Abstract. IMS (IP Multimedia Subsystem) is a framework that provides multimedia service to standard UMT-based mobile user. The IMS requires the assurance of QoS (Quality of Service) for the network flow between users, but QoS of network resource depends on existing protocol scheme. In recent, the research on reliability and QoS of the multimedia service based on NFV/SDN is claimed for the deployment of 5G network environment. Therefore, the design and analysis of QoS-enabled application service deployment is needed for the accomplishment for resource allocation of network resources. In this paper, we propose the architecture for QoS-enabled application in the environment of Virtualized IMS (V-IMS).

Keywords: SDN, IMS, QoS, NFV, ONOS

1 Introduction

The current communication network environment is developing at a rapid pace. Internet users have exchanged peta-byte data over the network. Until a few years ago, storage, computing, and network resources were physically separate from each other, and even the resource management systems were physically separate. In order to efficiently manage these resources, faster and better application is required. The IP Multimedia Subsystem (IMS), which is a wired/wireless integrated control network, has appeared, and users are increasingly using IMS services in a variety of terminals. However, network resources are limited and not infinite. Therefore, management of resources is getting more and more important. The Software Defined Network (SDN) and Network Function Virtualization (NFV) technologies allow software to control the network by separating the data plane and the control plane of the network. This is a technology that enables more flexible and inexpensive network infrastructures by applying virtualization technology to the commercial product base. The SDN controller is responsible for the configuration of physical resources. It also maintains the rules of the network and distributes network resources according to appropriate commands.
In this paper, we construct and propose a virtualization model of IMS to introduce various advantages. In the remaining pages, we provide a background investigation of related research such as IMS, NFV/SDN and ONOS [1].

2 IMS and NFV

The basic goal of IMS is to provide a complex combination of multimedia, such as voice, audio, video and data, based on the IP protocol. The P-CSCF in the IMS is a grass-landing point for IMS but not a starting point for users. This function accepts SIP messages and receives all validating SIP messages. It can perform forwarding the sending SIP message, maintaining an emergency session, compressing and decompressing all SIP messages as needed. It maintains user equipment security and approved QoS [2].

NFV is the virtualization of core network functions. Ultimately, the key point of NFV is the virtualization of IT resources in software. This eliminates the need for additional physical devices. And we can use virtualization technology to provide networking capabilities. NFV management and orchestration focuses on all aspects of virtualization that require specific management and operations in the NFV architecture [3].

Open Network Operating System (ONOS) is the first open source SDN network operating system for service providers, banks' online systems, and socially-challenging systems such as railways and aircraft operating systems. ONOS is designed to enhance the reliability, performance, and scale-out of the network. We have also created useful Northbound/Southbound concepts and interfaces with OpenFlow APIs for easy application development. The ONOS goal is largely three-fold: it uncovers the service provider's CAPEX and OPEX, and helps service providers move their current network to the white box and provide agile services [4].
3 Architecture and Implementation Model

Information networks are logically centralized to software-based SDN controllers that maintain a global view of the network. As a result, networks are represented by logical switches, a single policy engine and applications. By using SDN, companies and forwarders can simplify network design and operation, and operate the entire network from a single logical point in a vendor-independent manner [4]. Figure 1 shows a logical view of SDN architecture.

Figure 2 shows the IMS virtualization platform architecture based on NFV/SDN.

Fig. 1. SDN/NFV-based Flexible Architecture

Fig. 2. Implementation Model of suggested platform
The platform provides a combination of several devices. The details are as follows.

(1) The IMS can perform their roles by virtualization, and management of each virtualized IMS (V-IMS) is performed by an administrator virtualized IMS.

(2) The virtualization manager performs creation, removal and configuration of a virtual machine (VM) and configuration of a new virtualization system. In addition, IMS can perform operations such as initialization configuration, generation, suspension / resumption, and termination of virtualized IMS through a VM and monitoring functions to understand the operation status of virtualized IMS.

(3) V-IMS-Admin consists of configuration management module and monitoring module of virtualized IMS and performs operation and monitoring through VM operating on virtualized IMS system.

(4) The virtualized structure supports the execution of multiple VMs at the same time, and monitors / manages / VMs efficiently through the hypervisor.

(5) V-IMS sends SLS signal to QoS Enabled Intent Forwarding App. The deployed VNF for QoS Control is in charge of classifying the flow, and detecting its QoS class and compliance with the respective SLS. Following the classification, the DPI communicates with the several SDN controllers via the interface between SLS moderator and SDN controllers set of information required to identify the flow (e.g., Medium Access Control (MAC) and IP addresses, protocol, TCP/UDP ports) and its classification. As a result of the classification, each SDN controller changes the flow state of its own domain [6].

(6) In routing, media traffic such as video has different traffic performance due to various factors like delay. QoS Enabled Intent Forwarding App provides this traffic performance information to SLS Moderator.

(7) The SLS Moderator collects the traffic performance information and forwarding it to the multiple SDN-controllers.

(8) The SDN controller performs basic functions for centralized network control such as forwarding control, topology and resource status management, and routing control based on the global view of the network status. In addition, differentiated forwarding and packet processing rules are determined according to the upper application or policy request and the forwarding rules are applied to the lower SDN switch boxes.

4 Conclusion

Currently, Network management methods have been proposed to make traffic management more efficient due to increased traffic overload. In a next-generation network environment, it is essential to develop a virtualization-based platform.

Therefore, this paper proposes a new virtualized IMS model combining NFV/SDN. The core of this proposal is to use network resources and structure efficiently by classifying traffic and forwarding it to SDN controllers flexibly. It will have an effect on third platform market including Native/Web client technology, cloud technology and NFV/SDN linking technology including interface to various IoT/E
products. In the future, we will make a QoS-enabled Intent Forwarding App using ONOS and experiment with it.

References

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