

Project 6 GMPLS

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Part I

Dijkstra Routing algorithm:

I have implemented a Dijkstra algorithm based routing algorithm. The `DijkstraRouting.class` accepts the whole graph as a input and set the next-hop routing table in each router.

I have four tables in each router, which are IP routing table, Packet Switching Label Table, Lambda Switching Label Table and destination to label table if the router is the source of the packets.

I use integer as the label for Packet Switching table. New label for PSC is suggested by incrementing a next label variable in the LSR.

I use a destination to destination+1000 mapping in the destination to label table. Then I will store the destination+1000 as the input label to be stored in the PSC Switching Table. The output nic is decided by the routing table. The output label is suggested.

For LSC Switching Table, I come up with a `suggestLabel` function to help suggest a new label that is different from other input label and output label. It turns out the label here won't change for one direction.

For the label suggestion's part, I've implemented bidirectional label suggestion. DownStream label is suggested in the Path message. UpStream label is suggested in the Resv message.

I also differentiate the PSC and LSC path and resv message by inserting a string "lsc" or "psc" after the OAM message.

I setup a bidirectional path from A to G in the topology given. I send a packet from A to G and G to A. The two packets both arrived the destination successfully.

Part II

LSP Setup Failure case 1:

The topology: LSR A-LSR B- LSR C

A link on the route of the LSP got cut. Then there will be a PATHERR.

I cut the link between LSR B and LSR C.

So, PATH msg won't arrive at LSR C.

The output would be:

Router A:Path(PSC) 1 sent to C

Router B:Path(PSC) received from A

Router B:Path(PSC) 1 sent to C

Router B:Patherr(PSC) sent to A

Router A:Patherr(PSC) received

LSP Setup Failure case 2:

The topology: LSR A-LSR B- LSR C

This time , the reservation would fail at router B because the resources are limited.

The output would be:

Router A:Path(PSC) 1 sent to C

Router B:Path(PSC) received from A

Router B:Path(PSC) 1 sent to C

Router C:Path(PSC) received from A

Router C:Resv(PSC) 1 sent to B

Router B:ResvErr(PSC) sent to C

Router C:PathErr(PSC) sent to B

Router B:PathErr(PSC) sent to A

LSP Setup Failure case 3:

The topology : LSR A – LSR B- LSR C

This time, the LSP setup is going to fail because A and C want to setup a path at the same time to each other.

One of the setup msg should be PATHErr.

The output would be:

Router A:Path(PSC) 1 sent to B

Router C:Path(PSC) 1 sent to A

Router B:PathErr(PSC) sent to C

Router B:Path(PSC) 1 sent to C

Router C:Resv(PSC) 1 sent to B

Router B:Resv(PSC) 1 sent to A

Router A: Resvconf sent to B

Router B: Resvconf sent to C