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Software-Defined Networking based Policy Driven Network Slicing System

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Abstract

With the advent of Software-Defined Networking(SDN), the network environment has changed greatly to focus on users, and network virtualization technology has made great progress. However, networks that are getting bigger and more advanced have become more and more complex and difficult to use SDN. In such an environment, a network system that users can easily access and use is required.
In this document we propose a more advanced policy-based network virtualization system that allows users to select policies and provide networks accordingly, rather than a system that simply virtualizes a network and shares it with each user.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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Table of Contents

1. Introduction

Recently, the scale of the network is growing rapidly as more and more various kinds of devices are being connected. Software-Defined Networking(SDN) and network virtualization technology using SDN are being studied as a technology for flexible and efficient management of such networks, but the larger the networks, the network management with SDN becomes more and more complex, which increases the burden on the user. In this document, we propose a policy-based network virtualization system that delivers user packets according to a policy prepared in advance by the network administrator for ease of use by users.

2. SDN-based Network Virtualization

Nowadays SDN has led the change from the existing producer-centered networks to the user-centered networks[1]. After the advent of SDN-based network virtualization technology such as Flowvisor[2], the gap between the virtual network topology and the real network topology is reduced[3] ,and the network users' conveniene were promoted by integrating the APIs of the network controllers[4]. However, as the network grows network management using SDN becomes more and more complex to respond to changes in various situations(e.g., loop prevention, ...), which is no exception to virtualized networks. As a result, users of the SDN network need a lot of time and effort compared to the existing producer-centered networks.

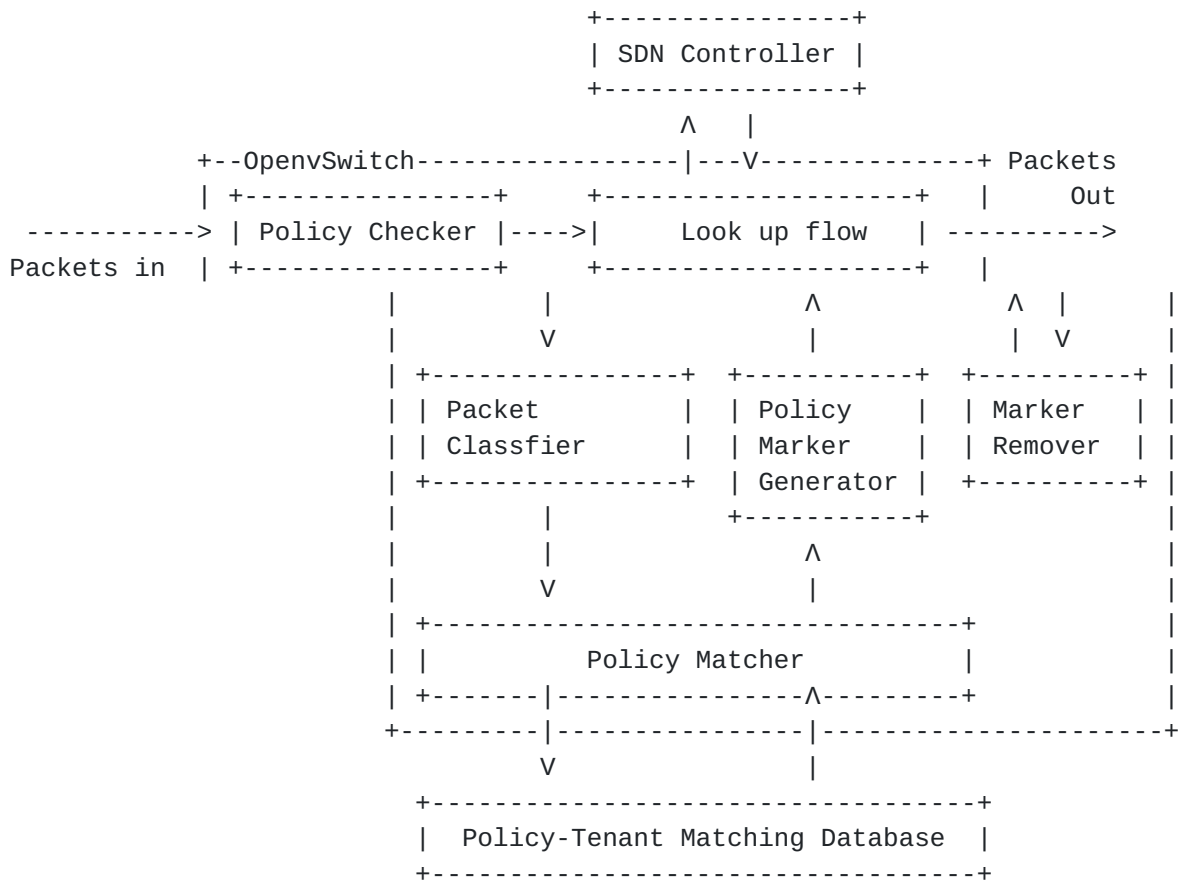

Figure 1: Policy Driven Network Slicing System Architecture

3. Policy-Driven Network Slicing using SDN

Policy-Driven Network Slicing(PDNS) is designed to maximize the convenience of network users, which is and advantage of the existing producer centered network, while ensuring the flexibility of the network using SDN. A network administrator who provides a virtual network presents

various policies (ex. security level, topology, network function) that users can use. Network users choose their own policy and use the network. The administrator downloads and stores this user-specific policy for each OVS, and delivers the user-specific packet to the algorithm appropriate to the policy.

[Figure 1] shows a PDNS system where each switch in the network is classified by matching the user's policy. For this classification, the network adds a policy marker to the user's packet. When each switch receives a packet, if the Policy Checker checks whether there is a Policy Marker, it delivers the packet according to the corresponding policy. If not, packet classifier analyzes which packet is, and policy matcher compares it with user's DB to determine which policy, add policy maker to packet, and deliver packet according to policy.
If there is a rule, the transmitted packet is transmitted according to the rule, if not, it is transmitted to the controller and assigned the rule. The controller refers to the policy marker of the received packet, and if the packet is delivered from the network to the end user or another network last in the relevant policy, it removes the policy marker and delivers the packet.

3. IANA Considerations

There are no IANA considerations related to this document.

4. Security Considerations

There are no security considerations related to this document.

5. References

5.1. Normative References

[1] McKeown, Nick, et al. "OpenFlow: enabling innovation in campus networks." ACM SIGCOMM Computer Communication Review 38.2 (2008): 69-74.

[2] Sherwood, Rob, et al. "Flowvisor: A network virtualization layer." OpenFlow Switch Consortium, Tech. Rep 1 (2009): 13

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5.2. Informative References

Acknowledgements

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