

Title	セグメントルーティングの階層化に関する研究
Author(s)	三島, 航
Citation	
Issue Date	2019-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/15912
Rights	
Description	Supervisor: 篠田 陽一, 先端科学技術研究科, 修士 (情報科学)

On Hierarchization of Segment Routing

1710193 Wataru Mishima

Due to the diversification of the utilization way of the Internet, users' demands are becoming diversified, and complicated. Therefore, network operators operate a middlebox that provides specific functions such as firewall, load balancer, and deep packet inspection (DPI) on the network and provides to users. These offer functions such as security protection and measured rate system. Service function chaining is a technology that offers capacity as a series of services by bypassing specific traffic to required features. As one of the methods to provide it, flexible traffic engineering that controls per service is needed. Segment routing is proposed as one method to achieve service function chaining. It defines routes as segments and produces flexible traffic engineering by source routing. It is spreading because it can reduce operating costs, and easy to migrate from MPLS.

Along with the spread of NFV and cloud computing, many Autonomous Systems (ASs) provide unique network functions. Since providing unique functions by each AS, users obtain more choices. Therefore, the service function chaining is expected to achieve a collaboration of multiple ASs. However, traditional segment routing cannot achieve independence of each AS and multi-AS collaboration. In the conventional method, operating costs increase due to an impossibility of division of the route advertisement range for each AS and the impossibility of independence of policy and ID space, also the expansion of the network decrease scalability and stability.

The purpose of this paper is to apply segment routing for multi-AS collaboration. I proposed hierarchical segment routing with subdomains. Hierarchical segment routing achieves independent configuration for each AS, and improve scalability and stability. Thus, I defined a control plane hierarchically, and realize a series of route calculations bundling multiple subdomains. Using this method, it is possible to divide management and configuration for each subdomain. As a result, in the multi-AS collaboration, I achieved a reduction of complexity of management and improvement in scalability and stability.

I introduced a hierarchical SR PCE that constructing a path of the whole domain to perform traffic engineering bundling multiple subdomains. In the hierarchical SR PCE, the lower layer SR PCE manages each subdomain, and the upper layer SR PCE performs path calculation of the entire domain.

Moreover, to realize routing control over the domain in hierarchical segment routing, I modeled multiple subdomain traversal methods during packet forwarding. Furthermore, I modeled multiple models by the policy setting

method used for route construction. Besides, we selected a subdomain traversal and policy setting model and designed and implemented a hierarchical SR PCE.

I selected the subdomain traversal model and policy setting model and implemented the hierarchical SR PCE. As a performance evaluation of the implemented hierarchical SR PCE, measuring the route construction time in a network where multiple ASs exists. Moreover, as an evaluation of the entire hierarchical segment routing, I evaluated the realization of administrative division by subdomain partition. Also, I assessed the scalability and stability of hierarchical segment routing.

As a result, I solved the problems such as the increase of the operating costs in the AS collaboration, and the reduction of the scalability and the stability. I contribute to providing service function chaining of multi-AS partnership.