Aim: Write a program showing the connection of 2 nodes and 4 router such that the extremes nodes act as client and server.

Description: We have 2 hosts and 4 routers. We create subnets among the network ad in ost1, router1 come under subnet1. The logical address of node is divided into network ID and Host ID. In a 32 bit IP address, the first 24 bit are given to network ID and rest 8 bits are given host ID.

Soucre code:

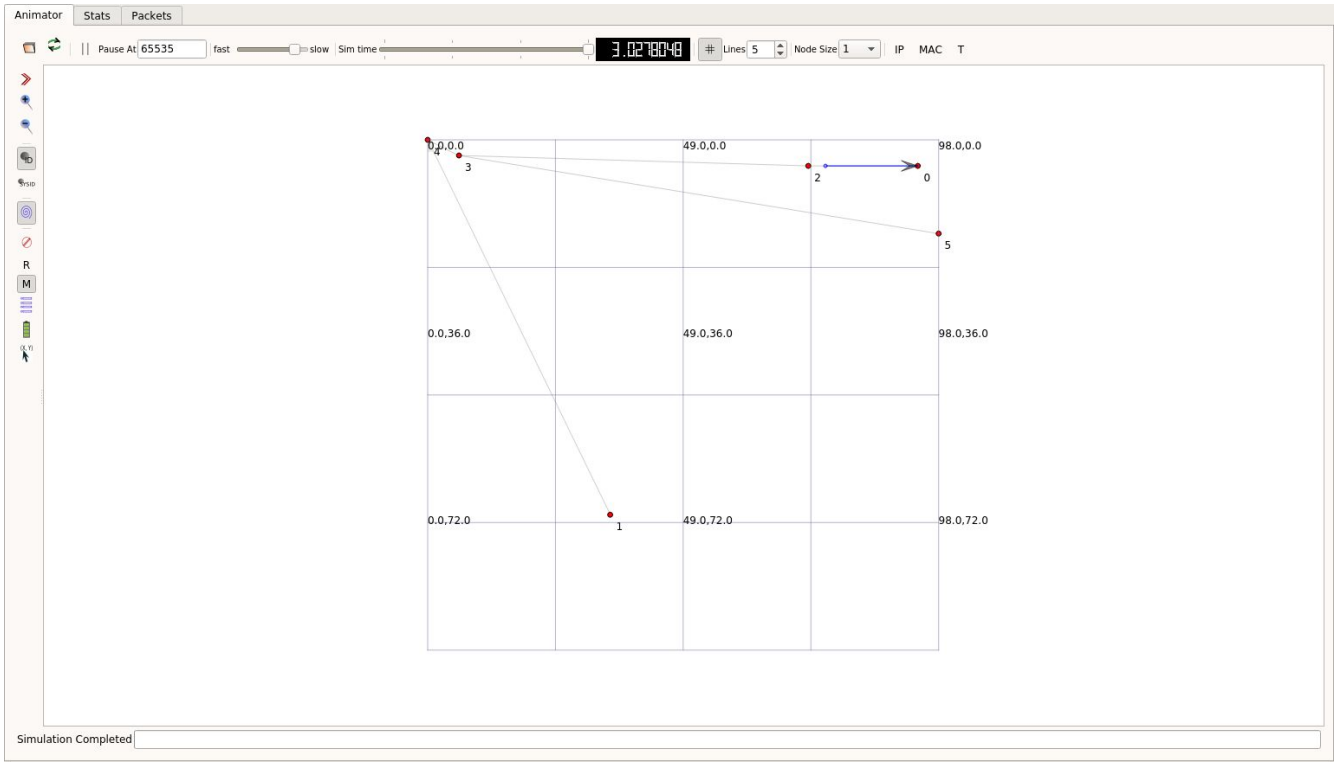
```
#include "ns3/core-module.h"
#include "ns3/network-module.h"
#include "ns3/csma-module.h"
 #include "ns3/internet-module.h"
#include "ns3/point-to-point-module.h"
#include "ns3/applications-module.h"
#include "ns3/ipv4-global-routing-helper.h"

using namespace ns3;
NS_LOG_COMPONENT_DEFINE ("SecondScriptExample");

int
main (int argc, char *argv[]) {
bool verbose = true;

if (verbose) {

LogComponentEnable ("UdpEchoClientApplication", LOG_LEVEL_INFO);

LogComponentEnable ("UdpEchoServerApplication", LOG_LEVEL_INFO); }

NodeContainer host, router, host1;
 host.Create (2);
router.Create (4);

NodeContainer subnet1;
subnet1.Add (host.Get (0));
subnet1.Add (router.Get (0));

PointToPointHelper pointToPoint;
pointToPoint.SetDeviceAttribute ("DataRate", StringValue ("5Mbps"));
pointToPoint.SetChannelAttribute ("Delay", StringValue ("2ms"));

NetDeviceContainer subnet1Devices; subnet1Devices = pointToPoint.Install (subnet1);

InternetStackHelper stack; stack.Install (router); stack.Install (host);
```

```
Ipv4AddressHelper address1, address2, address3, address4, address5, address6;
address1.SetBase ("10.1.1.0", "255.255.255.0");
Ipv4InterfaceContainer subnet1Interfaces;
subnet1Interfaces = address1.Assign (subnet1Devices);

NodeContainer subnet2;

subnet2.Add (router.Get (0));
subnet2.Add (router.Get (1));

NetDeviceContainer subnet2Devices;
subnet2Devices = pointToPoint.Install (subnet2);

address2.SetBase ("10.1.2.0", "255.255.255.0");
Ipv4InterfaceContainer subnet2Interfaces;
subnet2Interfaces = address2.Assign (subnet2Devices);

NodeContainer subnet3; subnet3.Add (router.Get (1));
subnet3.Add (router.Get (2));

NetDeviceContainer subnet3Devices;
subnet3Devices = pointToPoint.Install (subnet3);

address3.SetBase ("10.1.3.0", "255.255.255.0");
Ipv4InterfaceContainer subnet3Interfaces;
subnet3Interfaces = address3.Assign (subnet3Devices);

NodeContainer subnet4;
subnet4.Add (router.Get (1));
subnet4.Add (router.Get (3));

NetDeviceContainer subnet4Devices;
subnet4Devices = pointToPoint.Install (subnet4);

address4.SetBase ("10.1.4.0", "255.255.255.0");
Ipv4InterfaceContainer subnet4Interfaces;
subnet4Interfaces = address4.Assign (subnet4Devices);

NodeContainer subnet5; subnet5.Add (router.Get (2));
subnet5.Add (host.Get (1));

NetDeviceContainer subnet5Devices;
subnet5Devices = pointToPoint.Install (subnet5);

address5.SetBase ("10.1.5.0", "255.255.255.0");
Ipv4InterfaceContainer subnet5Interfaces;
subnet5Interfaces = address5.Assign (subnet5Devices);
```

```
UdpEchoServerHelper echoServer (9);

ApplicationContainer serverApps = echoServer.Install (subnet5.Get (1));
serverApps.Start (Seconds (1.0));
serverApps.Stop (Seconds (10.0));

UdpEchoClientHelper echoClient (subnet5Interfaces.GetAddress (1), 9);
echoClient.SetAttribute ("MaxPackets", UintegerValue (3));
echoClient.SetAttribute ("Interval", TimeValue (Seconds (1.0)));
echoClient.SetAttribute ("PacketSize", UintegerValue (1024));

ApplicationContainer clientApps = echoClient.Install (subnet1.Get (0));
clientApps.Start (Seconds (1.0));
clientApps.Stop (Seconds (10.0));

Ipv4GlobalRoutingHelper::PopulateRoutingTables ();

Simulator::Run (); Simulator::Destroy (); return 0;

}
```

Ouput:

```
Leaving directory `./ns-3.29'
root@cbit-OptiPlex-3060:/home/student/Downloads/ns-allinone-3.29 (2)# cd ns-3.29
root@cbit-OptiPlex-3060:/home/student/Downloads/ns-allinone-3.29 (2)/ns-3.29# ./
waf --run scratch/HYBRID
Waf: Entering directory `/home/student/Downloads/ns-allinone-3.29 (2)/ns-3.29/bu
ild'
Waf: Leaving directory `/home/student/Downloads/ns-allinone-3.29 (2)/ns-3.29/bui
ld'
Build commands will be stored in build/compile_commands.json
'build' finished successfully (3.444s)
At time 1s client sent 1024 bytes to 10.1.5.2 port 9
At time 1.01475s server received 1024 bytes from 10.1.1.1 port 49153
At time 1.01475s server sent 1024 bytes to 10.1.1.1 port 49153
At time 1.02949s client received 1024 bytes from 10.1.5.2 port 9
At time 2s client sent 1024 bytes to 10.1.5.2 port 9
At time 2.01475s server received 1024 bytes from 10.1.1.1 port 49153
At time 2.01475s server sent 1024 bytes to 10.1.1.1 port 49153
At time 2.02949s client received 1024 bytes from 10.1.5.2 port 9
At time 3s client sent 1024 bytes to 10.1.5.2 port 9
At time 3.01475s server received 1024 bytes from 10.1.1.1 port 49153
At time 3.01475s server sent 1024 bytes to 10.1.1.1 port 49153
At time 3.02949s client received 1024 bytes from 10.1.5.2 port 9
root@cbit-OptiPlex-3060:/home/student/Downloads/ns-allinone-3.29 (2)/ns-3.29#
```


Animator
Stats
Packets
Pause At 65535
fast
slow
Sim time
Lines 5
Node Size 1
IP
MAC
T
0.0,0.0
49.0,0.0
98.0,0.0
0.0,36.0
49.0,36.0
98.0,36.0
0.0,72.0
49.0,72.0
98.0,72.0
0
1
2
3
4
5
Simulation Completed