Assignment 3

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Contribution to code:

topology.cc

```
using namespace ns3;

#define NODE_NUMBER     6

NS_LOG_COMPONENT_DEFINE ("My topology");

int
main (int argc, char *argv[])
{
  CommandLine cmd;
  cmd.Parse (argc, argv);

  Time::SetResolution (Time::NS);
  LogComponentEnable ("UdpEchoClientApplication", LOG_LEVEL_INFO);
  LogComponentEnable ("UdpEchoServerApplication", LOG_LEVEL_INFO);

// Construct toplogy
  NodeContainer nodes;
  nodes.Create (NODE_NUMBER);
  NodeContainer n01 = NodeContainer (nodes.Get (0), nodes.Get (1));
  NodeContainer n02 = NodeContainer (nodes.Get (0), nodes.Get (2));
  NodeContainer n12 = NodeContainer (nodes.Get (1), nodes.Get (2));
  NodeContainer n13 = NodeContainer (nodes.Get (1), nodes.Get (3));
  NodeContainer n14 = NodeContainer (nodes.Get (1), nodes.Get (4));
  NodeContainer n24 = NodeContainer (nodes.Get (2), nodes.Get (4));
  NodeContainer n34 = NodeContainer (nodes.Get (3), nodes.Get (4));
  NodeContainer n45 = NodeContainer (nodes.Get (4), nodes.Get (5));

// Install protocol stacks on our nodes
  InternetStackHelper stack;
  stack.Install (nodes);

  PointToPointHelper p2p;
  p2p.SetDeviceAttribute ("DataRate", StringValue ("5Mbps"));
```

```
  p2p.SetChannelAttribute ("Delay", StringValue ("2ms"));

//create devices for nodes
  NetDeviceContainer d01 = p2p.Install (n01);
  NetDeviceContainer d02 = p2p.Install (n02);
  NetDeviceContainer d12 = p2p.Install (n12);
  NetDeviceContainer d13 = p2p.Install (n13);
  NetDeviceContainer d14 = p2p.Install (n14);
  NetDeviceContainer d24 = p2p.Install (n24);
  NetDeviceContainer d34 = p2p.Install (n34);
  NetDeviceContainer d45 = p2p.Install (n45);

// Associate the devices on our nodes with IP addresses
  Ipv4AddressHelper ipv4;
  ipv4.SetBase ("10.1.1.0", "255.255.255.0");
  Ipv4InterfaceContainer i01 = ipv4.Assign (d01);

  ipv4.SetBase ("10.1.2.0", "255.255.255.0");
  Ipv4InterfaceContainer i02 = ipv4.Assign (d02);

  ipv4.SetBase ("10.1.3.0", "255.255.255.0");
  Ipv4InterfaceContainer i12 = ipv4.Assign (d12);

  ipv4.SetBase ("10.1.4.0", "255.255.255.0");
  Ipv4InterfaceContainer i13 = ipv4.Assign (d13);

  ipv4.SetBase ("10.1.5.0", "255.255.255.0");
  Ipv4InterfaceContainer i14 = ipv4.Assign (d14);
```

```
93  Ipv4InterfaceContainer i14 = ipv4.Assign (d14);
94
95  ipv4.SetBase ("10.1.6.0", "255.255.255.0");
96  Ipv4InterfaceContainer i24 = ipv4.Assign (d24);
97
98  ipv4.SetBase ("10.1.7.0", "255.255.255.0");
99  Ipv4InterfaceContainer i34 = ipv4.Assign (d34);
100
101 ipv4.SetBase ("10.1.8.0", "255.255.255.0");
102 Ipv4InterfaceContainer i45 = ipv4.Assign (d45);
103
104 // Establish Routes and print them.
105 // print table in file
106 Ipv4GlobalRoutingHelper table;
107 table.PopulateRoutingTables ();
108
109 // Application layer to test topology.
110 UdpEchoServerHelper echoServer (9);// takes port number of the server
111
112 ApplicationContainer serverApps = echoServer.Install (nodes.Get (5));
113 serverApps.Start (Seconds (1.0));
114 serverApps.Stop (Seconds (10.0));
115
116 UdpEchoClientHelper echoClient (i45.GetAddress (1), 9);// takes the ip address & the port number of the server.
117 echoClient.SetAttribute ("MaxPackets", UintegerValue (1));// the maximum number of packets we allow it to send during the simulati
118 echoClient.SetAttribute ("Interval", TimeValue (Seconds (1.0)));// tells the client how long to wait between packets.
119 echoClient.SetAttribute ("PacketSize", UintegerValue (1024));// tells the client how large its packet payloads should be.
120
121 ApplicationContainer clientApps0 = echoClient.Install (nodes.Get (0));
122 clientApps0.Start (Seconds (2.0));
123 clientApps0.Stop (Seconds (10.0));
124
```

```
141 Ptr<OutputStreamWrapper> routingStreamOut = Create<OutputStreamWrapper>("routing-tables.routes" , std::ios::out);
142 table.PrintRoutingTableAllAt(Seconds(0) , routingStreamOut);
143
144 // Animation of our system using NetAnim.
145 MobilityHelper mobility;
146 mobility.SetMobilityModel ("ns3::ConstantPositionMobilityModel");
147 mobility.Install (nodes);
148
149 AnimationInterface anim ("topology.xml");
150
151    // Set position for nodes
152
153 Ptr<ConstantPositionMobilityModel> s1 = nodes.Get (0)->GetObject<ConstantPositionMobilityModel> ();
154 Ptr<ConstantPositionMobilityModel> s2 = nodes.Get (1)->GetObject<ConstantPositionMobilityModel> ();
155 Ptr<ConstantPositionMobilityModel> s3 = nodes.Get (2)->GetObject<ConstantPositionMobilityModel> ();
156 Ptr<ConstantPositionMobilityModel> s4 = nodes.Get (3)->GetObject<ConstantPositionMobilityModel> ();
157 Ptr<ConstantPositionMobilityModel> s5 = nodes.Get (4)->GetObject<ConstantPositionMobilityModel> ();
158 Ptr<ConstantPositionMobilityModel> s6 = nodes.Get (5)->GetObject<ConstantPositionMobilityModel> ();
159
160 s1->SetPosition (Vector ( 0.0, 10.0, 0  ));
161 s2->SetPosition (Vector ( 20.0, 20.0, 0  ));
162 s3->SetPosition (Vector ( 20.0, 0.0, 0  ));
163 s4->SetPosition (Vector ( 30.0, 20.0, 0  ));
164 s5->SetPosition (Vector ( 30.0, 0.0, 0  ));
165 s6->SetPosition (Vector ( 40.0, 0.0, 0  ));
166
167 Simulator::Run ();
168 Simulator::Destroy ();
169 return 0;
```

global-route-manager-impl.cc

```
// In particular, the parent nodes, the next hops, and the root's
// output interfaces of the two instances are being merged.
//
// Note that this is functionally equivalent to calling
// ospf_nexthop_merge (cw->nexthop, w->nexthop) in quagga-0.98.6
// (ospf_spf.c::859), although the detail implementation
// is very different from quagga (blame ns3::GlobalRouteManagerImpl)

// prepare vertex w
              /*w = new SPFVertex (w_lsa);
              SPFNexthopCalculation (v, w, l, distance);
              cw->MergeRootExitDirections (w);
              cw->MergeParent (w);
// SPFVertexAddParent (w) is necessary as the destructor of
// SPFVertex checks if the vertex and its parent is linked
// bidirectionally
              SPFVertexAddParent (w);
              delete w;*/
              return;
            }
          else // cw->GetDistanceFromRoot () > w->GetDistanceFromRoot ()
            {
//
// this path represents a new, lower-cost path to <w> (the vertex we found in
// the current link record of the link state advertisement of the current root
// (vertex <v>)
//
// N.B. the nexthop_calculation is conditional, if it finds a valid nexthop
// it will call spf_add_parents, which will flush the old parents
//
              if (SPFNexthopCalculation (v, cw, l, distance))
                {
//
// If we've changed the cost to get to the vertex represented by <w>, we
// must reorder the priority queue keyed to that cost.
//
```

Interfaces:

```
Node 0 :
        Interface 1 : 10.1.1.1
        Interface 2 : 10.1.2.1
Node 1 :
        Interface 1 : 10.1.1.2
        Interface 2 : 10.1.3.1
        Interface 3 : 10.1.4.1
        Interface 4 : 10.1.5.1
Node 2 :
        Interface 1 : 10.1.2.2
        Interface 2 : 10.1.3.2
        Interface 3 : 10.1.6.1
Node 3 :
        Interface 1 : 10.1.4.2
        Interface 2 : 10.1.7.1
Node 4 :
        Interface 1 : 10.1.5.2
        Interface 2 : 10.1.6.2
        Interface 3 : 10.1.7.2
        Interface 4 : 10.1.8.1
Node 5 :
        Interface 1 : 10.1.8.2
```

Routing table:

```
Node: 0, Time: +0.0s, Local time: +0.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Ipv4StaticRouting
Node: 0, Time: +0.0s, Local time: +0.0s, Ipv4StaticRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
127.0.0.0       0.0.0.0         255.0.0.0       U     0      -      -   0
10.1.1.0        0.0.0.0         255.255.255.0   U     0      -      -   1
10.1.2.0        0.0.0.0         255.255.255.0   U     0      -      -   2

  Priority: -10 Protocol: ns3::Ipv4GlobalRouting
Node: 0, Time: +0.0s, Local time: +0.0s, Ipv4GlobalRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.1.1.2        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.3.1        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.4.1        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.5.1        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.2.2        10.1.2.2        255.255.255.255 UH    -      -      -   2
10.1.3.2        10.1.2.2        255.255.255.255 UH    -      -      -   2
10.1.6.1        10.1.2.2        255.255.255.255 UH    -      -      -   2
10.1.4.2        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.7.1        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.5.2        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.6.2        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.7.2        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.8.1        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.8.2        10.1.1.2        255.255.255.255 UH    -      -      -   1
10.1.1.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.3.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.4.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.5.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.4.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.7.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.5.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.6.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.7.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.8.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
```

```
10.1.8.0        10.1.1.2        255.255.255.0   UG    -      -      -   1
10.1.2.0        10.1.2.2        255.255.255.0   UG    -      -      -   2
10.1.3.0        10.1.2.2        255.255.255.0   UG    -      -      -   2
10.1.6.0        10.1.2.2        255.255.255.0   UG    -      -      -   2

Node: 1, Time: +0.0s, Local time: +0.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Ipv4StaticRouting
Node: 1, Time: +0.0s, Local time: +0.0s, Ipv4StaticRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
127.0.0.0       0.0.0.0         255.0.0.0       U     0      -      -   0
10.1.1.0        0.0.0.0         255.255.255.0   U     0      -      -   1
10.1.3.0        0.0.0.0         255.255.255.0   U     0      -      -   2
10.1.4.0        0.0.0.0         255.255.255.0   U     0      -      -   3
10.1.5.0        0.0.0.0         255.255.255.0   U     0      -      -   4

  Priority: -10 Protocol: ns3::Ipv4GlobalRouting
Node: 1, Time: +0.0s, Local time: +0.0s, Ipv4GlobalRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.1.1.1        10.1.1.1        255.255.255.255 UH    -      -      -   1
10.1.2.1        10.1.1.1        255.255.255.255 UH    -      -      -   1
10.1.2.2        10.1.3.2        255.255.255.255 UH    -      -      -   2
10.1.3.2        10.1.3.2        255.255.255.255 UH    -      -      -   2
10.1.6.1        10.1.3.2        255.255.255.255 UH    -      -      -   2
10.1.4.2        10.1.4.2        255.255.255.255 UH    -      -      -   3
10.1.7.1        10.1.4.2        255.255.255.255 UH    -      -      -   3
10.1.5.2        10.1.5.2        255.255.255.255 UH    -      -      -   4
10.1.6.2        10.1.5.2        255.255.255.255 UH    -      -      -   4
10.1.7.2        10.1.5.2        255.255.255.255 UH    -      -      -   4
10.1.8.1        10.1.5.2        255.255.255.255 UH    -      -      -   4
10.1.8.2        10.1.5.2        255.255.255.255 UH    -      -      -   4
10.1.1.0        10.1.1.1        255.255.255.0   UG    -      -      -   1
10.1.2.0        10.1.1.1        255.255.255.0   UG    -      -      -   1
```

```
10.1.2.0        10.1.3.2        255.255.255.0   UG    -      -      -   2
10.1.3.0        10.1.3.2        255.255.255.0   UG    -      -      -   2
10.1.6.0        10.1.3.2        255.255.255.0   UG    -      -      -   2
10.1.4.0        10.1.4.2        255.255.255.0   UG    -      -      -   3
10.1.7.0        10.1.4.2        255.255.255.0   UG    -      -      -   3
10.1.5.0        10.1.5.2        255.255.255.0   UG    -      -      -   4
10.1.6.0        10.1.5.2        255.255.255.0   UG    -      -      -   4
10.1.7.0        10.1.5.2        255.255.255.0   UG    -      -      -   4
10.1.8.0        10.1.5.2        255.255.255.0   UG    -      -      -   4
10.1.8.0        10.1.5.2        255.255.255.0   UG    -      -      -   4

Node: 2, Time: +0.0s, Local time: +0.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Ipv4StaticRouting
Node: 2, Time: +0.0s, Local time: +0.0s, Ipv4StaticRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
127.0.0.0       0.0.0.0         255.0.0.0       U     0      -      -   0
10.1.2.0        0.0.0.0         255.255.255.0   U     0      -      -   1
10.1.3.0        0.0.0.0         255.255.255.0   U     0      -      -   2
10.1.6.0        0.0.0.0         255.255.255.0   U     0      -      -   3

  Priority: -10 Protocol: ns3::Ipv4GlobalRouting
Node: 2, Time: +0.0s, Local time: +0.0s, Ipv4GlobalRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.1.1.1        10.1.2.1        255.255.255.255 UH    -      -      -   1
10.1.2.1        10.1.2.1        255.255.255.255 UH    -      -      -   1
10.1.1.2        10.1.3.1        255.255.255.255 UH    -      -      -   2
10.1.3.1        10.1.3.1        255.255.255.255 UH    -      -      -   2
10.1.4.1        10.1.3.1        255.255.255.255 UH    -      -      -   2
10.1.5.1        10.1.3.1        255.255.255.255 UH    -      -      -   2
10.1.5.2        10.1.6.2        255.255.255.255 UH    -      -      -   3
10.1.6.2        10.1.6.2        255.255.255.255 UH    -      -      -   3
10.1.7.2        10.1.6.2        255.255.255.255 UH    -      -      -   3
10.1.8.1        10.1.6.2        255.255.255.255 UH    -      -      -   3
10.1.4.2        10.1.3.1        255.255.255.255 UH    -      -      -   2
10.1.7.1        10.1.3.1        255.255.255.255 UH    -      -      -   2
10.1.1.0        10.1.2.1        255.255.255.0   UG    -      -      -   1
```

```
10.1.1.0        10.1.2.1        255.255.255.0   UG    -      -      -   1
10.1.2.0        10.1.2.1        255.255.255.0   UG    -      -      -   1
10.1.1.0        10.1.3.1        255.255.255.0   UG    -      -      -   2
10.1.3.0        10.1.3.1        255.255.255.0   UG    -      -      -   2
10.1.4.0        10.1.3.1        255.255.255.0   UG    -      -      -   2
10.1.5.0        10.1.3.1        255.255.255.0   UG    -      -      -   2
10.1.4.0        10.1.3.1        255.255.255.0   UG    -      -      -   2
10.1.7.0        10.1.3.1        255.255.255.0   UG    -      -      -   2
10.1.5.0        10.1.6.2        255.255.255.0   UG    -      -      -   3
10.1.6.0        10.1.6.2        255.255.255.0   UG    -      -      -   3
10.1.7.0        10.1.6.2        255.255.255.0   UG    -      -      -   3
10.1.8.0        10.1.6.2        255.255.255.0   UG    -      -      -   3

Node: 3, Time: +0.0s, Local time: +0.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Ipv4StaticRouting
Node: 3, Time: +0.0s, Local time: +0.0s, Ipv4StaticRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
127.0.0.0       0.0.0.0         255.0.0.0       U     0      -      -   0
10.1.4.0        0.0.0.0         255.255.255.0   U     0      -      -   1
10.1.7.0        0.0.0.0         255.255.255.0   U     0      -      -   2

  Priority: -10 Protocol: ns3::Ipv4GlobalRouting
Node: 3, Time: +0.0s, Local time: +0.0s, Ipv4GlobalRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.1.1.2        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.3.1        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.4.1        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.5.1        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.5.2        10.1.7.2        255.255.255.255 UH    -      -      -   2
10.1.6.2        10.1.7.2        255.255.255.255 UH    -      -      -   2
10.1.7.2        10.1.7.2        255.255.255.255 UH    -      -      -   2
10.1.8.1        10.1.7.2        255.255.255.255 UH    -      -      -   2
10.1.1.1        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.2.1        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.2.2        10.1.4.1        255.255.255.255 UH    -      -      -   1
```

```
10.1.3.2        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.6.1        10.1.4.1        255.255.255.255 UH    -      -      -   1
10.1.1.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.3.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.4.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.5.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.1.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.2.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.2.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.3.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.6.0        10.1.4.1        255.255.255.0   UG    -      -      -   1
10.1.5.0        10.1.7.2        255.255.255.0   UG    -      -      -   2
10.1.6.0        10.1.7.2        255.255.255.0   UG    -      -      -   2
10.1.7.0        10.1.7.2        255.255.255.0   UG    -      -      -   2
10.1.8.0        10.1.7.2        255.255.255.0   UG    -      -      -   2

Node: 4, Time: +0.0s, Local time: +0.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Ipv4StaticRouting
Node: 4, Time: +0.0s, Local time: +0.0s, Ipv4StaticRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
127.0.0.0       0.0.0.0         255.0.0.0       U     0      -      -   0
10.1.5.0        0.0.0.0         255.255.255.0   U     0      -      -   1
10.1.6.0        0.0.0.0         255.255.255.0   U     0      -      -   2
10.1.7.0        0.0.0.0         255.255.255.0   U     0      -      -   3
10.1.8.0        0.0.0.0         255.255.255.0   U     0      -      -   4

  Priority: -10 Protocol: ns3::Ipv4GlobalRouting
Node: 4, Time: +0.0s, Local time: +0.0s, Ipv4GlobalRouting table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.1.1.2        10.1.5.1        255.255.255.255 UH    -      -      -   1
10.1.3.1        10.1.5.1        255.255.255.255 UH    -      -      -   1
10.1.4.1        10.1.5.1        255.255.255.255 UH    -      -      -   1
10.1.5.1        10.1.5.1        255.255.255.255 UH    -      -      -   1
10.1.2.2        10.1.6.1        255.255.255.255 UH    -      -      -   2
10.1.3.2        10.1.6.1        255.255.255.255 UH    -      -      -   2
```

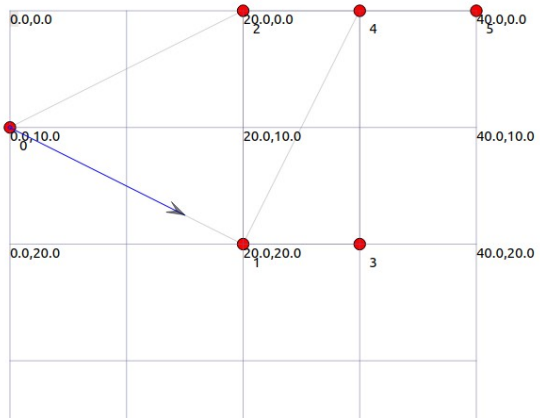
```
169 10.1.4.1        10.1.5.1        255.255.255.255 UH    -      -      -   1
170 10.1.5.1        10.1.5.1        255.255.255.255 UH    -      -      -   1
171 10.1.2.2        10.1.6.1        255.255.255.255 UH    -      -      -   2
172 10.1.3.2        10.1.6.1        255.255.255.255 UH    -      -      -   2
173 10.1.6.1        10.1.6.1        255.255.255.255 UH    -      -      -   2
174 10.1.4.2        10.1.7.1        255.255.255.255 UH    -      -      -   3
175 10.1.7.1        10.1.7.1        255.255.255.255 UH    -      -      -   3
176 10.1.8.2        10.1.8.2        255.255.255.255 UH    -      -      -   4
177 10.1.1.1        10.1.5.1        255.255.255.255 UH    -      -      -   1
178 10.1.2.1        10.1.5.1        255.255.255.255 UH    -      -      -   1
179 10.1.1.0        10.1.5.1        255.255.255.0   UG    -      -      -   1
180 10.1.3.0        10.1.5.1        255.255.255.0   UG    -      -      -   1
181 10.1.4.0        10.1.5.1        255.255.255.0   UG    -      -      -   1
182 10.1.5.0        10.1.5.1        255.255.255.0   UG    -      -      -   1
183 10.1.1.0        10.1.5.1        255.255.255.0   UG    -      -      -   1
184 10.1.2.0        10.1.5.1        255.255.255.0   UG    -      -      -   1
185 10.1.2.0        10.1.6.1        255.255.255.0   UG    -      -      -   2
186 10.1.3.0        10.1.6.1        255.255.255.0   UG    -      -      -   2
187 10.1.6.0        10.1.6.1        255.255.255.0   UG    -      -      -   2
188 10.1.4.0        10.1.7.1        255.255.255.0   UG    -      -      -   3
189 10.1.7.0        10.1.7.1        255.255.255.0   UG    -      -      -   3
190 10.1.8.0        10.1.8.2        255.255.255.0   UG    -      -      -   4
191
192 Node: 5, Time: +0.0s, Local time: +0.0s, Ipv4ListRouting table
193   Priority: 0 Protocol: ns3::Ipv4StaticRouting
194 Node: 5, Time: +0.0s, Local time: +0.0s, Ipv4StaticRouting table
195 Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
196 127.0.0.0       0.0.0.0         255.0.0.0       U     0      -      -   0
197 10.1.8.0        0.0.0.0         255.255.255.0   U     0      -      -   1
198
199   Priority: -10 Protocol: ns3::Ipv4GlobalRouting
200 Node: 5, Time: +0.0s, Local time: +0.0s, Ipv4GlobalRouting table
201 Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
202 0.0.0.0         10.1.8.1        0.0.0.0         UG    -      -      -   1
203
```

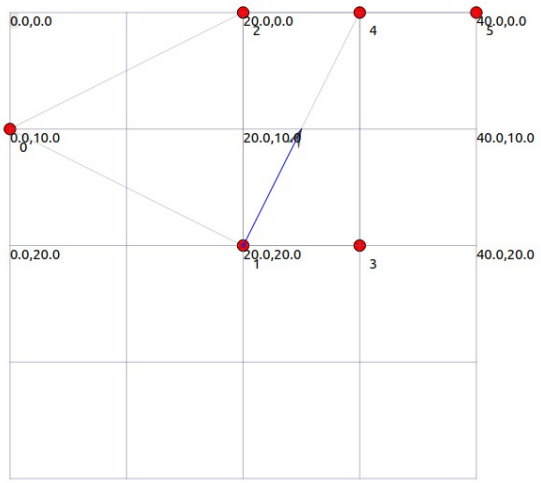
NetAnim sample run:

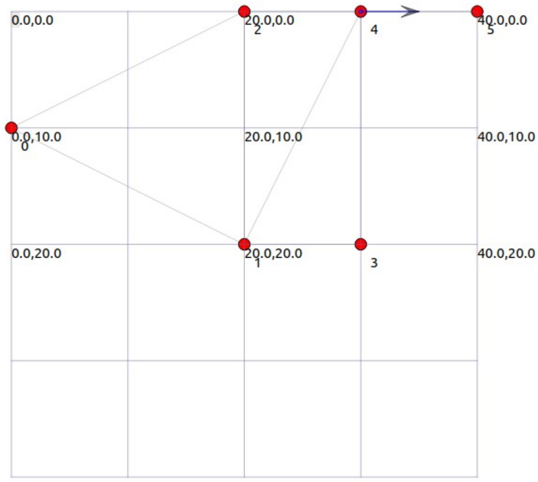
transfer 1 packet between node 0 and node 5

```
At time 2s client sent 1024 bytes to 10.1.8.2 port 9
At time 2.01106s server received 1024 bytes from 10.1.1.1 port 49153
At time 2.01106s server sent 1024 bytes to 10.1.1.1 port 49153
At time 2.02212s client received 1024 bytes from 10.1.8.2 port 9
toka@toka-Aspire-E1-570:~/Downloads/ns-allinone-3.31/ns-3.31$
```

route from node 0 to node 5: 0 → 1 → 4 → 5







route from node 5 to node 0: 5 → 4 → 2 → 0