DVR Networks Practical 2 Report - Danlei Zhu, Worcester College, TT20

Section 2:

I made changes so that the routers would send the whole routing table to neighbours so a path could be calculated.

```
void Router::sendRoutingUpdatesActivity() {
//Edited here: send whole routing table to neighbours
    for (auto route = routes.begin(); route != routes.end(); route++) {
    sendCost(route->second.dest);
  }
}
```

I updated the other activity functions to implement the actions a router should take when receiving a new UpdateActivity Packet.

Section 3:

I implemented the small infinity to prevent the count to infinity problem seen in section 2, and also split horizon (a node does not send routes learned from a neighbour back to that neighbour) and poison reverse (a node sends a route learned from a neighbour back to it but with negative information to ensure the neighbour will never use it).

```
void Router::initialize() {
  // Edited here: initialize infinite route costs/poison reverse/split horizon
  INFINITE_ROUTE_COST = par("smallInfinity");
  SPLIT_HORIZON = par("useSplitHorizon");
  POISON_REVERSE = par("usePoisonReverse");
```

I updated other functions to accommodate these changes, such as the ones in sendCost, and uncommented the variables in omnetpp.ini.

Simulations and Tests Below:

Leaving the sim-time-limit parameter in omnetpp.ini unchanged, we have the following subset of tables produced for the AllRoutersAlive simulation with only smallInfinity = 1000 but not SH nor PR:

```
<!> Simulation time limit reached -- at t=25s, event #248

Calling finish() at end of Run #0...
[INFO]  @A: Routing table:
[INFO]  --A--> A: 0
[INFO]  --B--> B: 1
[INFO]  --B--> C: 2
[INFO]  --B--> D: 2
[INFO]  --B--> E: 3
[INFO]
[INFO]  @B: Routing table:
[INFO]  --A--> A: 1
[INFO]  --B--> B: 0
[INFO]  --C--> C: 1
[INFO]  --D--> D: 1
[INFO]  --C--> E: 2
[INFO]
[INFO]  @C: Routing table:
[INFO]  --B--> A: 2
[INFO]  --B--> B: 1
[INFO]  --C--> C: 0
[INFO]  --E--> D: 2
[INFO]  --E--> E: 1
[INFO]
[INFO]  @D: Routing table:
[INFO]  --B--> A: 2
[INFO]  --B--> B: 1
[INFO]  --E--> C: 2
[INFO]  --D--> D: 0
[INFO]  --E--> E: 1
[INFO]
```

The simulation for AllRoutersAlive with smallInfinity = 1000, SH, and PR, which calculated the same end routing tables but faster:

```
<!> Simulation time limit reached -- at t=25s, event #164

Calling finish() at end of Run #0...
[INFO]  @A: Routing table:
[INFO]  --A--> A: 0
[INFO]  --B--> B: 1
[INFO]  --B--> C: 2
[INFO]  --B--> D: 2
[INFO]  --B--> E: 3
[INFO]
[INFO]  @B: Routing table:
[INFO]  --A--> A: 1
[INFO]  --B--> B: 0
[INFO]  --C--> C: 1
[INFO]  --D--> D: 1
[INFO]  --C--> E: 2
[INFO]
[INFO]  @C: Routing table:
[INFO]  --B--> A: 2
[INFO]  --B--> B: 1
[INFO]  --C--> C: 0
[INFO]  --E--> D: 2
[INFO]  --E--> E: 1
[INFO]
[INFO]  @D: Routing table:
[INFO]  --B--> A: 2
[INFO]  --B--> B: 1
[INFO]  --E--> C: 2
[INFO]  --D--> D: 0
[INFO]  --E--> E: 1
[INFO]
```

Ring5_4 with SI, SH, and PR results:

```
<!> Simulation time limit reached -- at t=60s, event #914

Calling finish() at end of Run #0...
[INFO]  @A: Routing table:
[INFO]  --A--> A: 0
[INFO]  --B--> B: 1
[INFO]  --B--> C: 2
[INFO]  --B--> D: 2
[INFO]  --B--> E: 3
[INFO]  --F--> F: 1
[INFO]  --F--> G: 2
[INFO]
[INFO]  @B: Routing table:
[INFO]  --A--> A: 1
[INFO]  --B--> B: 0
[INFO]  --C--> C: 1
[INFO]  --D--> D: 1
[INFO]  --C--> E: 2
[INFO]  --A--> F: 2
[INFO]  --C--> G: 2
[INFO]
[INFO]  @C: Routing table:
[INFO]  --B--> A: 2
[INFO]  --B--> B: 1
[INFO]  --C--> C: 0
[INFO]  --E--> D: 2
[INFO]  --E--> E: 1
[INFO]  --G--> F: 2
[INFO]  --G--> G: 1
```

Ring5_4_BFails doesn't seem to terminate when not using SH and PR, which is to be expected. Ring5_5_BFails works with with SI, SH, and PR, with results below, showing it has found different alternative routes to the Ring5_4 simulation:

```
<!> Simulation time limit reached -- at t=60s, event #753

Calling finish() at end of Run #0...
[INFO]  @A: Routing table:
[INFO]  --A--> A: 0
[INFO]  --F--> C: 3
[INFO]  --F--> D: 5
[INFO]  --F--> E: 4
[INFO]  --F--> F: 1
[INFO]  --F--> G: 2
[INFO]
[INFO]  @B: Routing table:
[INFO]  --A--> A: 1
[INFO]  --B--> B: 0
[INFO]  --C--> C: 1
[INFO]  --D--> D: 1
[INFO]  --C--> E: 2
[INFO]  --A--> F: 2
[INFO]  --C--> G: 2
[INFO]
[INFO]  @C: Routing table:
[INFO]  --G--> A: 3
[INFO]  --C--> C: 0
[INFO]  --E--> D: 2
[INFO]  --E--> E: 1
[INFO]  --G--> F: 2
[INFO]  --G--> G: 1
```