



Bachelor thesis No. 1014
Implementation of a Link-State Routing Protocol



Methods

Protocol design
Simulation

Topics

Network routing
Packet switching

Background

The global Internet is a complicated system, which combines a number of protocols working in several OSI (Open Systems Interconnection) layers together with the appropriate hardware. One of the most important points in this system is the routing protocol deployed in the nodes (i.e. routers), used to efficiently forward user traffic. In order to simplify the operation and the administration of the massive global network, the Internet is then divided into Autonomous Systems (AS).

The operator of each AS is responsible to manage, control and more importantly implement a routing protocol inside the AS. Firstly Distance-vector routing protocols were used for this reason. Later, as soon as their disadvantages became obvious, the community shifted over to Link-state routing protocols, giving birth to one of the most important Interior Gateway Protocols (IGP), which is widespread used in commercial and public networks, the OSPF (Open Shortest Path First).

A Link-state routing protocol requires that in the state of convergence all nodes carry the same database and thus have the same view of the network, which leads to efficient routing. In order to accomplish this, all nodes need to advertise the state of their directly connected links (LSA or Link State Advertisement) and cooperatively flood such foreign LSA messages further into the network. In a second step, each node must then calculate its routing table based on all the LSAs collected until this moment and by deploying a pathfinding algorithm like Dijkstra.

Problem Description

In the context of this work, you are asked to design a Link-state routing protocol and implement it in a simulation tool provided by IKR. This thesis can be structured in the following steps:

- study the literature and select an abstraction of a Link-state routing protocol
- freely adapt your choice in order to fit in the provided tool
- implement your design and evaluate the results

Acquired Knowledge

With this thesis you will get familiar with the concept of routing protocols. You will have the chance to develop your own implementation and let yourself be inspired by the popular OSPF. You will also come across several modern network routing problems. Apart from that, you will gain experience in using and developing a Java simulation tool which is strongly binded to SimLib, a big scale discrete event simulation library from IKR.

Requirements

Kommunikationsnetze I
Programming Experience in Java

Contact

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