CSE322 Project Update

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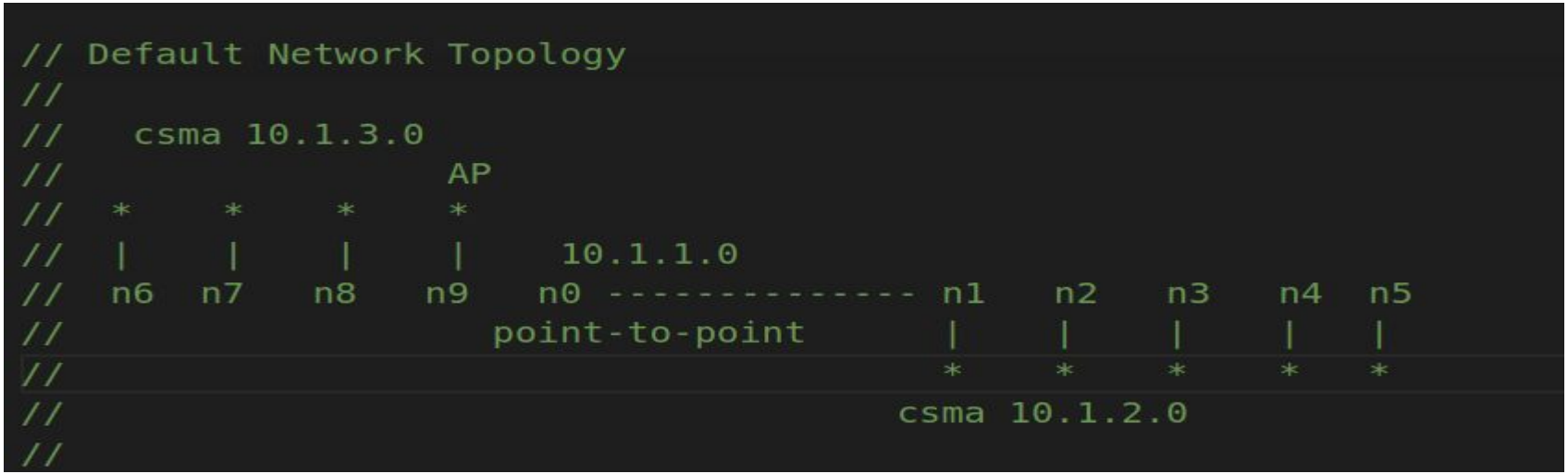
Wired Network : Topology With Three Network



Wired Network : Adding 10 Devices

```
tcpVariant = std::string ("ns3::") + tcpVariant;
Config::SetDefault ("ns3::TcpL4Protocol::SocketType", TypeIdValue (

uint32_t nCsma = 4;
CommandLine cmd (__FILE__);
cmd.AddValue ("useIpv6", "Use Ipv6", useV6);
cmd.Parse (argc, argv);

NodeContainer nodes; // p2pNodes
nodes.Create (2);

PointToPointHelper pointToPoint;
pointToPoint.SetDeviceAttribute ("DataRate", StringValue ("100Mbps"
pointToPoint.SetChannelAttribute ("Delay", StringValue ("10ms"));


NetDeviceContainer devices;
devices = pointToPoint.Install (nodes);

NodeContainer csmaNodes;
csmaNodes.Add (nodes.Get (1));
csmaNodes.Create (nCsma);

NodeContainer csmaNodes2;
```

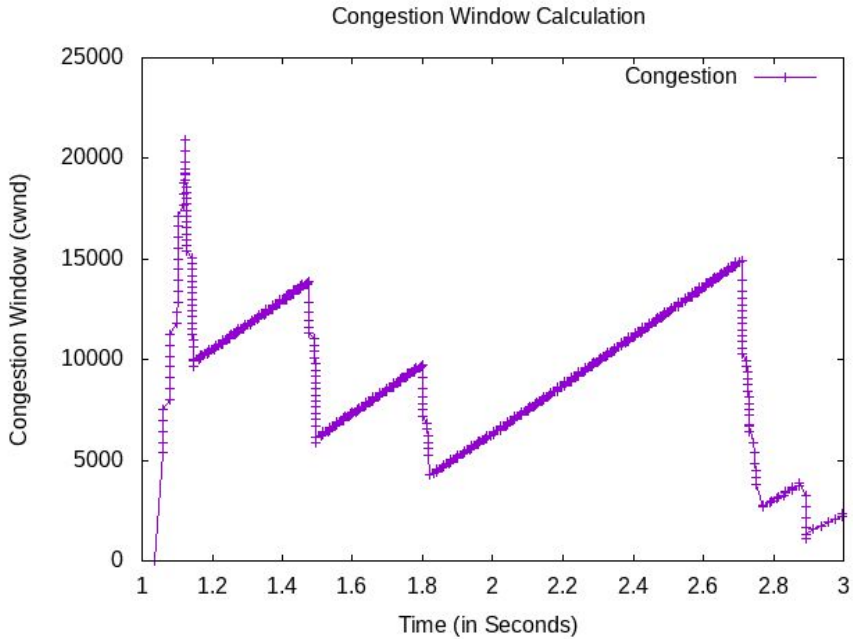
Wired Network : Setting IP Address

```
address.SetBase ("10.1.1.0", "255.255.255.0");
Ipv4InterfaceContainer p2pInterfaces;
p2pInterfaces = address.Assign (devices);

probeType = "ns3::Ipv4PacketProbe";
tracePath = "/NodeList/*/$ns3::Ipv4L3Protocol/Tx";

address.SetBase ("10.1.2.0", "255.255.255.0");
Ipv4InterfaceContainer csmaInterfaces;
csmaInterfaces = address.Assign (csmaDevices);

address.SetBase ("10.1.3.0", "255.255.255.0");
Ipv4InterfaceContainer csmaInterfaces2;
csmaInterfaces2 = address.Assign (csmaDevices2);
```

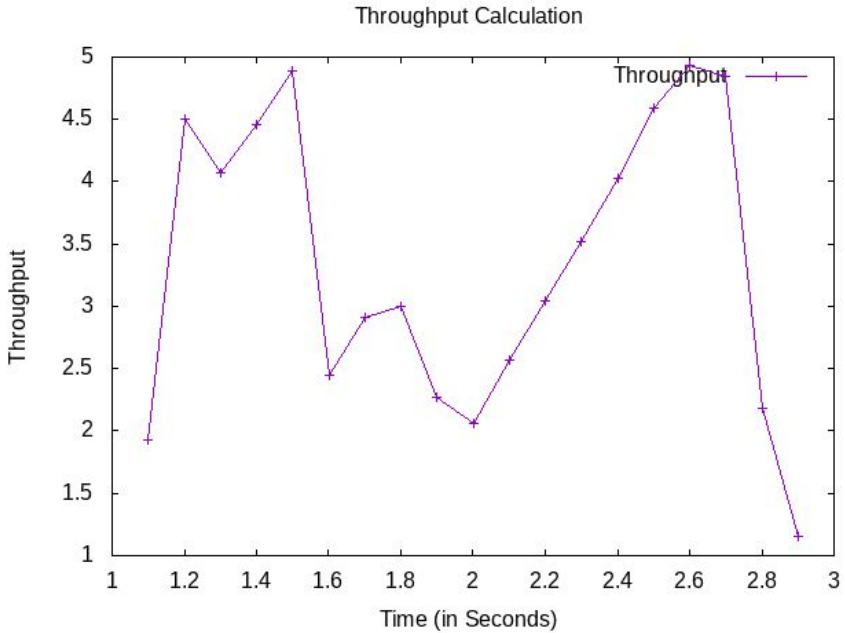
Wired Network : Setting Congestion Control Algorithm

```
std::string tcpVariant = "TcpNewReno";
tcpVariant = std::string ("ns3::") + tcpVariant;
Config::SetDefault ("ns3::TcpL4Protocol::SocketType", TypeIdValue (TypeId::LookupByName (tcpVariant)));
```

Wired Network : Congestion Window Graph



Wired Network : Throughput Graph



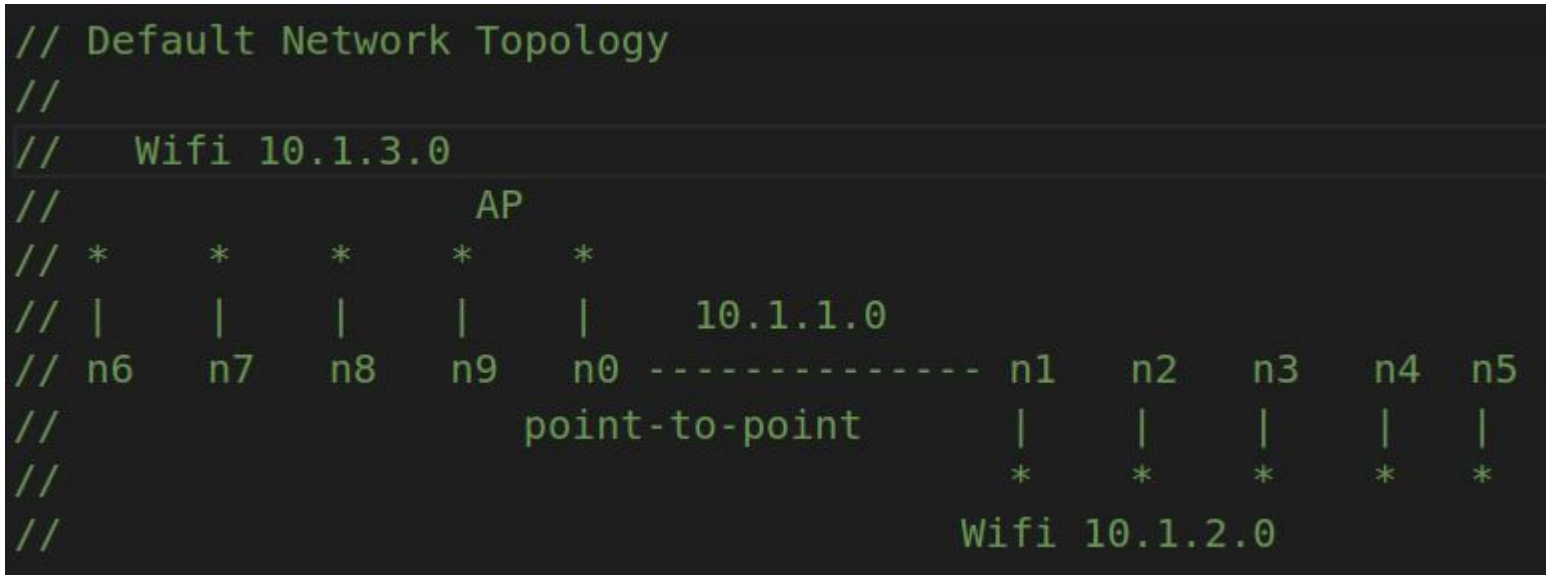
Wired Network : Flowmonitor

```
int num_half_flows = 3;
Ptr<Socket> ns3TcpSocket;
Ipv4GlobalRoutingHelper::PopulateRoutingTables();
for(int i = 0; i < num_half_flows; i++) {
  csmaDevices.Get (i)->SetAttribute ("ReceiveErrorModel", PointerValue (em));
  sinkAddress = InetSocketAddress (csmaInterfaces.GetAddress (i), sinkPort);
  anyAddress = InetSocketAddress (Ipv4Address::GetAny (), sinkPort);
  sinkPort++;
  PacketSinkHelper packetSinkHelper ("ns3::TcpSocketFactory", anyAddress);
  ApplicationContainer sinkApps = packetSinkHelper.Install (csmaNodes.Get (i));
  sink = StaticCast<PacketSink> (sinkApps.Get (0));
  sinkApps.Start (Seconds (0));
  // sinkApps.Stop (Seconds (i*2+20));
  ns3TcpSocket = Socket::CreateSocket (csmaNodes2.Get (i), TcpSocketFactory::GetTypeId ());
  Ptr<MyApp> app = CreateObject<MyApp> ();
  app->Setup (ns3TcpSocket, sinkAddress, 1040, 5000, DataRate ("20Mbps"));
  csmaNodes2.Get (i)->AddApplication (app);
  app->SetStartTime (Seconds (1));
}
```

Wired Network : Flowmonitor

```
<Ipv4FlowClassifier>
  <Flow flowId="1" sourceAddress="10.1.1.1" destinationAddress="10.1.2.1" protocol="6" sourcePort="49153" destinationPort="8080">
    <Dscp value="0x0" packets="9284" />
  </Flow>
  <Flow flowId="4" sourceAddress="10.1.2.1" destinationAddress="10.1.1.1" protocol="6" sourcePort="8080" destinationPort="49153">
    <Dscp value="0x0" packets="4618" />
  </Flow>
  <Flow flowId="5" sourceAddress="10.1.2.2" destinationAddress="10.1.3.2" protocol="6" sourcePort="8081" destinationPort="49153">
    <Dscp value="0x0" packets="758" />
  </Flow>
  <Flow flowId="6" sourceAddress="10.1.2.3" destinationAddress="10.1.3.3" protocol="6" sourcePort="8082" destinationPort="49153">
    <Dscp value="0x0" packets="816" />
  </Flow>
  <Flow flowId="2" sourceAddress="10.1.3.2" destinationAddress="10.1.2.2" protocol="6" sourcePort="49153" destinationPort="8081">
    <Dscp value="0x0" packets="1320" />
  </Flow>
  <Flow flowId="3" sourceAddress="10.1.3.3" destinationAddress="10.1.2.3" protocol="6" sourcePort="49153" destinationPort="8082">
    <Dscp value="0x0" packets="1504" />
  </Flow>
</Ipv4FlowClassifier>
```

Wireless Network : Topology With Three Network



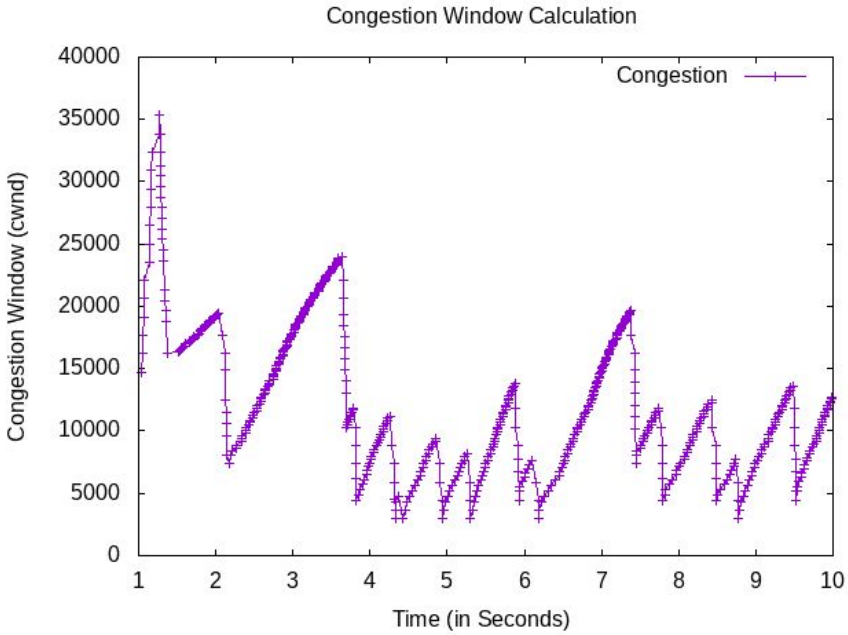
Wireless Network : Adding 10 Devices

```
NodeContainer wifiStaNodesLeft;
wifiStaNodesLeft.Create(leftnodes);
NodeContainer wifiApNodeLeft = p2pNodes.Get(0);

Config::SetDefault("ns3::TcpSocket::SegmentSize", UintegerValue(payloadSize));
WifiMacHelper macLeft;
WifiHelper wifiLeft;
wifiLeft.SetStandard(WIFI_STANDARD_80211n_5GHZ);
YansWifiChannelHelper channelLeft;
channelLeft.SetPropagationDelay("ns3::ConstantSpeedPropagationDelayModel");
channelLeft.AddPropagationLoss("ns3::FriisPropagationLossModel", "Frequency",
YansWifiPhyHelper phyLeft;

phyLeft.SetChannel(channelLeft.Create());
phyLeft.SetErrorRateModel("ns3::YansErrorRateModel");
wifiLeft.SetRemoteStationManager("ns3::ConstantRateWifiManager",
                                 "DataMode", StringValue(phyRate),
                                 "ControlMode", StringValue("HtMcs0"));
Ssid ssid = Ssid("ns-3-ssid");
macLeft.SetType("ns3::StaWifiMac",
                "Ssid", SsidValue(ssid),
                "ActiveProbing", BooleanValue(false));
NetDeviceContainer staDevicesLeft;
staDevicesLeft = wifiLeft.Install(phyLeft, macLeft, wifiStaNodesLeft);
macLeft.SetType("ns3::ApWifiMac",
                "Ssid", SsidValue(ssid));
NetDeviceContainer apDevicesLeft;
apDevicesLeft = wifiLeft.Install(phyLeft, macLeft, wifiApNodeLeft);
```

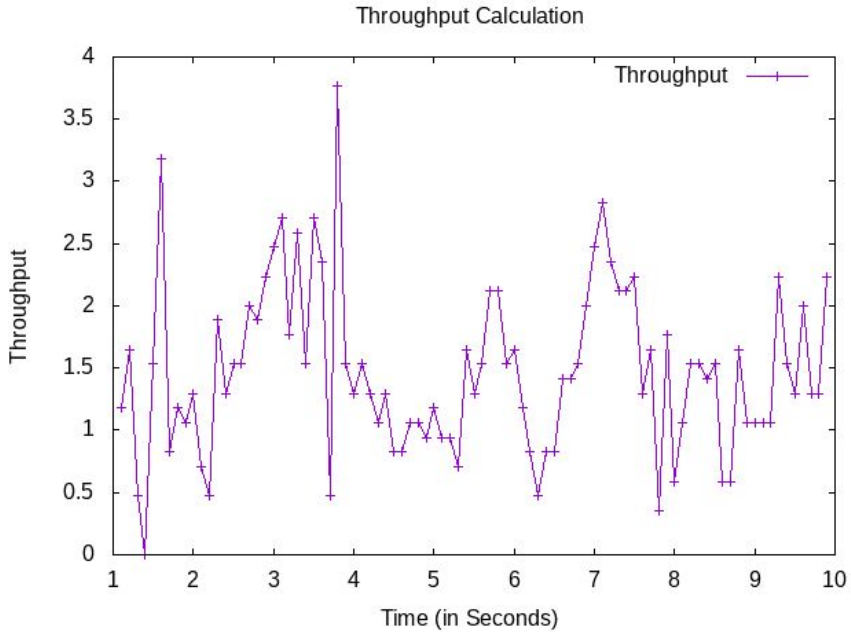
Wireless Network : Setting IP Address

```
InternetStackHelper stack;
stack.Install(wifiApNodeLeft);
stack.Install(wifiStaNodesLeft);
stack.Install(wifiApNodeRight);
stack.Install(wifiStaNodesRight);

Ipv4AddressHelper address;

address.SetBase("10.1.1.0", "255.255.255.0");
Ipv4InterfaceContainer p2pInterfaces;
p2pInterfaces = address.Assign(p2pDevices);

address.SetBase("10.1.2.0", "255.255.255.0");
Ipv4InterfaceContainer rightInterfaces;
rightInterfaces = address.Assign(staDevicesRight);
address.Assign(apDevicesRight);

address.SetBase("10.1.3.0", "255.255.255.0");
Ipv4InterfaceContainer leftInterfaces;
leftInterfaces = address.Assign(staDevicesLeft);
address.Assign(apDevicesLeft);
```

Wireless Network : Congestion Window Graph



Wireless Network : Throughput Graph



Wireless Network : Flowmonitor

```
source: 10.1.2.1 destination: 10.1.3.5
source: 10.1.2.2 destination: 10.1.3.4
source: 10.1.2.3 destination: 10.1.3.3
Flow 1 (10.1.2.1 -> 10.1.3.5)
  Tx Packets              :1170
  Tx Bytes                :1780140
  TxOffered               :1.58235 Mbps
  Rx Packets              :1140
  Rx Bytes                :1734420
  Lost Packets            :30
  Packet Loss ratio       :2.5641
  Packet Delivery ratio:97.4359
  Delay                   :+6.79076e+10ns
  Throughput              :1.54171 Mbps
Flow 2 (10.1.2.2 -> 10.1.3.4)
  Tx Packets              :1327
  Tx Bytes                :2019408
  TxOffered               :1.79503 Mbps
  Rx Packets              :1308
  Rx Bytes                :1990452
  Lost Packets            :19
  Packet Loss ratio       :1.4318
  Packet Delivery ratio:98.5682
  Delay                   :+6.27557e+10ns
  Throughput              :1.76929 Mbps
Flow 3 (10.1.2.3 -> 10.1.3.3)
  Tx Packets              :1152
  Tx Bytes                :1752708
  TxOffered               :1.55796 Mbps
  Rx Packets              :1127
  Rx Bytes                :1714608
  Lost Packets            :25
  Packet Loss ratio       :2.17014
  Packet Delivery ratio:97.8299
  Delay                   :+5.7891e+10ns
  Throughput              :1.5241 Mbps
```

```
Flow 4 (10.1.3.4 -> 10.1.2.2)
  Tx Packets              :741
  Tx Bytes                :40056
  TxOffered               :0.0356053 Mbps
  Rx Packets              :739
  Rx Bytes                :39944
  Lost Packets            :2
  Packet Loss ratio       :0.269906
  Packet Delivery ratio:99.7301
  Delay                   :+1.70103e+09ns
  Throughput              :0.0355058 Mbps
Flow 5 (10.1.3.3 -> 10.1.2.3)
  Tx Packets              :646
  Tx Bytes                :35036
  TxOffered               :0.0311431 Mbps
  Rx Packets              :646
  Rx Bytes                :35036
  Lost Packets            :0
  Packet Loss ratio       :0
  Packet Delivery ratio:100
  Delay                   :+1.48363e+09ns
  Throughput              :0.0311431 Mbps
Flow 6 (10.1.3.5 -> 10.1.2.1)
  Tx Packets              :682
  Tx Bytes                :37364
  TxOffered               :0.0332124 Mbps
  Rx Packets              :682
  Rx Bytes                :37364
  Lost Packets            :0
  Packet Loss ratio       :0
  Packet Delivery ratio:100
  Delay                   :+1.56223e+09ns
  Throughput              :0.0332124 Mbps
```