

# Comparative analysis of dynamic routing protocol in data center

Lukasz Joksch

*Department of Electronics,  
Wroclaw University of Science and Technology  
Wroclaw, Poland  
E-mail: 200963@student.pwr.edu.pl*

Tomasz Kowalik

*Department of Electronics,  
Wroclaw University of Science and Technology  
Wroclaw, Poland  
E-mail: 200943@student.pwr.edu.pl*

**Abstract**—During the last few decades all kind of computer networks has rapidly grown. It is noticeable especially in big companies, which have their own data centres. They require special solutions, different in different data centres. These solutions have to cope the most difficult requirements. It is very important to choose wisely different kinds of mechanism used in networks in example proper dynamic routing protocol. It is hard to say which one will be optimal in different cases. In this paper, we will investigate which popular dynamic routing protocol is the best in given cases. We also compare them with latest trend in networks Software-Defined Networking.

## 1. Introduction

Computer networks is one of the fastest growing area of technology in these days. At the beginning, they were used usually to communicate between people or to share a files. Nowadays modern networks brings much more functions: printer sharings, video conferencing, streaming video and music, entertainment and more. Large data centres use lots of applications and technologies which make work easier and more efficient. Therefore modern network must be fast and efficient too.

In past networks were different. For example it was necessary to have equipment made by the same vendor. Otherwise computers, printers or something else cannot communicate with each other. This problem was solved introducing the Open Systems Interconnection (OSI) reference model by the International Organization for Standardization (ISO). The OSI model was meant to help vendors create interoperable network devices and software in the form of protocols so that networks from different vendors could work with each other.

Actually, the most popular network layer protocol for connecting computer networks is Internet Protocol (IP). Network layer is responsible mostly for finding the best way from one host from one subnet to another host in another subnet. It is very difficult, especially in large networks. However, there are dynamic routing protocols, which do it automatically. Nowadays, the most widely used intra domain routing protocols are Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP), Inter-

mediate System to Intermediate System (IS-IS) and Routing Information Protocol (RIP). Lately, Software-Defined Networking were introduced. It is new solution for networks and it is said it will be future of networking. It is new kind of technology.

This article shows real time and simulation comparative between dynamic routing protocols such as OSPF, EIGRP, IS-IS, RIP and new solution SDN. Realistic survey were made using Cisco routers and the simulations were carried out by using the GNS3 simulator.

## 2. Related words

Works [1-5 and 7-11] testing the routing protocols using different simulators, like: OPNET, GNS3, NT-3 and Cisco. In their studies, authors of works [1-5 and 7-11], create various scenarios to compare performance of protocols such as EIGRP, OSPF, RIP, IS-IS. They usually survey convergence duration, traffic sent, link utilization, throughput and bandwidth. E. Shewandagn Lemma, S. A. Hussain, W. W. Anjelo, S. Farhangi, A. Rostami, S. Golmohammadi, as in [1-2], also were testing combination of various dynamic routing protocols. Articles [16-20] present solutions used in Software-Defined Networking. Authors shows their own algorithms, combinations of existing technology or compare existing technology with well known dynamic routing protocols such as OSPF.

## Acknowledgments

## References

- [1] E. Shewandagn Lemma, S. A. Hussain, W. W. Anjelo, Performance Comparison of EIGRP/ IS-IS and OSPF/ IS-IS, Master Thesis Electrical Engineering, Blekinge Tekniska Hogskolan, 2009;
- [2] S. Farhangi, A. Rostami, S. Golmohammadi, Performance Comparison of Mixed Protocols Based on EIGRP, IS-IS and OSPF for Real-time Applications, Middle-East Journal of Scientific Research 12 (11): 1502-1508, 2012;
- [3] S. G. Thorenoor, Dynamic Routing Protocol implementation decision between EIGRP, OSPF and RIP based on Technical Background Using OPNET Modeler, Second International Conference on Computer and Network Technology, IEEE, 2010;

- [4] S. G. Thorenoor, Communication Service Providers choice between OSPF and IS-IS Dynamic Routing Protocols and implementation criteria Using OPNET Simulator, Second International Conference on Computer and Network Technology, IEEE, 2010;
- [5] C. Wijaya, Performance Analysis of Dynamic Routing Protocol EIGRP and OSPF in IPv4 and IPv6 Network, First International Conference on Informatics and Computational Intelligence, 2011;
- [6] G. P. Sai Kalyan, D.Venkata Vara Prasad, Optimal Selection of Dynamic Routing Protocol with Real Time Case Studies, IEEE, 2012;
- [7] I. Fiigu, G. Todorean, Network Performance Evaluation for RIP, OSPF and EIGRP Routing Protocols, IEEE 2013;
- [8] C. K. Jha<sup>1</sup>, P. D. Parihar, P. Kumar, L. Garg, Realisation of Link State Routing Protocol and Advance Distance Vector in Different IP Schema, Sixth International Conference on Computational Intelligence and Communication Networks, 2014;
- [9] L. D. Circiumarescu, G. Predusca, N. Angelescu, D. Puchianu, Comparativ Analysis of Protocol RIP, OSPF, RIGRP and IGRP for Service Video Conferencing, E-mail, FTP, HTTP, 20th International Conference on Control Systems and Science, 2015;
- [10] M. Jayakumar, R. S. Rekha, B.Bharathi, A Comparative study on RIP and OSPF protocols, Analysis of RIP and OSPF protocols using GNS-3, 2nd International Conference on Innovations in Information Embedded and Communication Systems ICIECS15, 2015;
- [11] G. K. Dey, M. Ahmed, K. T. Ahmmed, Performance Analysis and Redistribution among RIPv2, EIGRP & OSPF Routing Protocol, 1st International Conference on Computer & Information Engineering, 2015;
- [12] N. Poprzen, N. Gospi, Scaling and Convergence speed of EIGRPv4 and OSPFv2 Dynamic Routing Protocols in Hub and Spoke Network, Telsiks, 2009;
- [13] M. Caria, A. Jukan, M. Hoffmann, SDN Partitioning: A Centralized Control Plane for Distributed Routing Protocols, IEEE Transaction on Network and Service Management, vol. 13, no. 3, 2016;
- [14] A. Sarikhani, M. Mahramian, H. Hoseini, Calculation of Cisco Router Processing Power for a Large Network with Thousands of Nodes, 2nd International Conference on Signal Processing Systems (ICSPS), 2010;
- [15] Z. Jing, Centralized Routing and Distributed Routing Protocol For Dynamic Routing, World Automation Congress, 2012;
- [16] E. Aubryy, T. Silverstonz, I. Chrisment, SRSC: SDN-based Routing Scheme for CCN, IEEE 2015;
- [17] H. Zhang, J. Yan, Performance of SDN Routing in Comparison with Legacy Routing Protocols, International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery, 2015;
- [18] S. Tomovic, N. Lekic, I. Radusinovic, G. Gardasevic, A new approach to dynamic routing in SDN networks, 18th Mediterranean Electrotechnical Conference, 2016;
- [19] M. Huangy, W. Liangy, Z. Xuy, W. Xuzy, S. Guo, Y. Xu, Dynamic Routing for Network Throughput Maximization in Software-Defined Networks, The 35th Annual IEEE International Conference on Computer Communications, 2016;
- [20] S. N. Hertiana, Hendrawan, A. Kurniawan, Performance Analysis of Flow-Based Routing in Software-Defined Networking, The 22nd Asia-Pacific Conference on Communications, 2016;