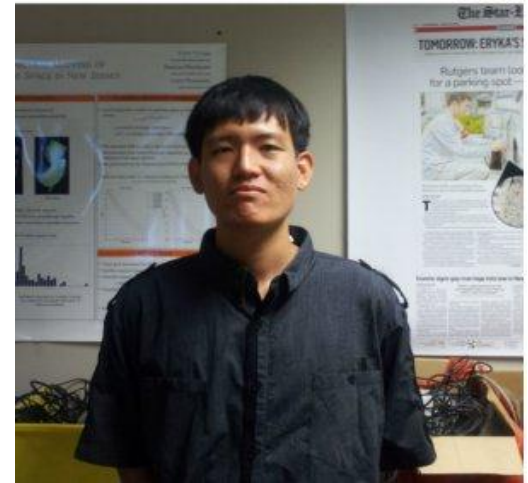# Extending GSTAR to support Multicast and Inter-Domain Routing

Shreyasee
Mukherjee

Sowrabh
Moily

Jay Lee

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Long Term Goals

- Understanding Generalized Storage Aware Routing (GSTAR) protocol

- Implementing multicasting in intra-domain using the Global Name Resolution Service (GNRS)

- Extending GSTAR to support inter-domain routing

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Performance Analysis on GSTAR

- Multihop wireless network of nine nodes

- Two flows:

1. Node 2 to Node 8

2. Node 6 to Node 3

- Link quality of Node6-Node-8 is periodically fluctuated from 54Mbps-6Mbps to simulate congestion

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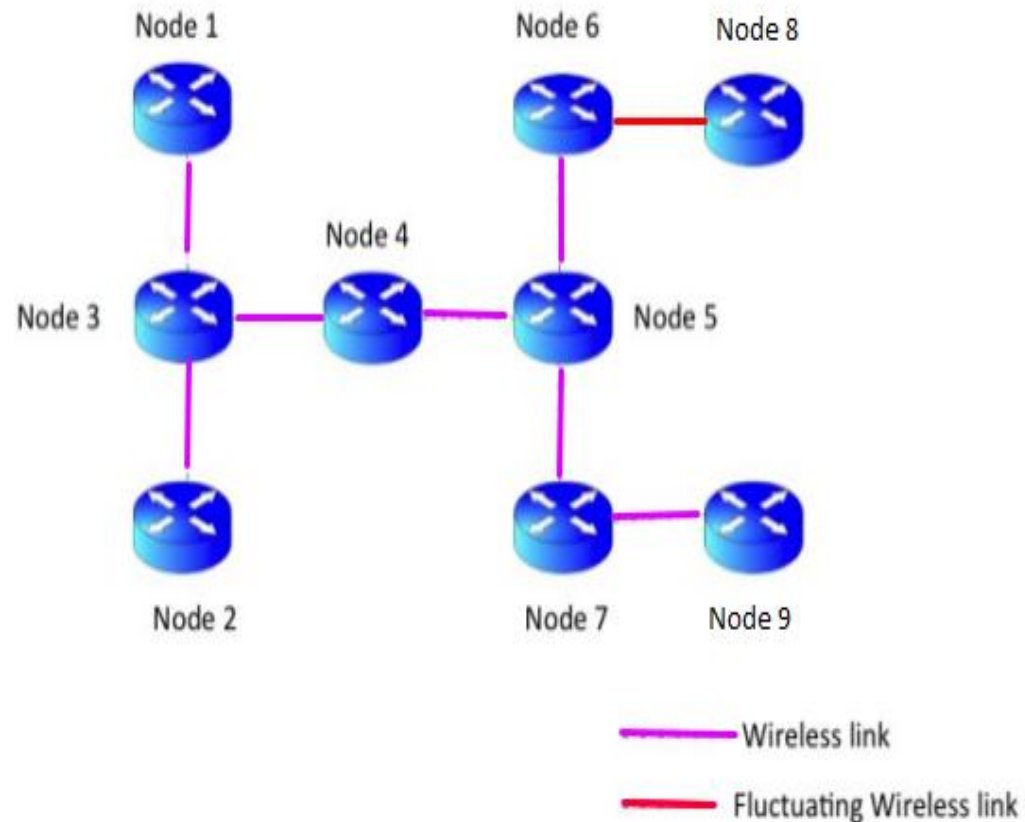
Results:

```
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 7 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 8 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 9 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 10 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 11 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 12 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 13 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 14 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 15 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 16 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 17 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 18 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 19 of chunck 20of source 10.1.1.6
@@@Received data packet at 10.1.1.3 from10.1.1.4
 Data Packet rcvd of seq no: 20 of chunck 20of source 10.1.1.6
```

DATA PACKETS CAPTURED AT NODE 6

```
24142 39.001056   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24146 39.001361   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24150 39.001728   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24154 39.002050   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24158 39.002436   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24162 39.002758   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24166 39.003107   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24170 39.003457   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24174 39.003887   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000
24178 39.004290   10.1.1.6          10.1.1.5          UDP     348 Source port: 5000  Destination port: 5000

27999 42.135374   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28003 42.135768   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28007 42.136136   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28011 42.136476   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28015 42.136861   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28019 42.137292   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28023 42.137722   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28027 42.138071   10.1.1.5          10.1.1.6          UDP     348 Source port: 5000  Destination port: 5000
28047 42.139769   10.1.1.6          10.1.1.8          UDP     348 Source port: 5000  Destination port: 5000
28051 42.140127   10.1.1.6          10.1.1.8          UDP     348 Source port: 5000  Destination port: 5000
28055 42.140431   10.1.1.6          10.1.1.8          UDP     348 Source port: 5000  Destination port: 5000
28059 42.140745   10.1.1.6          10.1.1.8          UDP     348 Source port: 5000  Destination port: 5000
28063 42.141085   10.1.1.6          10.1.1.8          UDP     348 Source port: 5000  Destination port: 5000
```

DATA PACKETS AT NODE 3

```
11389 23.025117   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11393 23.025413   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11397 23.025735   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11401 23.026030   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11405 23.026461   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11409 23.026882   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11413 23.027213   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11417 23.027581   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11421 23.027885   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11425 23.028306   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11429 23.028674   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11433 23.029050   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000
11437 23.029444   10.1.1.4          10.1.1.3          UDP     348 Source port: 5000  Destination port: 5000

25033 40.101303   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25037 40.101644   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25041 40.102020   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25045 40.102342   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25049 40.102692   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25053 40.103014   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25057 40.103309   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25061 40.103632   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25065 40.103990   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
25069 40.104402   10.1.1.3          10.1.1.4          UDP     348 Source port: 5000  Destination port: 5000
```

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Design Considerations of Multicast

- Scalability for large groups

- Flooding vs Centralised GNRS lookup

- Information in packet

- Optimality vs Delay

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Baseline Idea

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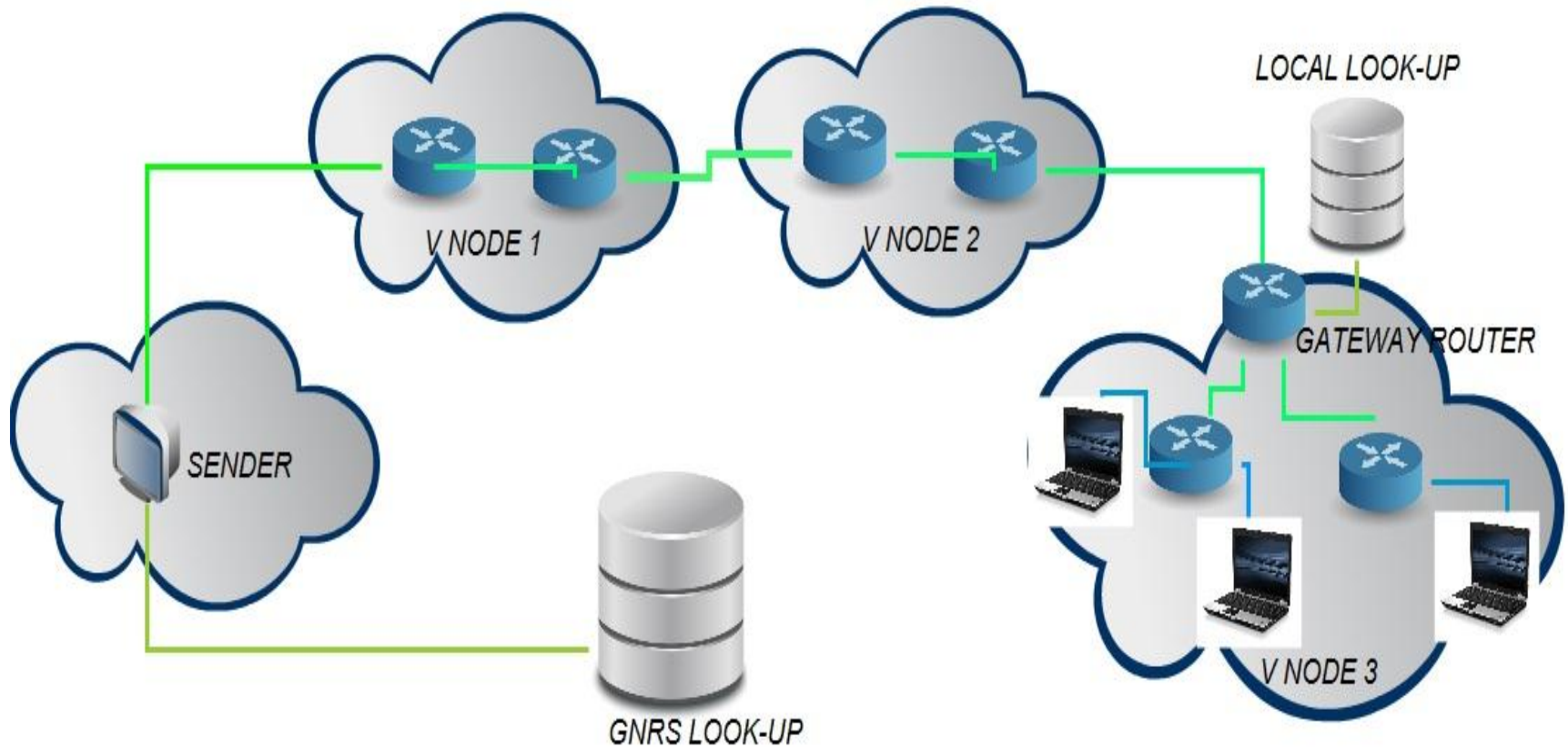
Work to be done in the coming week

- Implement simple multicast on existing click code

- Develop the multicast design

- Comparative study of GSTAR and traditional link state protocol

- Performance evaluation on hybrid network topologies and disconnected network environments

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