Implementation of IS-IS routing protocol for the eXtensible Open Router Platform (XORP)

Executive Summary

Group Members

Bitao Sun

Hongyi Li

Ling Zhen

Kang Tang

Xin Xiong

Supervisor

Professor Mark Handley

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Many researchers in the network community are facing a difficult problem that some of their experiments can only be carried out in simulation environments instead of real networks. For example, it is almost impossible to evaluate a new routing protocol, because the commercial router platforms consisting the Internet provide neither open source router software, nor open API to researchers to deploy the new protocol in real networks. The design of the eXtensible Open Router Platform (XORP) is aimed to provide a solution for this problem. It is designed to be both a stable deployment platform that can be used in production networks and be an extensible research platform so that researchers can introduce new protocols or improve existing protocols in the networks.

The primary goal of the project is to provide a functional IS-IS routing protocol implementation for the XORP platform. IS-IS is a link state routing protocol initially designed for the ISO's Connectionless Network Protocol and was later extended to support IP routing.

The project has successfully implemented the core features and routing functions defined for IS-IS:

- Exchange Hello PDUs to discover neighbours, form and maintain adjacencies.
- Elect Designated IS on broadcast networks.
- Generate and propagate link state information reliably throughout the routing domain.
- Maintain a Link State Database.
- Use Dijkstra algorithm to calculate a shortest path tree based on the link state information stored in the database and construct a forwarding database or route table.

The implementation has also been successfully integrated into the XORP platform, and the main interactions between the IS-IS system and XORP include:

- Obtain information about interface state from the FEA (Forwarding Engine Abstraction) module.
- Send and receive packets via the FEA.
- Send route updates to the Routing Information Base.