

# Simulation of Link-State Routing Protocol

Vivek Pabani,

CWID A20332117  
CS542 - Computer Networks 1  
Illinois Institute of Technology

Fall 2014

# Overview

- 1 Overview
- 2 Introduction
- 3 Work Flow
- 4 Exception Handling
- 5 Conclusion

# Introduction

- The basic concept of link-state routing is that every node constructs a map of the network topology in the form of a graph. Each node then independently calculates the next best logical path from it to every possible destination in the network. The collection of best paths will then form the node's routing table.
- Link state routing is based on the assumption that, although the global knowledge about the topology is not clear, each node has partial knowledge: it knows the state of its links. So, the whole topology can be compiled from the partial knowledge of each node. In this way, it allows the topology to be dynamic.

# Welcome Screen

```
sky:project vivek$ python lsp_project.py
#####

CS542 Link State Routing Simulator

(1) Input Network Topology File
(2) Build a Connection Table
(3) Shortest Path to Destination Router
(4) Exit

#####

Command : █
```

- Run the program with command - `python lsp_project.py`
- It will display all the options and prompt for command.

# Topology Data

```
Command : 1
```

```
Input original network topology matrix data file : topology.txt
```

```
Review original topology matrix:
```

```
0 2 5 1 -1  
2 0 8 7 9  
5 8 0 -1 4  
1 7 -1 0 2  
-1 9 4 2 0
```

```
Command : █
```

- Enter command '1'. It will prompt you to enter the topology file name.
- If valid filename is entered, it will display the file data to review, and prompt for next command.

# Source Router

Command : 2

Select a source router : 1

Destination	Interface
1	None
2	2
3	3
4	4
5	4

Command : █

- Enter command '2'. It will prompt you to enter the source router.
- If valid source router is entered, it will display the connection table, and prompt for next command.

# Destination Router

```
Command : 3
```

```
Select a destination router : 5
```

```
The shortest path from router 1 to router 5 : 1 4 5
```

```
The total cost is : 3
```

```
Command : █
```

- Enter command '3'. It will prompt you to enter the destination router.
- If valid destination router is entered, it will display the shortest path from source router to destination router with total cost, and prompt for next command.

# Exit the Program

```
Command : 4
```

```
Exit CS542 project. Good Bye!
```

```
sky:project vivek$ █
```

- Enter command '4' to exit from the program.
- It will exit the program, and control will be back to console.



# Invalid Topology File

```
sky:project vivek$ python lsp_project.py
#####

CS542 Link State Routing Simulator

(1) Input Network Topology File
(2) Build a Connection Table
(3) Shortest Path to Destination Router
(4) Exit

#####

Command : 1

Input original network topology matrix data file : topology_file.txt

The file does not exist. Please try again..

Command : █
```

- If invalid topology file is entered, it will display the error message, and prompt for next command.

# Override Topology File

```
Command : 1
```

```
The network topology is already uploaded. Do you want to overwrite? (Y/N) :Y
```

```
Input original network topology matrix data file : new_topology.txt
```

```
Review original topology matrix:
```

```
0 3 8 2 -1
1 0 6 -1 9
3 2 0 3 -1
5 7 -1 0 1
-1 9 4 2 0
```

```
Command : █
```

- If selected to override the existing topology, it will display the warning message, and prompt for choice.
- If confirmed to override the topology file, it will accept the new file and display the new topology data.

## Invalid Source or Destination Router

Command : 2

Select a source router : 10

Please enter a valid source router.

Command : █

Command : 3

Select a destination router : 15

Please enter a valid destination router.

Command : █

- If entered invalid source router or destination router, it will display the error message, and prompt for next command.

## Destination without Source

```
Command : 3
```

```
Select a destination router : 2
```

```
No source router selected yet. Please select a source router using choice : 2.
```

```
Command : █
```

- If command '3' is entered to select the destination router without selecting the source router, it will display the error message, and prompt for the next command.

## Same Source and Destination

Command : 2

Select a source router : 5

Destination	Interface
1	4
2	3
3	3
4	4
5	None

Command : 3

Select a destination router : 5

Source and Destination routers are same. Please select a different destination router.

Command : █

- If both source router and destination router are same, it will display the error message, and prompt for the next command.

## Conclusion

- The implemented program for Link State Algorithm works for any network topology regardless of the size of network.
- With every node having partial information about the network topology, it can create shortest path tree for the network.
- Given valid topology data, it will provide you with the shortest path between source router and destination router.