bandwidth: 239.576 Mbps
Link between nodes 27 and 24 configured with bandwidth: 165.096 Mbps
Link between nodes 27 and 25 configured with bandwidth: 105.178 Mbps
Link between nodes 27 and 26 configured with bandwidth: 65.1344 Mbps
Link between nodes 27 and 28 configured with bandwidth: 219.746 Mbps
Link between nodes 27 and 29 configured with bandwidth: 108.556 Mbps
Link between nodes 28 and 23 configured with bandwidth: 113.291 Mbps
Link between nodes 28 and 20 configured with bandwidth: 240.706 Mbps
Link between nodes 28 and 21 configured with bandwidth: 148.557 Mbps
Link between nodes 28 and 22 configured with bandwidth: 160.404 Mbps
Link between nodes 28 and 23 configured with bandwidth: 200.092 Mbps
Link between nodes 28 and 24 configured with bandwidth: 222.891 Mbps
Link between nodes 28 and 25 configured with bandwidth: 187.438 Mbps
Link between nodes 28 and 26 configured with bandwidth: 124.139 Mbps
Link between nodes 28 and 27 configured with bandwidth: 149.512 Mbps
Link between nodes 28 and 29 configured with bandwidth: 171.875 Mbps
Link between nodes 29 and 23 configured with bandwidth: 107.466 Mbps
Link between nodes 29 and 20 configured with bandwidth: 203.84 Mbps
Link between nodes 29 and 21 configured with bandwidth: 180.172 Mbps
Link between nodes 29 and 22 configured with bandwidth: 223.847 Mbps
Link between nodes 29 and 23 configured with bandwidth: 189.959 Mbps
Link between nodes 29 and 24 configured with bandwidth: 133.148 Mbps
Link between nodes 29 and 25 configured with bandwidth: 99.8508 Mbps
Link between nodes 29 and 26 configured with bandwidth: 83.6327 Mbps
Link between nodes 29 and 27 configured with bandwidth: 86.6421 Mbps
Link between nodes 29 and 28 configured with bandwidth: 148.001 Mbps
Link between nodes 30 and 39 configured with bandwidth: 155.786 Mbps
Link between nodes 30 and 31 configured with bandwidth: 142.292 Mbps
Link between nodes 30 and 32 configured with bandwidth: 238.459 Mbps
Link between nodes 30 and 33 configured with bandwidth: 222.518 Mbps
Link between nodes 30 and 34 configured with bandwidth: 204.099 Mbps
Link between nodes 30 and 35 configured with bandwidth: 119.341 Mbps
Link between nodes 30 and 36 configured with bandwidth: 74.6714 Mbps
Link between nodes 30 and 37 configured with bandwidth: 164.521 Mbps
Link between nodes 30 and 38 configured with bandwidth: 118.564 Mbps
Link between nodes 30 and 39 configured with bandwidth: 128.68 Mbps
Link between nodes 31 and 39 configured with bandwidth: 128.511 Mbps
Link between nodes 31 and 30 configured with bandwidth: 73.8192 Mbps
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Link between nodes 31 and 30 configured with bandwidth: 75.0192 Mbps
Link between nodes 31 and 32 configured with bandwidth: 218.283 Mbps
Link between nodes 31 and 33 configured with bandwidth: 109.072 Mbps
Link between nodes 31 and 34 configured with bandwidth: 232.2 Mbps
Link between nodes 31 and 35 configured with bandwidth: 203.397 Mbps
Link between nodes 31 and 36 configured with bandwidth: 107.171 Mbps
Link between nodes 31 and 37 configured with bandwidth: 93.5882 Mbps
Link between nodes 31 and 38 configured with bandwidth: 138.394 Mbps
Link between nodes 31 and 39 configured with bandwidth: 61.7586 Mbps
Link between nodes 32 and 39 configured with bandwidth: 223.81 Mbps
Link between nodes 32 and 30 configured with bandwidth: 70.8036 Mbps
Link between nodes 32 and 31 configured with bandwidth: 222.12 Mbps
Link between nodes 32 and 33 configured with bandwidth: 124.574 Mbps
Link between nodes 32 and 34 configured with bandwidth: 167.86 Mbps
Link between nodes 32 and 35 configured with bandwidth: 73.6229 Mbps
Link between nodes 32 and 36 configured with bandwidth: 158.293 Mbps
Link between nodes 32 and 37 configured with bandwidth: 219.779 Mbps
Link between nodes 32 and 38 configured with bandwidth: 231.579 Mbps
Link between nodes 32 and 39 configured with bandwidth: 231.991 Mbps
Link between nodes 33 and 39 configured with bandwidth: 85.4374 Mbps
Link between nodes 33 and 30 configured with bandwidth: 157.65 Mbps
Link between nodes 33 and 31 configured with bandwidth: 133.723 Mbps
Link between nodes 33 and 32 configured with bandwidth: 65.9847 Mbps
Link between nodes 33 and 34 configured with bandwidth: 161.125 Mbps
Link between nodes 33 and 35 configured with bandwidth: 126.03 Mbps
Link between nodes 33 and 36 configured with bandwidth: 126.26 Mbps
Link between nodes 33 and 37 configured with bandwidth: 214.271 Mbps
Link between nodes 33 and 38 configured with bandwidth: 92.2425 Mbps
Link between nodes 33 and 39 configured with bandwidth: 105.699 Mbps
Link between nodes 34 and 39 configured with bandwidth: 99.2886 Mbps
Link between nodes 34 and 30 configured with bandwidth: 212.545 Mbps
Link between nodes 34 and 31 configured with bandwidth: 205.504 Mbps
Link between nodes 34 and 32 configured with bandwidth: 99.1629 Mbps
Link between nodes 34 and 33 configured with bandwidth: 124.639 Mbps
Link between nodes 34 and 35 configured with bandwidth: 108.31 Mbps
Link between nodes 34 and 36 configured with bandwidth: 173.816 Mbps
Link between nodes 34 and 37 configured with bandwidth: 53.7198 Mbps
Link between nodes 34 and 38 configured with bandwidth: 50.4292 Mbps
Link between nodes 34 and 39 configured with bandwidth: 76.4188 Mbps
Link between nodes 35 and 39 configured with bandwidth: 238.334 Mbps
Link between nodes 35 and 30 configured with bandwidth: 229.245 Mbps
Link between nodes 35 and 31 configured with bandwidth: 174.002 Mbps
Link between nodes 35 and 32 configured with bandwidth: 161.557 Mbps
Link between nodes 35 and 33 configured with bandwidth: 126.005 Mbps
Link between nodes 35 and 34 configured with bandwidth: 122.169 Mbps
Link between nodes 35 and 36 configured with bandwidth: 58.6232 Mbps
```



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Link between nodes 35 and 36 configured with bandwidth: 58.6232 Mbps
Link between nodes 35 and 37 configured with bandwidth: 138.968 Mbps
Link between nodes 35 and 38 configured with bandwidth: 146.906 Mbps
Link between nodes 35 and 39 configured with bandwidth: 183.805 Mbps
Link between nodes 36 and 39 configured with bandwidth: 126.215 Mbps
Link between nodes 36 and 30 configured with bandwidth: 223.659 Mbps
Link between nodes 36 and 31 configured with bandwidth: 58.7798 Mbps
Link between nodes 36 and 32 configured with bandwidth: 236.217 Mbps
Link between nodes 36 and 33 configured with bandwidth: 83.4979 Mbps
Link between nodes 36 and 34 configured with bandwidth: 66.2886 Mbps
Link between nodes 36 and 35 configured with bandwidth: 161.474 Mbps
Link between nodes 36 and 37 configured with bandwidth: 55.0831 Mbps
Link between nodes 36 and 38 configured with bandwidth: 239.865 Mbps
Link between nodes 36 and 39 configured with bandwidth: 83.8983 Mbps
Link between nodes 37 and 39 configured with bandwidth: 107.723 Mbps
Link between nodes 37 and 30 configured with bandwidth: 150.996 Mbps
Link between nodes 37 and 31 configured with bandwidth: 96.3443 Mbps
Link between nodes 37 and 32 configured with bandwidth: 51.9268 Mbps
Link between nodes 37 and 33 configured with bandwidth: 234.148 Mbps
Link between nodes 37 and 34 configured with bandwidth: 221.055 Mbps
Link between nodes 37 and 35 configured with bandwidth: 63.6847 Mbps
Link between nodes 37 and 36 configured with bandwidth: 65.7825 Mbps
Link between nodes 37 and 38 configured with bandwidth: 138.994 Mbps
Link between nodes 37 and 39 configured with bandwidth: 84.4913 Mbps
Link between nodes 38 and 39 configured with bandwidth: 58.4548 Mbps
Link between nodes 38 and 30 configured with bandwidth: 182.597 Mbps
Link between nodes 38 and 31 configured with bandwidth: 155.995 Mbps
Link between nodes 38 and 32 configured with bandwidth: 93.1629 Mbps
Link between nodes 38 and 33 configured with bandwidth: 139.071 Mbps
Link between nodes 38 and 34 configured with bandwidth: 179.253 Mbps
Link between nodes 38 and 35 configured with bandwidth: 149.671 Mbps
Link between nodes 38 and 36 configured with bandwidth: 57.356 Mbps
Link between nodes 38 and 37 configured with bandwidth: 229.399 Mbps
Link between nodes 38 and 39 configured with bandwidth: 85.2974 Mbps
Link between nodes 39 and 39 configured with bandwidth: 204.435 Mbps
Link between nodes 39 and 30 configured with bandwidth: 203.58 Mbps
Link between nodes 39 and 31 configured with bandwidth: 83.4242 Mbps
Link between nodes 39 and 32 configured with bandwidth: 191.974 Mbps
Link between nodes 39 and 33 configured with bandwidth: 159.801 Mbps
Link between nodes 39 and 34 configured with bandwidth: 216.03 Mbps
Link between nodes 39 and 35 configured with bandwidth: 52.3593 Mbps
Link between nodes 39 and 36 configured with bandwidth: 179.987 Mbps
Link between nodes 39 and 37 configured with bandwidth: 176.467 Mbps
Link between nodes 39 and 38 configured with bandwidth: 140.713 Mbps
Link between nodes 40 and 49 configured with bandwidth: 54.0225 Mbps
Link between nodes 40 and 41 configured with bandwidth: 194.333 Mbps
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Link between nodes 40 and 49 configured with bandwidth: 54.0225 Mbps
Link between nodes 40 and 41 configured with bandwidth: 194.333 Mbps
Link between nodes 40 and 42 configured with bandwidth: 207.351 Mbps
Link between nodes 40 and 43 configured with bandwidth: 239.022 Mbps
Link between nodes 40 and 44 configured with bandwidth: 61.5288 Mbps
Link between nodes 40 and 45 configured with bandwidth: 165.106 Mbps
Link between nodes 40 and 46 configured with bandwidth: 245.35 Mbps
Link between nodes 40 and 47 configured with bandwidth: 170.493 Mbps
Link between nodes 40 and 48 configured with bandwidth: 108.986 Mbps
Link between nodes 40 and 49 configured with bandwidth: 54.4526 Mbps
Link between nodes 41 and 49 configured with bandwidth: 120.971 Mbps
Link between nodes 41 and 40 configured with bandwidth: 52.4822 Mbps
Link between nodes 41 and 42 configured with bandwidth: 132.588 Mbps
Link between nodes 41 and 43 configured with bandwidth: 230.079 Mbps
Link between nodes 41 and 44 configured with bandwidth: 119.163 Mbps
Link between nodes 41 and 45 configured with bandwidth: 75.1755 Mbps
Link between nodes 41 and 46 configured with bandwidth: 167.447 Mbps
Link between nodes 41 and 47 configured with bandwidth: 201.833 Mbps
Link between nodes 41 and 48 configured with bandwidth: 94.555 Mbps
Link between nodes 41 and 49 configured with bandwidth: 222.389 Mbps
Link between nodes 42 and 49 configured with bandwidth: 214.313 Mbps
Link between nodes 42 and 40 configured with bandwidth: 147.998 Mbps
Link between nodes 42 and 41 configured with bandwidth: 188.289 Mbps
Link between nodes 42 and 43 configured with bandwidth: 219.244 Mbps
Link between nodes 42 and 44 configured with bandwidth: 245.08 Mbps
Link between nodes 42 and 45 configured with bandwidth: 75.3659 Mbps
Link between nodes 42 and 46 configured with bandwidth: 212.982 Mbps
Link between nodes 42 and 47 configured with bandwidth: 205.204 Mbps
Link between nodes 42 and 48 configured with bandwidth: 173.822 Mbps
Link between nodes 42 and 49 configured with bandwidth: 221.941 Mbps
Link between nodes 43 and 49 configured with bandwidth: 240.162 Mbps
Link between nodes 43 and 40 configured with bandwidth: 231.998 Mbps
Link between nodes 43 and 41 configured with bandwidth: 153.403 Mbps
Link between nodes 43 and 42 configured with bandwidth: 96.8673 Mbps
Link between nodes 43 and 44 configured with bandwidth: 69.6133 Mbps
Link between nodes 43 and 45 configured with bandwidth: 209.363 Mbps
Link between nodes 43 and 46 configured with bandwidth: 176.827 Mbps
Link between nodes 43 and 47 configured with bandwidth: 118.081 Mbps
Link between nodes 43 and 48 configured with bandwidth: 83.338 Mbps
Link between nodes 43 and 49 configured with bandwidth: 192.045 Mbps
Link between nodes 44 and 49 configured with bandwidth: 114.902 Mbps
Link between nodes 44 and 40 configured with bandwidth: 60.2344 Mbps
Link between nodes 44 and 41 configured with bandwidth: 78.3493 Mbps
Link between nodes 44 and 42 configured with bandwidth: 169.425 Mbps
Link between nodes 44 and 43 configured with bandwidth: 142.254 Mbps
Link between nodes 44 and 45 configured with bandwidth: 216.5 Mbps
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Link between nodes 45 and 43 configured with bandwidth: 80.1583 Mbps
Link between nodes 45 and 44 configured with bandwidth: 177.94 Mbps
Link between nodes 45 and 46 configured with bandwidth: 173.429 Mbps
Link between nodes 45 and 47 configured with bandwidth: 241.446 Mbps
Link between nodes 45 and 48 configured with bandwidth: 73.4959 Mbps
Link between nodes 45 and 49 configured with bandwidth: 52.628 Mbps
Link between nodes 46 and 49 configured with bandwidth: 106.282 Mbps
Link between nodes 46 and 40 configured with bandwidth: 213.581 Mbps
Link between nodes 46 and 41 configured with bandwidth: 71.5847 Mbps
Link between nodes 46 and 42 configured with bandwidth: 119.175 Mbps
Link between nodes 46 and 43 configured with bandwidth: 166.808 Mbps
Link between nodes 46 and 44 configured with bandwidth: 239.993 Mbps
Link between nodes 46 and 45 configured with bandwidth: 109.69 Mbps
Link between nodes 46 and 47 configured with bandwidth: 168.213 Mbps
Link between nodes 46 and 48 configured with bandwidth: 203.828 Mbps
Link between nodes 46 and 49 configured with bandwidth: 177.421 Mbps
Link between nodes 47 and 49 configured with bandwidth: 157 Mbps
Link between nodes 47 and 40 configured with bandwidth: 119.104 Mbps
Link between nodes 47 and 41 configured with bandwidth: 198.261 Mbps
Link between nodes 47 and 42 configured with bandwidth: 233.189 Mbps
Link between nodes 47 and 43 configured with bandwidth: 223.611 Mbps
Link between nodes 47 and 44 configured with bandwidth: 230.64 Mbps
Link between nodes 47 and 45 configured with bandwidth: 58.301 Mbps
Link between nodes 47 and 46 configured with bandwidth: 92.471 Mbps
Link between nodes 47 and 48 configured with bandwidth: 199.765 Mbps
Link between nodes 47 and 49 configured with bandwidth: 176.357 Mbps
Link between nodes 48 and 49 configured with bandwidth: 119.508 Mbps
Link between nodes 48 and 40 configured with bandwidth: 71.754 Mbps
Link between nodes 48 and 41 configured with bandwidth: 135.863 Mbps
Link between nodes 48 and 42 configured with bandwidth: 109.209 Mbps
Link between nodes 48 and 43 configured with bandwidth: 216.976 Mbps
Link between nodes 48 and 44 configured with bandwidth: 164.744 Mbps
Link between nodes 48 and 45 configured with bandwidth: 77.3022 Mbps
Link between nodes 48 and 46 configured with bandwidth: 82.0493 Mbps
Link between nodes 48 and 47 configured with bandwidth: 65.4366 Mbps
Link between nodes 48 and 49 configured with bandwidth: 202.845 Mbps
Link between nodes 49 and 49 configured with bandwidth: 191.924 Mbps
Link between nodes 49 and 40 configured with bandwidth: 226.856 Mbps
Link between nodes 49 and 41 configured with bandwidth: 91.3433 Mbps
Link between nodes 49 and 42 configured with bandwidth: 94.2566 Mbps
Link between nodes 49 and 43 configured with bandwidth: 202.095 Mbps
Link between nodes 49 and 44 configured with bandwidth: 210.142 Mbps
Link between nodes 49 and 45 configured with bandwidth: 84.8268 Mbps
Link between nodes 49 and 46 configured with bandwidth: 169.966 Mbps
Link between nodes 49 and 47 configured with bandwidth: 78.5541 Mbps
Link between nodes 49 and 48 configured with bandwidth: 70.3016 Mbps

```

Source and Destination Nodes:

The source node is node 0 in AS1 and the destination nodes in node 47 in AS5.

Links between Gateway Routers of ASes:

- Link between nodes 6 and 27 configured with bandwidth: 97.8392 Mbps
- Link between nodes 11 and 24 configured with bandwidth: 162.235 Mbps
- Link between nodes 23 and 49 configured with bandwidth: 232.682 Mbps
- Link between nodes 26 and 39 configured with bandwidth: 161.704 Mbps

```

Link between nodes 6 and 27 configured with bandwidth: 97.8392 Mbps
Link between nodes 11 and 24 configured with bandwidth: 162.235 Mbps
Link between nodes 23 and 49 configured with bandwidth: 232.682 Mbps
Link between nodes 26 and 39 configured with bandwidth: 161.704 Mbps

```

ii) Best path (3 marks)

The best path is determined using Dijkstra's algorithm for each autonomous system (AS), calculating the shortest paths from the source node (Node 0) to the designated gateway nodes within each AS. Link costs are based on randomly assigned bandwidth values. These optimal paths within each AS are then combined to form the overall optimal path from the source to the destination node (Node 47). The dynamic link costs and optimal paths are determined during the simulation through randomized link bandwidths. The best path is chosen by minimizing the cumulative cost across ASes, ensuring an efficient route from source to destination while accommodating diverse network conditions within each AS.

```
Overall Shortest path from node 0 to 47:  
Shortest paths from node 0 to gateway 6: 141.815  
Link cost for Gateway 6 to gateway 27: 97.8392  
Shortest paths from node 27 to gateway 23: 174.734  
Link cost for Gateway 23 to gateway 49: 232.682  
Shortest paths from node 49 to node 47: 160.957  
Total Shortest Path from node 0 to 47: 808.026  
admin@admin:~/ns-allinone-3.29/ns-3.29$
```