Routing protocol for Ethernet based on IS-IS

The goal of this bachelor thesis was the implementation of the Intermediate System to Intermediate System protocol (IS-IS). IS-IS is part of the link state routing protocol family, in which the different network components actively work together in order to create a complete map of the network topology.

Special care was taken to write a lightweight and modular software, without operating system dependencies and able to run on an embedded system. An additional requirement was that the software should be well tested and documented.

IS-IS is a complex protocol, therefore only a part of it could be implemented in the given time. The main focus was on the specialities of the link state protocol, thus most of the software deals with establishing connections to neighbouring devices and synchronising the network topology.

In order to test the software, we used a supplied test environment, which creates a network using virtual machines. The test environment required some minor modifications in order to work with our software.

The result of the development is a routing software prototype that recognises the network topology and is capable of correctly calculating the shortest path between two nodes. During the course of our work, tests were written to verify the functions, culminating in an extensive test suite.

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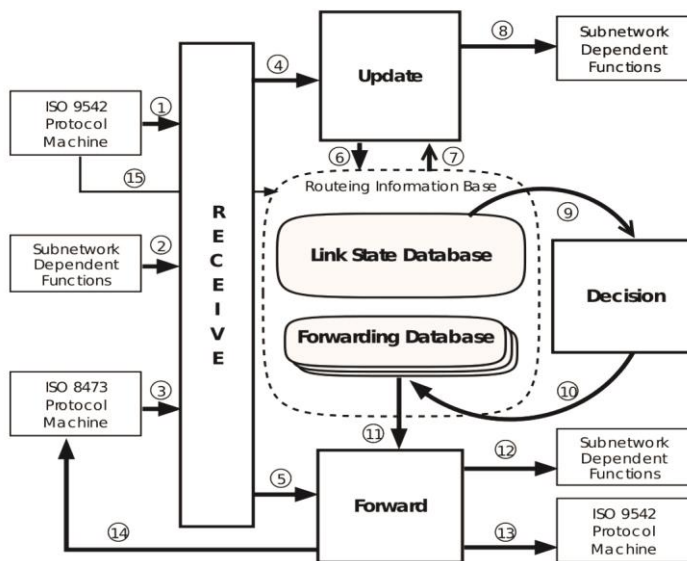
Structural overview of an IS-IS implementation. At the center is the Link State Database which contains the complete network topology.

Source: RFC 1142