TOPOLOGY CONTROL IN MANETS WITH COOPERATIVE COMMUNICATION

[AREA – WIRELESS ADHOC NETWORKS]

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OBJECTIVE

- We present a topology control scheme with the objective of optimizing network capacity in MANETs with cooperative communications.
- By analyzing the performance of various routing protocols and enhancing the power conservation using distributed topology control algorithm.

ABSTRACT

- A **Capacity-Optimized Cooperative (COCO)** topology control Scheme to improve the network capacity in MANETs by jointly considering both upper layer network capacity and physical layer cooperative communications is proposed.
- The proposed topology control scheme can substantially improve the network capacity by achieving high throughput, less Packet Drops and minimum power consumption in MANETs with cooperative communications

WORK DONE

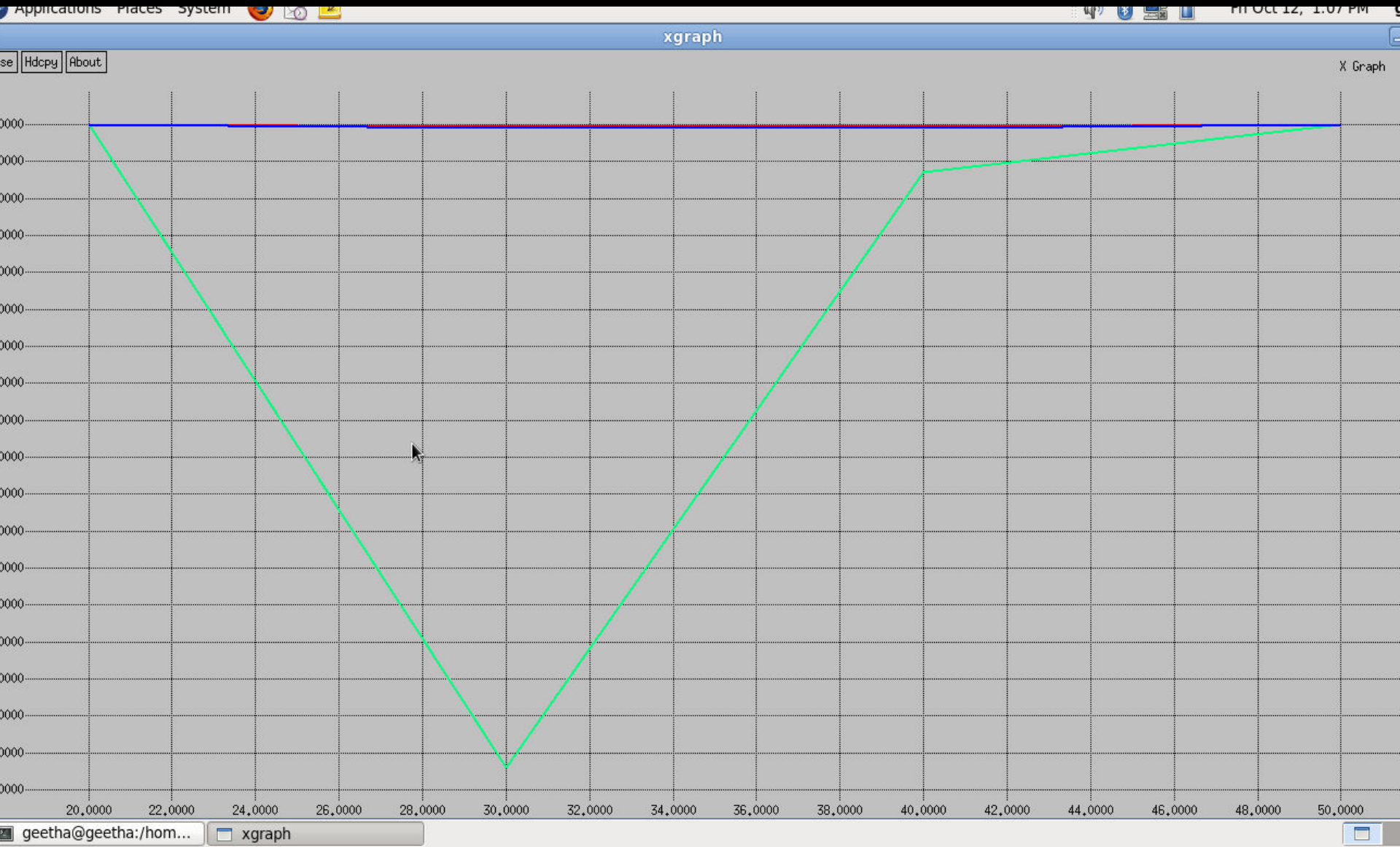
- We have analyzed various existing routing protocols by measuring the PDR and delay with respect to varying number of nodes.
- Presented a paper for a National Conference at KSR College on the topic ”Performance evaluation of AODV,DSDV and DSR routing protocols.”
- Developed the code for power consumption and have taken various results for analysing the problems related to it, which follows.
- Demonstrated how a path with least power consumption is established by considering the power consumed by each node and thus optimising the network capacity.

PROTOCOL COMPARISON..

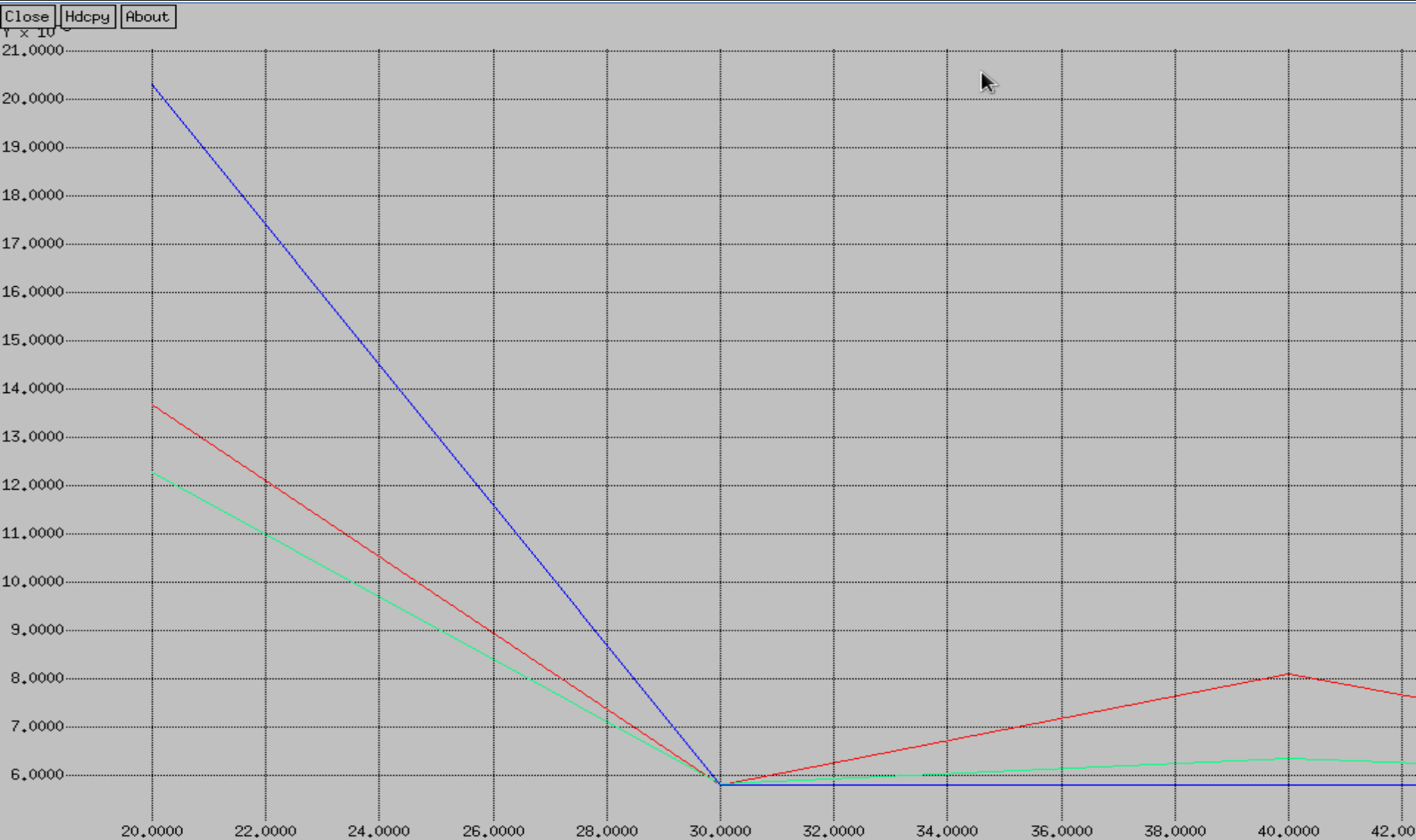
PERFORMANCE COMPARISON OF ADHOC ROUTING PROTOCOLS

1. AODV
2. DSDV
3. DSR

COMPARISON OF AODV,DSDV AND DSR (NODES VS PDR)



COMPARISON OF AODV,DSDV AND DSR (NODES VS DELAY)



INFERENCE

- Here, we have analyzed various existing routing protocols by measuring the packet delivery ratio, end to end delay with respect to varying number of nodes
- Thus, from the mentioned Protocols we used AODV Routing protocol for our further enhancement in our Project

PROBLEM EXISTING

All wireless nodes are activated initially. Once an active sensor runs out of energy, those nodes are not present in the network. So communication is not fully completed.

DRAWBACKS:

- All nodes are activated (Power consumption high)
- Network lifetime is low
- Drop is high
- Throughput is low

ADVANTAGES OF THE PROPOSED METHOD

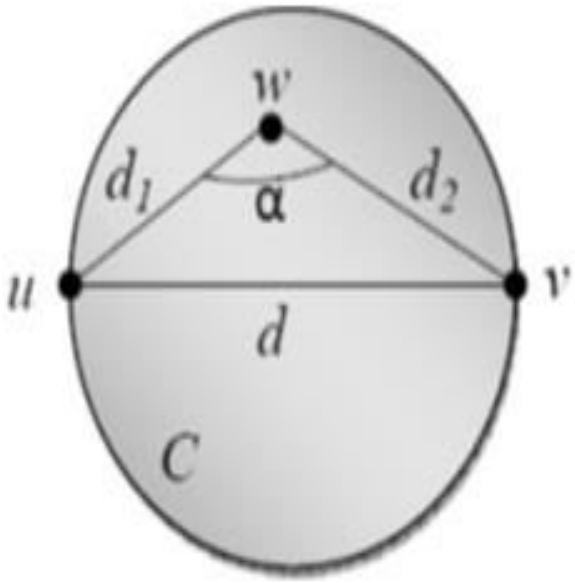
- Particular sensors are activated initially (power consumption low)
- Network lifetime is high
- Reduces the drop
- Increase throughput

PROPOSED ALGORITHM

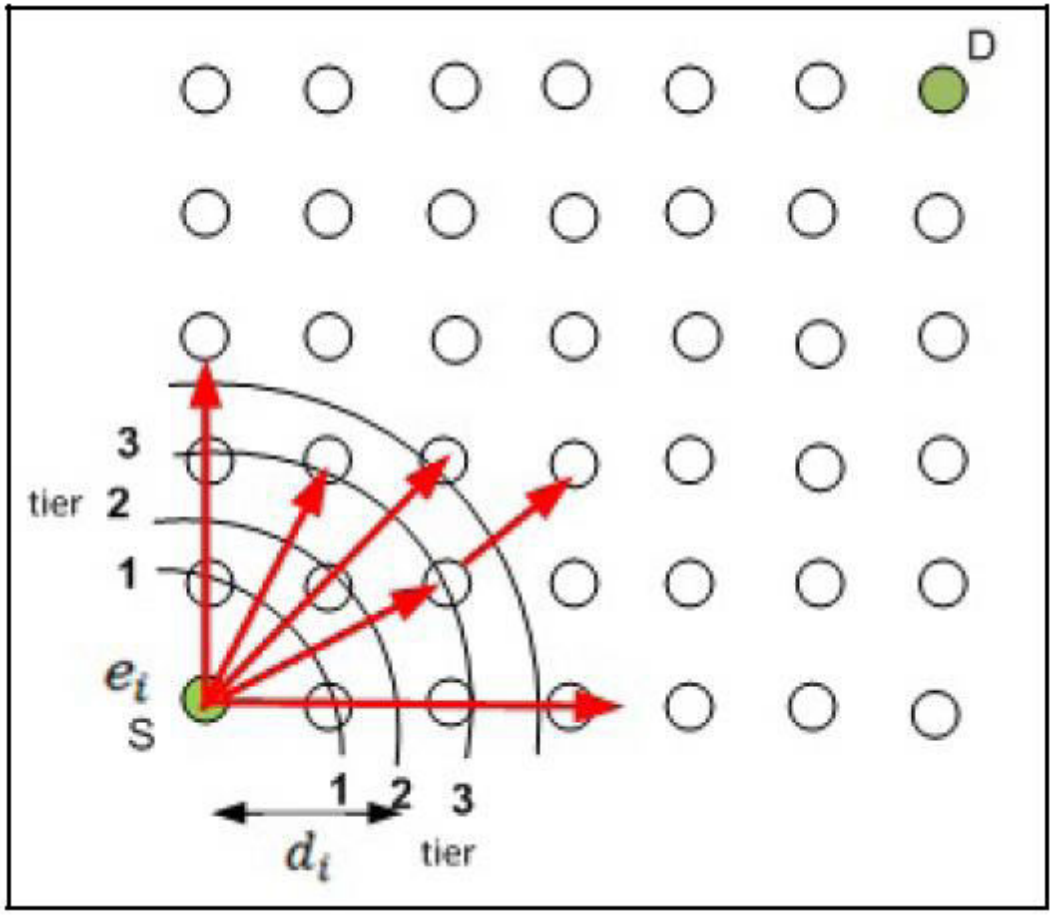
- Local decision is made to guarantee the node connectivity
- Finding minimum Energy paths to increase network lifetime
- To minimize packet drops
- Should be simple and efficient for small mobile nodes

MULTIHOP COMMUNICATION

- u and v are two nodes,
- d(u,v)= distance between u &v
- d(u,v)= d
- d(u,w)= d_1<d
- d(v,w)= d_2<d, where w can be used as a relay to pass the packet



ENERGY REACHEABLE ZONE



MATHEMATICAL FORMULATION

- Energy level of node i = e_i
- Distance of node i = d_i
- Energy Distance Factor = P_i
- Energy Distance Product of node = m_i
- $m_i = e_i * d_i$

$P_i = ei * di / \sum_{i=1}^{n} ei . di$, where n is the no. of nodes in tier 1,2 etc

CONTINUED..

- **Case I**: Consider No intermediate nodes between Source and Destination, then

  $e_i = 0$, then $m_i = e_i * d_i = 0$, Also $P_i = 0$

- **Case II**: Consider only one intermediate node in between, then

  $m = e * d$, then $P = 1$, since $i = 1$

- **Case III**: Consider if there is more than one intermediate node in between, then

$$m_i = e_i * d_i \text{ is proportional to } \sum_{i=1}^{n} ei \,.\, di$$

Hence, $P_i = ei * di / \sum_{i=1}^{n} ei \,.\, di < 1$

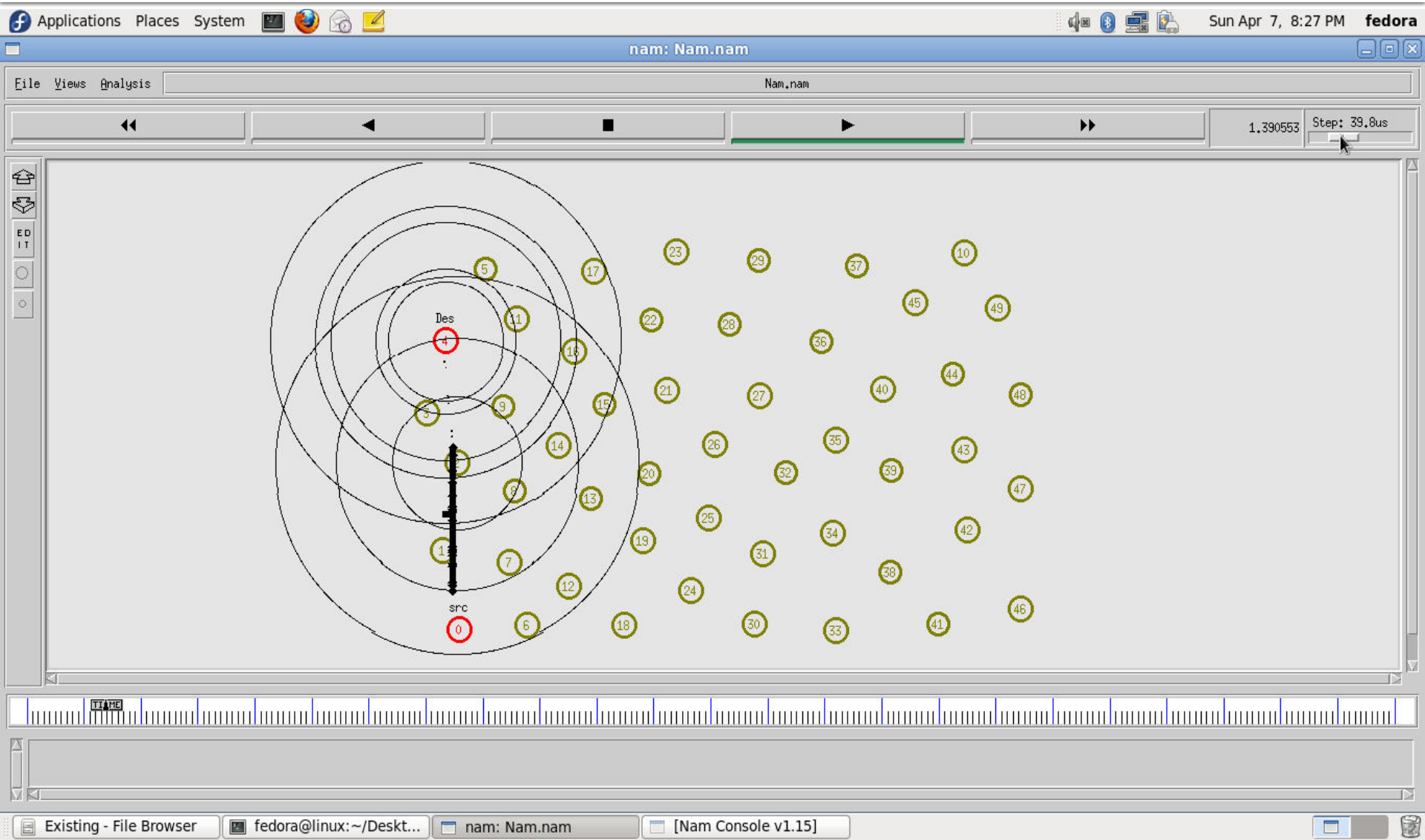
Thus for all cases, $0 <= P_i <= 1$

Hence in this way, Stable Path for Packet Transmission is estimated.

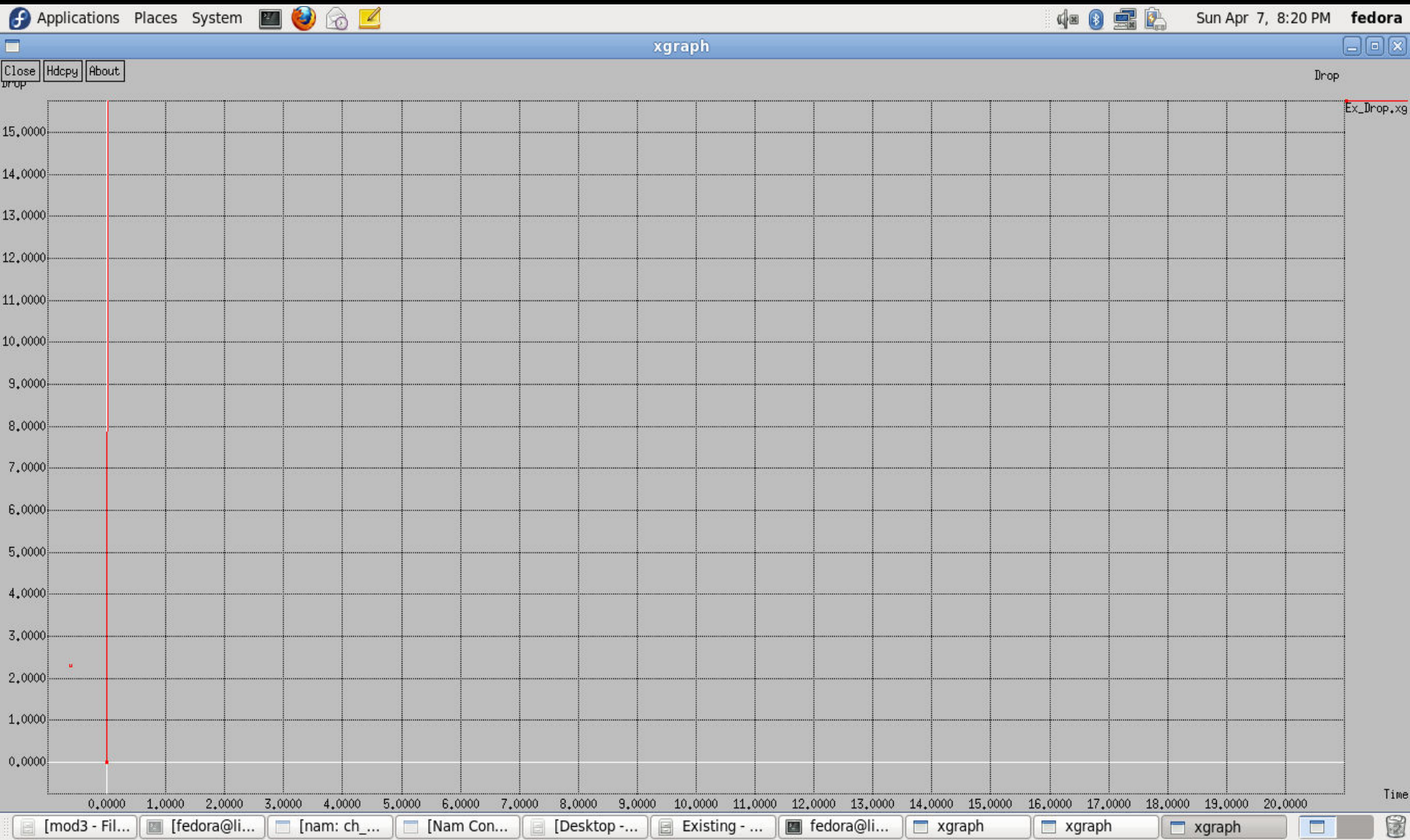
NODE CONFIGURATION

Option	Available Values	Default
Wireless Oriented		
Adhoc Routing	AODV	ON
AntType	Antenna/Omni Antenna	ON
Channel	Wireless Channel	ON
topoInstance	<topology file>	ON
Initial Energy	100 <value in joules>	ON
RxPower	1.5 <value in W>	ON
TxPower	2 <value in W>	ON
Idle Power	0.5 <value in W>	ON

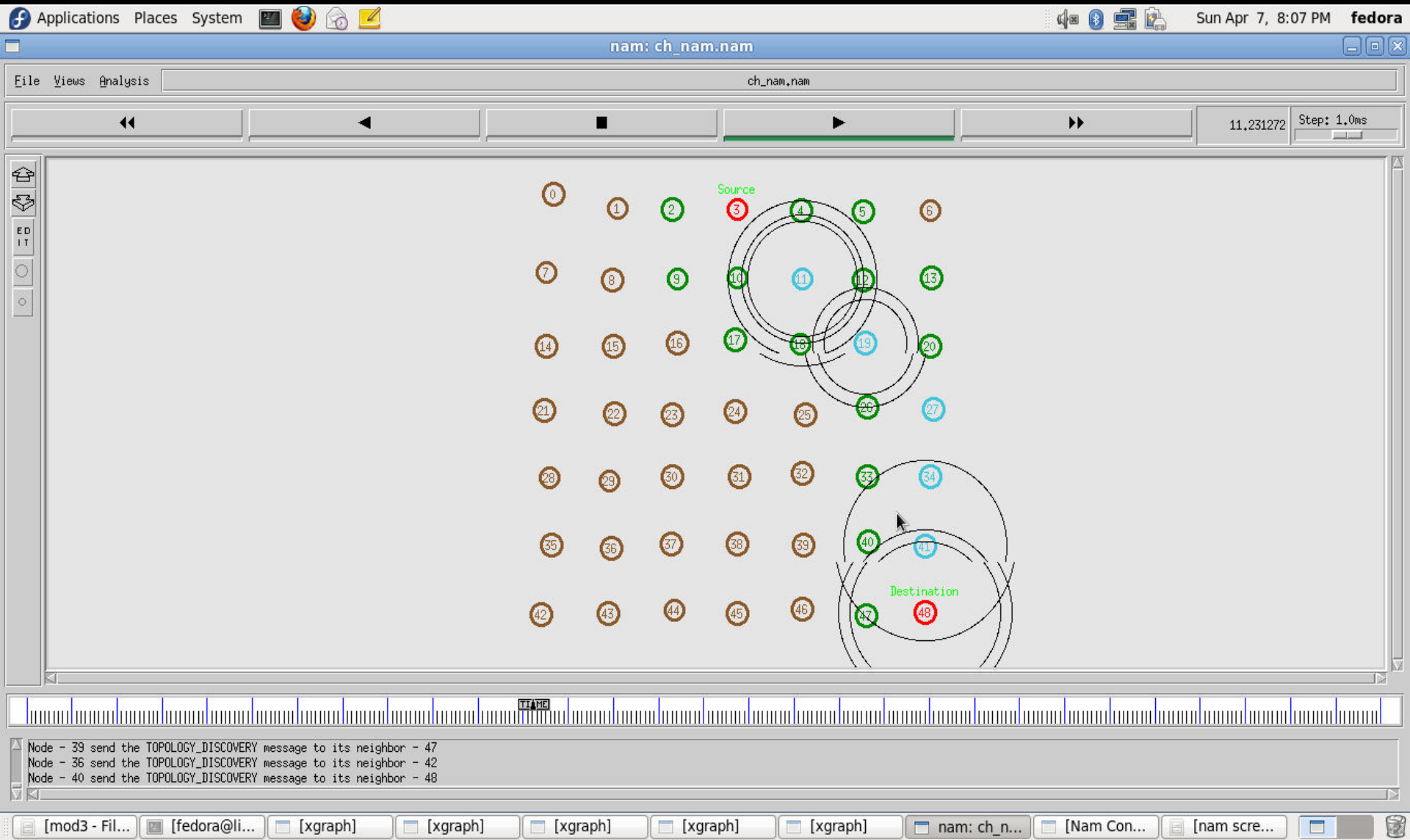
DROP OF PACKETS DURING TRANSMISSION (EXISTING)



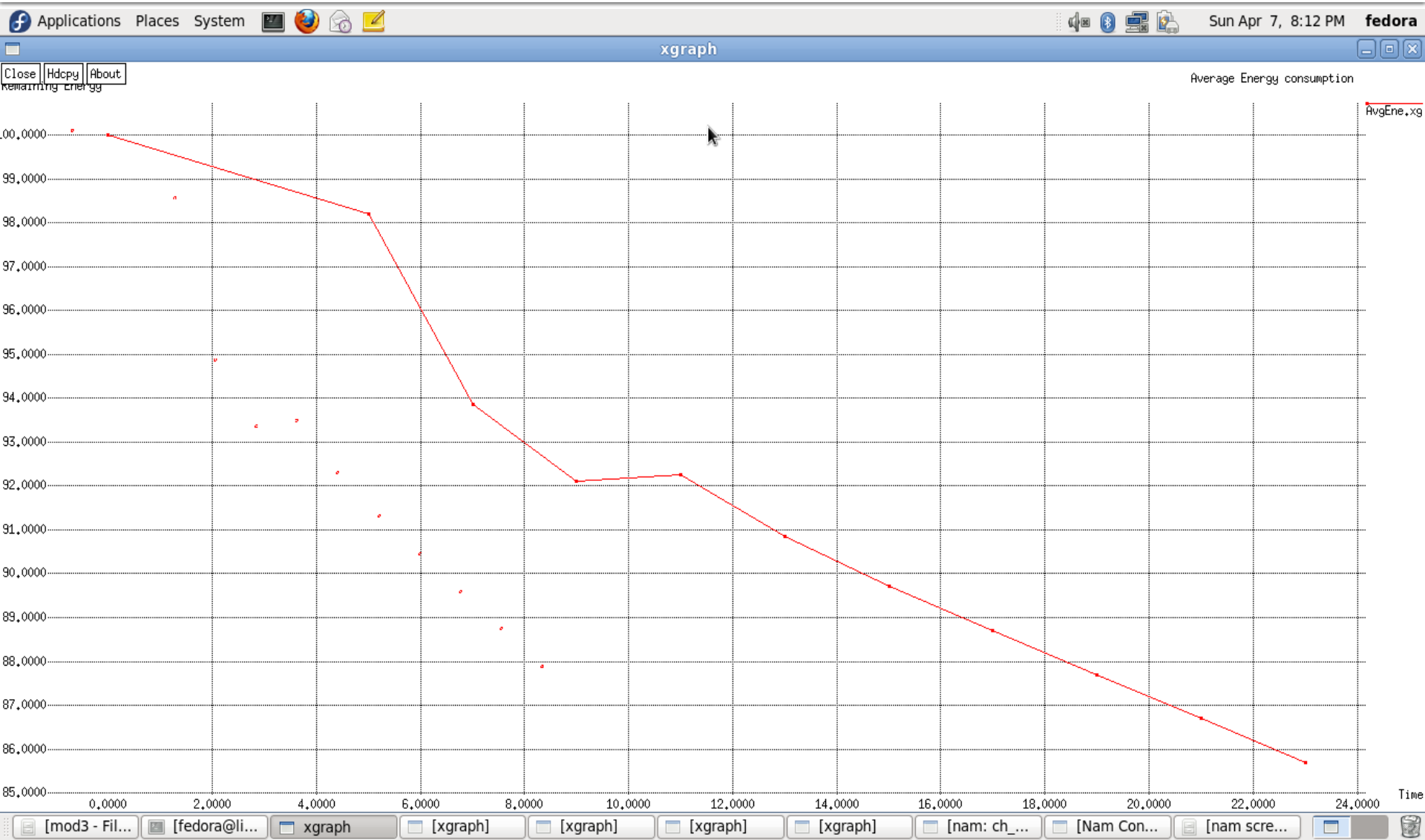
TIME VS DROP(EXISTING TOPOLOGY)



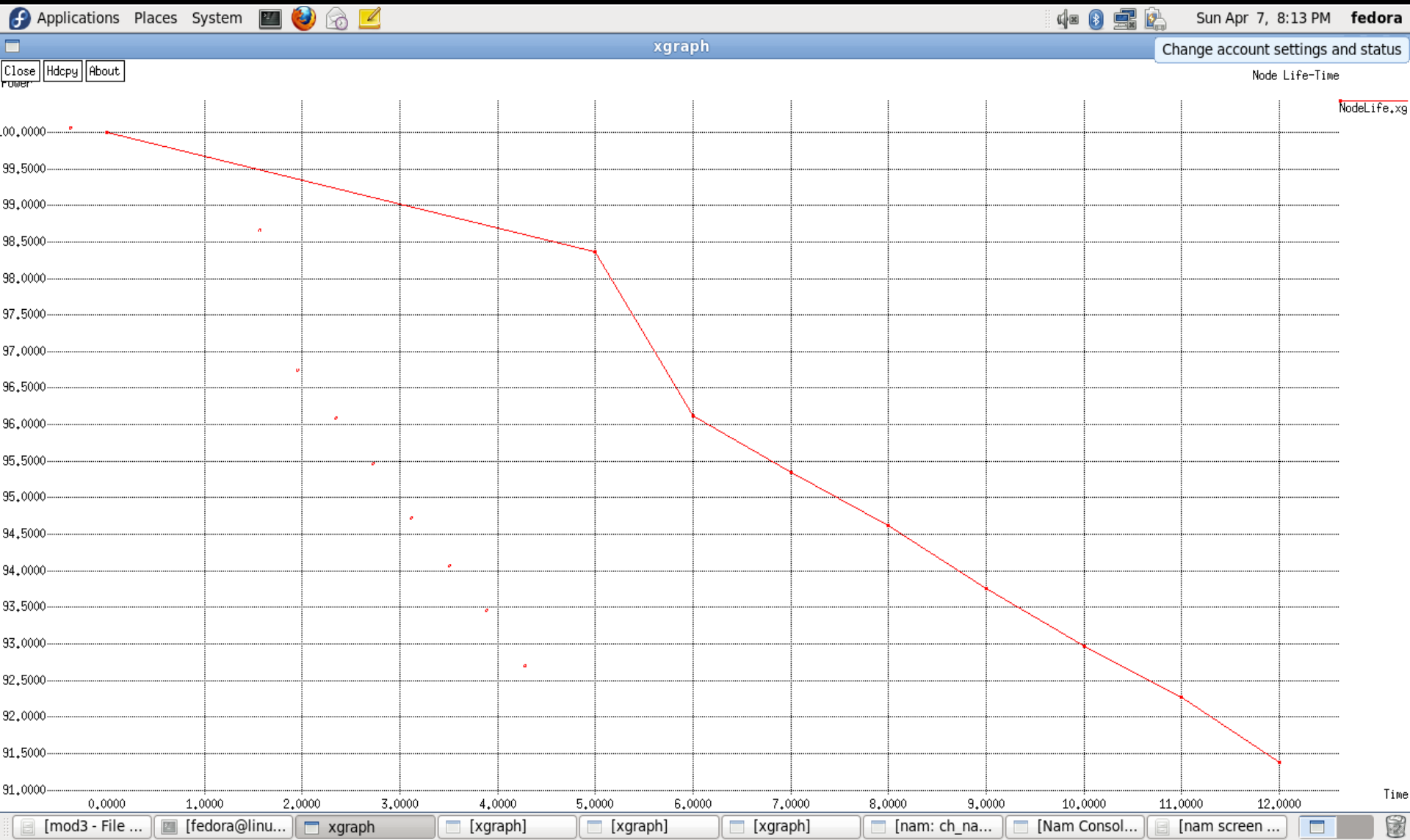
PROPOSED TOPOLOGY



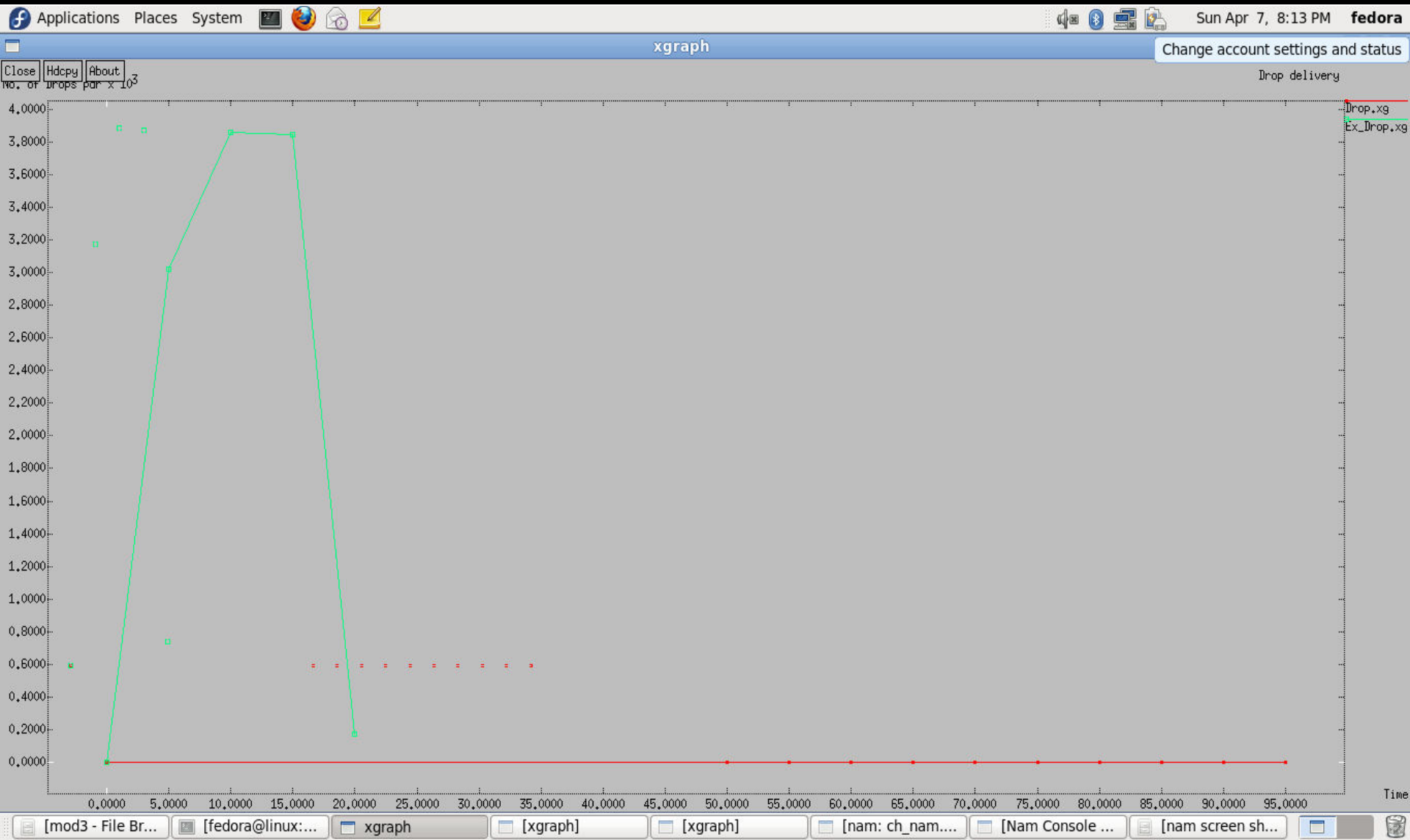
AVERAGE ENERGY CONSUMPTION VS TIME



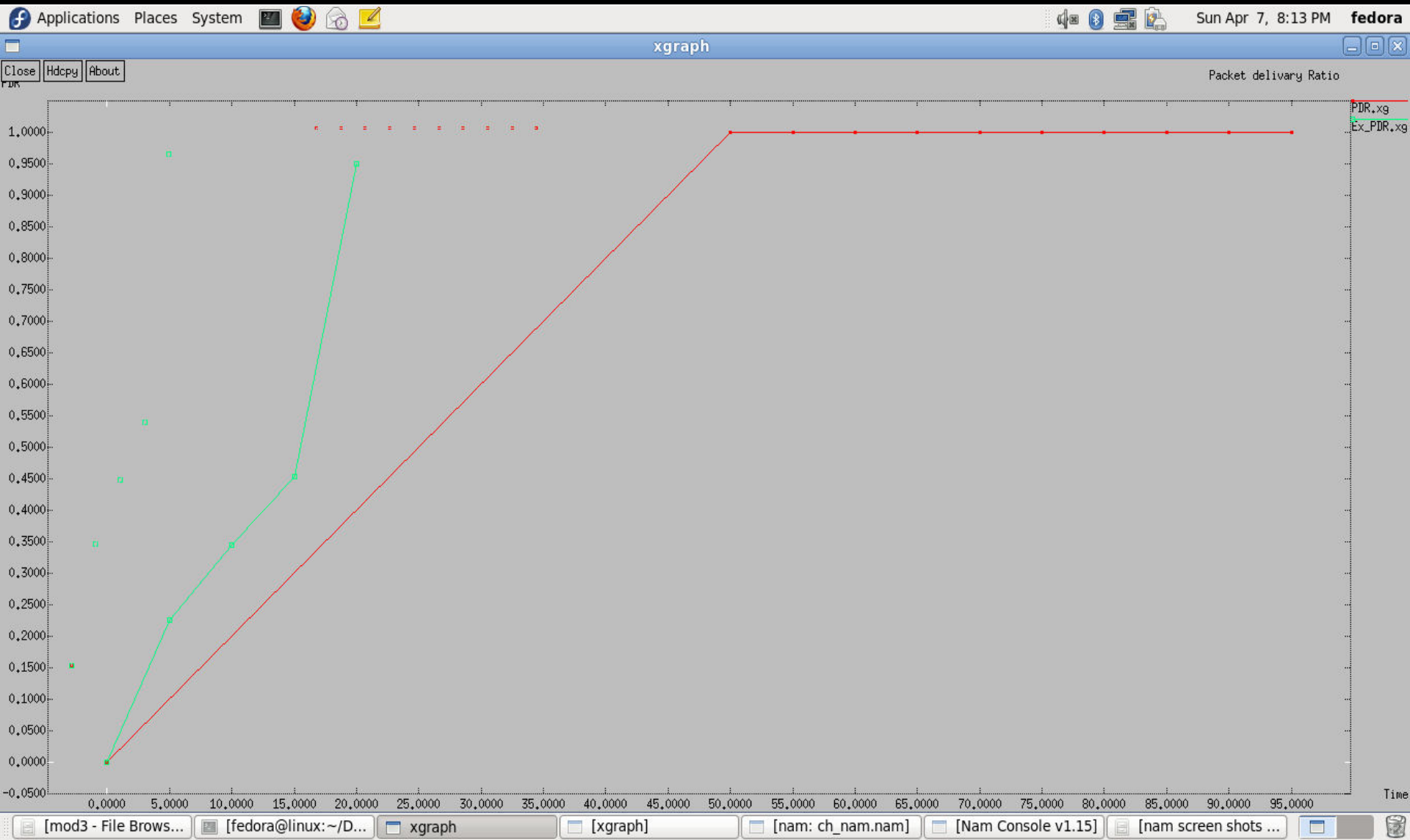
NODE LIFETIME VS TIME



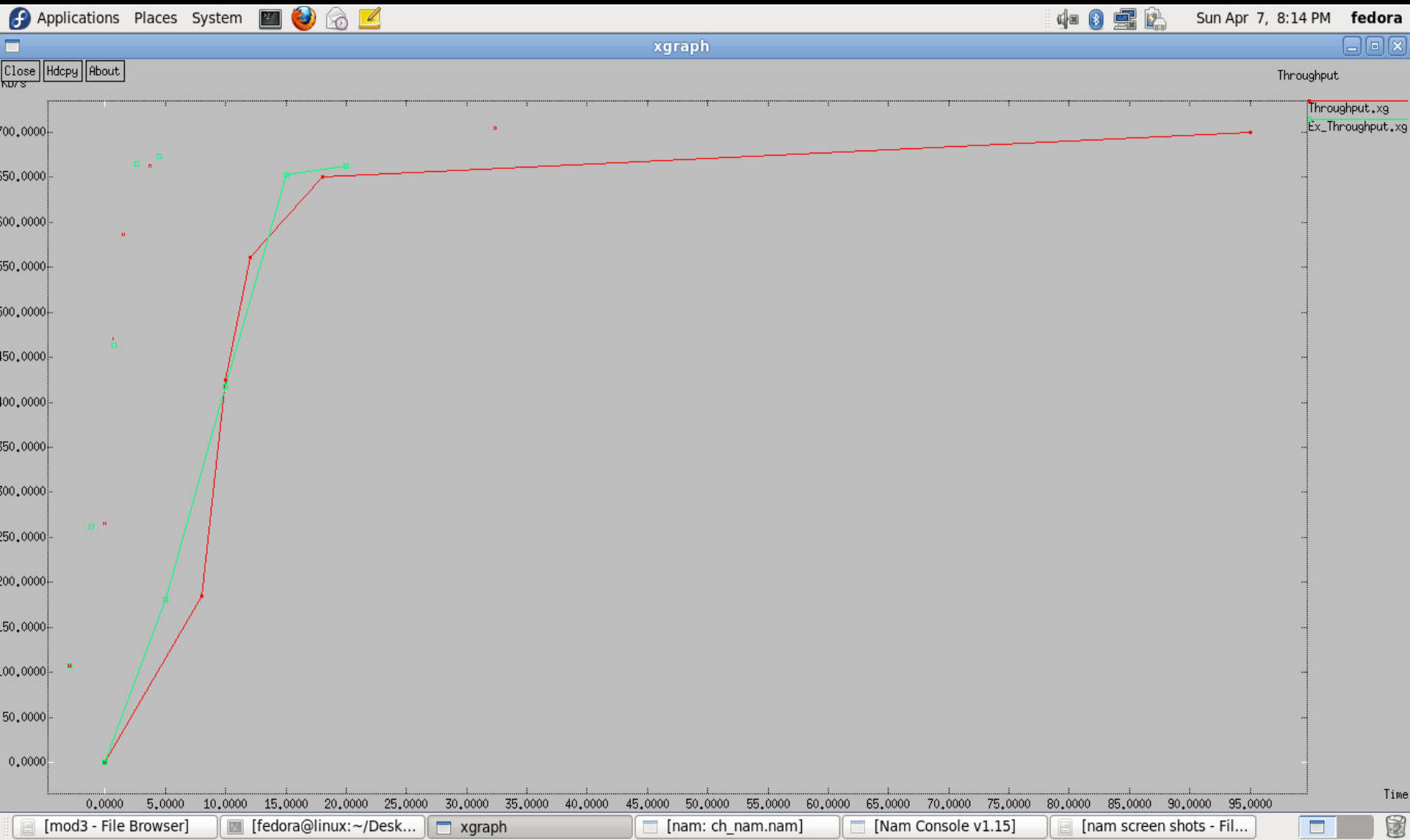
DROP DELIVERY VS TIME



PACKET DELIVERY RATIO VS TIME



THROUGHPUT VS TIME



CONCLUSION

- In this project, we have introduced physical layer cooperative communications and Network Layer topology control thus enhancing the network capacity in MANETs
- To improve the network capacity of MANETs with cooperative communications, we have proposed a Capacity- Optimized Cooperative (COCO) topology control scheme that considers both upper layer network capacity and physical layer relay selection

FURTHER ENHANCEMENT

- The project can be further enhanced by considering dynamic traffic patterns in the proposed scheme to further improve the performance of MANETs with cooperative communications

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THANK YOU