ENSC 427:Communication Network

Comparison of EIGRP, RIP and OSPF Routing Protocols based on OPNET

Group#11

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Introduction

- Introduce the basic features of RIP, OSPF, EIGRP
- Simulate three different topologies:
  - Star
  - Large Mesh
  - Tree
- Compare the performance and convergence using OPNET 18.0

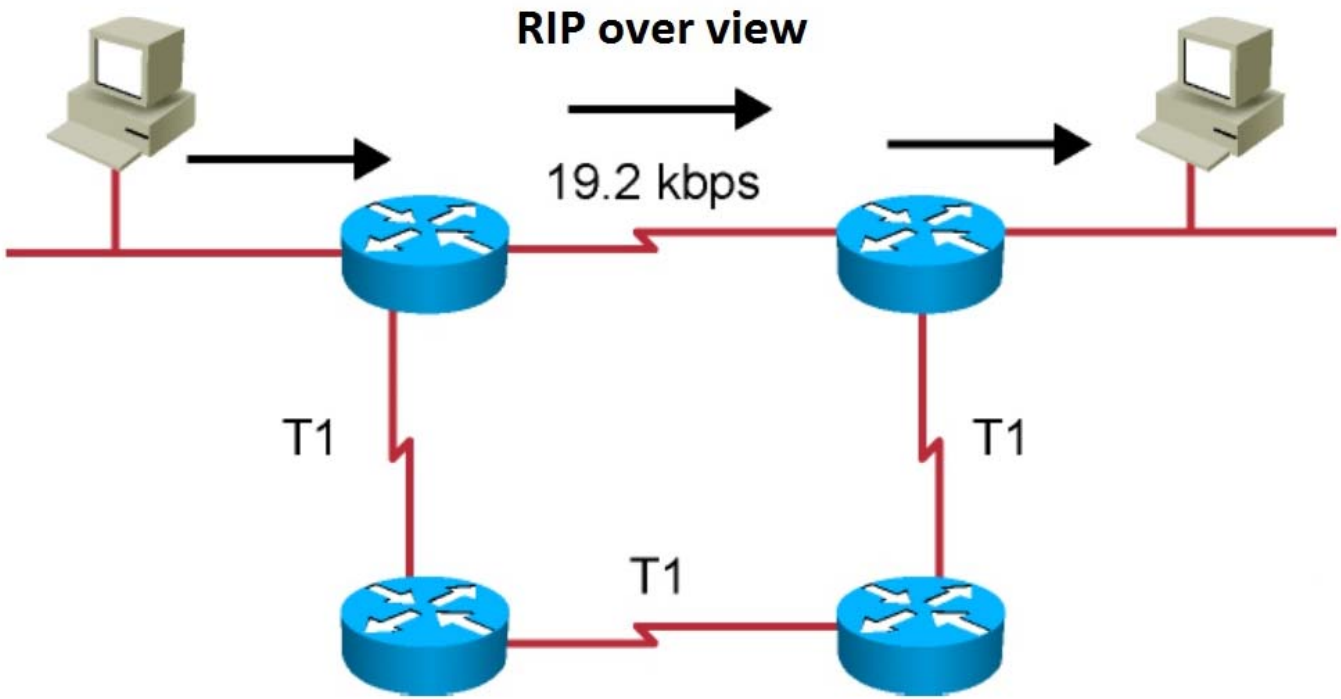
Protocol: RIP

One of the oldest distance vector protocols. Also, RIP uses the count of hops to determine routing metric.

There are four timers for RIP to operate

- Update timer
- Invalid timer
- Flush timer
- Hold-down timer

Protocol: RIP



A RIP example between two computers

Protocol: OSPF

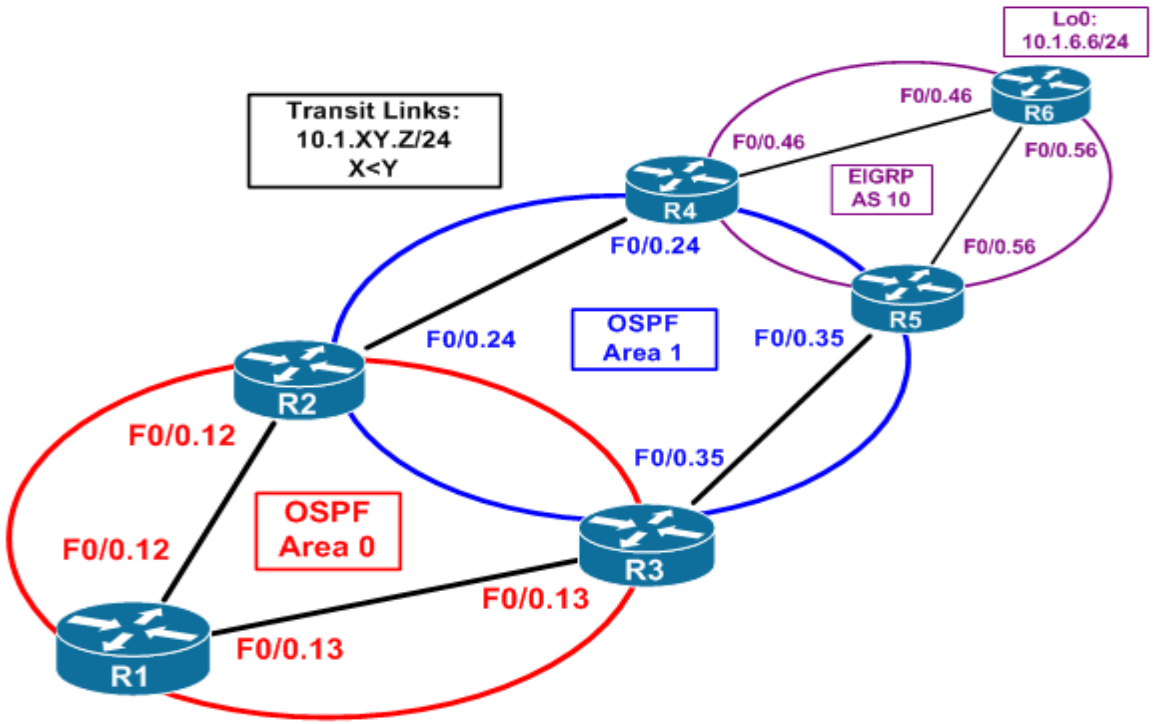
Open Shortest Path First is the network protocol that uses a link state algorithm (SPF) to determine the lowest total metric.

Link state routing is usually used for packet switching.

OSPF defines the following routers:

- Internal router (IR)
- Area border router (ABR)
- Backbone router (BR)
- Autonomous system boundary router (ASBR)

Protocol: OSPF



An example for OSPF and EIGRP choose the paths for six routers.

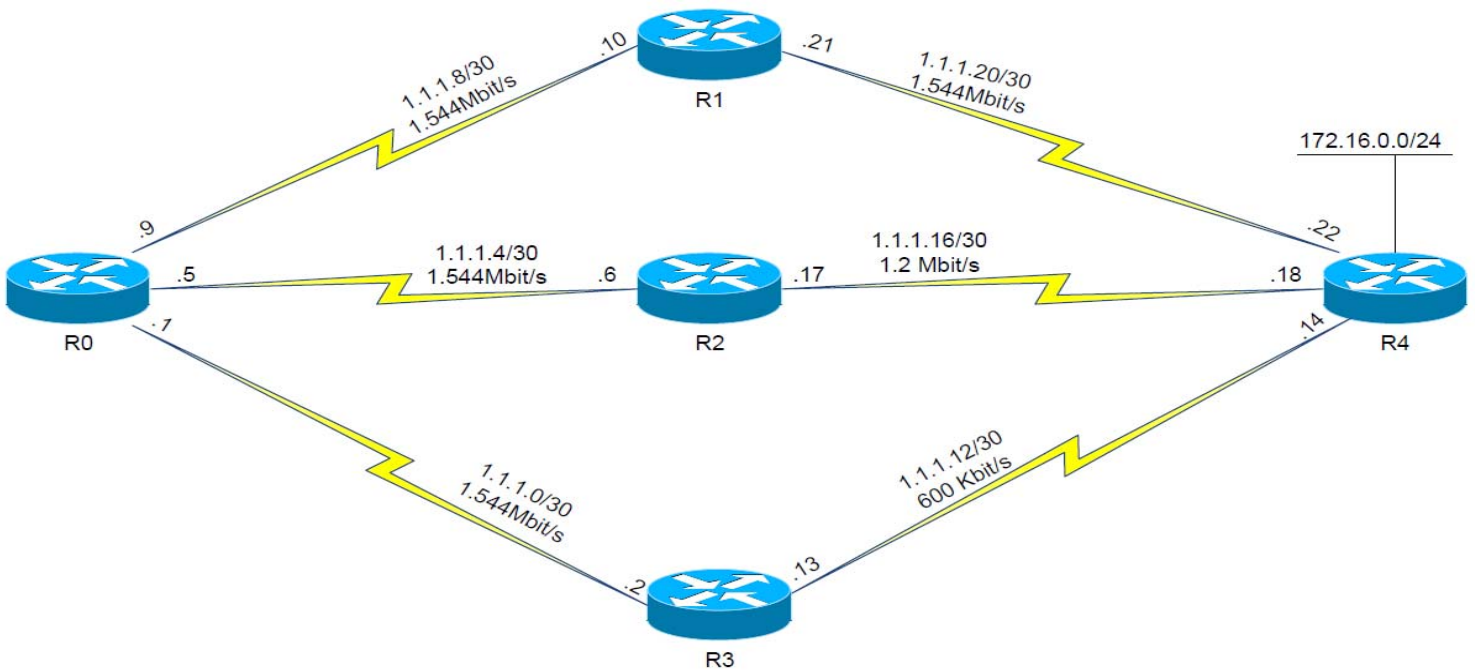
For OSPF, R1 connects to R2 and R3 via area 0. Also, R2 and R3 connect to R4 and R5 via area 1.

Protocol: EIGRP

Enhanced Interior Gateway Routing Protocol (EIGRP) is a combination of distance vector and link state algorithms.

*Distance vector protocols is used to calculate the distance to next hop. Therefore, EIGRP goes to the hop which has the minimum distance.

Protocol: EIGRP

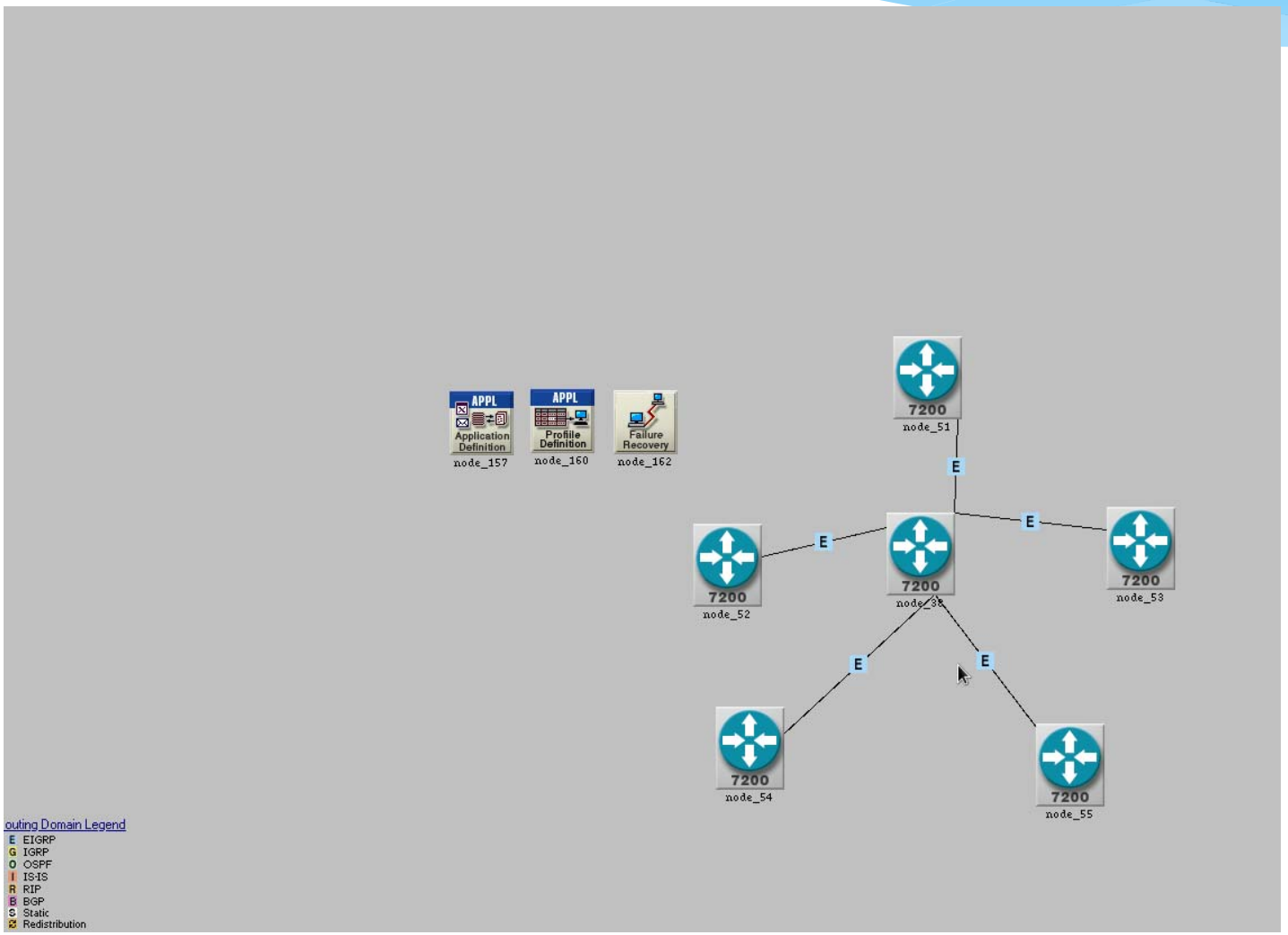


EIGRP selects one of the three possible routers by comparing the metrics. The metric is calculated by bandwidth, delay, and other parameters.

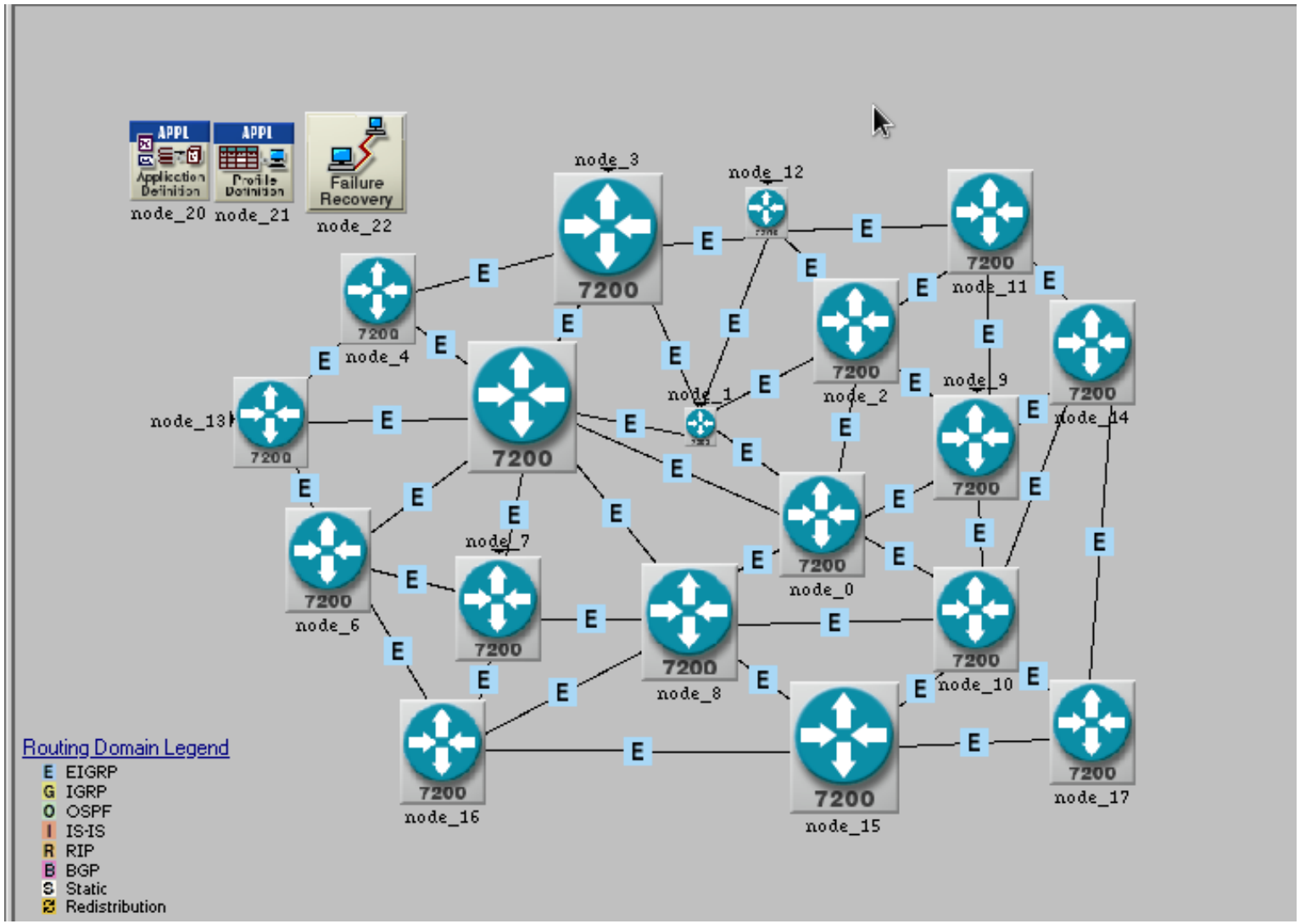
Protocol: Comparison

	RIP	OSPF	EIGRP
Protocol Type	Distance Vector	Link State	Hybrid
Algorithm	RMTI	SPF	DUAL
Convergence	slow	fast	very fast
Default Metric	Hops Count	Bandwidth	Bandwidth/Delay
Hop Count Limit	15	No limit	255

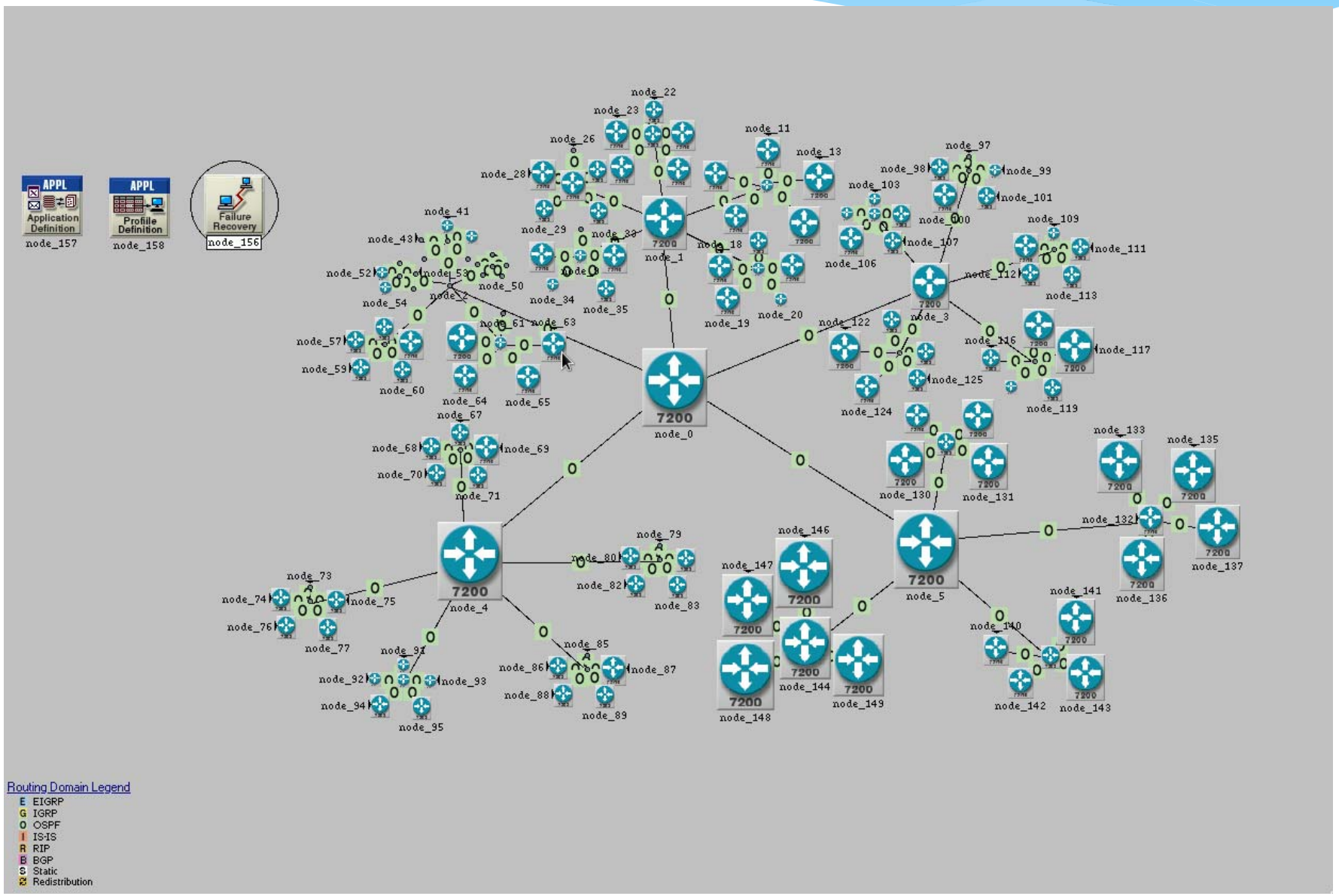
Simulation: Star



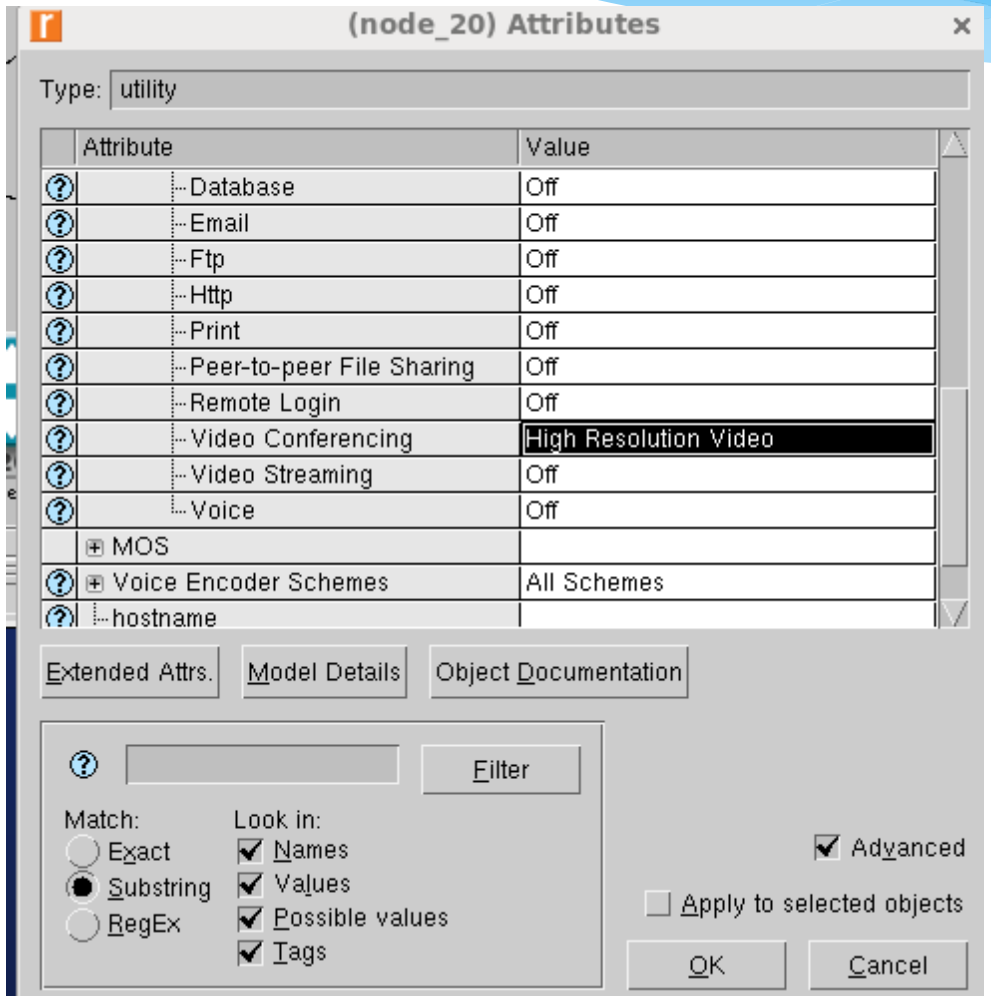
Simulation: Large Mesh



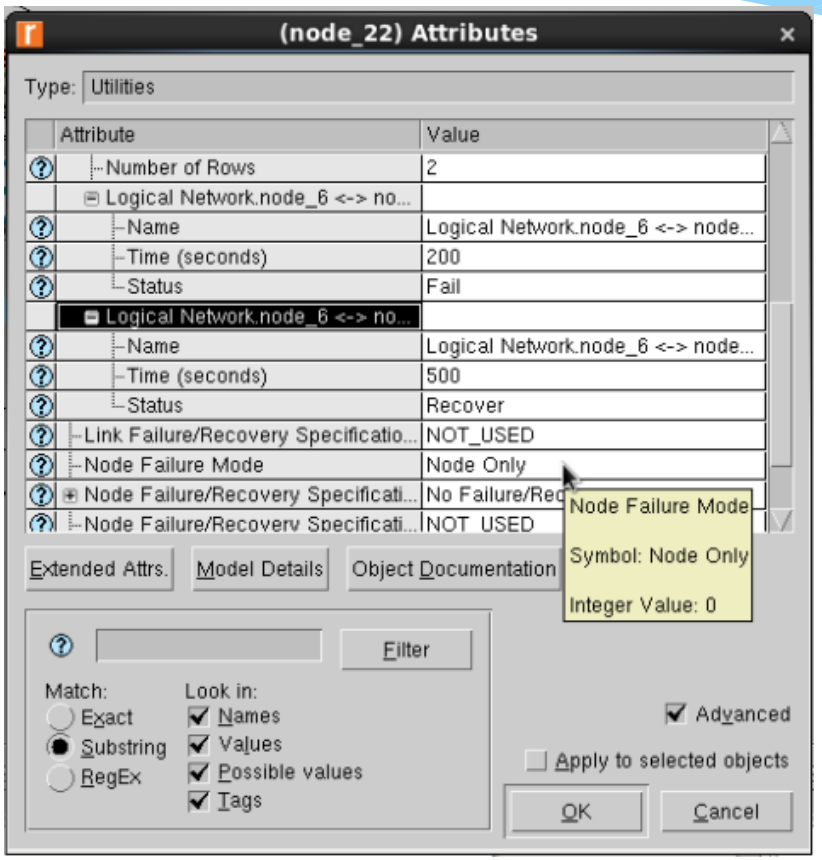
Simulation: Tree



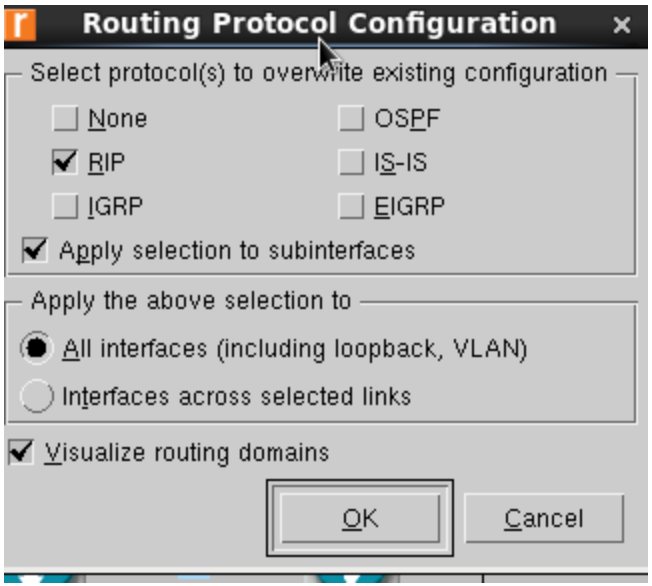
Simulation: Setting Attributes



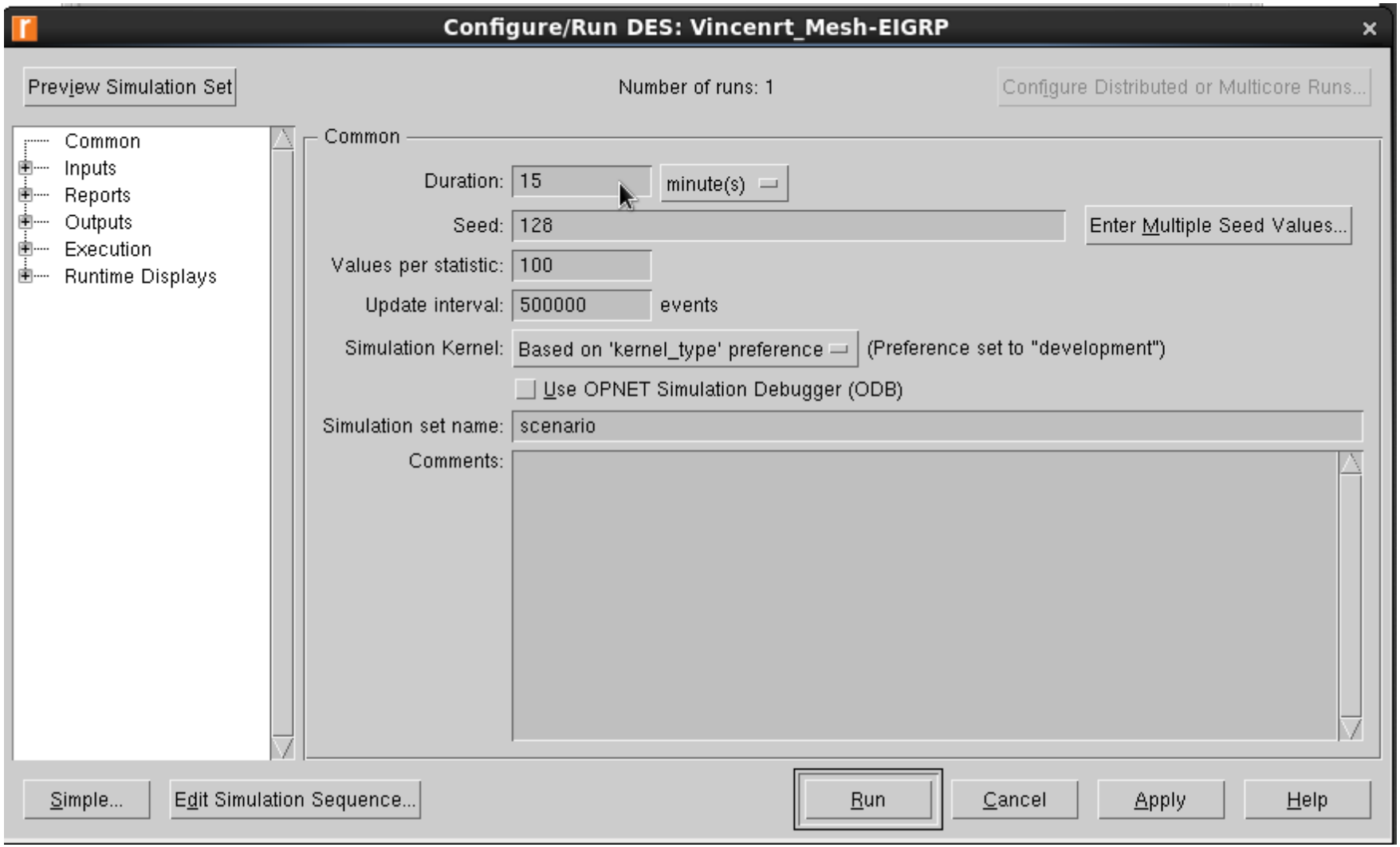
Simulation: Setting Attributes



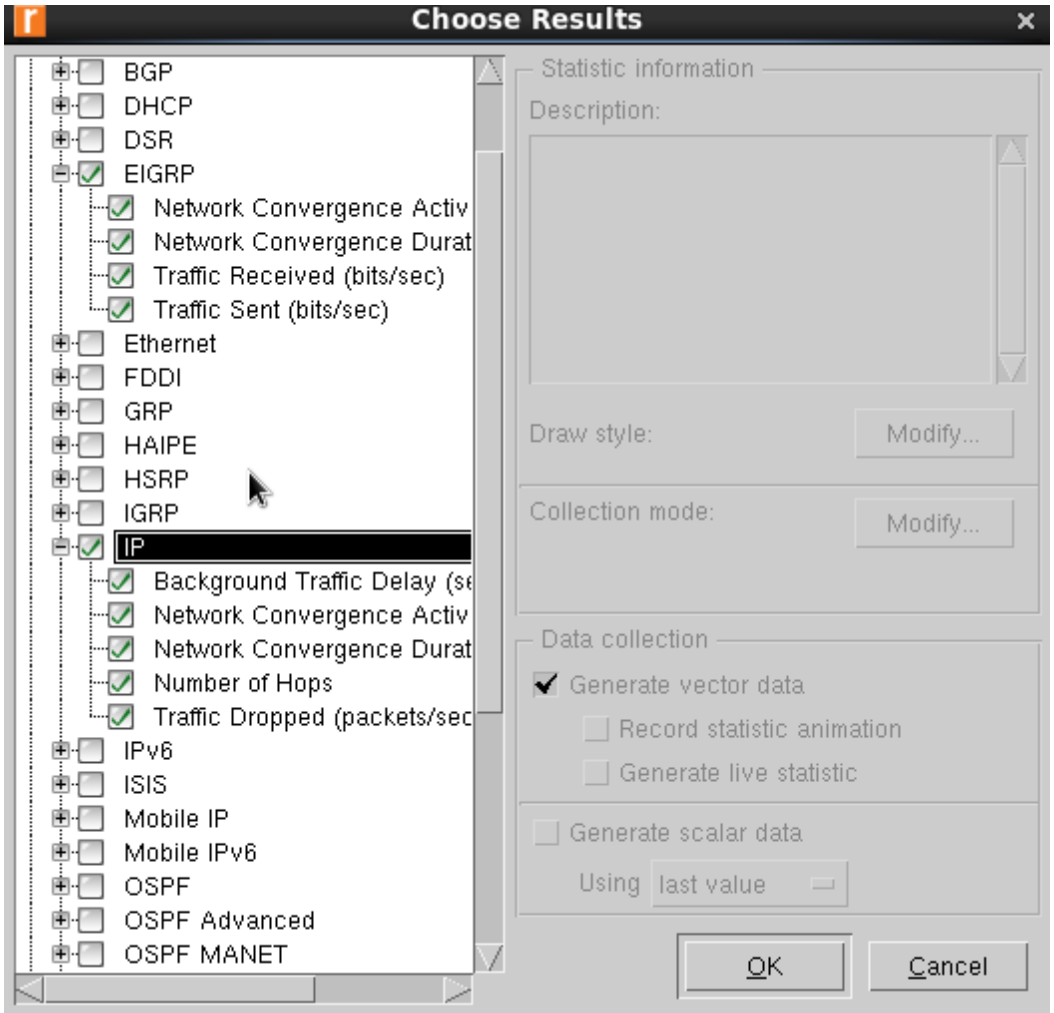
Simulation: Setting the Protocol



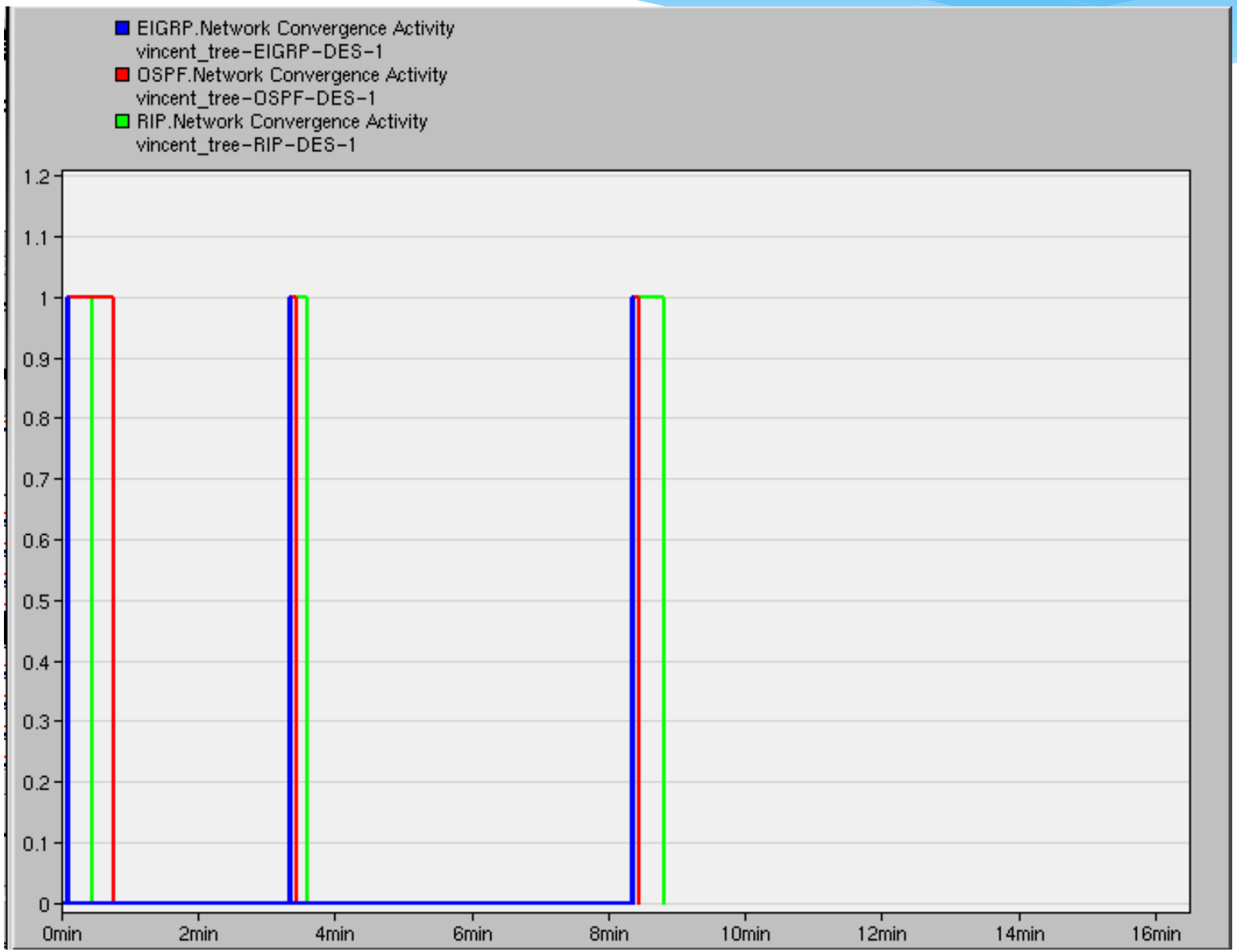
Simulation: Setting the duration for simulation



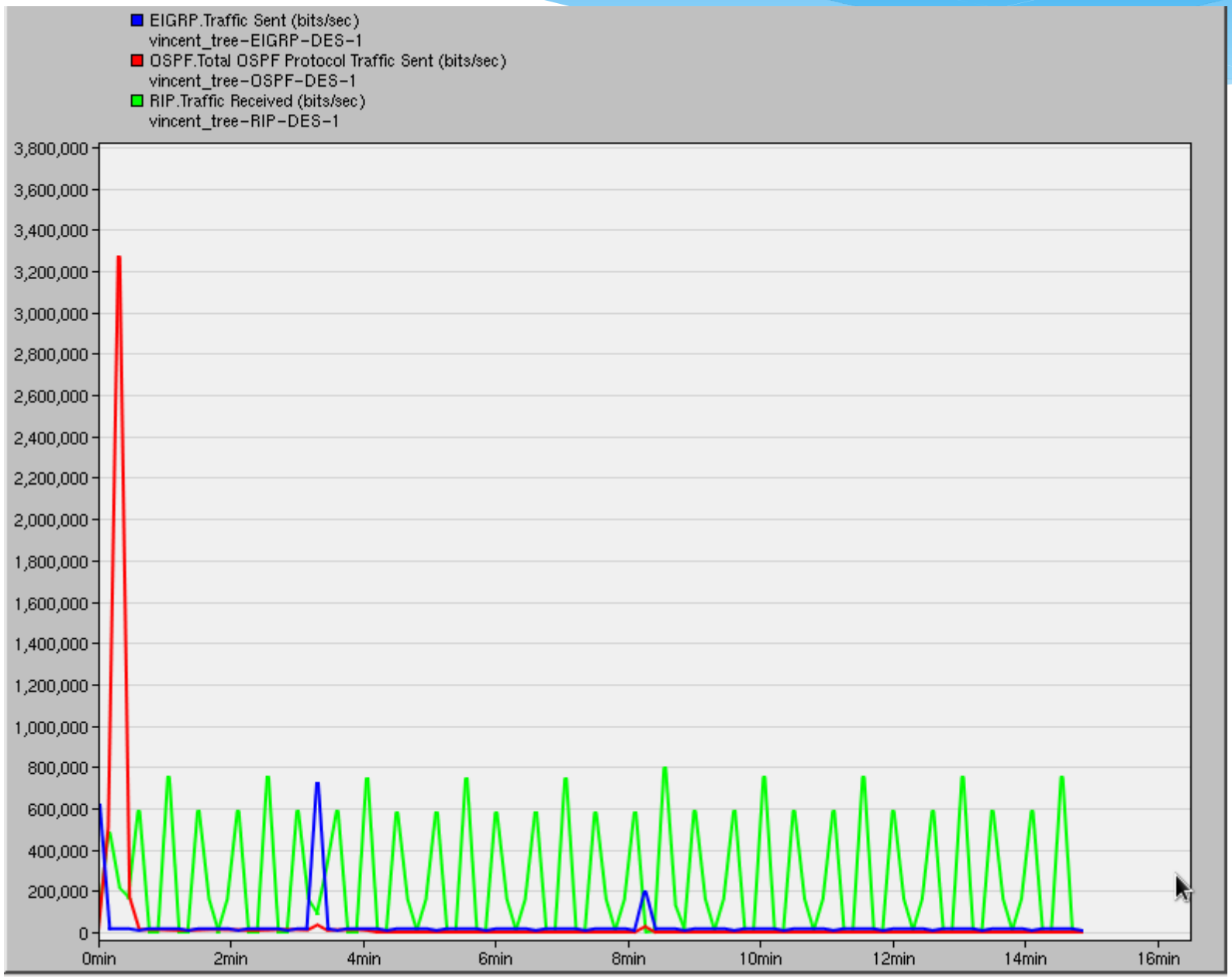
Simulation: To choose results for comparing



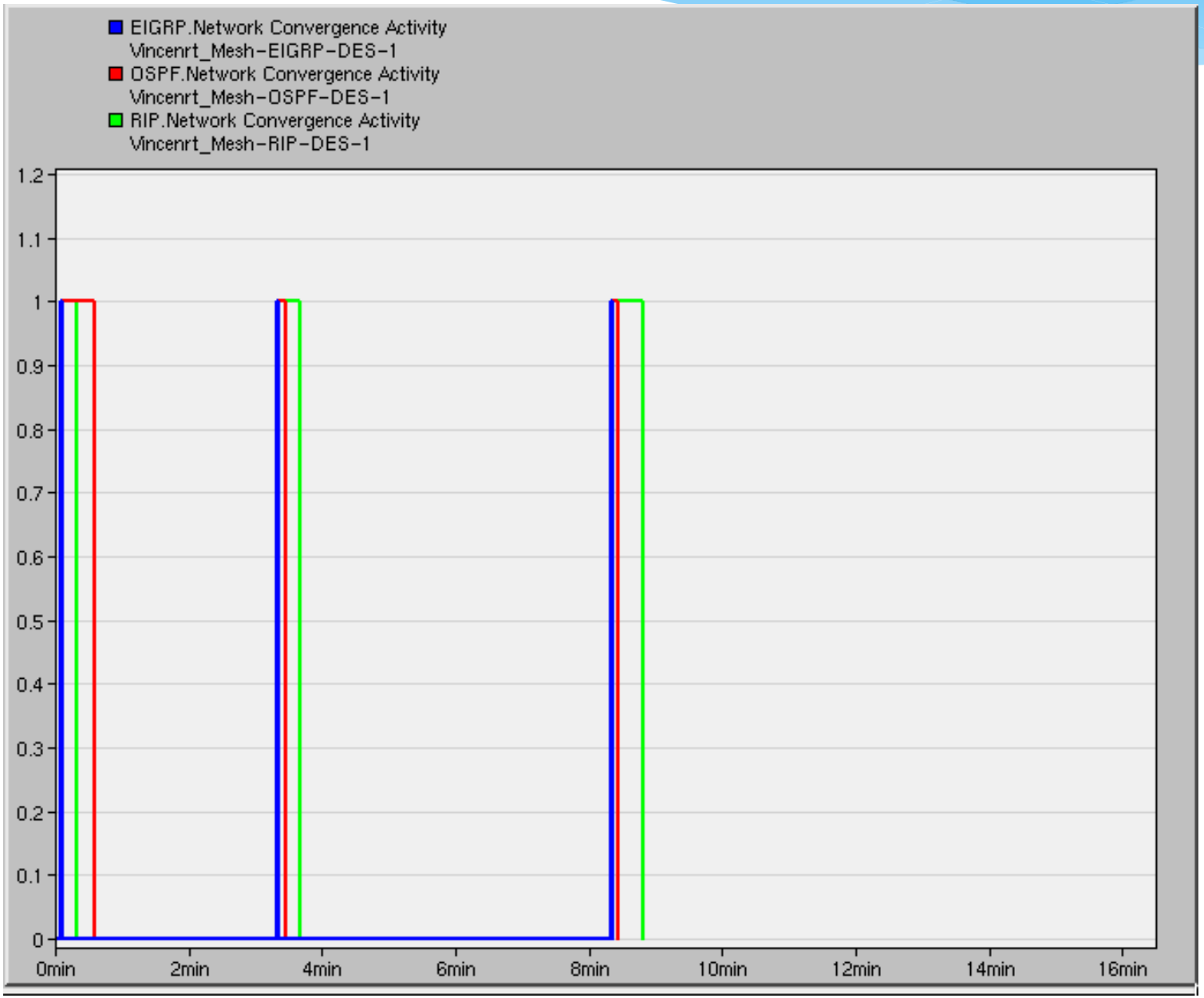
Comparison: Star Convergence Activity



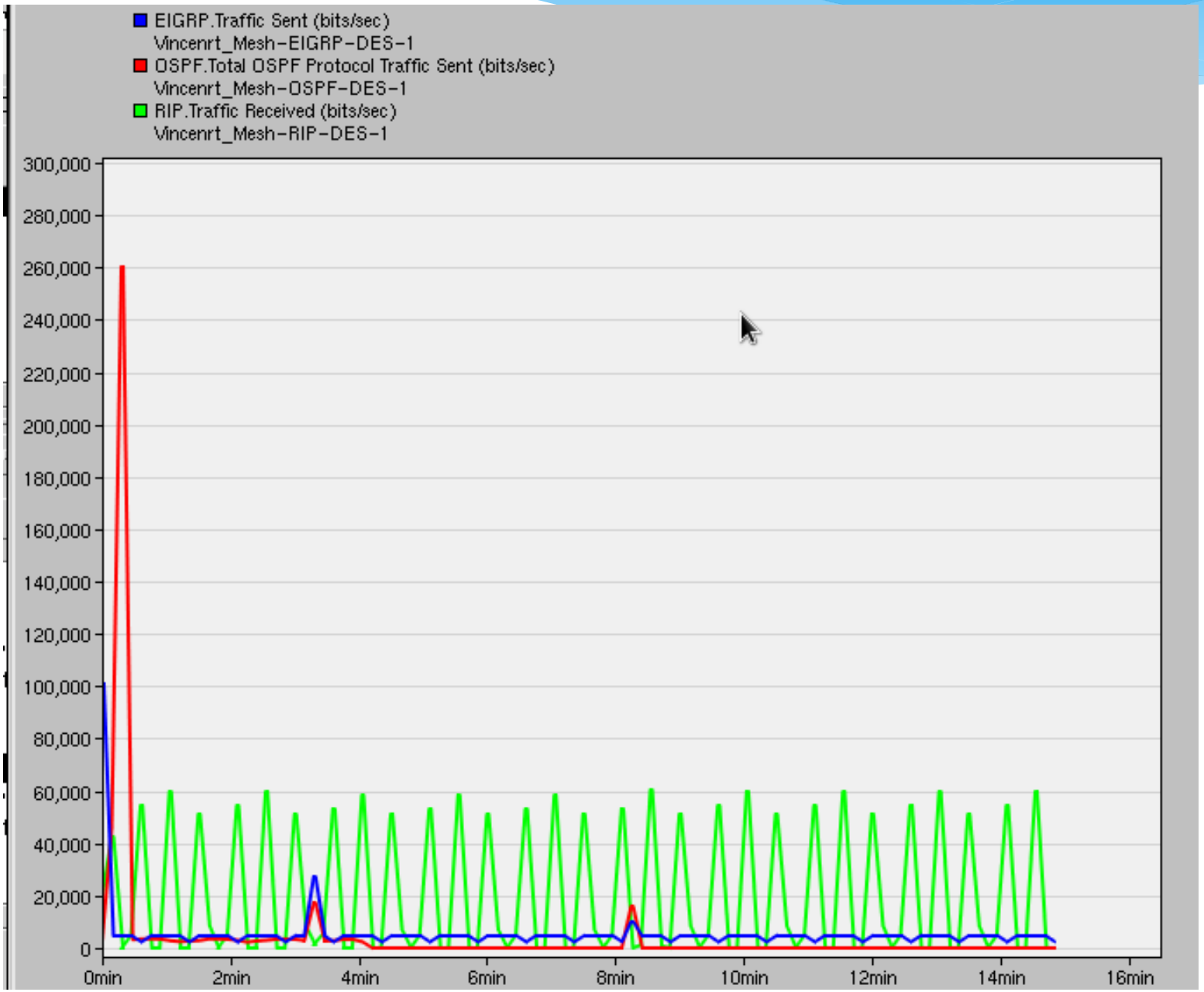
Comparison: Star Traffic



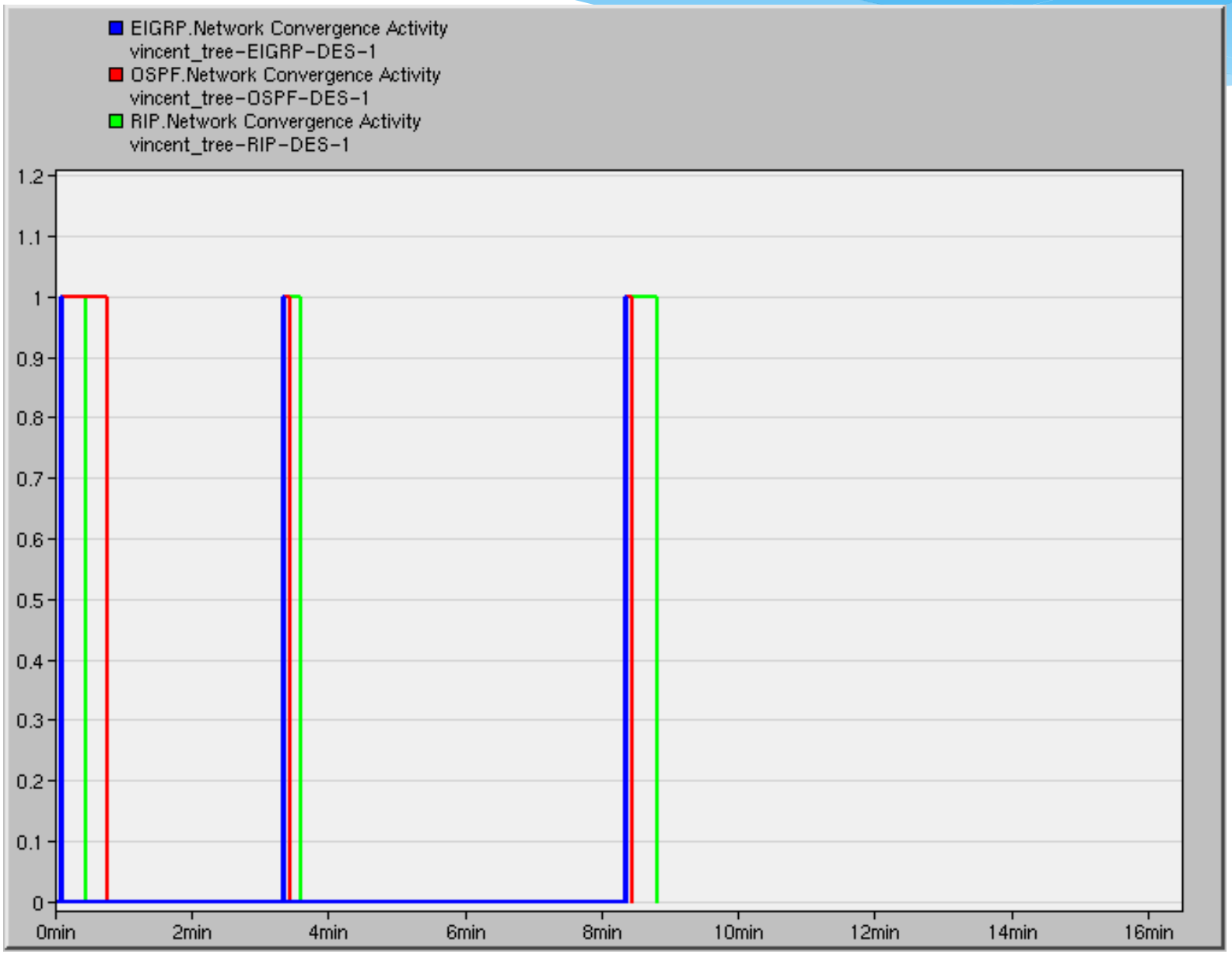
Comparison: Large Mesh Convergence Activity



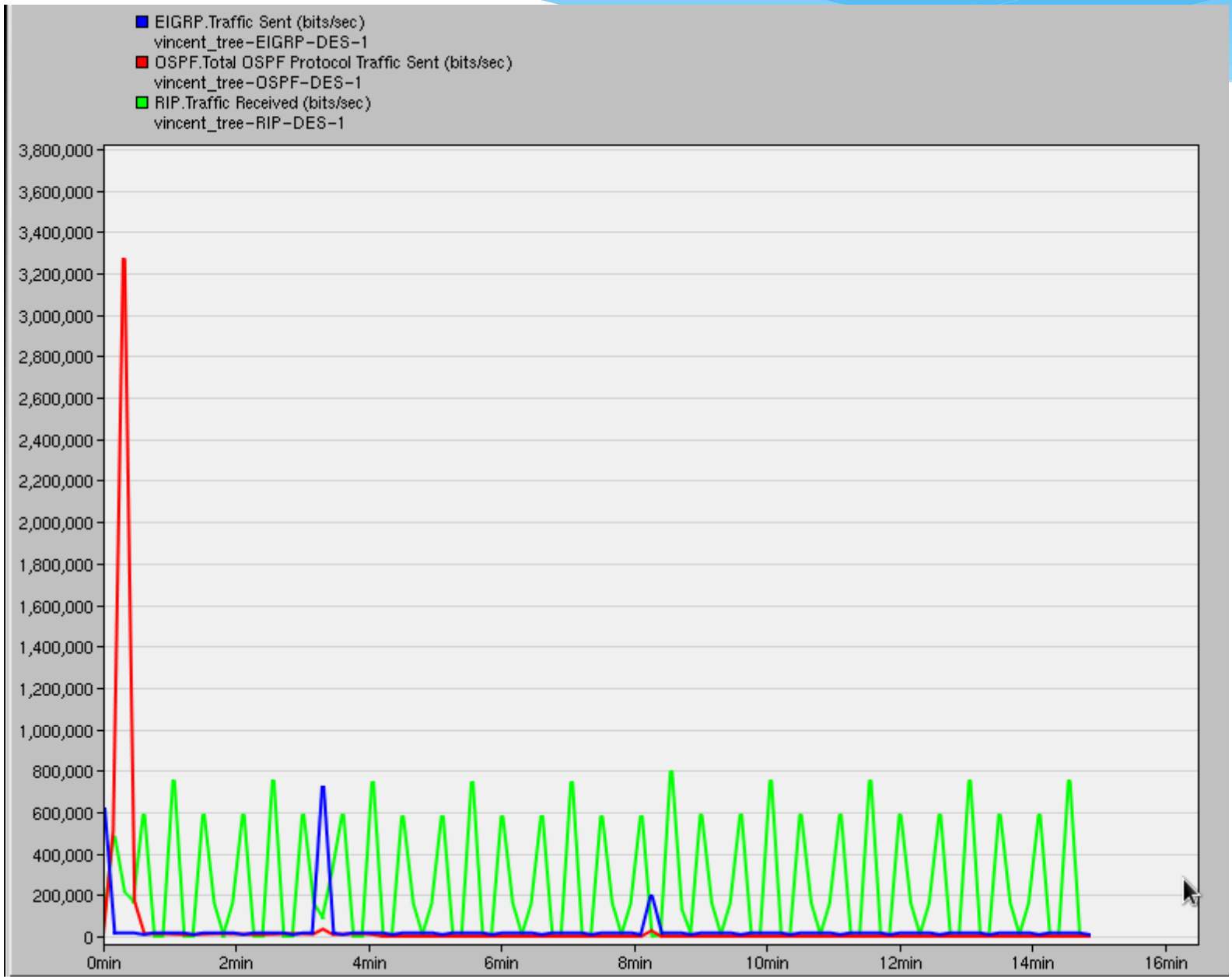
Comparison: Large Mesh Traffic



Comparison: Tree Convergence Activity



Comparison: Tree Traffic



Discussion

For Star topologies

- **Convergence: EIGRP>RIP>OSPF**
- **Traffic Sent (Assumed): EIGRP>RIP>OSPF**

For Large Mesh and Tree topologies

- **Convergence: EIGRP>OSPF>RIP**
- **Traffic Sent (Assumed): EIGRP>OSPF>RIP**

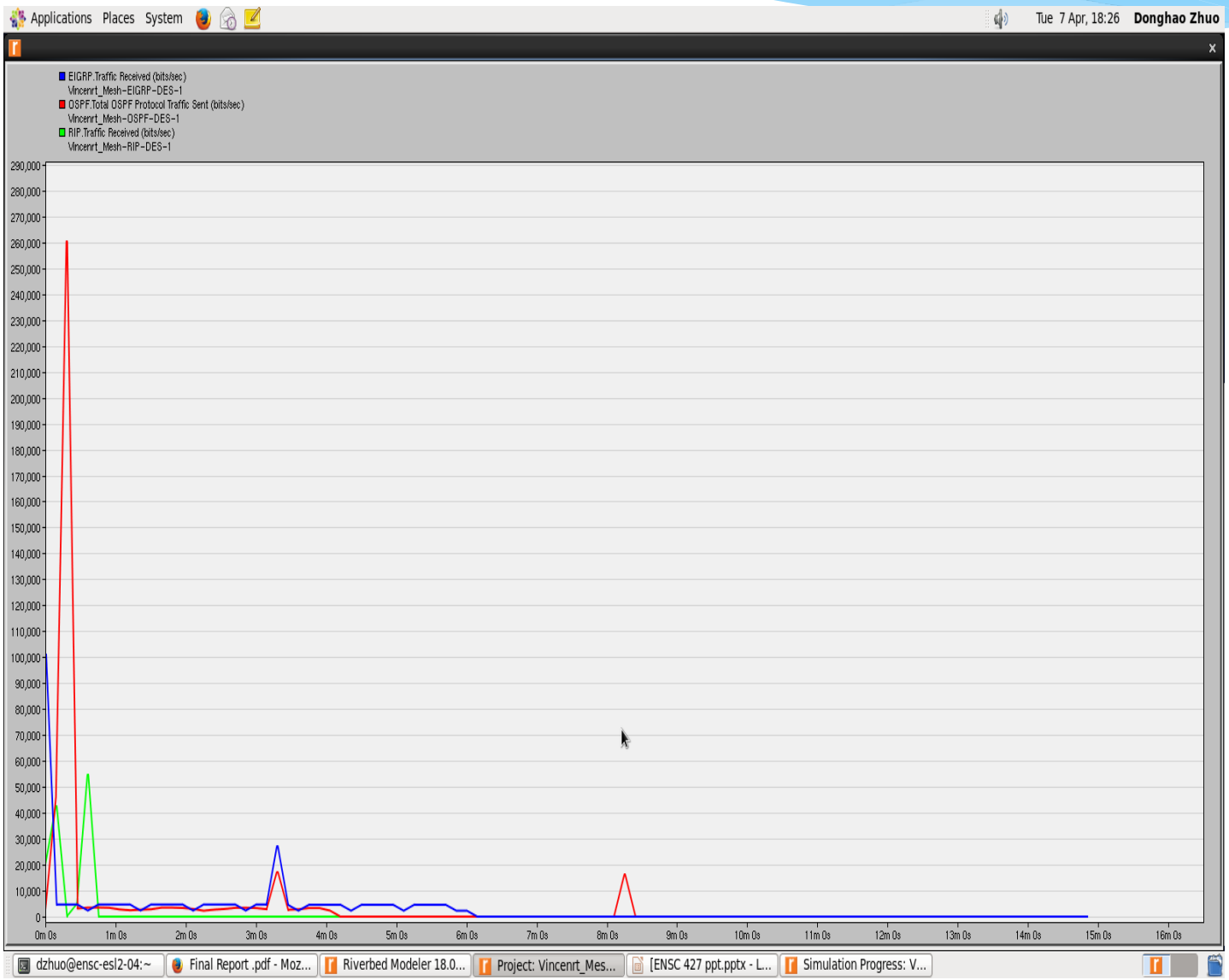
Cost

- **EIGRP>OSPF>RIP**

Applicability

- **OSPF>EIGRP>RIP**

Problems


Applications Places System
Tue 7 Apr, 18:26 Donghao Zhuo
EIGRP.Traffic Received (bits/sec)
Vincenrt_Mesh-EIGRP-DES-1
OSPF.Total OSPF Protocol Traffic Sent (bits/sec)
Vincenrt_Mesh-OSPF-DES-1
RIP.Traffic Received (bits/sec)
Vincenrt_Mesh-RIP-DES-1
290,000
280,000
270,000
260,000
250,000
240,000
230,000
220,000
210,000
200,000
190,000
180,000
170,000
160,000
150,000
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
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Project: Vincenrt_Mes...
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Simulation Progress: V...

Organization and Time Management

-Current progress: 30% of the final report and 80% of simulation.

-Planning to fix the problem within 3 days meanwhile write the final report.

Reference

[1] Routing Information Protocol (RIP),2003, Retrieved from: https://www.mikrotik.com/documentation/manual_2.6/Routing/RIP.html

[2] Experts at Making You an Expert (iNE),2013, Retrieved from: http://blog.ine.com/2011/04/04/understanding-ospf-external-route-path-selection/

[3] Keeping it classless,2011, Retrieved from: http://keepingitclassless.net/2011/07/eigrp-feasible-successors/